SPACEX

December 30, 2020

**BY ELECTRONIC FILING**

Marlene H. Dortch
Secretary
Federal Communications Commission
45 L Street, N.E.
Washington, DC 20554

Re: *IB Docket No. 18-313; IBFS File Nos. SAT-MPL-20200526-00056, SAT-MOD-20200417-00037*

Dear Ms. Dortch:

This letter is submitted in response to a recent filing[1] in which Viasat, Inc. ("Viasat") opposes a proposal by Space Exploration Technologies Corp. ("SpaceX") to update the Commission's orbital debris rules to better account for the true cost of persistent debris.[2]

An initial matter, SpaceX welcomes Viasat's recent advocacy in support of extending the Commission's orbital debris rules to non-U.S. licensees.[3] With this apparent reversal of Viasat's prior opposition, the Commission is now able to move swiftly to close this loophole in its rules. No rules can truly improve space sustainability unless they are applied evenly to all operators. As the world's largest market for satellite service, the U.S. has the unique ability to truly improve the space environment.

Despite this welcome change from Viasat that will improve space safety, it nonetheless still opposes strong rules to hold each satellite operator more accountable for the duration of the risk it poses to others. These differences in risk are stark—at lower orbits objects persist for only a handful of years, while at higher orbits these risks last many generations. Unfortunately, lacking in substantive support for its opposition, Viasat once again relies on ad hominem attacks.

But moving past these irrelevant distractions, Viasat primarily makes two points for ignoring the duration of debris in space. First, Viasat argues that objects at lower orbits still remain in space for several years and still pose some risk. Second, Viasat repeats unrelated claims about using an aggregate metric to determine collision risk.

Yet despite its rhetoric, Viasat does not really challenge the main benefits of better accounting for the years objects remain in orbit. For instance, Viasat does not dispute:

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1 *See* Letter from Amy R. Mehlman to Marlene H. Dortch, IB Docket No. 18-313 (Dec. 2, 2020) ("Viasat Letter").
2 *See* Further Comments of Space Exploration Technologies Corp., IB Docket No. 18-313, at 7-11 (Oct. 9, 2020).
3 Consolidated Opposition of Viasat, Inc., IB Docket No. 18-313, at 10-11 (Nov. 24, 2020).

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- Objects at higher altitudes remain in orbit for decades or centuries, as opposed to just a few years.
- As the orbits for objects at higher altitudes slowly decay, the objects traverse some of the most congested areas of space, thereby increasing the risk of collision with both large and small objects.
- These high-risk collisions will create debris clouds that could make certain altitudes unusable for millennia.
- Not only do objects at lower orbits decay in just a few years, these altitudes are less congested with space debris, decreasing the risk of these same collisions with small objects.

Considering these indisputable facts, only a collision risk metric that also measures the time debris would remain in orbit post-collision can truly account for the potential harm a proposed satellite system can cause to others.

Aside from its opposition to including this commonsense metric in calculating collision risk, Viasat also makes the odd claim that SpaceX's system will be exempt from this calculation.[4] To the contrary, SpaceX fully supports applying such a metric to its system on an equal basis to all other systems, including non-U.S. licensed systems like Viasat's. In fact, SpaceX designed its system to operate at lower altitudes specifically to take advantage of the better safety attributes of these orbits.

But rather than present any real substantive opposition to accounting for the years debris remains in orbit, Viasat instead repeats its plea for a flawed aggregate metric for collision risk. But as has been well documented, the metric supported by Viasat provides little, if any, benefit for space safety, while exacting a significant cost for broadband users on the ground. As several commenters have already explained, the aggregate metric supported by Viasat would lead to uneven rules that regulate each satellite based on the identity of the operator as opposed to the attributes of the satellite.[5] Such an unbalanced approach fails to account for the true effects the satellite will have on its environment. But because Viasat's proposed approach would essentially cap the size of broadband systems and the altitudes at which they can operate, the real result of Viasat's proposal—and perhaps the intended result—would be to limit the service that U.S.-licensed systems can provide to American broadband users.

Yet, even if the Commission were to adopt such a flawed aggregate risk approach, it should still include a better accounting for the years inoperable satellites and related debris remain in orbit should a collision occur. Using Viasat's aggregate metric, but refining the metric to account for the years the debris risk will persist in space according to NASA's Debris Assessment Software

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4 *See* Viasat Letter at 2.

5 *See, e.g.*, Comments of Telesat Canada, IB Docket No. 18-313, at 2 (Oct. 9, 2020) (such a metric "would artificially limit constellation size and hamstring the ability of non-geostationary satellite orbit ('NGSO') low earth orbit ('LEO') satellite systems to provide continuous high-capacity global coverage"); Comments of Kuiper Systems LLC, IB Docket No. 18-313, at 3 (Oct. 9, 2020) (arguing that a strict limit imposed on a per-satellite basis "will best promote a safe operating environment in space without arbitrarily limiting constellation size and other design choices" and "provides a path for the Commission to improve the current space safety environment significantly, while also facilitating the deployment of large NGSO constellations").

("DAS"), SpaceX's system would result in a 0.014 collision risk-years.[6] In contrast, while Viasat has steadfastly avoided providing complete information about the debris profile of its own proposed system, it is nonetheless possible to determine that Viasat's proposed system would result in a minimum of 8.96 collision risk-years even within the current limits of DAS analysis (which will only report up to 100 years of decay time), while a more representative recursive application of DAS would yield 68.07 collision risk-years.[7] Using an aggregate metric and accounting for the true risk of the system over time, Viasat's proposed system has a risk profile several hundred to several thousand times higher than that posed by SpaceX, even assuming Viasat can meet its optimistic claims of 99.5% reliability.

To hold operators responsible for the true risk their systems cause to the sustainability of space, the Commission should better account for the years objects remain in orbit on a per satellite basis. The record makes clear that the aggregate metric proposed by Viasat would do little to improve the space environment, but would severely restrict competition and ultimately harm services to consumers. Yet even if the Commission were to adopt Viasat's anti-competitive aggregate proposal, including a measure of the years objects remain in orbit would better reflect the true risk caused by a proposed constellation.

Sincerely,

*/s/ David Goldman*

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[6] For the Starlink system, this calculation assumes a 98 percent reliability factor and a DAS-calculated Large Object Collision Risk (average per failed satellite) of 9.3434e-05 and average decay time of 1.72 years. The resulting computation of aggregate risk years is thus 0.02*(9.34e-05)*1.72*4408 = 0.014.

[7] For the Viasat system, this calculation assumes a 99.5 percent reliability factor and a DAS-calculated Large Object Collision Risk (average per failed satellite) of 3.11e-04 and minimum average decay time of 100 years for the limited case and 760 years for the recursive case. The resulting computation of aggregate risk years is thus 0.005*(6.22e-02)*100*288 = 8.96 for the limited case and 0.005*(6.22e-02)*760*288 = 68.07 for the recursive case.