

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

In the Matter of	)	
	)	
Telesat Canada	)	SAT-PDR-20161115-00108; Call Sign S2976
	)	
The Boeing Company	)	SAT-LOA-20161115-00109; Call Sign S2977
	)	
Space Norway AS	)	SAT-PDR-20161115-00111; Call Sign S2978
	)	
LeoSat MA, Inc.	)	SAT-PDR-20161115-00112; Call Sign S2979
	)	
Karousel LLC	)	SAT-LOA-20161115-00113; Call Sign S2980
	)	
Audacy Corporation	)	SAT-LOA-20161115-00117; Call Sign S2982
	)	
Space Exploration Holdings, LLC	)	SAT-LOA-20161115-00118; Call Sign S2983
	)	
ViaSat, Inc.	)	SAT-PDR-20161115-00120; Call Sign S2985
	)	
Theia Holdings A, Inc.	)	SAT-LOA-20161115-00121; Call Sign S2986
	)	
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	)	

**REPLY OF SES S.A. AND O3B LIMITED**

SES S.A. (“SES”) and its subsidiary O3b Limited (“O3b”), hereby submit this reply regarding the above-captioned non-geostationary orbit (“NGSO”) satellite license applications and requests for authority to serve the U.S. market (collectively, the “Ku/Ka NGSO Filings”). The record before the Commission supports implementation of the measures set forth in the SES/O3b Comments<sup>1</sup> to ensure protection of geostationary orbit (“GSO”) networks from interference and to facilitate sharing among co-frequency NGSO operations. In addition, other

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<sup>1</sup> Comments of SES S.A. and O3b Limited, File Nos. SAT-PDR-20161115-00108 *et al.*, dated June 26, 2017 (“SES/O3b Comments”).

parties agree that it is premature to grant relief from system construction and operation milestones and that a set of reasonable terms and conditions consistent with those imposed on O3b and other NGSO applicants should be included in any grants of the Ku/Ka NGSO Filings.

**I. THE COMMISSION MUST SEEK ADDITIONAL DATA AND IMPOSE CONDITIONS TO PROTECT GSO OPERATIONS**

The SES/O3b Comments emphasize the need to protect GSO satellites operated by SES and others from interference caused by new NGSO systems seeking to operate in GSO-primary spectrum. In particular, the filing highlights the importance of ensuring that NGSO applicants conform to applicable equivalent power flux density (“EPFD”) limits. Other parties echo these concerns and reinforce the SES/O3b proposals regarding actions the Commission must take to prevent interference to GSO systems.

As a threshold matter, the Commission must defer processing of Ku/Ka NGSO Filings that lack the data necessary to permit verification of their EPFD compliance claims. The SES/O3b Comments point out that several applicants – Telesat, Audacy, Boeing, and SpaceX – failed to supply supporting information regarding the Equivalent Isotropically Radiated Power (“EIRP”) and power flux density (“PFD”) masks that would allow others to independently confirm whether their statements regarding meeting the EPFD limits are accurate.<sup>2</sup> The SES/O3b filing also notes that because these masks must be provided to the International Telecommunication Union (“ITU”),<sup>3</sup> a Commission requirement to submit the information in these proceedings will not place an undue burden on applicants. Indeed, the Commission has already instructed most of the applicants in this processing round to provide this data, including

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<sup>2</sup> *Id.* at 4-5.

<sup>3</sup> *See* Recommendation ITU-R S.1503-2 (December 2013), Section 1.1.

O3b.<sup>4</sup> In its comments, OneWeb similarly expresses concern that the failure to provide EIRP and PFD mask information renders these applications incomplete.<sup>5</sup>

In response to SES/O3b and others, SpaceX readily agrees to submit the EIRP and PFD mask information,<sup>6</sup> but Telesat, Audacy, and Boeing continue to assert the information should not be required. None of these applicants, however, presents a valid reason why the Commission should exempt a few parties from submitting data that all other filers in the processing round have already provided.<sup>7</sup> Telesat notes that the information will be publicly available from the ITU once it has completed its analysis,<sup>8</sup> but does not explain why SES/O3b and other interested parties should have to wait until that time to see data Telesat has already

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<sup>4</sup> See Letter of Jose P. Albuquerque, Chief, Satellite Division, International Bureau, Federal Communications Commission, to Karis Hastings, Counsel to O3b Limited, File No. SAT-AMD-20161115-00116, dated Mar. 21, 2017, at 2, question 3 (requesting that O3b submit “a complete set of PFD masks on the surface of the Earth for each of the 56 active space stations in its NGSO FSS system, and a complete set of NGSO FSS earth station EIRP masks as a function of the off-axis angle generated by the NGSO FSS earth station, which are required to run the ITU-R Recommendation S.1503 EPFD Validation Software”).

<sup>5</sup> See, e.g., Comments of WorldVu Satellites Limited, d/b/a OneWeb, File No. SAT-PDR-20161115-00108, dated June 26, 2017, at 6-7.

<sup>6</sup> Consolidated Opposition and Response of Space Exploration Holdings, LLC, SAT-LOA-20161115-00118, dated July 7, 2017 (“Space X Response”) at 25 (noting that SpaceX previously submitted the information to the Commission on a confidential basis but will file a publicly available copy of the materials).

<sup>7</sup> Boeing and Telesat point out that the Commission has not yet adopted a rule requiring submission of mask information for Ka-band frequencies. See Opposition and Response of the Boeing Company, File No. SAT-LOA-20161115-00109, dated July 7, 2017 (“Boeing Response”) at 14; Telesat Canada’s Response to Comments of SES S.A. and O3b Limited, File No. SAT-PDR-20161115-00108, dated July 7, 2017 (“Telesat Response”) at 3. But the absence of a rule did not keep the Commission from requiring other applicants to submit mask data and therefore does not justify selectively excusing certain applicants from supplying the data.

<sup>8</sup> Telesat Response at 3.

compiled. Given its obligation to treat similarly situated applicants similarly,<sup>9</sup> the Commission should promptly require Telesat, Audacy, and Boeing to submit EIRP and PFD masks.

The record also supports conditioning any grants of the Ku/Ka NGSO Filings on compliance with applicable aggregate EPFD limits, as suggested by SES/O3b and others.<sup>10</sup> SES and O3b recognize that the matter of implementing and enforcing aggregate EPFD limits is being considered as part of the pending rulemaking on NGSO operations,<sup>11</sup> and applicants will be required to conform their operations to the rules adopted in that proceeding. However, SES and O3b also urge the Commission to make clear that any authorizations are subject to modification as necessary to keep aggregate EPFD levels within applicable limits.

## **II. VIASAT’S NGSO-TO-GSO PROPOSAL RAISES UNIQUE ISSUES**

The Commission must conduct further analysis of the ViaSat proposal to communicate between its planned NGSO space stations, at an altitude of 8200 km, and its GSO spacecraft and must adopt appropriate conditions to protect other GSO and NGSO operations. The SES/O3b Comments observe that the ViaSat plan raises novel questions, including how rules designed to manage interference to adjacent GSO satellites from transmissions originating at an earth station antenna can be applied to a situation in which transmissions are coming from

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<sup>9</sup> See, e.g., *Freeman Engineering Assoc., Inc. v. Federal Communications Commission*, 103 F.3d 169 (D.C. Cir. 1997); *Melody Music, Inc. v. Federal Communications Commission*, 345 F.2d 730 (D.C. Cir. 1965).

<sup>10</sup> See SES/O3b Comments at 5-6; Hughes Networks Systems, LLC Comments, File Nos. SAT-PDR-20161115-00108 *et al.*, dated June 26, 2017 (“Hughes Comments”) at 2-3; Petition to Deny of Inmarsat, File No. SAT-PDR-20161115-00120, dated June 26, 2017 (“Inmarsat Petition”) at 5.

<sup>11</sup> *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Notice of Proposed Rulemaking, 31 FCC Rcd 13651 (2016) (“NGSO NPRM”).

NGSO spacecraft.<sup>12</sup> Other parties similarly express concern about the potential for these transmissions to cause interference to GSO satellites.<sup>13</sup> Implications for spectrum sharing among NGSO systems must also be considered.<sup>14</sup>

In defending its NGSO-to-GSO proposal, ViaSat implicitly acknowledges that its system design does not conform to architectures that are typical for either the fixed-satellite service (“FSS”) or satellite-to-satellite links. For example, ViaSat’s supplemental technical analysis suggests that the NGSO transmissions can be considered as similar to a VSAT or earth station in motion (“ESIM”) operating in the FSS, but states that because the NGSO-to-GSO link originating at 8200 km “has slightly less path loss and no atmospheric losses to overcome,” the transmitted EIRP density “is about 3.5 dB lower than for a typical VSAT or ESIM.”<sup>15</sup> In other words, if ViaSat were allowed to use typical VSAT or ESIM power density for its NGSO-to-GSO transmissions, the signal strength at the GSO receiver would be higher by a factor of 3.5 dB. This suggests that at a minimum, the Commission must condition any grant of the ViaSat proposal to require compliance with the 3.5 dB reduction factor ViaSat uses in its analysis.

Similarly, ViaSat’s showing of compatibility with other NGSO constellations is dependent on ViaSat’s assertion that its NGSO-to-GSO links will operate only “within the cone of coverage projected from [the] GSO satellite to the Earth.”<sup>16</sup> Since that assumption is essential

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<sup>12</sup> SES/O3b Comments at 5.

<sup>13</sup> See Inmarsat Petition at 2-4; Hughes Comments at 3-4.

<sup>14</sup> SES/O3b Comments at 7.

<sup>15</sup> Consolidated Opposition and Reply Comments of ViaSat, Inc., File No. SAT-PDR-20161115-00120, dated July 7, 2017 (“ViaSat Response”) Exhibit A at A-2.

<sup>16</sup> *Id.*, Exhibit A at A-2.

to ViaSat's sharing demonstration, any grant of the ViaSat proposal must expressly specify that NGSO-to-GSO transmissions can occur only when an NGSO satellite is within the GSO spacecraft's footprint.

Moreover, the ViaSat Response does not include a comprehensive analysis of the effects of its system on two-degree adjacent satellites<sup>17</sup> or provide any further justification for its assertion that its NGSO-to-GSO transmissions should be exempt from EPFD ↑ limits designed to protect GSO satellites near the target spacecraft. Nor does ViaSat fully respond to the issues noted in the SES/O3b Comments regarding ViaSat's ability to share with other NGSO systems. For example, ViaSat's analysis of NGSO-to-NGSO sharing includes only systems with lower altitude than the ViaSat NGSO satellites,<sup>18</sup> ignoring the fact that NGSO constellations operating in a higher orbit than ViaSat's would be at greater risk of interference. The Commission must require ViaSat to submit additional information on these points before acting on the ViaSat NGSO-to-GSO proposal.

### **III. NGSO-NGSO SHARING SHOULD NOT DEPEND ON ITU PRIORITY**

The record strongly supports the SES/O3b position that the Commission should not consider ITU priority in imposing sharing obligations on NGSO systems.<sup>19</sup> Space Norway observes that under existing Commission rules and those proposed in the NGSO NPRM, all

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<sup>17</sup> The ViaSat supplemental analysis provides simulation results showing the interference impact of its transmissions over time with respect to certain specific satellites, but not for a satellite located two degrees from the target. *See id.*, Exhibit A at A-8 to A-9.

<sup>18</sup> *See id.*, Exhibit A at A-9 to A-12.

<sup>19</sup> SES/O3b Comments at 7.

qualified applicants in an NGSO processing round are treated “on equal terms, without regard to [ITU] date priority.”<sup>20</sup> Other parties express similar views.<sup>21</sup>

In their responses to the SES/O3b Comments, Telesat and LeoSat, which had emphasized the ITU priority of the filings on which they rely for their proposed networks, simply reiterate the importance of the ITU coordination process and express support for a coordination condition similar to what was imposed in the OneWeb Grant.<sup>22</sup> SES and O3b certainly agree that inclusion of a coordination condition is appropriate – the SES/O3b Comments expressly request that the Commission incorporate such a condition in any grant of the Ku/Ka NGSO Filings.<sup>23</sup> But as Boeing emphasizes, acknowledging the need for parties to engage in ITU coordination does not “equate to precedence in NGSO interference events based on ITU priority.”<sup>24</sup> All NGSO systems proposing to serve the U.S. market must conform to Commission sharing rules, without regard to ITU priority.

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<sup>20</sup> Response of Space Norway AS to Comments and Opposition to Petitions to Deny, File No. SAT-PDR-20161115-00111, dated July 7, 2017 (“Space Norway Response”) at 2. *See also* ViaSat Response at 15 (“As the Commission has made clear, all applicants in a given processing round have co-equal licensing priority, without regard to ITU priority”) (footnote omitted).

<sup>21</sup> *See* Theia Holdings A, Inc. Consolidated Opposition and Response, File No. SAT-LOA-20161115-00121, dated July 7, 2017 (“Theia Response”) at 32 (“Theia agrees with O3b that ITU filing priority should not be considered in matters of setting priority of spectrum use when in-line events need to be resolved between NGSO systems”); Karousel LLC’s Response to Comments and Opposition to Petitions, File No. SAT-LOA-20161115-00113, dated July 7, 2017 (“Karousel Response”) at 8-9.

<sup>22</sup> *See* Telesat Response at 3-4; Opposition and Response of LeoSat MA, Inc., File No. SAT-PDR-20161115-00112, dated July 7, 2017 (“LeoSat Response”) at 9-10, *citing WorldVu Satellites Limited Petition for a Declaratory Ruling Granting Access to the U.S. Market for the OneWeb NGSO FSS System*, File No. SAT-LOI-20160428-00041, Order and Declaratory Ruling, FCC 17-77 (rel. June 23, 2017) (“OneWeb Grant”).

<sup>23</sup> SES/O3b Comments at 9.

<sup>24</sup> Boeing Response at 11.

#### IV. ACTION ON MILESTONE RELIEF WOULD BE PREMATURE

Other commenters also concur with SES/O3b that the Commission should defer action on specific requests by Boeing and SpaceX for extended milestone schedules.<sup>25</sup> As noted in the SES/O3b Comments, milestone policy issues are being considered pursuant to the NGSO NPRM,<sup>26</sup> and making individualized decisions while the rulemaking is pending could be viewed as prejudging the outcome of that proceeding.<sup>27</sup> Boeing agrees with this point, conceding that the Commission should decide milestone issues in the context of the NGSO NPRM rulemaking.<sup>28</sup>

SpaceX, on the other hand, argues that the Commission need not await the conclusion of the rulemaking to decide on its milestone waiver request, noting that the Commission declined to withhold action on OneWeb's request for U.S. market access pending completion of the rulemaking proceeding.<sup>29</sup> This is an apples-to-oranges comparison. The SES/O3b Comments do not suggest that no action should be taken on the SpaceX application at all while the NGSO NPRM proceeding is pending, only that it is premature to rule on SpaceX's request for an extended milestone schedule when the Commission is in the midst of making substantive decisions about NGSO constellation milestones. The approach the Commission took in the OneWeb Grant – issuing an authorization subject to compliance with rules subsequently

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<sup>25</sup> SES/O3b Comments at 7-8; Hughes Networks Systems, LLC Reply Comments, File Nos. SAT-PDR-20161115-00108 *et al.*, dated July 7, 2017, at 3-4; Comments of WorldVu Satellites Limited, d/b/a OneWeb, File No. SAT- LOA-20161115-00109, dated June 26, 2017, at 1-8; Comments of WorldVu Satellites Limited, d/b/a OneWeb, File No. SAT- LOA-20161115-00118, dated June 26, 2017, at 2-7.

<sup>26</sup> NGSO NPRM at ¶¶ 32-33.

<sup>27</sup> SES/O3b Comments at 7-8.

<sup>28</sup> Boeing Response at 19.

<sup>29</sup> SpaceX Response at 22 n.38, *citing* OneWeb Grant at ¶ 12.



adopted in response to the NGSO NPRM – would make no sense in the context of the SpaceX milestone waiver request, as SpaceX would still be required to satisfy the milestone requirements ultimately imposed in the rulemaking. Clearly it would be more efficient for the Commission simply to defer consideration of the SpaceX request until the rulemaking has been concluded.

**V. THE RECORD SUPPORTS IMPOSITION OF CONSISTENT CONDITIONS ON ANY GRANTS OF Ku/Ka NGSO FILINGS**

Most parties concur with the SES/O3b Comments that any grants of Ku/Ka NGSO Filings should be subject to standard conditions similar to those imposed on O3b and in the OneWeb Grant.<sup>30</sup> In particular, commenters express support for making any authority conferred subject to compliance with the outcome of the NGSO NPRM proceeding.<sup>31</sup>

The sole exception is Audacy, which argues that many of the rules being considered in the pending rulemaking “do not apply to an in-space relay network, and would effectively prohibit the use of [Ka-band] frequencies for feeder service if imposed indiscriminately upon Audacy.”<sup>32</sup> This vague objection cannot be grounds for exempting Audacy from the requirements adopted in the NGSO NPRM rulemaking. If Audacy believes that it will not be able to comply with the rules imposed in that proceeding, it can either decline

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<sup>30</sup> See, e.g., Theia Response at 31-32 (“Theia supports treating similarly situated parties the same with respect to the adoption of any license conditions and does not object to the grant of a license subject to any applicable conditions” imposed on OneWeb); Telesat Response at 4.

<sup>31</sup> See Boeing Response at 12; Space Norway Response at 10. LeoSat observes that certain conditions that were originally imposed on O3b involve issues that are now being considered in the context of the NGSO NPRM proceeding, and therefore the condition language should be updated to reference that rulemaking. See LeoSat Response at 19. SES and O3b do not object to such a change.

<sup>32</sup> Opposition and Response of Audacy Corporation, File No. SAT-LOA-20161115-00117, dated July 7, 2017, at 9.

to accept a Commission authorization that is conditioned on such compliance or it can submit a concrete waiver request once the rules are in place.

## **VI. CONCLUSION**

For the foregoing reasons, and those expressed in the SES/O3b Comments, the Commission should take steps to ensure that operations pursuant to any grants of the Ku/Ka NGSO Filings meet requirements for sharing with both GSO satellites and other NGSO systems. The Commission should conduct further review of the ViaSat NGSO-to-GSO proposal, defer action on milestone extension requests, and use standard condition language in any grants issued in response to the filings.

Respectfully submitted,

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## CERTIFICATE OF SERVICE

I hereby certify that on this 14th day of July, 2017, I caused to be served a true copy of the foregoing “Reply of SES S.A. and O3b Limited” by first class mail, postage prepaid, to the following:

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