

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

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Application of)	
SPACE EXPLORATION HOLDINGS, LLC)	Call Sign: S3018
For Approval for Orbital Deployment)	
and Operating Authority for the)	File No. SAT-LOA-20170726-00110
SpaceX NGSO Satellite System)	
_____)	

**CONSOLIDATED RESPONSE TO COMMENTS
OF SPACE EXPLORATION HOLDINGS, LLC**

Space Exploration Holdings, LLC (“SpaceX”) hereby responds to the comments¹ filed with respect to its application for operating authority for a non-geostationary orbit (“NGSO”) satellite system in the Fixed-Satellite Service (“FSS”) using Ku- and Ka-band frequencies that supplement those previously proposed for use by SpaceX.² Only two parties—WorldVu Satellites Limited (“OneWeb”) and SES S.A./O3b Limited (“O3b”)—filed comments that reiterated a subset of their

¹ See Comments of WorldVu Satellites Limited, IBFS File No. SAT-LOA-20170726-00110 (filed Nov. 20, 2017) (“OneWeb Comments”); Comments of SES S.A. and O3b Limited, IBFS File No. SAT-LOA-20170726-00110 (filed Nov. 20, 2017) (“O3b Comments”).

² See Space Exploration Holdings, LLC, Application, IBFS File No. SAT-LOA-20170726-00110 (July 26, 2017) (“Supplemental Ku/Ka Application”).

comments on SpaceX's original Ku/Ka application. SpaceX has already addressed each of these comments at length, and incorporates those responses by reference herein.³

In its comments, O3b asks that the Commission “defer[] consideration”⁴ of SpaceX's requested waiver of the Commission's implementation milestones, and seeks assurances that the SpaceX system will coexist with other GSO and NGSO systems, and will be held to similar conditions as other FSS operators.

SpaceX has no objection to providing the necessary protections to GSO systems and coordinating with other NGSO operators—in fact, SpaceX has already provided detailed explanations of its system's unique capabilities in this regard.⁵ It also has no objection to the Commission's conditioning the grant of SpaceX's license on compliance with applicable coordination and other rules similar to those that apply to other NGSO FSS operators.

In its filing, OneWeb repeats its prior assertions that the SpaceX system will substantially increase the risk of orbital debris and human casualty, and opposes the narrow waivers that SpaceX has requested of the Commission's deployment milestone and geographic coverage rules. However, the Commission should disregard these unfounded concerns relating to orbital debris and its meritless objections to SpaceX's requested waivers. As SpaceX has demonstrated, its requested waiver of the Commission's implementation milestone presents no risk of warehousing; SpaceX's request for a limited waiver of the geographic coverage rules applies only to the *initial* deployment of the SpaceX constellation. Further, SpaceX has provided lengthy details which

³ See Consolidated Reply of Space Exploration Holdings, LLC, IBFS File No. SAT-LOA-20161115-00118 (filed July 14, 2017) (“SpaceX Ku/Ka-band Response”); Consolidated Response to Comments of Space Exploration Holdings, LLC, IBFS File No. SAT-LOA-20170301-00027 (filed Oct. 10, 2017) (“SpaceX V-band Response”).

⁴ O3b Comments at 2.

⁵ See *generally* Supplemental Ku/Ka Application, Technical Attachment.

confirm that its system has been carefully designed to meet or exceed all U.S. requirements to ensure the continued safety of space.

I. GRANTING SPACEX’S WAIVER REQUESTS, TO THE EXTENT THEY ARE NECESSARY, WOULD SERVE THE PUBLIC INTEREST.

OneWeb objects to two interrelated waiver requests that ask the Commission to account for the significant size of the proposed SpaceX system in applying its implementation and geographic coverage rules.

The first requests that the Commission consider its implementation milestone requirements to have been satisfied upon SpaceX’s completion of its Initial Deployment of 1,600 satellites. This Initial Deployment will comprise more satellites than are currently in operation worldwide and in fact more satellites than OneWeb proposed to deploy in its entire constellation. Despite these compelling facts, OneWeb claims that even after SpaceX’s deployment of 1,600 satellites, its application would remain “speculative” and indicate a “lack of commitment to deployment”⁶ until SpaceX is able to deploy each and every remaining satellite. While SpaceX agrees that the Commission should carefully police unrealistic applications that threaten to warehouse scarce spectrum or orbital resources, SpaceX’s requested waiver clearly raises no concerns of spectrum lying fallow. On the contrary, such a substantial deployment would demonstrate SpaceX’s commitment to fully deploy its FSS system and intensively employ the frequencies associated with its filing.

Although the Commission’s newly adopted implementation rules for deployment of NGSO systems relax the milestone timelines, they do not completely obviate the need for requesting a waiver to the new rules or undermine the rationale for the Commission to grant one under the

⁶ OneWeb Comments at 4.

unique circumstances of the SpaceX application. Deploying a large number of satellites over a six-year period, and the full constellation over a nine-year period, would require an unprecedented launch cadence and volume. SpaceX's constellation planning is designed to meet the Commission's milestone timelines and reflects the complexities of deploying a large constellation, including the company's unparalleled leadership in innovating launch and reusability capabilities. Nonetheless, SpaceX has requested a waiver out of an abundance of caution. Indeed, even as the Commission adopted the revised milestone requirement, Commissioner O'Rielly questioned whether current launch capabilities are sufficient to meet the new performance benchmarks, and whether specific waivers of the rule may be required.⁷

The other waiver request to which OneWeb objects merely seeks to address an ambiguity in the Commission's rules, were it to grant SpaceX's requested waiver of the deployment milestones: it was not clear at the time of filing whether the Commission's original geographic service requirements apply only to final system deployments or whether they also apply to interim deployments. To the extent that the rule applies only to final deployments, no waiver is necessary because the final SpaceX deployment will provide global coverage, including continuous coverage of every part of the United States. However, should the Commission interpret its rules to apply to the Initial Deployment as well, SpaceX requested, in an abundance of caution, a waiver consistent with the waiver granted to another NGSO operator.⁸ This waiver would allow SpaceX merely to delay—not avoid—serving these areas so that it is able to prioritize completion of the Initial Deployment. This Initial Deployment will allow SpaceX to cover unserved consumers in the

⁷ See *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Statement of Commissioner Michael O'Rielly, FCC 17-122, IB Docket No. 16-408 (rel. Sept. 27, 2017).

⁸ See *O3b Limited, Stamp Grant*, IBFS File Nos. SAT-LOI-20141029-00118 and SAT-AMD-20150115-00004, at condition 14 (Jan. 22, 2015).

continental United States, Puerto Rico, and Hawaii, as well as more than half of all unserved consumers in Alaska.⁹ Clearly, there is good cause to reject OneWeb’s arguments and grant both of the requested waivers.

II. SPACEX IS DEDICATED TO ENSURING THE SAFETY OF SPACE.

SpaceX has amply demonstrated its commitment to safe space operations. It has demonstrated that its system will far surpass all U.S. and international standards for human casualty risk and, to support this, has submitted more in-depth information to detail its orbital debris mitigation and end-of-life disposal plans than any other applicant in the ongoing NGSO processing rounds. Nonetheless, OneWeb’s comments once again seek to establish new and unwarranted orbital debris and casualty risk requirements that would also apply to SpaceX—and SpaceX alone.

OneWeb points to a partial “overlap” in the orbits of the SpaceX and OneWeb systems as evidence that the SpaceX system presents an elevated risk of orbital debris. This appears to be the latest incarnation of OneWeb’s “buffer zone” concept, which postulates an arbitrary minimum separation distance between OneWeb’s own system and others. However, neither that arbitrary separation distance nor OneWeb’s new “no overlap” concept are to be found or supported in any U.S. or international rules.¹⁰ To the contrary, the full Commission recently rejected a related OneWeb call to impose an arbitrary buffer zone on another NGSO system applicant, Telesat Canada (“Telesat”), where the system proposed to operate some of its satellites at an altitude of

⁹ See SpaceX V-band Response at 8.

¹⁰ OneWeb asserts that SpaceX’s proposed orbital altitude “flies in the face of Inter-Agency Space Debris Coordination Committee recommendations.” OneWeb Comments at 2. The recommendation OneWeb cites, however, simply encourages operators to “consider sufficient altitude separation” and provides no support for OneWeb’s claim that SpaceX’s proposed orbital altitude poses a substantial risk of collision. Inter-Agency Space Debris Coordination Committee, *IADC Statement on Large Constellations of Satellites in Low Earth Orbit*, IADC-15-03, § 4.2.1. (Sept. 2017), available at http://www.iadc-online.org/index.cgi?item=docs_pub.

1,248 km (i.e., 48 km above OneWeb’s constellation).¹¹ The Commission concluded that “these concerns are best addressed in the first instance through inter-operator coordination,” and thus declined to impose a regulatory requirement reflecting OneWeb’s self-initiated 125 km buffer zone.¹² Moreover, as SpaceX has previously outlined,¹³ adopting any such “buffer zone” based rule would be anti-competitive, allowing one applicant, OneWeb, to effectively warehouse orbital resources by seeking to exclude other current NGSO applicants and future NGSO systems from large portions of the available LEO altitudes with desirable radiation and debris flux characteristics.

Likewise, SpaceX has thoroughly demonstrated that it fully complies with the risk metrics considered by the Commission for total spacecraft risk of human casualty.¹⁴ In fact, as previous filings indicate, the risk of human casualty due to the gradual turnover and decommissioning of SpaceX satellites over time is expected to be far outstripped in comparison to the far larger natural variation in the impact rate of meteorites and other existing space objects.¹⁵ Despite exceeding every applicable U.S. and international standard for human casualty and orbital debris mitigation, SpaceX nonetheless intends to surpass even this very low risk level through continual design improvements and even higher-fidelity modeling.

¹¹ See *Telesat Canada*, Order and Declaratory Ruling, FCC 17-147, IBFS File No. SAT-PDR-20161115-00108, ¶ 2 (rel. Nov. 3, 2017).

¹² *Id.* ¶ 12. It is worth noting that OneWeb did not raise these same objections in connection with Telesat’s proposed V-band NGSO system.

¹³ See, e.g., SpaceX V-band Response at 10-16.

¹⁴ See Supplemental Ku/Ka Application, Technical Attachment at 29-42 (discussing analysis).

¹⁵ SpaceX V-band Response at 16-18.

CONCLUSION

SpaceX has proposed an ambitious global NGSO system, with the resources necessary to help bridge the digital divide and bring advanced broadband services to those who are underserved or unserved in the United States and around the world. It is committed to launching and operating this system, and has sought appropriate limited waivers in an abundance of caution. In addition, the SpaceX system has demonstrated that it will meet or exceed all existing U.S. and international requirements for safety of operations in space and upon de-orbit of satellites. Accordingly, none of the reiterated issues raised in the comments filed in response to SpaceX's application should delay the Commission in granting the application and its associated waiver requests.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that, on this 5th day of December, 2017, a copy of the foregoing pleading was served via First Class mail upon:

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