Federal Communications Commission
Washington, D.C. 20554

December 23, 2021

**VIA ELECTRONIC MAIL**

Mr. William M. Wiltshire
Harris, Wiltshire & Grannis LLP
1919 M Street, NW
Suite 800
Washington, D.C. 20036
wwiltshire@hwglaw.com

Re: IBFS File Nos. SAT-LOA-20200526-00055, SAT-AMD-20210818-00105; Call Sign: S3069

Dear Mr. Wiltshire:

On May 26, 2020, Space Exploration Holdings, LLC (SpaceX) submitted the above-referenced application for authority to construct, deploy, and operate a constellation in a configuration consisting of approximately 30,000 non-geostationary orbit (NGSO) satellites operating in low-earth orbit (LEO).[1] SpaceX amended this application on August 18, 2021.[2] To assist the Satellite Division's review of the application, as amended, please provide the information requested below.[3]

1. SpaceX describes this satellite system as its "next-generation Gen2 System" and states that its Gen2 system is meant to complement its first generation system.[4] Please clarify the relationship between SpaceX's first generation satellite system and the Gen2 system SpaceX proposes in this application and amendment. Does SpaceX plan to operate both systems simultaneously? Will SpaceX deploy replacement satellites for the first generation system in addition to deploying satellites in this Gen2 system, or will the Gen2 satellites be deployed in lieu of first generation system replacement satellites? Will a customer user terminal be able to access satellites from either system, or will there be separate customer user terminals for each system?

2. Section 25.159 of the Commission's rules states that applicants for one licensed-but-unbuilt NGSO-like satellite system in a particular frequency band will not be permitted to apply for another NGSO-like satellite system in that frequency band.[5] SpaceX requests frequencies in its Gen2 system application that are the same as frequencies authorized for its first generation system. Please address the applicability of section 25.159, particularly with respect to those frequencies requested in this Gen2 application that overlap with those authorized in the first

[1] *Space Exploration Holdings, LLC.*, Application for Approval for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO System, IBFS File No. SAT-LOA-20200526-00055 (filed May 26, 2020) (SpaceX Application).

[2] *Space Exploration Holdings, LLC.*, Amendment to Pending Application for the SpaceX Gen2 NGSO Satellite System, IBFS File No. SAT-AMD-20210818-00105 (filed Aug. 18, 2021) (SpaceX Amendment).

[3] 47 CFR § 25.111(a).

[4] SpaceX Amendment, Legal Narrative at 2.

[5] 47 CFR § 25.159.

generation system, given that SpaceX has not yet completed deploying its first generation system, or reached the minimum 50% required by milestone rules. Please address the cadence of launches going forward with respect to the currently authorized system.

3. SpaceX states that it will generally observe a minimum elevation angle as low as 25 degrees, although certain shells may use lower elevations in certain circumstances.[6] In its original application, SpaceX states that satellites in the high inclination shells operating at altitudes of 360 km and 373 km will observe a minimum elevation angle of five degrees for gateways located inside the Polar Regions.[7] Given the amended orbital parameters,[8] please indicate for each alternative orbital configuration which satellites would observe a minimum elevation angle below 25 degrees.

4. Please provide additional detail regarding SpaceX's launch plans for the Gen2 system. Specifically, for each of the alternative orbital configurations described in SpaceX's application,[9] what is the anticipated order for launching into the various altitudes and orbital planes? Does SpaceX have any updates regarding the expected timing of launches for the Gen2 system, and does SpaceX have an estimated timeline in which it would plan to notify the Commission concerning which of the two configurations it plans to deploy?[10]

5. In the amended legal narrative and technical attachment, SpaceX states it will conduct testing of its Gen2 satellites at low insertion altitudes before orbit-raising them to operational altitudes,[11] consistent with the authorization for its first generation satellites. However, elsewhere in the technical attachment, SpaceX states the new configuration of satellites will allow for direct-to-station launches,[12] and we note at least one public statement concerning direct injection of satellites into the operational altitude.[13] Please clarify how SpaceX intends to deploy its Gen2 satellites.

6. What is the expected reliability of SpaceX's Gen2 post-mission disposal systems? Does SpaceX expect the satellites will have reliability of systems necessary for post-mission disposal that is on-par with its first generation system to date?

7. Given the updated orbital parameters, please confirm whether the expected in-orbit lifetime of a fully-functional SpaceX Gen2 satellite will continue to be five to seven years?[14]

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[6] SpaceX Amendment, Technical Attachment at 5.

[7] *See, e.g.*, SpaceX Application, Technical Attachment A at 10 (discussing Ka-band), 13 (discussing E-band).

[8] *See* SpaceX Amendment, Technical Attachment at 5, 6.

[9] SpaceX Amendment, Legal Narrative at 3-4.

[10] *See id.* at ii (stating that SpaceX would "notify the Commission which of the two configurations it wishes to deploy").

[11] SpaceX Amendment, Legal Narrative at i-ii; Technical Attachment at 17.

[12] SpaceX Amendment, Technical Attachment at 4 (stating that "[t]he revised orbital planes enable 'direct to station' launch campaigns that capitalize on the ability of Starship to deliver satellites at a faster pace.").

[13] *See* https://twitter.com/elonmusk/status/1420430105780891655

[14] SpaceX Application, Technical Attachment A at 48.

8. Will SpaceX's Gen2 satellites employ an identical automated collision avoidance system as that used for its first generation system, or has SpaceX made improvements or otherwise altered the system?[15] Please confirm whether SpaceX will observe a risk threshold of 0.001% as the trigger for a collision avoidance maneuver, as indicated in its original application.[16]

9. SpaceX indicates that it has "maintained an overall probability of collision with small debris (down to one millimeter in diameter) sufficient to prevent compliance with post-mission disposal maneuvers of less than 0.01 for an individual Gen2 space station during its mission lifetime."[17] Please clarify this statement. What is the probability of collision with small debris per satellite, as calculated using the NASA Debris Assessment Software (DAS)? Of the two alternative orbital configurations described in SpaceX's amended application, which has a lower probability overall of collision with small debris?

10. Please provide a description of how SpaceX's "internal software leveraging NASA's Debris Assessment Software" works.[18] How does SpaceX's software differ from DAS? What are the input parameters? What is the casualty risk result obtained from simply using the NASA DAS, and how does this compare with the results of SpaceX's calculation? Please provide for reference a "standard" DAS analysis, including supporting material concerning input data, to the extent this would help to illustrate the differences.

11. Does SpaceX plan to utilize spacers and/or stiffening rods as part of the deployment of the satellites requested in this application?

12. Please indicate whether the application, as modified, includes all satellites for which SpaceX is pursuing regulatory approval for operations in the frequency bands included in the referenced IBFS files, whether from the FCC, other ITU Administrations, or other national licensing authorities. To the extent there are any such satellites not described in the application, please provide information concerning the deployment plans for those satellites, including the number of such satellites and whether they are intended as substitutes or replacements for the satellites request in this application, or additional deployments.

Please submit the requested information by **January 7, 2022**.

Sincerely,

*Karl A. Kensinger*

Karl A. Kensinger
Chief, Satellite Division
International Bureau

[15] *See* SpaceX Amendment, Technical Attachment at 7 (stating that SpaceX will continue to deploy satellites with its proven advanced collision-avoidance and propulsions systems).

[16] SpaceX Application, Technical Attachment A at 41.

[17] SpaceX Amendment, Technical Attachment at 18.

[18] *See id.*