

September 29, 2020

BY ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Re: *Space Exploration Holdings, LLC, IBFS File No. SAT-MOD-20200417-00037*

Dear Ms. Dortch:

This letter corrects the record in response to misleading and incorrect filings recently submitted by Viasat, Inc.¹ and Hughes Network Systems, LLC² (collectively, “GSO operators” or “GSOs”). In both filings, the GSO operators, neither of whom has ever operated any satellites in Low Earth Orbit (“LEO”), repeat false assumptions and misrepresent record filings in a strained effort to reach false conclusions about how SpaceX’s non-geostationary orbit (“NGSO”) satellite system works. In contrast, SpaceX is operating more than 700 LEO satellites that are already providing high-quality broadband service to users, and has conducted millions of performance tests on its network.

In short, while the GSOs postulate theoretical claims about how they might operate an NGSO network and their inability to provide low-latency service, SpaceX has conducted millions of tests on its actual operating equipment that demonstrate definitively it can deliver to consumers a true low-latency broadband.

SpaceX Has Run Extensive Real-World Tests That Show Conclusively That Its System Delivers Low-Latency Service.

The GSOs’ arguments about SpaceX’s latency hinge entirely on the assertion that because SpaceX used a few images of screen tests for illustrative purposes in a previous presentation to the Commission, SpaceX lacks other data to support the parameters of its network performance. But the GSOs are reading too much into a single image used in an overview presentation. Indeed, if true, Viasat’s contortions about latency would seem to call into question the credibility of its own stated reason for asking to modify its

¹ See Letter of Amy Melhman, Viasat, Inc., to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-MOD-20200417-00037 (filed Sept. 17, 2020).

² See Letter of Jennifer Manner, Hughes Network Systems, LLC, to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-MOD-20200417-00037 (filed Sept. 21, 2020).

authorization for its NGSO system—to operate, for the first time, its own low-latency service from an altitude twice as high as SpaceX.³

In fact, SpaceX has now conducted millions of tests on actual consumer-grade equipment in congested cells, showing consistent observed median latency of approximately 30 ms. These end-to-end latency measurements—based on actual data, not theory—include all sources of network latency. Contrary to the GSOs’ claims, these beta-test results of latency and throughput are not “best-case” performance measurements. Rather, they reflect testing performed using peak busy-hour conditions, heavily loaded cells, and representative locations. If anything, SpaceX’s beta testing uses conditions designed to support on-going optimization and testing of the network that make network performance measurements *worse, not better*. For example, all the user terminals were configured to transmit debug data continuously, even if the beta customer didn’t have any regular internet traffic, forcing every terminal to continuously utilize the beam.

Moreover, these results are based on beta-test software frame grouping settings that do not yet reflect performance using the software designed to optimize performance for commercial use. Until recently, the network had been grouping user terminals in groups of 8 per radio-frame, instead of the 20 terminals per radio-frame the system supports. This operating choice is to support on-going optimization and testing of the network but has the consequence of introducing 2.5 times longer delay between radio-frames for a given user in a fully loaded cell, corresponding to the smaller group sizes. Importantly, this software feature has just been enabled and is specifically designed to optimize speeds in highly populated cells, increasing throughput by approximately 2.5 times.

In addition to the datapoints representing SpaceX’s aggregate performance, SpaceX analyzed the last week of measurements for a community of 30 high-usage customers. As shown in Figure 1, these measurements, totaling 1,048,576 datapoints, indicated a 95th percentile latency of 42 ms and 50th percentile latency of 30 ms between end users and the point of presence connecting to the Internet. These measurements confirm the SpaceX network is capable of allocating resources efficiently such that latency remains consistent whether the measurement point is the overall network or individual groups of customers.

³ See, e.g., Application of Viasat, Inc., Exhibit A, IBFS File No. SAT-MPL-20200526-00056, at 5 (filed May 26, 2020) (“[T]he modified system responds to the Commission’s recently-stated policy goal of encouraging the deployment of infrastructure capable of supporting sub-100 ms broadband service.”).

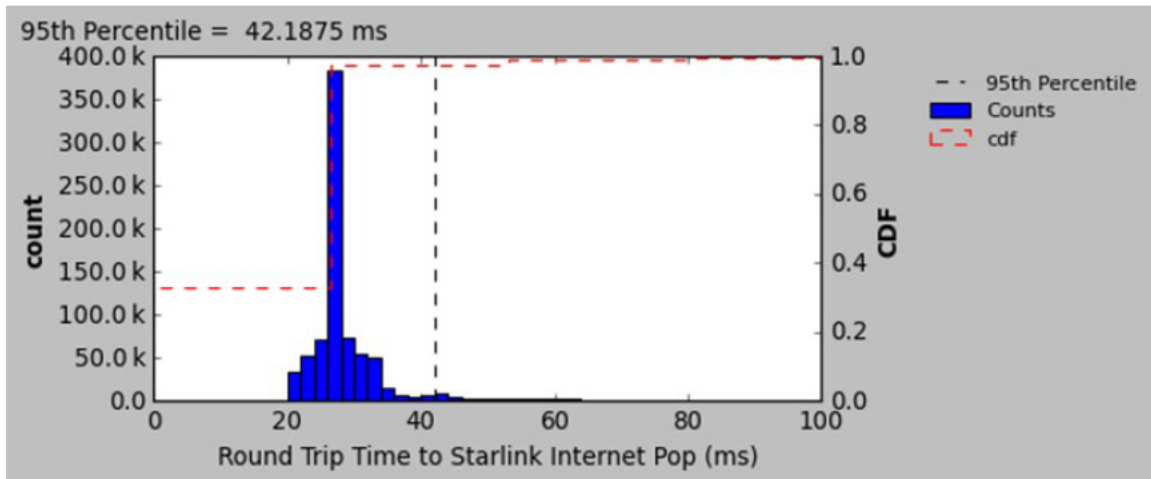


Figure 1. One Week of Latency Measurements (15 second data, 30 users)

The Commission should not be distracted by self-interested, ill-informed speculation from GSOs that have never operated an actual low-latency system. Instead, it should rely on actual data that SpaceX has provided the Commission.

Viasat’s Conclusions About SpaceX Operations Are Based on Documented Misrepresentations and Skewed Analysis.

Viasat steadfastly refuses to allow facts to get in the way of the story it wishes were true. To support its claims about SpaceX’s operations, Viasat relies extensively on research by Professor Jonathan McDowell. SpaceX urges the Commission to review the letter Professor McDowell himself filed in the record in which he called Viasat’s filing a “misreading of my results” and stated that Viasat’s analysis is an “inexplicable interpretation.”⁴

SpaceX is fully transparent about reporting when satellites lose maneuvering capability. All satellite failures are marked on space-track.org, to which every operator and the public at large have access. SpaceX has been continuously and diligently working to upgrade its satellites as technology improves. As a result of these upgrades—and as SpaceX has previously reported, but Viasat continues to ignore—the last 233 satellites SpaceX has launched have had no failures at the time of this filing. Nonetheless, SpaceX continues to work to improve the performance and reliability of its vehicles.

Despite the heated rhetoric from competitors, SpaceX’s modification will in fact significantly improve its safety profile and ensure consumers have access to a truly low-latency service. The Commission would be particularly justified in discounting claims

⁴ See Letter from Jonathan McDowell, Center for Astrophysics, to FCC, IBFS File No. SAT-MPL-20200526-00056 (filed Sep. 21, 2020) (explaining that Viasat’s presentation of data is “a misreading of my results”).

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from Viasat, given its ongoing misrepresentations and its apparent flaunting of Commission rules by its seeming unauthorized use of certain spectrum bands.⁵

The Commission should quickly approve SpaceX's modification.

Sincerely,

/s/ David Goldman

David Goldman
Director of Satellite Policy

SPACE EXPLORATION TECHNOLOGIES CORP.
1155 F Street, NW
Suite 475
Washington, DC 20004
Tel: 202-649-2641
Email: David.Goldman@spacex.com

⁵ See SpaceX Request for Order to Show Cause, IBFS File Nos. SES-LIC-20170401-00357, et al. (filed Sep. 18, 2020).