March 26, 2021

BY ELECTRONIC FILING

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
45 L Street, NE
Washington, DC 20554

Re: Viasat, Inc. *Ex Parte* Presentation, IB Docket No. 18-313 and IBFS File Nos. SAT-MOD-20200417-00037 and SAT-MPL-20200526-00056

Dear Ms. Dortch:

Viasat, Inc. responds to the letter filed by Space Exploration Technologies Corp. ("SpaceX") on March 2, 2021.[1] That letter purports to address extensive technical analysis submitted by Viasat on January 15, 2021.[2] But SpaceX's letter is fundamentally flawed in four critical respects:

- ***First***, SpaceX mischaracterizes Viasat's January 15 filing and strips it of relevant context. In particular, SpaceX ignores that Viasat filed its technical analysis to refute: (i) SpaceX's suggestion that *its* proposed modification would amount to a "safety upgrade" simply because certain of its satellites would operate at lower altitude; and (ii) SpaceX's attempt to use a flawed, bespoke metric to "prove" this point. Importantly, Viasat's analysis was limited to comparing the safety profile of various iterations of *SpaceX's* system design using three established analytical methodologies; Viasat did *not* claim that operating *any and all* NGSO satellites at lower altitude would be more dangerous than operating them at higher altitude, as SpaceX mistakenly suggests.

- ***Second***, SpaceX purports to "correct" technical analysis conducted by Viasat using NASA's Debris Assessment Software ("DAS"). But SpaceX does not even claim that Viasat departed from established and accepted DAS methodologies in any respect. At the same time, the "corrections" that SpaceX attempts to implement: (i) are fundamentally inconsistent with the purpose for which DAS was designed, as well

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1 *See* Letter from SpaceX to FCC, IB Docket No. 18-313 and IBFS File Nos. SAT-MOD-20200417-00037 and SAT-MPL-20200526-00056, at 1 (Mar. 2, 2021) ("SpaceX Letter").

2 *See* Letter from Viasat to FCC, IB Docket No. 18-313 and IBFS File Nos. SAT-MOD-20200417-00037 and SAT-MPL-20200526-00056 (Jan. 15, 2021) ("Viasat Jan. 15 Letter").

as the Commission's own rules and policies; (ii) amount to yet another attempt to use a bespoke approach to "prove" SpaceX's predetermined point; and (iii) skew the valid results that DAS would otherwise generate.

- ***Third***, much of SpaceX's letter focuses on the uncontroversial notion that there are benefits to operating satellites at lower altitude, including that this generally decreases the time necessary for them to passively deorbit. But SpaceX does not demonstrate that these benefits materialize *in SpaceX's case* in a way that outweighs harms associated with various aspects of SpaceX's system. Ultimately, the results of Viasat's objective technical analysis speak for themselves, confirming that they may not.

- ***Fourth***, SpaceX ignores the remaining technical analysis included in Viasat's January 15 letter, which relies on methodologies other than DAS. SpaceX asks the Commission to ignore this analysis simply because the underlying methodologies allegedly have not been "endorsed" by the Commission, but ignores that: (i) this position conflicts with SpaceX's attempts to utilize unproven, bespoke metrics in this proceeding when convenient for SpaceX; and (ii) the non-DAS methodologies used by Viasat are established and valid for the comparative purposes for which they were used.

In light of record evidence on the significant space safety issues associated with Starlink, the Commission should not grant SpaceX's pending modification application at this time.

I. SPACEX MISCHARACTERIZES VIASAT'S JANUARY 15 LETTER AND STRIPS IT OF ALL RELEVANT CONTEXT

As the Commission may recall, in December 2020 SpaceX filed a letter that: (i) proposed a new and bespoke metric for estimating the "true cost" for space safety of operating a large LEO system; and (ii) attempted to use this flawed metric in an attempt to validate the falsehood that its proposed modification somehow represents a "safety upgrade."[3] As Viasat demonstrated, that flawed metric had no basis in the Commission's rules, NASA's standards, or readily available scientific literature. Furthermore, SpaceX did not specify any consistent approach to calculating this bespoke metric, let alone justify any such approach.

Indeed, very little was clear with respect to the metric proposed by SpaceX—other than that it included a factor that was obviously designed to minimize the calculated risk associated with its own NGSO system, while artificially inflating the risk posed by systems operating at higher altitude. The inherent issues in SpaceX's bespoke metric were compounded by its decision to use overly favorable inputs in applying that metric to itself.[4] In short, SpaceX's use

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[3] Letter from SpaceX to FCC, IB Docket No. 18-313 and IBFS File Nos. SAT-MOD-20200417-00037 and SAT-MPL-20200526-00056 (Dec. 30, 2020). Tellingly, SpaceX's recent letter makes no attempt to rehabilitate the flawed "aggregate risk years" metric it proposed in December.

[4] *See* Viasat Jan. 15 Letter at 13-14.

of its bespoke metric strongly suggested that it had been specifically designed to "justify" SpaceX's overly reductive assumption that, when it comes to orbital altitude, "lower is necessarily better."

Viasat's January 15 filing sought to disabuse the Commission of this notion by demonstrating that the relationship between the altitude at which an NGSO system operates and the collision risk it poses is actually far more complex than SpaceX had suggested—*i.e.,* lower is *not* necessarily better in all cases.[5] Among other things, Viasat noted that lower altitudes tend to be more congested than higher altitudes—which can exacerbate overall collision risk. Although factors like congestion may or may not mean that an NGSO system operated at lower altitude is less safe than one operated at higher altitude, simply ignoring such factors can lead to dangerously incorrect risk assessments. For example, under the "lower is necessarily better" approach that SpaceX advocates, it would follow that moving *every* LEO constellation operating above 550 km to 550 km would make space safer. Clearly that would not be the case, and nothing in the "lower is necessarily better" approach accounts for the significant collisions risks created by large numbers of satellites operating in congested space and the risk associated with very large number of associated conjunctions.

Viasat's overarching point was that it is necessary to analyze the specific characteristics of various iterations of an NGSO system using established methodologies in order to properly estimate the relative collision risks each poses, instead of simply assuming that lowering altitude will make a system safer. This is precisely what Viasat did with respect to the various iterations of SpaceX's NGSO system design. Given the complex nature of the orbital environment and the factors that contribute to orbital collision risk, Viasat used a series of widely accepted, preexisting, third-party methodologies to analyze the problem in multiple ways and compare the relative collision risk presented by each Starlink design iteration. In no case did Viasat rely on a bespoke metric specifically designed to "prove" a point, and Viasat applied each methodology in a transparent, reasonable fashion to to analyze available data and present the results to the Commission for its consideration.[6]

The results of Viasat's technical analysis clearly show that, in SpaceX's case, lower is probably *not* better—and actually could be quite a bit worse. Stated differently, the results show that SpaceX's proposed modification is unlikely to be a "safety upgrade" of its network, and may actually amount to a safety *down*grade. And, notably, these results are specific to *SpaceX's* system design and do not imply any single relationship between altitude and collision risk as a general matter. Of course, the same methodologies could be used to evaluate other NGSO

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[5] Critically, Viasat did not attempt to prove that operations at higher altitudes are necessarily safer. Indeed, this sort of reductive thinking is precisely what Viasat has argued against.

[6] SpaceX suggests that Viasat somehow reached a "pre-determined conclusion," *see* SpaceX Letter at 1, but does not claim that Viasat deviated in any way from accepted methodologies for the use of DAS.

systems[7]—although the results of any such analyses would not be relevant to the Commission's evaluation of the safety risks posed by *SpaceX's* system.[8]

II. SPACEX'S ATTEMPTS TO "CORRECT" VIASAT'S *PROPER* USE OF DAS EFFECTIVELY CREATE YET ANOTHER FLAWED, BESPOKE METRIC

A. SpaceX Misuses DAS, Effectively Creating Yet Another Bespoke Approach that Serves SpaceX's Own Interests above All Others

As noted above, Viasat's January 15 letter utilized several widely accepted, preexisting, third-party methodologies to compare the relative collision risk presented by each Starlink design iteration. One of these third-party methodologies utilized the then-latest version of DAS.

DAS-based analysis does not examine every potential source of in-orbit collision risk, nor could it. DAS, like other methodologies, relies on a series of simplifying assumptions to gain analytical "torque" and construct a model with which to estimate in-orbit collision risk with debris objects. The DAS model is designed for a specific purpose—to "assess the ability of the *design and mission profile of a space system* to limit the probability of accidental collision with known resident space objects during the system's orbital lifetime."[9] Because DAS is focused on assessing the collision risk associated with a given system design, DAS assumes that the system operates as intended—*e.g.,* that satellites will not fail or alter their baseline trajectories.

SpaceX suggests that Viasat uses DAS incorrectly because Viasat allegedly: (i) ignored "non-maneuverable satellites" and (ii) did not assume that the collision risk associated with maneuverable satellites is zero.[10] But Viasat used DAS as it was intended to be used, in

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[7] SpaceX suggests that Viasat is subjecting SpaceX to scrutiny "never applied to any other applicant." *See* SpaceX Letter at 1. But SpaceX's system *should* be subject to an elevated level of scrutiny, given that SpaceX has: (i) experienced extraordinarily high initial failure rates; (ii) refused to provide sufficient information about those failures, the root cause thereof, or whether those root causes might affect other satellites; and (iii) failed to honor its prior commitments to the Commission with respect to reliability and "pausing" further deployment in the event of obvious design issues. In any event, Viasat has been clear that it intends to operate its system in a manner consistent with the same requirements that the Commission applies to its competitors.

[8] SpaceX attempts to distract attention from the potential space safety risks posed by its proposed modification by focusing on Viasat's proposal to "grow its own system 14 times larger and move it to a much riskier altitude." *See* SpaceX Letter at 1. SpaceX ignores that Viasat is proposing to operate a total of 288 satellites, which would pose far less risk the the more than 4,400 satellites that SpaceX proposes to operate. And, notably, SpaceX is not yet permitted to operate over 2,800 of those satellites at any altitude.

[9] *See Debris Assessment Software User's Guide,* NASA/TP-2020-5002380, at B-4 (2020) (emphasis added).

[10] *See* SpaceX Letter at 1-2.

accordance with established methodologies. Notably, SpaceX does not claim otherwise,[11] nor does it dispute that the results presented by Viasat in its January 15 letter accurately reflect the results of the DAS analysis that Viasat conducted.[12]

Nevertheless, SpaceX purports to "correct" Viasat's straightforward (and correct) use of DAS by using a modified approach that somehow: (i) assumes a 2 percent failure rate; and (ii) assumes that all maneuverable satellites present zero risk of collision. SpaceX does not specify how exactly it has incorporated these assumptions into its DAS analysis or modified the outputs generated by DAS in light of those assumptions. As such, the summary results presented in Table 1 and Table 2 of its letter cannot be evaluated or validated—a step that is particularly critical given that no qualified engineer certifies to the accuracy of the technical information presented by SpaceX.

Regardless, the net result of the two "corrective" assumptions that SpaceX makes is a fundamental departure from the purpose for which DAS was created—namely, the assessment of collision risk associated with a particular system design assuming that the system operates as intended. Instead, SpaceX attempts to create yet another bespoke metric that is specifically designed to generate highly skewed results that "prove" SpaceX's point. SpaceX is certainly free to propose such a metric, but it is not free to pretend that it has the imprimatur of NASA or that Viasat's proper use of DAS was wrong.

B. SpaceX's Improper "Corrective" Assumptions Skew Its Results

Even the limited insight that SpaceX has provided with respect to its bespoke approach suggests that it has used its "corrective" assumptions in deeply flawed ways that have skewed the results that DAS would otherwise produce. Among other things:

1. SpaceX Incorrectly Applies the Commission's Assumption that a Maneuverable Satellite Will Pose Zero Collision Risk

Although the Commission has adopted a "simplifying" assumption that a maneuverable satellite will pose zero risk of collision, it has done so only with respect to individual satellites, and only "during the period of the time when the space station is able to conduct collision avoidance maneuvers."[13] The Commission had made no such assumption with respect to multi-satellite NGSO systems—which makes sense because even small residual risks that can be safely

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[11] To the extent SpaceX believes DAS should treat failed or maneuverable satellites differently, those comments should be directed toward the developers of DAS and not Viasat.

[12] Viasat utilized the latest version of DAS available at the time. SpaceX claims that Viasat incorrectly referred to "DAS 3.1.1" because, SpaceX asserts, the latest release of DAS is 3.1.0. *See* SpaceX Letter at 2 n.4. But this is incorrect—and Viasat's claim is verifiable with minimal diligence—notwithstanding what the outdated release notes cited by SpaceX, published almost one year ago, might suggest. *See, e.g., Debris Assessment Software (DAS) v. 3.1.2*, *at* https://software.nasa.gov/software/MSC-26690-1 (last visited Mar. 23, 2021).

[13] *See Mitigation of Orbital Debris in the New Space Age*, 35 FCC Rcd 4156, at ¶ 35 ("*April 2020 NPRM*").

ignored for a single satellite can become substantial when aggregated across large constellations.[14] Notably, the Commission has sought comment with respect to the appropriate treatment of multi-satellite NGSO systems.[15] SpaceX's assumption of zero-risk with respect to its multi-satellite constellation not only prejudges the outcome of that proceeding but does so in a way that is at odds with other evidence in the record.[16]

Even in the single-satellite context, the ability of a given satellite to "conduct collision avoidance maneuvers" is a question of fact for the Commission—and not SpaceX—to resolve. To the extent SpaceX believes it is entitled to rely on the zero-risk assumption, the proper course would have been for SpaceX to use DAS to calculate relevant collision probabilities across its constellation in accordance with established methodologies, and then present the results to the Commission and seek its consent to "zero out" the risk associated with specific satellites after demonstrating that they will be able to maneuver for as long as they remain in orbit. SpaceX's decision to simply ignore all satellites that *it* believes are sufficiently maneuverable turns this process on its head, and also prevents the Commission and other interested parties from understanding the collision risks that would be present once a given satellite is *not* maneuverable at a particular time.

Notably, in adopting the zero-risk assumption for individual satellites, the Commission was careful to provide that the assumption would not be applied "in individual cases, to the extent there is evidence that a particular system or operator is unable to effectively maneuver or is maneuvering only at risk thresholds that raise reasonable questions about its ability to meet the 0.001 collision risk metric even with some degree of maneuverability . . . ."[17] As Viasat has observed, the satellites that SpaceX has deployed to date have experienced an *extraordinarily high* failure rate. Even SpaceX's recent disclosure as to non-maneuverable "v1.0" satellites makes this clear.[18] And that disclosure does not even attempt to reflect the actual level of maneuverability failures on its first 60 satellites, a number of which remain in orbit and, according to third-party data, are not maneuverable, while others may not be working.[19] Therefore, there can be no doubt that there is evidence that a large number of Starlink satellites, in particular, are "unable to effectively maneuver." As such, SpaceX's attempt to rely on the zero-risk assumption is fundamentally flawed.

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[14] *Id.* & n.104. The Commission was careful to note that even maneuverable satellites pose some level of risk—although the Commission believed this risk could be ignored safely with respect to individual satellites pending further work in this area by NASA and other stakeholders. *See id.* & n.102.

[15] *Id.* at ¶ 160.

[16] *See, e.g.,* Letter from Viasat to FCC, IB Docket No. 18-313 and IBFS File No. SAT-MOD-20200417-00037 (Mar. 23, 2021).

[17] *April 2020 NPRM* ¶ 35.

[18] *See* Letter from SpaceX to FCC, IBFS File No. SAT-MOD-20200417-00037, Att. at 5 (Feb. 22, 2021) (identifying numerous non-maneuverable Starlink satellites above injection orbit).

[19] *See generally* https://planet4589.org/space/stats/megacon/starbad.html.

And even ignoring SpaceX's experiential failure rate, the assumptions it makes in its pseudo-DAS "analysis" are inherently incompatible in light of the above guidance from the Commission. For purposes of its DAS analysis, SpaceX assumes a 2 percent failure rate. But a 2 percent failure rate would certainly raise "reasonable questions" about SpaceX's ability to meet a 0.001 collision probability standard. Stated differently, any system with a 2 percent failure rate could not also rely on the zero-risk assumption, as SpaceX suggests it could.

2. SpaceX Improperly Omits *98%* of Its Constellation in Evaluating the Collision Risk Posed by Various Iterations of Its System Design

The Commission has made clear that the DAS analysis presented by an applicant—including, in particular, SpaceX—should "assum[e] that the maneuver capability on the satellite is not available . . . ."[20] This is consistent with the purpose for which DAS was created, as described above. Therefore, in attempting to calculate collision probability using DAS, SpaceX should *not* have assumed that any of its satellites would be maneuverable—and certainly should *not* have ignored the collision risk posed by such satellites.

The upshot is that SpaceX's "analysis" effectively ignores the potential collision risk posed by *98 percent* of its constellation. With respect to its proposed system, this means that SpaceX evaluated the collision risk associated with only 88 satellites instead of 4,408 satellites—a significant difference.

And, as Viasat has explained, with SpaceX's proposed modification it could expect to receive over 3,350 warnings per day, over 370 of which might require planning and execution of avoidance maneuvers. Even if SpaceX could process 2.5 warnings per minute, and plan and actually execute an avoidance maneuver every four minutes, that would leave over 1 million warnings per year that would not be acted upon. The inherent uncertainty with orbit predictions means that some collisions still could occur even where avoidance maneuvers were not effectuated. Even using a very low maneuver threshold for a conjunction alert of a 0.00001 (1 in 100,000) probability of collision, with over 1 million alerts per year not acted upon, SpaceX would be expected to experience an average of 10.9 collisions per year. That means 163 collisions could be expected over a 15-year license term, even if one assumes 100% reliability of the Starlink collision avoidance capability, which is not the case given its experiential failure rate.[21]

SpaceX's more recent March 16, 2021 letter in which it committed to "initiating mitigating actions when Pc is greater than lE-05 (i.e., 1 in 100,000)"[22] is no response to Viasat's calculation of collision risk when an extremely large number of expected conjunctions are considered.

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[20] *See* Letter from FCC to SpaceX, IBFS File No. SAT-MOD-20200417-00037 (May 6, 2020).

[21] *See* Viasat Jan. 15 Letter at 11-13 & Annex C.

[22] *See* Letter from SpaceX to FCC, IBFS File No. SAT-MOD-20200417-00037 (Mar. 16, 2021).

It is impossible to know the extent to which SpaceX's decision to ignore 98% of its constellation skewed its results based on the information it has provided. Among other things, SpaceX provides no information about *which* of its satellites it has assumed would fail, and were therefore included in its "analysis." This decision could have had a dramatic impact on the "average" collision probability that SpaceX generated, as the DAS-calculated collision probability of satellites in SpaceX's proposed system varies considerably based on the operating characteristics of the individual satellite.[23]

3. SpaceX Improperly Assumes that Its Satellites Will Remain in Orbit for Far Longer than Intended, Skewing the Results of Its "Analysis"

As noted above, SpaceX attempts to use DAS to evaluate failed satellites, a task for which DAS simply was not designed. SpaceX attempts to adapt DAS for this purpose by artificially extending the intended orbital lifetimes of relevant satellites to whatever length of time would be necessary for those satellites to passively decay from orbit.

SpaceX's misuse of DAS skews its results significantly. Because satellites operating at higher altitude generally take more time to passively decay,[24] SpaceX's approach dramatically inflates the collision risk presented by systems operating at higher altitudes. This, in and of itself, explains why SpaceX's results are the *opposite* of those generated by Viasat through a straightforward application of DAS.

Notably, the approach that SpaceX employs generates absurdly high collision probability estimates for any satellite operating above 650 km given the amount of time that would be necessary for such satellites to passively deorbit. As a consequence, under the Commission's existing 0.001 per-satellite collision probability limit, SpaceX's approach would effectively ban the operation of satellites in much of LEO and much of MEO (as well as geostationary satellites altogether). NASA itself recognized as much, which is one reason that DAS does not allow users to specify intended orbital lifetimes of more than 100 years.[25]

III. SPACEX'S REMAINING "ANALYSIS" CONSISTS OF GENERAL STATEMENTS THAT IN NO WAY PROVE THAT *SPACEX'S* PROPOSED SYSTEM DESIGN WOULD REPRESENT A "SAFETY UPGRADE"

After presenting flawed analysis based on its flawed approach to (mis)using DAS, SpaceX spends much of the rest of its letter making broad claims about the relationship between altitude and safety, divorced from the specifics of SpaceX's system designs. Among other things, SpaceX quotes statements from the Commission and NASA suggesting that satellites

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[23] *See* Viasat Jan. 15 Letter at Annex A, Table 7.

[24] No party disputes that, as a matter of physics, satellites at lower altitude will passively deorbit at a faster rate than satellites at higher altitude as a general matter.

[25] *See, e.g., Process for Limiting Orbital Debris*, NASA-STD-8719.14B, at 37 (Apr. 25, 2019) (explaining that at higher altitude orbital lifetime must be limited "because in principle an infinite lifetime will always equate to a mathematical collision probability of one").

operating at lower altitudes tend to decay faster, which can reduce the potential for collision that persists during the time a satellite remains in orbit.[26]

But these broad statements do not address other factors that may offset the safety benefits of operating at lower altitude. Notably, NASA has acknowledged that there are other factors that may suggest that a given system would be safer at a higher altitude. For example, the NASA Handbook identifies orbital density as an important consideration, and specifies that "[o]rbit selection [in any specific case] should be informed by a study to determine expected conjunction rates."[27] In other words, NASA has acknowledged the need to evaluate multiple, system-specific factors in order to evaluate the collision risk associated with a given system—instead of simply assuming that "lower is necessarily better."

Certainly, these broad statements do not address the safety risk associated with the specific iterations of *SpaceX's* system design that were analyzed by Viasat using established methodologies. Consequently, these broad statements in no way support SpaceX's claim that *its* proposed modification would amount to a "safety upgrade." Nor do these broad statements invalidate: (i) Viasat's broader point that the relationship between altitude and safety is more complex that SpaceX suggests; or (ii) Viasat's analysis showing that, in the case of SpaceX's *specific* system, operations at lower altitude could actually be riskier.

SpaceX's attempt to rely on general assertions of this nature—instead of the constellation-specific analysis that SpaceX promised—is unavailing; as with any bad magician, this attempted sleight-of-hand is easy to spot and expose.

IV. SPACEX DOES NOT REFUTE VIASAT'S NON-DAS TECHNICAL ANALYSIS

As noted above, Viasat's January 15 filing used a series of widely accepted, preexisting, third-party methodologies to analyze the problem in multiple ways and compare the relative collision risk presented by each Starlink design iteration. Only one such methodology utilized DAS analysis. Viasat also presented technical analysis using two non-DAS methodologies, based on: (i) the Kinetic Theory of Gases and (ii) the Number of Encounters Assessment Tool (NEAT). The results generated by those methodologies *also* suggest that Starlink operations at lower altitude would be less safe than prior iterations of Starlink.

As Viasat explained in its January 15 letter, DAS analysis does not account for important aspects of the collision-risk problem, including (but not limited to):

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[26] *See* SpaceX Letter at 3-4, 7. SpaceX also presents graphs which purport to depict: (i) that satellites at higher altitude generally take longer to passively decay; and (ii) that the collision risk calculated for some unspecified satellite is higher as altitude increases. The first of these points is uncontroversial, and the second proves nothing with respect to *SpaceX's* system. *See id.* at 4, 6.

[27] *See NASA Spacecraft Conjunction Assessment and Collision Avoidance Best Practices Handbook*, NASA/SP-20205011318, at 14 (Dec. 2020).

- The risk of collisions due to future changes in the orbital environment (*e.g.,* additional satellites being launched);

- The risk of collisions with all sizes of space objects (*e.g.,* between 1 cm and 10 cm);

- Risks related to the continued reliability of critical command and propulsion capabilities needed to allow satellites to maneuver to avoid collisions as long as they remain in orbit (not just predictions at the application stage);

- The risk of intra-system collisions within large NGSO systems; and

- Known risks with techniques used to maneuver to try to avoid collisions (because of the inherent uncertainties involved).

The Kinetic Theory of Gases, NEAT, and other non-DAS methodologies help to address these gaps in DAS analysis. For example, analysis using the Kinetic Theory of Gases helps to estimate potential intra-system risks. And analysis using NEAT helps to estimate potential risks associated with satellites that *can* maneuver but do not do so to avoid a predicted conjunction. None of these methodologies (DAS included) is comprehensive, and each makes different simplifying assumptions. That said, it is significant that Viasat's results using each of these methodologies support the same conclusion—that SpaceX's various modifications have increased risk and made its system design less safe.

SpaceX makes minimal effort to respond to Viasat's non-DAS analyses, suggesting that the Commission should dismiss the findings presented by Viasat because the non-DAS methodologies it uses allegedly have not been "endorsed" by the Commission.[28] Notably, both the Kinetic Theory of Gases and NEAT are established and widely accepted methodologies, which can and should be incorporated into the Commission's analysis of orbital safety. Ultimately, though, the relevant question is not whether a methodology has been "endorsed" previously, but whether it provides valid and valuable insight into the potential safety risks associated with SpaceX's operations.[29] The answer to that question is a clear "yes."

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[28] *See* SpaceX Letter at 7.

[29] SpaceX accuses Viasat of "[m]isus[ing] academic work to support misrepresentations about SpaceX . . . ." *See* SpaceX Letter at 8. This is simply not true. In support of this claim, SpaceX references: (i) a case in which a third party disagreed with Viasat's consideration of data regarding *all failed Starlink satellites* in estimating SpaceX's failure rate, but *still* confirmed that SpaceX's initial failure rate was much higher than the rate that SpaceX had said it would be "nowhere near;" and (ii) a case in which a third-party organization disagreed with one aspect of a recent Viasat filing but confirmed the need to address environmental issues more broadly and expressed appreciation for Viasat's advocacy in support of those issues. That these parties do not agree with every aspect of every argument that Viasat has made on the record in no way supports SpaceX's baseless accusation. Moreover, SpaceX had no response to Viasat's September 24, 2020 explanation of why all Starlink failures are

SpaceX's suggestion that the Commission ignore technical analysis that is otherwise valid simply because it has not been "endorsed" strongly suggests that SpaceX has something to hide. Furthermore, that suggestion is inconsistent with SpaceX's recent efforts to utilize its own bespoke metric to evaluate collision risk, as well as its own bespoke approach to DAS analysis. If anything, it is *SpaceX* that advocates the use of unproven and self-serving methodologies, with respect to both the collision risk and interference risk posed by its system.

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For the reasons set forth herein and in Viasat's letter of January 15, 2021, the Commission should reject SpaceX's unsubstantiated claim that its proposed NGSO system modification would necessarily amount to a "safety upgrade."

Respectfully submitted,

/s/
Amy R. Mehlman
Vice President
US Government Affairs and Policy

Jarrett S. Taubman
Associate General Counsel
Government and Regulatory Affairs

relevant in assessing SpaceX's failure to honor its commitments to the Commission. Nor has SpaceX contested recent findings that: (i) SpaceX has not achieved the reduction in light pollution it sought to achieve; and (ii) more work is needed to address serious optical and radio astronomy concerns raised about Starlink operations. *See* United Nations Office for Outer Space Affairs, DARK AND QUIET SKIES FOR SCIENCE AND SOCIETY: REPORT AND RECOMMENDATIONS (2020).

DECLARATION OF MARK A. STURZA

I, Mark A. Sturza, hereby make the following declarations under penalty of perjury:

1. I am President of 3C Systems Company, which has acted as consultant to Viasat, Inc. ("Viasat") regarding the matters addressed in the foregoing letter.

2. I prepared the engineering information submitted in the foregoing letter and otherwise have reviewed its substance, which is complete and accurate to the best of my knowledge, information and belief.

/s/

Mark A. Sturza
President
3C Systems Company

March 26, 2021