

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
<b>VIASAT, INC.</b>	)	Call Sign: E170088
	)	
Application for Blanket Earth Station License Using Ka-band Spectrum	)	IBFS File No. SES-LIC-20170401-00357
	)	

**OPPOSITION OF SPACE EXPLORATION HOLDINGS, LLC**

Space Exploration Holdings, LLC (“SpaceX”) hereby opposes the Petition for Partial Reconsideration filed by Viasat, Inc. (“Viasat”).<sup>1</sup> Viasat requests that the Commission modify a condition imposed in its blanket license to deploy millions of fixed earth stations throughout the United States for communications in the 28.6-29.1 GHz band with two of Viasat’s geostationary satellite orbit (“GSO”) space stations.<sup>2</sup> That condition was imposed in response to concerns raised by non-geostationary satellite orbit (“NGSO”) system operators (including SpaceX) about Viasat’s GSO use of the band, which the Commission has designated specifically for primary use by uplinks for NGSO systems. Viasat seeks to remove the requirements to either coordinate with NGSO systems in the band, submit a detailed technical analysis demonstrating how NGSO systems would be protected, or cease operations in the band. For the reasons discussed below, the Commission should find that Viasat has failed to provide the detailed technical

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<sup>1</sup> See Petition for Partial Reconsideration of Viasat, Inc., IBFS File No. SES-LIC-20170401-00357 (Dec. 11, 2017) (“Viasat Petition”).

<sup>2</sup> See Radio Station Authorization, Call Sign E170088 (Nov. 9, 2017) (“Viasat Blanket License”).

demonstration necessary to confirm that its earth station operations would protect NGSO systems in this band, and therefore deny Viasat's request to modify the condition.

### ***1. Background***

Viasat has been licensed to deploy up to four million 0.75 meter and ten thousand 1.8 meter earth stations across the United States. These earth stations will operate in several bands, including the 18.8-19.3 GHz downlink and 28.6-29.1 GHz uplink bands that have been designated by the Commission for primary use by NGSO systems. Under the Commission's rules, any GSO system operating in these bands must do so on a non-interference, non-protected basis.<sup>3</sup>

Both SpaceX and O3b Limited ("O3b") raised concerns in response to Viasat's blanket license application in the NGSO uplink band.<sup>4</sup> SpaceX provided an initial analysis of two interference scenarios, illustrating the effect on SpaceX's proposed NGSO system assuming angular separation of 10, 20, and 30 degrees from a Viasat earth station uplink transmission. While the results varied depending upon the scenario and the earth station considered, the calculated  $\Delta T/T$  impact ranged from 15% to 452% at 20 degrees and from 6% to 164% at 30 degrees.<sup>5</sup> Subsequently, after reviewing these calculations further, SpaceX has discovered that these interference calculations actually *understate* the potential interference impact by 10 dB, such that the  $\Delta T/T$  would actually be *ten times worse*. The initial assessment was based on earth station EIRPs in 40 kHz bandwidth, when the actual EIRPs proposed by ViaSat were in 4 kHz. After adjusting

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<sup>3</sup> *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, 32 FCC Rcd. 7809, ¶ 14 (2017) ("NGSO Update Order").

<sup>4</sup> *See, e.g.*, Reply of Space Exploration Holdings, LLC, File No. SES-LIC-20170401-00357 (June 26, 2017) ("SpaceX Reply"); Petition to Defer of O3b Limited, File No. SES-LIC-20170401-00357 (June 2, 2017).

<sup>5</sup> *See* SpaceX Reply at 3-6.

for that updated assumption, all of these values reveal a far more significant interference effect than the 6%  $\Delta T/T$  standard for non-interference previously claimed by ViaSat.<sup>6</sup> Given the large potential impact on NGSO operations, both SpaceX and O3b requested that the Commission deny or defer licensing until Viasat demonstrated that its operations would adequately protect NGSO operations in the NGSO-primary band.

In apparent response to this concern, the Commission imposed Condition 90447 on the Viasat Blanket License, which provides in pertinent part:

[N]o later than sixty days before the scheduled initial launch of each NGSO FSS satellite system licensed or granted market access in the United States to operate in the 18.8-19.3 GHz and 28.6-29.1 GHz frequency bands, the licensee must either: (1) notify the Commission in writing when an agreement has been reached with the NGSO satellite system operator, or (2) seek and obtain the Commission's approval of a modification of this license including detailed technical demonstrations of how the licensee will protect the NGSO FSS satellite system. If neither condition is met, the licensee must cease earth station operations in the 18.8-19.3 GHz and 28.6-29.1 GHz frequency bands pursuant to this license until such time as compliance is demonstrated.

This condition clearly anticipates that Viasat would attempt to reach coordination agreements with affected NGSO system operators, which presumably could be easily achieved if there is truly no potential for harmful interference. Indeed, Viasat reports that it has already completed coordination with one proposed NGSO system, OneWeb.<sup>7</sup> For some reason, Viasat has abandoned this path of seeking additional coordination agreements with the many other NGSO operators and proposed systems, and instead has

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<sup>6</sup> See, e.g., ViaSat-1 Application, IBFS File No. SAT-AMD-20080623-00131, Narrative at 7 (June 23, 2008) (citing *contactMEO Communications, LLC*, 21 FCC Rcd. 4035, ¶ 33 (IB 2006)). See also *Northrop Grumman Space & Mission Systems Corp.*, 24 FCC Rcd. 2330, ¶ 86 (IB 2009) (concluding that the proposed GSO system would not cause harmful interference to NGSO systems where impact was less than 6%  $\Delta T/T$ ).

<sup>7</sup> See Viasat Petition, Exhibit 1 at 4.

filed its Petition “in an effort to obviate the need for the type of subsequent license modification applications contemplated by the new condition.”<sup>8</sup>

While Viasat has submitted what it describes as a technical analysis, which “discusses the results of a series of simulations,” this information falls far short of the detail needed to successfully demonstrate that operations under the Viasat Blanket License would not result in harmful uplink interference into any of the Ka-band NGSO systems involved in the current processing round.<sup>9</sup> The “analysis” provided offers only a very high level description of the type of simulation used and a tabular presentation of the results. In that presentation, Viasat uses -12.2 dB I/N as a reference “for illustrative purposes,” but concedes that it “is not intended as a threshold for when harmful interference would occur.”<sup>10</sup> Nonetheless, based on this illustrative information, Viasat “do[es] not believe that VS-2 Earth Station operations would result in harmful interference in NGSO-primary band segments under any circumstances.”<sup>11</sup> It therefore requests that the Commission delete Condition 90447, and replace it with a simple non-interference requirement.<sup>12</sup>

## ***2. Discussion***

The efficacy of Viasat’s Petition depends upon the validity of the simulation that leads to its conclusion that the authorized earth stations will not cause harmful interference to NGSO systems. Any simulation is only as good as the model and the assumptions used to set it up. Viasat has not provided the details of its analysis at a level

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<sup>8</sup> Viasat Petition at 2.

<sup>9</sup> *See id.* at 2-3 and Exhibit 1.

<sup>10</sup> *Id.*, Exhibit 1 at 4.

<sup>11</sup> *Id.* at 6.

<sup>12</sup> *See* Viasat Petition at 3.

that would enable the Commission and other interested parties not only to reproduce the results, but also to evaluate the reasonableness of the assumptions made and the soundness of the model employed in order to determine the validity of those results. For example, Viasat does not disclose:

- how many Viasat and NGSO earth stations are used in the simulation;
- how its model assumes those earth stations are arranged geographically;
- the uplink EIRP assumed in the simulation for the Viasat earth stations;<sup>13</sup> and
- whether the analysis uses Viasat’s 0.75 meter antennas, its 1.8 meter antennas, or a mixture of the two (and if so, in what proportions).

In addition, the analysis appears to refer only to earth stations communicating with the ViaSat-2 satellite,<sup>14</sup> but Viasat’s authorization includes transmissions in the relevant bands with ViaSat-1 as well – and it is not clear that this was considered. Without such key inputs to Viasat’s simulation, it is not possible to evaluate the results.

By comparison, SpaceX has provided complete information in support of the analysis previously presented in this proceeding. Viasat criticizes that analysis because it included a 10 degree separation angle, even though SpaceX has announced its intention to observe a 22-degree separation from the GSO arc.<sup>15</sup> Yet Viasat failed to recognize the additional examples that SpaceX presented of the proposed earth stations’ impact at

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<sup>13</sup> Viasat asserts that the EIRP levels requested in its application and included in its authorization, which SpaceX used in its earlier evaluation in this proceeding, “would typically be employed” only during faded conditions (*see* Viasat Petition, Exhibit 1 at 4), yet it has never provided the EIRP value anticipated for its operations in clear sky conditions. Nothing in the Viasat Blanket License indicates or requires different EIRP limits during clear sky conditions.

<sup>14</sup> *See, e.g.*, Viasat Petition, Exhibit 1 at 1 (referring to simulations based on “the characteristics of the ViaSat-2 blanket license earth stations”) and 6 (discussing the “orbital separation from the NGSO satellites and VS-2”).

<sup>15</sup> *See id.* at 3.

separation angles as large as 30 degrees – which still show significant interference risk. Viasat has not explained why those calculations are not valid or applicable.

ViaSat also faults SpaceX’s analysis for not including an orbital simulation. But such simulation details are largely beside the point when the results clearly indicate a serious interference risk at an angular separation of 30 degrees, which is certain to occur regardless of the details of any orbital simulation. Indeed, the fact that Viasat’s model apparently concludes that such interference will *not* happen – and therefore fails to identify this significant interference risk – is sufficient reason to doubt the results of that simulation. Because Viasat failed to provide complete information on the assumptions and methodology underlying its simulation, there is no way to determine the reason for this failure. Until that information is provided, the Commission cannot rely on the described (but not substantiated) results of Viasat’s analysis.

### **3. Conclusion**

The Commission has only designated one uplink and one downlink band (18.8-19.3 GHz and 28.6-29.1 GHz) for use by NGSO FSS systems on a primary basis. As it recently confirmed, “preserving the 18.8-19.3 GHz and 28.6-29.1 GHz bands for more intensive use by burgeoning NGSO FSS systems will serve the public interest.”<sup>16</sup> If the Commission were to allow GSO systems to compromise that spectrum without regard to the interference impact on NGSO operations, the Commission would put at risk a new generation of high-capacity, low-latency satellite broadband services. Although Viasat has described the results of a simulation, it has failed to provide a “detailed technical demonstration” of how its earth stations would protect NGSO satellite systems from harmful interference. Accordingly, the Commission should maintain the modest

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<sup>16</sup> *NGSO Update Order*, ¶ 14.

condition that requires ViaSat to either complete coordination with NGSO systems or demonstrate with a detailed technical showing that it can operate on a non-interference basis with NGSO systems in the NGSO-primary bands.

Respectfully submitted,

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December 26, 2017

## ENGINEERING CERTIFICATION

The undersigned hereby certifies to the Federal Communications Commission as follows:

- (i) I am the technically qualified person responsible for the engineering information contained in the foregoing Opposition,
- (ii) I am familiar with Part 25 of the Commission's Rules, and
- (iii) I have either prepared or reviewed the engineering information contained in the foregoing Opposition, and it is complete and accurate to the best of my knowledge and belief.

Signed:

*/s/ Mihai Albulet*

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Mihai Albulet, PhD  
Principal RF Engineer  
SPACE EXPLORATION TECHNOLOGIES CORP.

December 26, 2017

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Date



**CERTIFICATE OF SERVICE**

I hereby certify that, on this 26<sup>th</sup> day of December, 2017, a copy of the foregoing Opposition was served by First Class mail upon:

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