

**BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554**

In the Matter of	)
	)
WorldVu Satellites Limited	) IBFS File Nos.
	) SAT-LOI-20170301-00031 &
	) SAT-AMD-20180104-00004
	)
	)
	) Call Sign S2994
Amendment to Petition for Declaratory Ruling	)
Seeking Access to the U.S. Market for the	)
OneWeb V-Band System	)

**REPLY COMMENTS OF AERONET GLOBAL COMMUNICATIONS INC.**

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September 12, 2018

## INTRODUCTION AND SUMMARY

Aeronet Global Communications Inc. hereby submits these comments on the Amendment to Petition for Declaratory Ruling (“Amendment”) filed by WorldVu Satellites Limited (“OneWeb”).<sup>1</sup> Aeronet supports the Commission’s efforts to make additional spectrum available for innovative uses in the 70/80/90-GHz Band (the “E Band” or “Band”). As the Commission has recognized, numerous companies—including Aeronet, Elefante Group, Google, and Facebook—have proposed different uses for spectrum in this band, none of which fits “the traditional mobile broadband [] or fixed link models.”<sup>2</sup> With its Amendment, OneWeb also proposes a non-traditional use of the E Band. Accordingly, as Aeronet has urged in other proceedings, the Commission should engage in a careful inquiry to ensure that OneWeb’s proposal, if adopted, would not foreclose other innovative uses in the E Band.<sup>3</sup>

Aeronet appreciates OneWeb’s assurance that it “is confident that it can share” spectrum in the E Band “with existing and future users through the use of its innovative, sharing-enhancing technologies as well as traditional coordination methods.”<sup>4</sup> But more study is necessary to determine whether OneWeb’s proposed MEO deployment would be consistent with

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<sup>1</sup> See WorldVu Satellites Limited, Petition for Declaratory Ruling Granting Access to the U.S. Market for the OneWeb V-Band System, Legal Narrative, IBFS File No. SAT-LOI-20170301-00031 (Mar. 1, 2017) (“OneWeb/WorldVu V-band Petition”); WorldVu Satellites Limited, Amendment to Petition for Declaratory Ruling Granting Access to the U.S. Market for the OneWeb W-band System, Legal Narrative, IBFS File No. SAT-AMD-20180104-00004 (Jan. 4, 2018) (“OneWeb/WorldVu Amendment Legal Narrative”).

<sup>2</sup> *In re Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10,988, 11,053 ¶ 201 (2017) (“*Spectrum Frontiers Order*”); see Comments of Facebook, GN Docket No. 14-177, 4-5 (Sept. 30, 2016).

<sup>3</sup> See Comments of Aeronet Global Communications Inc., RM-11809 (Jul. 11, 2018).

<sup>4</sup> OneWeb/WorldVu V-band Petition at 28.

the proposed use of E-Band spectrum by Aeronet and others. In particular, we note that “OneWeb requests a waiver of the U.S. Table of Frequency Allocations, and, to the extent necessary, 47 C.F.R. § 25.112(a)(3) of the Commission’s rules, to operate gateway links in a unique architecture: utilizing a ‘reverse-band’ basis, in which OneWeb will operate gateway uplinks, as well as gateway downlinks, in the 71-76 GHz band” (the “Reverse-Band Waiver”).<sup>5</sup> Such “reverse-band” operation would potentially harm other innovative users in the Band. Aeronet thus asks that the Commission develop a robust record and proceed with caution before granting this waiver. Any action the Commission takes on the Amendment should, consistent with prior actions, promote industry-wide rules that allow for innovative uses and coexistence among users “to provide an opportunity for future growth . . . in these bands.”<sup>6</sup>

**I. AERONET HAS DEVELOPED AN INNOVATIVE AVIATION AND MARITIME BROADBAND SOLUTION THAT WILL DELIVER CLEAR BENEFITS TO CONSUMERS AND TRANSPORTATION PROVIDERS.**

Aeronet has developed an innovative technology to provide true high-speed broadband service in the air and on the sea.<sup>7</sup> Consumers want, and increasingly expect, an “in home” equivalent broadband experience wherever they are, as evidenced by burgeoning consumer demand for in-flight and on-ship connectivity.<sup>8</sup> This growth in demand is compounded by onboard crew connectivity needs and IoT safety requirements of ships and aircraft, such as engine monitors, weather sensors, remote storage, and service-crew tablets.

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<sup>5</sup> OneWeb/WorldVu Amendment Legal Narrative at 14.

<sup>6</sup> *Spectrum Frontiers Order*, 32 FCC Rcd at 11,054 ¶ 200.

<sup>7</sup> Aeronet is also using its technology to develop a high-speed broadband solution for rural areas.

<sup>8</sup> See, e.g., *Inmarsat Survey Shows 60% Believe In-Flight Wi-Fi is a Necessity*, Avionics (July 31, 2017), <https://www.aviationtoday.com/2017/07/31/inmarsat-survey-shows-60-believe-inflight-wi-fi-necessity/>.

Aeronet addresses these demands by harnessing the kind of point-to-point links used successfully for years to carry heavy data traffic—with special adaptations to address the unique challenges that are present in the aviation and maritime contexts—all while coexisting with existing users. Specifically, Aeronet’s architecture takes advantage of the fact that planes and ships, while mobile, are following predetermined routes at known times. This allows for an architecture that is more like a fixed network in many ways, including coordination with fixed links.<sup>9</sup> In March 2017, Aeronet successfully achieved 1 Gbps download and upload speeds to its test aircraft in Ireland,<sup>10</sup> and Aeronet has achieved similar results during ongoing maritime tests off the coast of Florida pursuant to Special Temporary Authority granted by the FCC.<sup>11</sup> Aeronet has installed further ground test stations in the Bahamas and Ireland to expand its maritime and aviation service testing during 2018 and 2019.

## **II. THE COMMISSION SHOULD PRESERVE THE E BAND’S UNIQUE ENVIRONMENT FOR INNOVATIVE SERVICES.**

There are several characteristics of the E Band that make it uniquely suitable for innovative high-speed broadband services to locations that are essentially fixed, like Elefante’s proposed service, or follow a scheduled trajectory like that of Aeronet and OneWeb. First, the technical characteristics of the Band are ideal for the type of networks—mesh point-to-point data link networks—that such services utilize. The highly directional narrow beam widths in the Band support angular separation mechanisms for individual links, allowing for the creation of

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<sup>9</sup> See Letter from Brian Russell, Aeronet Global Communications Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 (Oct. 5, 2017).

<sup>10</sup> Mary Kirby, *Irish Firm Eyes New ATG and Mesh Network Tech for Broadband IFC*, Runway Girl Network (July 5, 2017), <https://runwaygirlnetwork.com/2017/07/05/irish-firm-touts-new-atg-and-mesh-network-tech-forbroadband-ifc/>.

<sup>11</sup> Federal Communications Commission, Experimental Special Temporary Authority, WL9XRX, 1156-EX-ST-2017.

separated 3D polygons for different service types—terrestrial fixed-links, ground-ocean vehicle datalinks, ground-aerial vehicle datalinks and aerial-aerial vehicle datalinks. Additionally, the highly directional beams in this band are appropriate for aviation and maritime needs, because they support the delivery of targeted bandwidth to those individual high capacity demand customer locations (*i.e.*, an airplane or a ship).

Second, the regulatory approach to the E Band in the United States—a light license regime that supports federal and non-federal uses based on link registrations—is streamlined, and results in only minimal administrative refinements by third-party database managers to facilitate innovative uses of this spectrum. As Google explained in the Commission’s *Spectrum Frontiers* proceeding, more than “400 national licensees collectively have registered tens of thousands of links in the[se] bands, and new entrants readily can participate in the registration process.”<sup>12</sup> Further, the Commission’s light-touch approach to the E Band generally is mirrored by light license regimes across the globe.<sup>13</sup> If the Commission exercises leadership in permitting new innovative uses of the E Band, there is a tremendous opportunity for harmonization with, and replication by, other countries. This harmonization will ultimately expand the delivery of inflight and on-ship broadband connectivity for global passengers.

Third, there should be ample spectrum in the E Band to support multiple innovative uses. The Band is currently uncongested: Incumbent fixed-link user volume is low (although it is expected to rise in dense population areas as 5G services come online) and spatially separated

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<sup>12</sup> Comments of Google Inc. and Google Fiber Inc., GN Docket No. 14-177, at 2 (filed Sept. 30, 2016) (“Comments of Google Inc. and Google Fiber Inc.”).

<sup>13</sup> See Mario Giovanni Luigi Frecassetti, *E-Band and V-Band - Survey on Status of Worldwide Regulation* 23 (ETSI White Paper No. 9, June 2015), [https://www.etsi.org/images/files/ETSIWhitePapers/etsi\\_wp9\\_e\\_band\\_and\\_v\\_band\\_survey\\_20150629.pdf](https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp9_e_band_and_v_band_survey_20150629.pdf) (noting that the UK, Australia, and others regulate the E-Band with a “light licensing” regime).

from the proposed uses of Aeronet, Elefante, Google and OneWeb through the terrestrial usage patterns of fixed incumbents.<sup>14</sup>

Nevertheless, OneWeb’s proposed Amendment creates heightened risks with respect to coordination. For example, the Amendment indicates that OneWeb would use the 71-76 GHz Band for both downlink *and uplink* operations and the 81-86 GHz Band for uplink operations.<sup>15</sup> While such uses might not foreclose others in some or all cases, they reduce the opportunities for coordination. For example, using the same link directions, Aeronet’s uplink receiver on the airplane could be overpowered by OneWeb’s uplink signal strength as the airplane flies through the look angles of the OneWeb earth station. Without OneWeb’s Reverse-Band Waiver, one coordination approach would be to place Aeronet’s ground-to-air transmissions in 71-76 GHz, where the table of allocations requires space-to-earth transmissions.

OneWeb’s proposed Reverse-Band Waiver for the 71-76 GHz Band should be considered carefully given its potential impact on global harmonization, Radio Astronomy, and other innovative uses like those proposed by Aeronet and Google, among others. Aeronet also notes that OneWeb’s stated reason for this request is that “operating in Mode 1 versus Mode 2 configuration provides *considerable flexibility* to allow OneWeb to *optimize* the service provided to the end user.”<sup>16</sup> There is no indication that OneWeb requires the waiver—or would otherwise lack *sufficient* flexibility—to support its operations for end users.

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<sup>14</sup> OneWeb recognizes this fact, citing the Commission’s reference to E-Band spectrum as “the functional equivalent of a green field” over most of the U.S. See Consolidated Opposition and Reply Comments of OneWeb, IBFS File Nos. SAT-LOI-20170301-00031 and SAT-AMD-20180104-00004, at 16 (August 27, 2018).

<sup>15</sup> See OneWeb/WorldVu Amendment Legal Narrative at 9, 13-14; OneWeb/WorldVu Amendment Technical Narrative at 46-48.

<sup>16</sup> OneWeb/WorldVu Amendment Technical Narrative at 9 (emphases added).

It is of course possible that OneWeb's proposed operations under the Reverse-Band Waiver *could* be coordinated in the beam areas of other innovative uses of the E Band, including other satellite operations, as well as such uses as proposed by Google and Aeronet. But the co-existence of these uses needs further study. OneWeb's desire for increased efficiency from reverse-band operations thus should be carefully weighed against the benefits that would arise from facilitating both international harmonization of the Band and coexistence among diverse innovative uses—especially when OneWeb's proposal involves an apparent abundance of spectrum for earth-to-space uplink operations.<sup>17</sup>

Ultimately, care must be taken to ensure coordination between future users of the E Band. Aeronet agrees with Elefante and OneWeb that appropriate coordination mechanisms can be developed and utilized for the E Band.<sup>18</sup>

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<sup>17</sup> OneWeb/WorldVu Amendment Technical Narrative at 5.

<sup>18</sup> For example, Aeronet agrees that coordination should be achievable with respect to link locations, the orientations of the links over time, and the specific frequencies of the links.

## CONCLUSION

Given the unique characteristics of the E Band, it is essential that the Commission proceed with caution. There are multiple providers like Aeronet, OneWeb, and Elefante that seek to offer novel services in the band.<sup>19</sup> Indeed, Aeronet hopes to use the E Band to bring a fast, high-quality broadband service to markets where broadband service historically has lagged. Given this, and other innovative offerings that may be possible in the E Band, the Commission must be careful not to take any action that would either harm incumbent users *or* foreclose innovative uses by new entrants. In particular, the Reverse-Band Waiver should be carefully considered. For the reasons stated above, Aeronet asks that the Commission proceed carefully, based on a robust record, in this proceeding.

Respectfully submitted,

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<sup>19</sup> For example, Google has registered 70/80 GHz links for diverse purposes, including developing Project Loon's use of high altitude balloons to offer broadband access where deployment of terrestrial networks is uneconomic. *See* Comments of Google Inc. and Google Fiber Inc. at 2-3; *In re Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, GN Docket No. 14-177, Comments of Google Inc. at 5 (Jan. 28, 2016).