

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, DC 20554

In the Matter of	)	
	)	
ViaSat, Inc.	)	Call Sign: S2985
	)	
Petition for Declaratory Ruling Granting	)	File No. SAT-PDR-20161115-00120
Access to the U.S. for a Non-U.S.-Licensed	)	
Nongeostationary Orbit Satellite Network	)	

**REPLY COMMENTS OF WORLDVU SATELLITES LIMITED**

WorldVu Satellites Limited, d/b/a OneWeb (“OneWeb”), pursuant to Section 25.154(d) of the rules of the Federal Communications Commission (the “FCC” or “Commission”) and the Commission’s public notice instituting the current processing round,<sup>1</sup> hereby submits this reply to the Consolidated Opposition and Reply Comments filed by ViaSat, Inc. (“ViaSat”) regarding its petition for U.S. market access for a non-geostationary orbit (“NGSO”), medium-Earth orbit (“MEO”) satellite system in the Fixed-Satellite Service (“FSS”).<sup>2</sup>

**I. THE VIASAT OPPOSITION DOES NOT RESOLVE THE FLAWS IN VIASAT’S EPFD<sub>UP</sub> ANALYSIS**

In the ViaSat Opposition, ViaSat states that its EPFD<sub>up</sub> analysis is correct.<sup>3</sup> However, ViaSat continues to use an unrealistically low estimate of user density in its EPFD<sub>up</sub> calculations.

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<sup>1</sup> See 47 C.F.R. § 25.154(d). See also Satellite Policy Branch Information; *Applications Accepted for Filing; Cut-Off Established for Additional NGSO-Like Satellite Applications or Petitions for Operations in the 12.75-13.25 GHz, 13.85-14.0 GHz, 18.6-18.8 GHz, 19.3-20.2 GHz, and 29.1-29.5 GHz Bands*, Public Notice, DA 17-524 (rel. May 26, 2017) (“Public Notice”).

<sup>2</sup> Consolidated Opposition and Reply Comments of ViaSat, Inc., File No. SAT-PDR-20161115-00120, Call Sign S2985 (filed July 7, 2017) (“ViaSat Opposition”).

<sup>3</sup> ViaSat Opposition at 9-10.

This distorts the EPFD calculation and results in lower estimated EPFD<sub>up</sub> levels than ViaSat can reasonably expect to generate in operation. ViaSat's claim that it "does not intend to operate its system in the manner suggested by OneWeb"<sup>4</sup> is unavailing and ultimately moot; the flaw in its analysis is a matter of simple arithmetic.

ViaSat states that its constellation will support 16 beams on each of its 24 satellites,<sup>5</sup> and each beam will support co-frequency operation.<sup>6</sup> This results in  $16 \times 24 = 384$  co-frequency users worldwide. If these users are spread uniformly across the entire surface of the Earth<sup>7</sup> (the most optimistic possible user-density assumption for EPFD<sub>up</sub> analyses), then the average area per user would be approximately  $(5.1 \times 10^8 \text{ km}^2) / (384 \text{ users}) = 1.33 \times 10^6 \text{ km}^2$  per user. ViaSat's EPFD<sub>up</sub> calculation, however, started with an NGSO satellite field of view of 63,850,000 km<sup>2</sup> and concluded that the area per user would be  $(6.358 \times 10^7 / 20) = 3.18 \times 10^6 \text{ km}^2$  – approximately 2.4 times greater than the most optimistic possible assumption.<sup>8</sup> The Earth's surface area would have to be 2.4 times greater in order to accommodate the total number of co-frequency users (384) given this user density. It is clearly impossible for ViaSat users to be as spread out as ViaSat claims.

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<sup>4</sup> *Id.* at 10.

<sup>5</sup> Note that ViaSat's original EPFD analysis assumed 20 beams per satellite. See ViaSat, Inc. *Petition for Declaratory Ruling Granting Access to the U.S. for a Non-U.S.-Licensed Nongeostationary Orbit Satellite Network*, Technical Annex, Exhibit 1: Demonstration of EPFD Compliance, IBFS File No. SAT-PDR-20161115-00120 (filed Nov. 15, 2016), at 6 ("EPFD Exhibit").

<sup>6</sup> See *id.*

<sup>7</sup> The Earth's surface area is 510.1 million km<sup>2</sup>.

<sup>8</sup> See *Comments of WorldVu Satellites Limited, In re ViaSat, Inc. Petition for Declaratory Ruling Granting Access to the U.S. for a Non-U.S.-Licensed Nongeostationary Orbit Satellite Network*, IBFS File No. SAT-PDR-20161115-00120, at 7 (filed June 26, 2017) ("OneWeb Comments"); EPFD Exhibit at 6.

As OneWeb has previously noted, ViaSat's calculation is also unrealistic because it does not account for the likelihood that ViaSat's users will be concentrated on land.<sup>9</sup> If users are distributed only on Earth's land area<sup>10</sup> (including Antarctica), this would result in  $(1.49e8 \text{ km}^2)/(384 \text{ users}) = 3.88e5 \text{ km}^2$  per user – about 8 times more dense than ViaSat claims. More significantly, the ViaSat NGSO system will have about three satellites that can simultaneously serve the continental U.S., averaged over many orbits. If each NGSO satellite can serve 16 users, this results in a user density of  $(7.66e6 \text{ km}^2)/(3*16 \text{ users}) = 1.60e5 \text{ km}^2$  per user – about 20 times more dense than ViaSat claims.

A low estimate of user density skews the EPFD<sub>up</sub> calculation by underestimating the power level of aggregate transmissions from earth stations to a single NGSO satellite. This means that the NGSO operator in turn is underestimating the amount of potential interference into GSO systems its uplink transmissions could potentially cause. Because of its incorrect user density estimate, ViaSat has not provided a true picture of the potential for its constellation to cause harmful interference with GSO operations. Moreover, in line with ViaSat's substantial concerns regarding aggregate EPFD, it is critical that each NGSO FSS network provide an accurate analysis of its EPFD<sub>up</sub> profile.<sup>11</sup>

ViaSat should be required to submit an EPFD<sub>up</sub> analysis that uses a more accurate measure of its likely user density, or to justify its continued use of unrealistically low user density estimates. Alternatively, for the protection of GSO operators, the Commission should

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<sup>9</sup> See OneWeb Comments at 7.

<sup>10</sup> The Earth's land area is approximately 149 million km<sup>2</sup>.

<sup>11</sup> See ViaSat Opposition at 9-13.

condition ViaSat's market access grant on its commitment to never exceed its stated user density estimate.

## **II. VIASAT SHOULD NOT BE PERMITTED TO OPERATE ITS PROPOSED SATELLITE-TO-SATELLITE LINKS IN A WAY THAT CAUSES INTERFERENCE INTO OTHER OPERATORS' CONSTELLATIONS**

In its initial Comments on ViaSat's Petition, OneWeb and other commenters expressed concerns that ViaSat's proposed satellite-to-satellite links would cause interference into their respective constellations.<sup>12</sup> However, in its Opposition, ViaSat provided additional information that significantly reduces OneWeb's concerns about such potential interference into its NGSO FSS system.<sup>13</sup> ViaSat claims that it will only transmit between its MEO satellites and any GSO satellite when the MEO satellite is within the "cone of coverage projected from that GSO satellite with respect to the Earth."<sup>14</sup> The Commission should explicitly condition any grant of U.S. market access to ViaSat for its NGSO system to reflect this operational limitation. Furthermore, the Commission should make ViaSat's use of Ka-band spectrum for satellite-to-satellite links subject to ViaSat not causing harmful interference to, or claiming protection from, other NGSO FSS systems operating in the stated direction of transmission.

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<sup>12</sup> See OneWeb Comments at 2; *Petition to Deny of Inmarsat, Inc., In re ViaSat, Inc. Application for U.S. Market Access*, at 3 (filed June 26, 2017); *Comments of SES S.A. and O3b Limited, In re NGSO-Like Satellite Applications and Petitions for U.S. Market Access in the 12.75-13.25 GHz, 13.85-14.0 GHz, 18.6-18.8 GHz, 19.3-20.2 GHz, and 29.1-29.5 GHz Bands*, at 5 (filed June 26, 2017); *Comments of Hughes Network Systems, LLC, In re Additional NGSO-Like Satellite Applications or Petitions for Operations in the 12.75-13.25 GHz, 13.85-14.0 GHz, 18.6-18.8 GHz, 19.3-20.2 GHz, and 29.1-29.5 GHz Bands*, at 2 (filed June 26, 2017).

<sup>13</sup> ViaSat Opposition at 7, Exhibit A.

<sup>14</sup> ViaSat Opposition at 7.

### III. CONCLUSION

The EPFD<sub>up</sub> analysis provided by ViaSat is unreliable and understates the actual EPFD<sub>up</sub> values. ViaSat must provide a more credible EPFD<sub>up</sub> analysis that relies on a more accurate measure of its likely user density. The Commission should also only authorize ViaSat's proposed satellite-to-satellite links on a non-interference basis and with the explicit operational condition proposed above.

Respectfully submitted,

WORLDVU SATELLITES LIMITED

/s/ Mariah Shuman

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July 14, 2017

**CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION**

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in these Reply Comments, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in these Reply Comments, and that it is complete and accurate to the best of my knowledge and belief.

Dated: July 14, 2017

/s/ Marc Dupuis

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**CERTIFICATE OF SERVICE**

I, Ashley Yeager, hereby certify that on this 14th day of July 2017, a copy of the foregoing Reply Comments is being sent via first class, U.S. Mail, postage paid, to the following:

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