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

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| Viasat, Inc. | ) | IBFS File No. SAT-MPL-20200526-00056 |
| | ) | |
| Modification to Authorization for VIASAT-NGSO Satellite System Operating in the Ka- and V-bands | ) | Call Sign S2985 |

**REPLY COMMENTS OF**
**THE BOEING COMPANY**

Despite Viasat's claims to the contrary, its proposal to increase its satellites from 20 to 288 clearly has the potential to dramatically increase the interference to Boeing's proposed non-geostationary satellite orbit ("NGSO") system.[1] For this reason, the Commission's rules require that its modification application be considered in a new processing round.

In seeking different treatment, Viasat appears to have presented a novel proposal (albeit abstrusely) that may merit consideration by the Commission and the NGSO satellite industry. Viasat is arguing that, despite the increased potential for intersystem interference, it should be permitted to increase its NGSO satellites to 288 because it is promising to operate its modified system such that it "does not exceed the interference profile of its pre-modified system with respect to other same-round NGSO FSS systems."[2] Viasat seems to suggest that such a concession should

[1] Viasat briefly suggests that the increased interference to Boeing's proposed V-band NGSO system is irrelevant because Boeing's license has not yet been granted. *See* Consolidated Opposition to Petitions and Response to Comments of Viasat, Inc., File No. SAT-MPL-20200526-00056 (call sign S2985) at 23 (Sept. 15, 2020) ("*Viasat Opposition*"). Viasat promptly drops this argument, however, in apparent recognition that Viasat must consider the sharing environment for all NGSO systems filed in the same processing round regardless of the order of their grant.

[2] *Id.* at 27; *see also id.* at ii (indicating the "actual operation of its modified system will maintain the same expected operating environment with respect to other systems authorized in the same processing round"); *id.* at iv (committing "to undertake operational measures so that its modified

alleviate the requirement for its modification application to be considered as a part of a new processing round.

Viasat's proposal would not have been possible just a few years ago under the Commission's then-existing NGSO spectrum sharing rules, which were based on inline events. In 2017, however, the Commission changed its default NGSO sharing rules to define a "band-splitting" event between two NGSO systems as a 6 percent increase in the ΔT/T of the interfered link.[3] Under the old approach, an inline event resulted from the physical alignment of NGSO satellites and earth stations and therefore could not be manipulated by NGSO system operators. Under the new approach, however, a 6 percent increase in ΔT/T can be avoided by an NGSO system operator by shutting down the interfering satellite (*i.e.*, refraining from transmitting or receiving from that satellite toward the aligned earth station). This appears to be what Viasat is proposing.

Although Viasat's proposal may merit consideration, several threshold issues must be addressed. Most important, it is imperative that Viasat's obligation to operate its modified NGSO system within the existing interference envelope of its 20-satellite system be implemented in an objective and fully transparent manner. As the Commission has repeatedly recognized, sharing between co-frequency NGSO systems is extremely complex, observing that it "requires close cooperation of the involved NGSO FSS operators, including, at a minimum, periodic exchanges

---

system maintains the same expected operating environment with respect to other systems authorized in the same processing rounds); *id.* at 3 (indicating it will operate its modified NGSO system "within the interference envelope established in Viasat's current NGSO authorization"); *id.* at 31 (indicating it will operate its system such that it "does not exceed the I/N interference profile of its pre-modified system with respect to other same-round NGSO FSS systems").

[3] *See* Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters, IB Docket No. 16-408, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 17-122, ¶ 49 (Sept. 27, 2017) ("*2017 NGSO Sharing Order*").

of ephemeris data."[4] Further "[t]he magnitude of sharing difficulty increases with an increase in the number of active visible satellites in the modified system,"[5] which is exactly what Viasat is proposing. "Thus, a customer using another satellite system will have more difficulty operating with that system if the number of visible satellites in the modified system is increased."[6]

The first step in ensuring that Viasat's sharing commitment is implemented in an objective and transparent manner is to model the baseline interference that would have resulted from Viasat's 20-satellite system and then impose that model on Viasat's 288-satellite system. This modeling process would have been fairly simple if Viasat was only proposing to increase its satellites from 20 to 288 with no other changes. Replicating the interference from the 20-satellite system using the 288-satellite system would require that each satellite in the 288-satellite constellation be treated as available for uplink or downlink communications to each point on earth 14.4 percent of the time.[7] Viasat, however, has proposed other significant changes to its NGSO system including lowering the inclination angle and changing the orbit from medium Earth orbit ("MEO") to low Earth orbit ("LEO"), injecting significant complexity into the modeling and implementation process. Potentially adding to this complexity is the fact that the sharing conditions that must be applied to Viasat's 288-satellite system may need to be different depending on the characteristics of the victim NGSO system. For example, Viasat's proposed reduction in altitude may have a

---

[4] Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ka-Band, IB Docket No. 01-19, *Report and Order*, FCC 03-137, ¶ 44 (July 9, 2003).

[5] *See* Teledesic LLC for Minor Modification of License to Construct, Launch and Operate a Non-Geostationary Fixed Satellite Service System, Order and Authorization, 14 FCC Rcd 2261, ¶ 13 (Jan. 29, 1999) ("*Teledesic Order*").

[6] *Id.*

[7] 288 divided by 14.4 equals 20.

different impact on LEO systems from the same processing round as compared to MEO systems from that same round.

The second step in the implementation process would be to document Viasat's sharing requirements so that other NGSO systems can rely on them in their own operations and so the Commission can enforce them. Viasat seems to suggest that no such information sharing is necessary, arguing that "Viasat's commitment does not depend on other operators taking any new steps with their systems to maintain the interference environment—and certainly does not require other providers to use Viasat's beam-pointing information to alter their own operations."[8]

Boeing agrees that other NGSO systems that are authorized in the same processing round must not be required to alter their operations to maintain the interference environment that would have existed prior to Viasat's modification. Other NGSO system operators, however, obviously will need to know the details of the steps that Viasat is taking to maintain the same interference environment. Specifically, each time an alignment occurs between one of Viasat's 288 satellites and a satellite from another NGSO system, the operator of that other system must be able to know whether it needs to treat that alignment as a band-splitting event or whether it can disregard the alignment and keep using 100 percent of the spectrum as a part of Viasat's implementation of its sharing obligations.

Further, other NGSO system operators must be able to make this determination without having to consult with Viasat. As Viasat acknowledges, such real time or near-real time communications would not be practical due to "other real-world considerations such as latency in the communications link between the operators, rain fade, or other atmospheric conditions

[8] *Viasat Opposition* at 38.

occurring for some users while the system updates are being sent out."[9] Instead, the timing intervals regarding when each of Viasat's satellites must be treated as operational, versus not operational to a particular location on the ground, must be predetermined and reliable.

Boeing acknowledges that documenting these requirements may not require Viasat to disclose its operational beam-pointing information. Viasat's *actual* beam pointing operations may be irrelevant to other operators once the objective structure of Viasat's *permissible* beam-pointing operations have been documented. The information that will need to be disclosed by Viasat, however, invariably will exceed the ephemeris data for its satellites. Viasat argues that it should only be required to share ephemeris data,[10] observing that the Commission previously directed that only ephemeris data needed to be shared.[11] The Commission reached this conclusion, however, in the context of a spectrum sharing environment in which every inline event would be treated as a band-splitting event, not Viasat's proposed environment in which most of these events will be avoided to maintain Viasat's pre-modified sharing environment. Boeing isn't certain exactly what information will need to be shared, but it is clear that Viasat's ephemeris data alone will not be sufficient.

The implementation of Viasat's spectrum sharing requirements also would need to be documented in a transparent manner to ensure that Viasat's outage periods are equitably apportioned both in time and duration throughout the world. Viasat cannot be permitted to allocate a disproportionate share of the capacity of its 288 satellites over highly populated regions of the world, relegating its self-imposed shutdown events to sparsely populated areas.

---

[9] *Id.* at 39.

[10] *Id.* at 38.

[11] *See 2017 NGSO Sharing Order*, ¶ 58; 47 C.F.R. § 25.146(e).

Consideration is also necessary regarding Viasat's reduction in the orbit inclination of its satellites and the resulting concentration of network capacity density over highly populated regions. Boeing does not have the answers to these issues — having considered this proposal for barely a week — but these and other questions would need to be fully resolved.

Given these uncertainties, the most appropriate course of action is for the Commission to incorporate Viasat's proposal into the Notice of Proposed Rulemaking ("NPRM") that the Commission may already be preparing in response to the petitions for rulemaking that were filed by Spacex and Amazon respectively seeking changes to Sections 25.261 and 25.117 of the Commission's rules.[12] Viasat's proposal would complement the issues raised in those petitions, particularly with respect to changes to Section 25.117 in furtherance of the Commission's longstanding policy of seeking "to allow licensees to modify their satellite systems when possible."[13] Therefore, Boeing hopes that the Commission will quickly adopt an NPRM addressing Viasat's proposal and the other questions raised in the petitions.

Meanwhile, the Commission should direct Viasat to prepare and submit a proposed plan on how it would operate its 288-satellite constellation within the same interference environment of its authorized 20-satellite system. The plan should identify the operational constraints that Viasat will use vis-à-vis each of the other NGSO systems that were proposed in the same processing rounds, including Boeing's. The plan should also identify the timing, duration and locations of such outage events in sufficient detail so that other operators can incorporate Viasat's

[12] *See* Revision of Section 25.261 of the Commission's Rules to Increase Certainty in Spectrum Sharing Obligations Among Non-Geostationary Orbit Fixed-Satellite, *Petition for Rulemaking*, RM-11855 (May 14, 2020); Modernization of Section 25.117 of the Commission's Rules for Modifications of NGSO FSS Systems in the New Space Age, *Petition for Rulemaking*, RM-11861 (July 9, 2020).

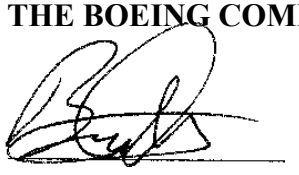
[13] *Teledesic Order*, ¶ 5.

proposal into computer models that can replicate the sharing environment and its impact on their existing and proposed NGSO systems. The Commission should then place Viasat's proposal on public notice for comment in order to determine whether consensus can be reached on an operational framework for Viasat's 288-satellite system that replicates the interference environment of Viasat's 20-satellite system in a fair, objective and transparent manner. Finally, any approval for Viasat's modified system should be conditioned on compliance with the rules that are adopted in the above-discussed rulemaking proceeding.

Obviously, the above implementation steps are contingent on Viasat's cooperation in disclosing the details of its plans for operating its proposed 288-satellite system within the interference envelope of its authorized 20-satellite system. This approach is also contingent on NGSO satellite operators reaching consensus on the equitable implementation of Viasat's modified proposal. If, however, Viasat declines to disclose its plans, or if the disclosed plans appear inequitable, then the Commission should enforce its existing rules and case law by relegating Viasat's modification application to a subsequent processing round with a new generation of applicants.

Respectfully submitted,

**THE BOEING COMPANY**

By: 

Audrey L. Allison
Vice President, Global Spectrum Management
The Boeing Company
929 Long Bridge Drive
Arlington, VA 22202
(703) 465-3215

Bruce A. Olcott
Jones Day
51 Louisiana Ave. NW
Washington, D.C. 20001
(202) 879-3630

Its Attorneys

September 25, 2020

## CERTIFICATE OF SERVICE

I, Bruce A. Olcott, hereby certify that on September 25, 2020, I caused a copy of the foregoing Comments of The Boeing Company to be served by electronic mail to the following, except for Viasat, which requested to be served by U.S. first-class mail, postage paid:

John P. Janka
Viasat, Inc.
901 K Street, NW
Suite 400
Washington, DC 20001

Karis A. Hastings
SatCom Law LLC
1317 F Street, N.W., Suite 400
Washington, D.C. 20004
karis@satcomlaw.com

*Counsel to O3b Limited*

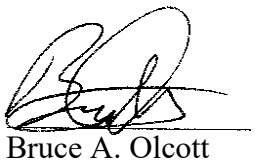
William M. Wiltshire
HARRIS, WILTSHIRE & GRANNIS LLP
1919 M Street, N.W. Suite 800
Washington, DC 20036
wwiltshire@harriswiltshire.com

*Counsel to Spacex*

Joseph A. Godles
Goldberg, Godles, Wiener & Wright LLP
1025 Connecticut Avenue, NW, Suite 1000
Washington, DC 20036
(202) 429-4900
JGodles@g2w2.com

*Counsel to Telesat Canada*

Mariah Dodson Shuman
Corporate Counsel
Kuiper Systems LLC
410 Terry Avenue N
Seattle, WA 98109
marishum@amazon.com



Bruce A. Olcott