



December 22, 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
Long-Form Application of Starlink Services, LLC, Auction 904 File Number
0009395128, *et al.*;
Rural Digital Opportunity Fund (Auction 904), AU Docket No. 20-34;
Rural Digital Opportunity Fund, WC Docket No. 19-126;
*Petition of Starlink Services, LLC for Designation as an Eligible
Telecommunications Carrier*, WC Docket No. 09-197;
Expanding Flexible Use of the 12.2-12.7 GHz Band, WT Docket No. 20-443

Dear Ms. Dortch:

Over the course of this year, numerous stakeholders, including Members of Congress¹ and industry participants,² have raised serious concerns with respect to SpaceX's ability to meet its RDOF service commitments. Viasat, for its part, has submitted extensive technical analyses demonstrating that even if SpaceX were to deploy a full, 4,408-satellite Starlink system, that system would fall short in satisfying SpaceX's RDOF commitments in a number of material respects.³ Among other things, Viasat has shown that even under a "best-case scenario in which

¹ See, e.g., Letter from the Honorable James E. Clyburn, Member of Congress, *et al.*, to the Honorable Ajit Pai, Chairman, Federal Communications Commission, at 1 (Jan. 19, 2021), at <https://walberg.house.gov/sites/walberg.house.gov/files/WalbergFCCRDOFletter.pdf>.

² See, e.g., Fiber Broadband Association & NTCA, Starlink RDOF Assessment Final Report (Feb. 8, 2021) (appended to Letter from Fiber Broadband Association & NTCA to FCC, AU Docket No. 20-34 *et al.* (Feb. 8, 2021)); Letter of the Competitive Carriers Association, AU Docket No. 20-34 *et al.* (May 6, 2021); Letter of the Computer & Communications Industry Association, AU Docket No. 20-34 *et al.* (June 16, 2021).

³ See Letter from Viasat to FCC, Auction 904 File Number 0009149922 *et al.*, AU Docket No. 20-34 *et al.* (Apr. 5, 2021) ("Viasat Apr. 5 Letter"); Letter from Viasat to FCC, Auction 904 File Number 0009395128 *et al.*, AU Docket No. 20-34 *et al.* (June 1, 2021) ("Viasat June 1 Letter"); see also Letter from Viasat to FCC, Auction 904 File Number 0009395128 *et al.*, AU Docket No. 20-34 *et al.* (May 10, 2021) ("Viasat May 10 Letter").

SpaceX has absolutely zero non-RDOF-based demands for Starlink capacity,” there “is not enough Starlink capacity (bandwidth) available in the specific geographic locations that SpaceX bid for and provisionally ‘won’” to meet its RDOF service commitments.⁴ Viasat also demonstrated that SpaceX lacks the financial and other qualifications necessary to receive RDOF support.⁵ SpaceX has *never* directly responded to this analysis—a silence that is truly deafening.

At the same time, SpaceX’s founder and Chief Executive Officer—Elon Musk—continues to make numerous public statements that *confirm* the analysis presented by Viasat and other parties. For example, Mr. Musk has repeatedly observed that SpaceX is a financially risky endeavor (making SpaceX ineligible for RDOF funding under Commission precedent).⁶ Mr. Musk has also acknowledged that the Starlink network is inherently capacity-constrained and “can hit max users in some areas fast”—consistent with Viasat’s technical analysis showing that SpaceX will not be able to meet its RDOF coverage requirements in many areas.⁷

A more recent example is an e-mail that Mr. Musk sent to SpaceX employees just prior to Thanksgiving (reproduced in Exhibit A to this letter).⁸ The nominal focus of that e-mail is SpaceX’s “Raptor production crisis”—*i.e.*, its apparent difficulties successfully manufacturing its new Raptor engine. However, in discussing that crisis, Mr. Musk makes several admissions that bear directly on the Commission’s evaluation of SpaceX’s RDOF application. More specifically, he:

- Acknowledges that SpaceX plans to rely on unproven and risky technologies to make the Starlink network viable—contrary to the Commission’s RDOF framework;
- Underscores the financially risky nature of the Starlink network and SpaceX’s precarious financial position—facts that make SpaceX ineligible to receive RDOF support under applicable Commission precedent;
- Strongly suggests that SpaceX is relying on an unauthorized Starlink satellite design—which reliance *SpaceX* has argued is impermissible under the RDOF framework; and

⁴ Viasat Apr. 5 Letter at 13.

⁵ *See, e.g.*, Letter from Viasat to FCC, Auction 904 File Number 0009395128 *et al.*, AU Docket No. 20-34 *et al.* (July 20, 2021) (“Viasat July 20 Letter”); Letter from Viasat to FCC, Auction 904, File Number 0009395128 *et al.*, AU Docket No. 20-34 *et al.* (Nov. 10, 2021) (“Viasat Nov. 10 Letter”).

⁶ Viasat July 20 Letter at 3-5.

⁷ Viasat Nov. 10 Letter at 3.

⁸ *See* Derek Wise, *Elon Musk says SpaceX could face ‘genuine risk of bankruptcy’ from Starship engine production*, SPACE EXPLORED (Nov. 29, 2021), at <https://spaceexplored.com/2021/11/29/spacex-raptor-crisis/>.

- Confirms that Starlink faces inherent capacity limitations that preclude it from serving additional customers within its footprint—consistent with Viasat’s still-unrefuted technical analysis.

These admissions warrant careful consideration by the Commission, particularly in light of Starlink’s ongoing performance issues—including a significant *decrease* in median speeds in Q3 versus Q2 of 2021 as measured by third-party independent speed tests.⁹ Viasat takes this opportunity to bring these matters to the Commission’s attention and place them into appropriate context.

1. The Musk E-Mail Acknowledges that SpaceX Is Relying on Unproven Technologies to Deploy Starlink—And Therefore Is Ineligible to Receive RDOF Support

Under the Commission’s framework for the RDOF auction, long-form applicants were required to provide detailed information about how they would meet applicable performance requirements using *existing, proven technologies*. In establishing this requirement, the Commission emphasized that it would be inappropriate to “test unproven technologies using universal service support.”¹⁰ Thus, an applicant is not permitted to rely on speculative technological improvements that may or may not be feasible to address shortcomings that exist at the time its long-form application is filed—let alone while that application is being evaluated.

But in his recent e-mail, Mr. Musk acknowledges that this is *precisely* what SpaceX is attempting to do. Indeed, Mr. Musk explains that SpaceX will not be able to deploy or operate Starlink successfully without Raptor engine and Starship launch vehicle technologies that are not yet viable—and certainly were not viable when SpaceX submitted its RDOF long-form application earlier this year.¹¹ Furthermore, Mr. Musk concedes that SpaceX’s ability to *ever* perfect those technologies is very much in doubt, characterizing the current state of their development as a “disaster” that cannot be “sugarcoat[ed].”

In short, Mr. Musk’s e-mail confirms that Starlink is being deployed in a manner fundamentally at odds with the Commission’s RDOF framework. This renders SpaceX ineligible for RDOF support, and raises serious questions about whether SpaceX should have been permitted to participate in the RDOF auction in the first place.

⁹ See Isla McKetta, *Starlink Expands but Q3 2021 Performance Flattens in Some Areas* (Dec. 20, 2021), at <https://www.speedtest.net/insights/blog/starlink-hughesnet-viasat-performance-q3-2021/>.

¹⁰ See *Rural Digital Opportunity Fund Phase I Auction Scheduled for October 29, 2020; Notice and Filing Requirements and Other Procedures for Auction 904*, Public Notice, 35 FCC Rcd 6077, at ¶ 98 (2020) (“RDOF Procedures PN”).

¹¹ Mr. Musk explains that these technologies are critical to SpaceX’s ability to launch its so-called “V2” satellites, and that without those satellites SpaceX: (i) may not be financially viable; and (ii) may be unable to handle bandwidth demand.

2. The Musk E-Mail Underscores that Starlink Is a Financially “Risky Venture” Ineligible to Receive RDOF Support

Under the Commission’s RDOF framework, provisionally winning bidders must establish that they are financially qualified to receive RDOF support. In evaluating the financial qualifications of a given applicant, the Commission considers (among other things) evidence that the applicant may not be able to continue as a going concern.¹² This is consistent with Bureau precedent requiring each LEO applicant to establish that it is not proposing a “risky venture.”¹³

In its letter of July 20, 2021, Viasat highlighted public statements by Mr. Musk expressing significant doubt as to SpaceX’s ability to avoid bankruptcy, and thus its financial qualifications to receive RDOF support.¹⁴ As Viasat observed, these statements contradict representations that SpaceX has made in its RDOF long-form application claiming a clean bill of financial health.¹⁵ True to form, SpaceX has offered no response to these concerns.

Mr. Musk’s recent e-mail provides further evidence that the claims made in that application do not reflect SpaceX’s *actual* view of its financial qualifications or the financial viability of the Starlink network. To the contrary, that e-mail clearly acknowledges that SpaceX cannot continue as a going concern using the Starlink satellites previously described to and authorized by the Commission (the so-called “V1” satellites). Indeed, Mr. Musk characterizes these satellites as “financially weak,” and explains that that SpaceX “face[s] genuine risk of bankruptcy” if it cannot perfect its unproven engine and launch vehicle technologies (necessary to deploy so-called “V2” satellites), and is instead forced to rely on “V1” satellites that can be deployed with existing technologies.

Given this evidence, there can be no doubt that: (i) Starlink represents the sort of “risky venture” that cannot be supported under the Commission’s RDOF framework; and (ii) serious questions exist as to whether SpaceX demonstrated appropriate candor in describing its financial qualifications in its RDOF long-form application.

3. The Musk E-Mail Strongly Suggests that SpaceX Is Relying on an Unauthorized Satellite Design—Which Reliance SpaceX Has Argued Is Impermissible

SpaceX’s *current* NGSO system license, granted earlier this year, authorizes the deployment and operation of satellites with the physical characteristics described in SpaceX’s underlying application—which reflect the Starlink “V1” satellites. Mr. Musk’s e-mail strongly suggests that the “V2” satellites will be significantly larger and heavier than the authorized “V1” satellites, as the existing “Falcon [launch vehicle] has neither the volume *nor* the mass to orbit

¹² See *RDOF Procedures PN ¶¶ 56-57* (subjecting applications to greater scrutiny where audited financial statements raise concerns about an entity’s inability to remain in business).

¹³ See Letter from Jonathan M. Campbell, FCC Office of Economics and Analytics, to Christopher Murphy, Viasat, at 3 (Oct. 27, 2020).

¹⁴ Viasat July 20 Letter at 4.

¹⁵ *Id.*

needed for satellite V2.” This raises material questions as to whether SpaceX has the requisite Commission authority to deploy and operate its “V2” satellites. Notably:

- (i) SpaceX’s NGSO license authorizes it to deploy its Starlink system under a specific orbital debris mitigation plan reviewed and approved by the Commission;
- (ii) SpaceX was required to obtain Commission approval of that plan “[u]pon finalization of its space station design”—which obviously had not occurred if SpaceX is now proposing to deploy “V2” satellites with a materially different design;¹⁶
- (iii) Specific elements of that plan—including calculations of collision risk and human casualty risk—are derived from physical satellite characteristics (*e.g.*, size and mass) previously provided by SpaceX in the application process and will be invalidated by the shift to “V2” satellites;
- (iv) SpaceX’s authority is generally conditioned upon it operating in a manner “consistent with the technical specifications provided to the Commission” in the underlying application proceeding—including information about the physical characteristics of its satellites;¹⁷ and
- (v) The Commission has confirmed that SpaceX would need to follow the “process under the rules for . . . licensed systems to request modification” in the event of any material deviation from those specifications.¹⁸

In short, it appears that SpaceX must obtain new or additional authority from the Commission before deploying any “V2” satellites. And Mr. Musk’s recent e-mail asserts that the “V2” satellites are critical to the technical and financial viability of the Starlink network. It follows that, under Mr. Musk’s own characterization of the situation, Starlink may lack the authority needed to viably deploy and operate its network—and credibly satisfy its RDOF obligations.

Even if SpaceX were able to obtain such authorization, under *SpaceX’s* interpretation of the RDOF application rules it could not rely on such authorization to meet its RDOF obligations. Notably, in a filing submitted earlier this year SpaceX argued that other RDOF auction applicants were required to hold all “authorizations necessary to meet their proposed bid-tier obligations” prior to participating in the RDOF auction.¹⁹ Consistent with that position, SpaceX has claimed that it was and is able to meet its RDOF obligations “rel[ying] on the LEO NGSO spectrum authorizations it held at the time” of its *short-form application* and not “any pending

¹⁶ See *Space Exploration Holdings LLC*, 34 FCC Rcd 12307, at ¶ 21.q (2019).

¹⁷ See *Space Exploration Holdings LLC*, 36 FCC Rcd 7995, at ¶ 97.s (2021).

¹⁸ *Id.* ¶ 28.

¹⁹ See *Space Exploration Technologies Corp. Opposition to Viasat, Inc. Application for Review*, GN Docket No. 21-231, at 2 (June 28, 2021).

modifications”²⁰ As that is clearly no longer the case—if it ever was—the Commission should dismiss SpaceX’s long-form application.

In any event, even if SpaceX were able to deploy its “V2” satellites it would still lack sufficient capacity to meet its RDOF deployment obligations. This is because complying with the spectrum reuse limits in SpaceX’s NGSO system and earth station authorizations limits its maximum system capacity in many of the areas it provisionally “won” in the RDOF auction—as Viasat has demonstrated previously.

4. The Musk E-Mail Confirms that the Starlink Network Faces Inherent Capacity Constraints that Would Preclude It from Satisfying Its RDOF Obligations

As Viasat has demonstrated on the record, the Starlink network faces inherent capacity constraints that would prevent it from meeting its RDOF obligations even if SpaceX were to: (i) successfully implement its Raptor and Starship technologies; and (ii) obtain Commission authorization for its “V2” satellites. More specifically, over the past year Viasat has provided extensive technical analysis demonstrating that the Starlink system does not and will not have the ability to serve the RDOF locations that SpaceX was provisionally awarded through the RDOF auction. This would be the case even if SpaceX were to deploy its full complement of 4,408 authorized satellites.²¹

SpaceX has not even *attempted* to refute this analysis. At the same time, SpaceX has confirmed that it faces severe limitations on its network capacity. Notably, the Starlink website explicitly acknowledges that SpaceX is unable to serve additional households in certain parts of the Starlink coverage area.²² Moreover, press reports indicate that SpaceX has significantly delayed in-service estimates for many areas into early 2023—apparently because SpaceX lacks capacity to serve additional customers.²³

The Starlink website claims that these delays are the result of “[s]ilicon shortages” that have “impacted [SpaceX’s] ability to fulfill orders”—*i.e.*, “ship Starlink Kits” to customers.²⁴ But Mr. Musk’s recent e-mail contradicts this explanation, and acknowledges that, in the first instance, the limiting factor is actually the number, performance, and capability of Starlink satellites that are in orbit. As Mr. Musk explains, SpaceX will be able to produce millions of user terminals, which will be useless unless SpaceX is able to deploy the future “V2” satellites

²⁰ *Id.* at 5 n.15 (emphasis eliminated); *see also* Space Exploration Technologies Corp., Auction 904 File No. 0009149922, Spectrum Access Attachment, at 1 (July 14, 2020).

²¹ *See generally* Viasat Apr. 5 Letter.

²² *See* “Account, Billing & Orders: When will I receive my Starlink?”, support.starlink.com (last visited Dec. 17, 2021).

²³ *See* Michael Kan, SpaceX Pushes Wait Times for Starlink to ‘Late 2022, Early 2023’ for More Areas, PC MAGAZINE (Oct. 27, 2021), <https://www.pcmag.com/news/spacex-pusheswait-times-for-starlink-to-late-2022-early-2023-for-more>.

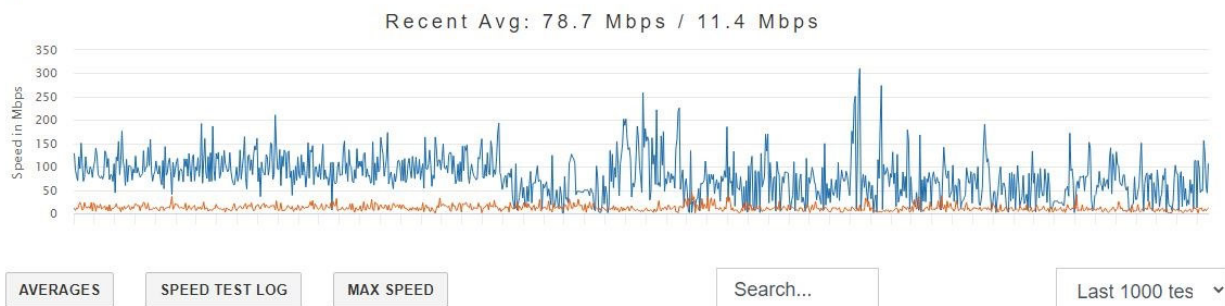
²⁴ *See* n.22, *supra*.

necessary to “handle the bandwidth demand” (which is very much in doubt for the reasons discussed above).

The inherent limitations of the Starlink network also explain why SpaceX has been unable to satisfy other applicable RDOF performance requirements—*e.g.*, speed requirements. In its letters of April 5, 2021 and May 10, 2021, Viasat submitted the results of independent, third-party analysis of the Starlink system showing that Starlink had been unable to meet the speed requirements applicable to SpaceX.²⁵ More than seven months later, SpaceX is *still* unable to meet these requirements. In fact, as Ookla recently reported, “Starlink’s median download speed *decreased* from 97.23 Mbps during Q2 2021 to 87.25 Mbps in Q3 2021, which could be a function of adding more customers.” Ookla reported a similar decrease (from 13.89 Mbps to 13.54 Mbps) in Starlink’s median upload speed.²⁶

Testmy.net reported similar findings. Indeed, as reflected in the graphic below, even focusing on the 1000 most recent speed test results reported on testmy.net as of a few days ago shows that Starlink is not coming anywhere close to meeting either the 100 Mbit/s download speed requirement *or* the 20 Mbit/s upload speed requirement.

SpaceX Starlink



Source: testmy.net/hstats (Dec. 19, 2021).

And these measurements are being taken over a network that remains lightly loaded—suggesting that performance over a highly loaded network would be far worse—particularly as the addition of subscribers and/or the natural increase in bandwidth demand from existing subscribers between Q2 and Q3 has *already* resulted in degradation in the performance of the Starlink network.²⁷

²⁵ See Viasat Apr. 5 Letter at 9-11; Viasat May 20 Letter at 1-3.

²⁶ See Isla McKetta, *Starlink Expands but Q3 2021 Performance Flattens in Some Areas* (Dec. 20, 2021), at <https://www.speedtest.net/insights/blog/starlink-hughesnet-viasat-performance-q3-2021/> (emphasis added).

²⁷ See *id.* There is an inverse relationship between network load and performance. As Professor Michael Fitch of the University of Surrey has explained, “not very many [Starlink] users can have the top speed at the same time in a given area.” Thus, “[t]he average bit-rate

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The Commission should not award *any* amount of RDOF support to SpaceX—let alone the approximately \$890 million provisionally awarded to the company—given that its principal has: (i) acknowledged that SpaceX would rely on unproven technologies that may not be viable; (ii) conceded that the company’s underlying business model is inherently risky, and that its ability to continue as a going concern is in doubt; (iii) strongly suggested that the company may lack the Commission authority necessary to deploy its intended network in a manner consistent with the RDOF framework; and (iv) confirmed that the Starlink network is inherently capacity-constrained—consistent with unrefuted record evidence showing that the company cannot possibly meet its RDOF coverage obligations. The existing record simply provides no rational basis upon which the Commission could grant SpaceX’s long-form application.

Respectfully submitted,

/s/

Jarrett S. Taubman
VP & Deputy Chief Government Affairs and
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cc: Umair Javed
David Strickland
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that individual users experience will reduce as the number of nearby users increases, since the system has a finite capacity that it can provide over any given area.” *See* Chris Vallance, *Why Pigeons Mean Peril for Satellite Broadband*, BBC (Aug. 29, 2021), <https://www.bbc.com/news/technology-58061230>.

Exhibit A: Musk E-Mail to Employees

(Excerpted from Derek Wise, *Elon Musk says SpaceX could face 'genuine risk of bankruptcy' from Starship engine production*, SPACE EXPLORED (Nov. 29, 2021), at <https://spaceexplored.com/2021/11/29/spacex-raptor-crisis/>)

Unfortunately, the Raptor production crisis is much worse than it had seemed a few weeks ago. As we have dug into the issues following the exiting of prior senior management, they have unfortunately turned out to be far more severe than was reported. There is no way to sugarcoat this.

I was going to take this weekend off, as my first weekend off in a long time, but instead, I will be on the Raptor line all night and through the weekend.

Unless you have critical family matters or cannot physically return to Hawthorne, we will need all hands on deck to recover from what is, quite frankly, a disaster.

The consequences for SpaceX if we can not get enough reliable Raptors made is that we then can't fly Starship, which means we then can't fly Starlink Satellite V2 (**Falcon has neither the volume nor the mass to orbit needed for satellite V2**). Satellite V1, by itself, is financially weak, while V2 is strong.

In addition, we are spooling up terminal production to several million units per year, which will consume massive capital, assuming that satellite V2 will be on orbit to handle the bandwidth demand. These terminals will be useless otherwise.

What it comes down to, is that we face a genuine risk of bankruptcy if we can't achieve a Starship flight rate of at least once every two weeks next year.

Thanks,

Elon