

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Viasat, Inc. Application for Authority to	)	IBFS File No. SES-LIC-20190411-00503
Operate Ka-band Earth Station Antennas	)	Call Sign E190201
Mounted on Aircraft	)	

**REPLY OF O3B LIMITED**

O3b Limited (“O3b”) submits this reply regarding the above-captioned application of Viasat, Inc. (“Viasat”) for authority to deploy 1,000 aeronautical earth stations in motion (“ESIMs”) in Ka-band spectrum including nonconforming use of the 28.6-29.1 GHz and 18.8-19.3 GHz bands in which non-geostationary orbit (“NGSO”) systems such as O3b’s have sole primary status.<sup>1</sup> O3b’s initial filing sought deferral of the Viasat Application pending submission of additional technical data regarding Viasat’s ability to adequately protect NGSO operations in these frequencies.<sup>2</sup> Because Viasat’s response<sup>3</sup> provides the detailed supplemental information O3b sought, O3b withdraws its request for deferral. O3b has no further objection to the Viasat Application provided that the Commission conditions any grant to ensure full protection of existing and future NGSO operations by requiring Viasat, pending completion of coordination, to inhibit transmissions in the NGSO-primary spectrum during in-line events with O3b.<sup>4</sup>

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<sup>1</sup> Viasat, Inc., Call Sign E190201, File No. SES-LIC-20190411-00503 (the “Viasat Application”).

<sup>2</sup> O3b Limited Petition to Defer, Call Sign E190201, File No. SES-LIC-20190411-00503 (the “O3b Petition”).

<sup>3</sup> Viasat Opposition to O3b Petition to Defer, Call Sign E190201, File No. SES-LIC-20190411-00503 (“Viasat Opposition”).

<sup>4</sup> Viasat has argued that the O3b Petition should be considered as informal comments because O3b inadvertently filed the petition under an incorrect file number. *See id.* at 3 n.6. Viasat

O3b has reviewed the additional information provided by Viasat and performed its own analysis using the data, shown in the attached Annex 1. Critically, Viasat's calculations of the interference-to-noise ("I/N") threshold are premised on a criterion of 6%  $\Delta T/T$  that is the trigger for coordination between co-primary operators and cannot be validly used to assess the acceptability of interference from a nonconforming operation into a primary operation.<sup>5</sup> Viasat's use of an inappropriate interference standard undermines its repeated attempts to downplay the risk that O3b's primary services would be adversely affected.<sup>6</sup>

In any event, Viasat's showing confirms that its proposed ESIM operations would exceed even this unjustifiably generous criterion for interference to O3b operations for short periods of time.<sup>7</sup> Although Viasat asserts that short-term interference is "typically acceptable,"<sup>8</sup> O3b rather than Viasat is the proper entity to determine the acceptability of any interference to the O3b network. Moreover, as shown in Annex 1, O3b's calculations suggest that interference levels could be materially higher than Viasat predicts and highlight other flaws in the Viasat analysis.

In short, the record demonstrates that Viasat's proposed ESIM operations do create a risk of interference to the O3b network. The appropriate approach to resolve these issues is through

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acknowledges that it timely received the mailed service copy of the O3b Petition, however, giving Viasat adequate notice of the O3b filing and sufficient time to prepare a response. Moreover, on learning of the error, O3b promptly submitted its petition in the correct file. Under these circumstances, Viasat has not been disadvantaged by the defective original filing of the O3b Petition, and the Commission should consider the arguments raised by O3b on their merits.

<sup>5</sup> *Id.*, Attachment 1 at 2 (the "threshold criteria" Viasat used in its simulations "was the 6%  $\Delta T/T$  coordination trigger which is equivalent to an I/N of -12.2 dB").

<sup>6</sup> *See, e.g., id.* at 4 (suggesting that in-line events that would exceed an I/N of -12.2 dB toward O3b's system would be "extremely infrequent and fleeting"); Attachment 1 at 2 (the -12.2 dB I/N criteria was met more than 99.999% of the time").

<sup>7</sup> *Id.*, Attachment 1 at 2.

<sup>8</sup> *Id.*

coordination between Viasat and O3b, and O3b believes a coordination agreement can be achieved. Viasat indicates that its Network Management System has been designed with the ability to calculate in-line events and inhibit emissions or change frequencies for each ESIM as necessary.<sup>9</sup> O3b asks that the Commission condition any grant of the Viasat Application to require use of this capability to protect the O3b system unless and until Viasat successfully completes coordination of its proposed operations with O3b.

Respectfully submitted,

**O3b LIMITED**

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<sup>9</sup> *Id.* at 4-5.

## ANNEX 1

The graphic below depicts O3b's calculations of I/N effects on an O3b satellite of an ESIM transmitting from two different latitudes, 25° North and 40° North. In-line conjunction events at these latitudes occur only with O3b satellites in inclined orbit, but the simulation considers all O3b satellites, both inclined and equatorial. The results produced by O3b deviate from the Viasat calculations due to the following three factors:

1. Antenna pattern: O3b assumes a generic antenna pattern from Appendix 8 of the International Telecommunication Union ("ITU") Radio Regulations, whereas Viasat appears to have used simulated or actual antenna pattern data from its proposed G-12 ESIM antenna.<sup>10</sup> O3b was unable to use the G-12 data because it was not readily available in an electronic format that could be interpreted by the simulation software O3b used.<sup>11</sup>
2. Bandwidth advantage: Viasat assumed a bandwidth advantage of  $10 \cdot \log_{10}(80/220)$  or 4.4 dB, but O3b did not use this assumption and therefore obtained a peak I/N value approximately 4.4 dB higher than the Viasat results. O3b excluded this factor because O3b transmissions are not always 220 MHz, resulting in the possibility of higher levels of harmful interference from the Viasat ESIM antennas.
3. Duty cycle: Viasat states that it ran its simulation using a 100% duty cycle,<sup>12</sup> but it appears that Viasat converted its results to reflect only a 1% duty cycle, which is why

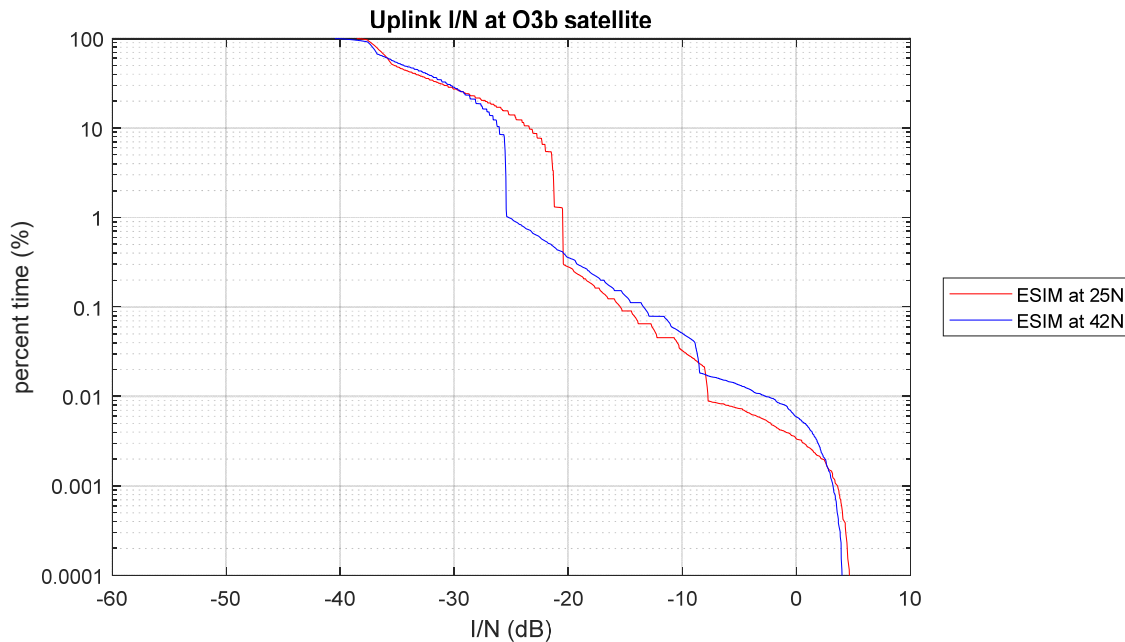
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<sup>10</sup> Viasat Opposition, Attachment 1 at 1.

<sup>11</sup> O3b obtained PDF versions of the G-12 antenna pattern from the Commission's website, but these data are not easily extracted into table form for simulation purposes.

<sup>12</sup> Viasat Opposition, Attachment 1 at 2.

the results in the Viasat graph terminate at 1%.<sup>13</sup> Viasat's use of a 1% duty cycle ignores the possibility of aggregate interference from multiple co-frequency terminals, such as could occur near an airport. O3b's results terminate at 100%. To demonstrate a lower duty cycle, the curves below would need to be shifted in time (along the y-axis), but their shape would remain unchanged.



It is also important to correct Viasat's claim that:

Above 41.5 degrees the -12.2 dB I/N criterion is never exceeded during the 30-day run. Accordingly, at any latitude of 41.5 degrees both the equatorial and 70-degree inclined orbits of O3b will be unaffected by any ESIM operating in this region.<sup>14</sup>

Leaving aside that Viasat is again referencing an I/N value based on an invalid interference criterion for nonconforming operations, the Viasat statement is simply incorrect. As a matter of orbital geometry, an inclined orbit O3b satellite can receive harmful interference

<sup>13</sup> *Id.*, Attachment 1 at 3.

<sup>14</sup> *Id.*, Attachment 1 at 4.

from an ESIM operating at any latitude because an in-line conjunction event can occur whenever an O3b inclined satellite passes between an ESIM station and its serving geostationary orbit satellite. For the O3b inclined satellites, in-line event geometry is not constrained by ESIM latitude, as suggested by the Viasat statement. Indeed, the blue line in the O3b graph above shows the impact on an O3b satellite of an ESIM terminal operating at 42 degrees North latitude, above the point where Viasat claims there would be no effect. If Viasat's simulation did not show any impact in this region, that suggests the test parameters may have been flawed.

## DECLARATION

I, Zachary Rosenbaum, hereby certify under penalty of perjury that I am the technically qualified person responsible for preparation of the technical information contained in the foregoing Annex 1; that I am familiar with the technical requirements of Part 25; and that I either prepared or reviewed the technical information contained in the annex and that it is complete and accurate to the best of my knowledge, information and belief.

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Head of Spectrum Management  
and Development Americas and  
NGSO, SES

Dated: 17 September 2019

## CERTIFICATE OF SERVICE

I hereby certify that on this 17th day of September, 2019, I caused to be served a true copy of the foregoing "Reply of O3b Limited" by first class mail, postage prepaid, upon the following:

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/s/ \_\_\_\_\_

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