

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

In the Matter of )  
 )  
Application of Space Exploration Holdings, LLC ) File No. SAT-MOD-20181108-00083  
For Modification of Authorization for the )  
SpaceX NGSO Satellite System )

To: The International Bureau

**JOINT REPLY**

The Commercial Smallsat Spectrum Management Association (“CSSMA”) and several of its members<sup>1</sup> (collectively, the “Petitioners”) jointly submit this Joint Reply to the Consolidated Opposition to Petitions and Response to Comments (the “Opposition”) of Space Exploration Holdings, LLC (“SpaceX”).<sup>2</sup> Nothing in the Opposition rebuts the Petitioners’ position that responsible space stewardship and the FCC’s rules require that SpaceX conduct a collision risk analysis to assess the impact of its proposal to relocate more than 1,500 satellites to the 550 km orbital altitude.<sup>3</sup> SpaceX’s proposal radically changes the makeup of the 400-600 km orbital region, which to date has been primarily used by small satellite constellations of varying

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<sup>1</sup> A number of the CSSMA members separately filed Petitions to Defer the SpaceX application. *See* Planet Labs, Inc., Petition to Defer, File No. SAT-MOD-20181108-00083 (filed Jan. 29, 2019); Spire Global, Inc., Petition to Defer, File No. SAT-MOD-20181108-00083 (filed Jan. 29, 2019); Kepler Communications Inc., Comments and Conditional Petition to Deny, File No. SAT-MOD-20181108-00083 (filed Jan. 29, 2019); and Astro Digital U.S., Inc., Petition to Defer, File No. SAT-MOD-20181108-00083 (filed Jan. 29, 2019); *see also* CSSMA, Comments and Petition to Defer, File No. SAT-MOD-20181108-00083 (filed Jan. 29, 2019) (“CSSMA Comments”). Kepler Communications Inc. has separately filed a reply.

<sup>2</sup> *See* Consolidated Opposition to Petitions and Response to Comments of Space Exploration Holdings, LLC, File No. SAT-MOD-20181108-00083 (filed Feb. 11, 2019) (“SpaceX Opposition”).

<sup>3</sup> *See* Application of Space Exploration Holdings for Modification of Authorization for the SpaceX NGSO Satellite System, File No. SAT-MOD-20181108-00083 (filed Nov. 8, 2018) (“SpaceX Modification”).

mass and propulsive capabilities (“smallsats”). Accordingly, granting the SpaceX Modification prior to due consideration of the significant policy issues regarding the sharing of valuable low-Earth orbit resources or without establishing appropriate license conditions could inadvertently erect regulatory barriers that effectively preclude smallsat systems from using the 400-600 km orbital region and make SpaceX the *de facto* gatekeeper for satellite deployment in this region.<sup>4</sup>

For these reasons, the Petitioners request that the International Bureau (“Bureau”) defer action on the application until SpaceX submits a collision risk analysis and until the conclusion of relevant rulemaking proceedings regarding the sharing of valuable low-Earth orbit resources. Alternatively, assuming SpaceX provides the collision risk analysis and that analysis demonstrates that SpaceX’s commitment to assume the burden of conducting collision avoidance maneuvers is operationally practical and credible, Petitioners would have no objection to the grant of the SpaceX Modification subject to the adoption of appropriate license conditions.

## **DISCUSSION**

In comments and petitions to defer, the Petitioners raised concerns that SpaceX did not fully analyze the impact of its proposal to relocate 1,584 satellites from their currently authorized altitude of 1,150 km to an altitude of 550 km.<sup>5</sup> SpaceX failed to provide, as required by the FCC’s rules,<sup>6</sup> a detailed collision risk analysis with the other satellites in the 400-600 km orbital range, even though the company was proposing to operate in “identical” or “very similar” low-Earth orbits as other non-geostationary orbit satellite (“NGSO”) systems.<sup>7</sup> Indeed, SpaceX’s

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<sup>4</sup> See, e.g., CSSMA Comments at 4, n.14.

<sup>5</sup> See *supra* note 1.

<sup>6</sup> See 47 C.F.R. § 25.114(d)(14)(iii); see also *Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567 ¶ 50 (2004).

<sup>7</sup> Although SpaceX asserts that its satellites at 53° inclination are not at “identical” or “very similar” to most smallsat constellations, many of the CSSMA members have authority to deploy

application did not acknowledge the numerous NGSO constellations operating in the 400-600 km orbital altitude range or evince awareness that the orbital range is used extensively by government, commercial, domestic, and international operators.<sup>8</sup>

In light of this omission and also because of significant policy issues regarding the sharing of the valuable orbital resources<sup>9</sup> and the potential resolution of these issues in pending rulemaking proceedings, the Petitioners asked that the FCC defer consideration of the SpaceX

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at various inclinations, including 53°. For example, Planet has wide authority to deploy at any inclination 30° and above (except for 51.6°). *See* Stamp Grant Planet Labs, Inc., IBFS File No. SAT-MOD-20170713-00103 (granted Aug. 25, 2017); *see also* Application, Narrative, SAT-MOD-20150802-00053, at 3 (filed August 2, 2015) (identifying orbital parameters of constellation); Application, Narrative, SAT-MOD-20170713-00103, at 3 (filed July 13, 2017) (“The minimum inclination for any Flock Satellite will be 30 degrees.”); Stamp Grant, Spire Global, Inc., IBFS File No. SAT-AMD-20180102-00001 (granted in part and deferred in part Nov. 28, 2018) (granting Spire authority to (i) construct, deploy, and operate satellites initially deployed to altitudes from 385 to 650 km with inclinations ranging from equatorial to polar sun-synchronous (98 degrees) and (ii) deploy satellites directly above the International Space Station at 51.6 degrees).

<sup>8</sup> SpaceX states that in light of its general obligation to coordinate with all NGSO systems it did not identify other systems specifically. *See* SpaceX Opposition at 2. Nevertheless, the text of the SpaceX application suggests that its focus was on avoiding other NGSO FSS systems participating in the relevant processing rounds. *See* SpaceX Modification, Attachment A Technical Information to Supplement Schedule S, at 43-44; Narrative at 9 (“SpaceX proposes to separate itself from most other NGSO constellations ....”).

<sup>9</sup> Although such policies are best debated in relevant rulemaking proceedings, the Petitioners note that SpaceX’s conclusion that propulsive satellites systems have “better technologies” and create a more responsible space environment is unsupported and simplistic. *See* SpaceX Opposition at 7. For example, as a technical matter, small satellites (even in large constellations) can pose a considerably smaller collision threat due to their smaller mass and cross sectional area and minimal stored energy (*e.g.*, there is no unused fuel/propellant or pressurized systems). More generally, the Commission should support a commercial space policy that facilitates opportunities for space actors having varying business plans and technologies and not attempt to pick winners and losers. *See, e.g., Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in A Reasonable & Timely Fashion, & Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Report, 14 FCC Rcd 2398 ¶ 5 (1999) (“Our role is not to pick winners and losers, or to select the best technology to meet consumer demand.”); *Creation of Low Power Radio Service*, Report and Order, 15 FCC Rcd 2205 (2000) (Statement of Chairman William Kennard) (“[I]t is not the business of the FCC to pick winners and losers.”).

Modification.<sup>10</sup> Petitioners also cautioned that premature action on the SpaceX Modification could inadvertently make SpaceX the *de facto* gatekeeper for satellite deployment in the 400-600 km region by creating regulatory barriers that act to effectively preclude smallsat systems from using it.<sup>11</sup>

In the Opposition, SpaceX commits to sharing the 400-600 km orbital region with smallsat systems by making “clear that it intends to conduct active maneuvers to avoid collisions with both debris and other spacecraft throughout the life of [SpaceX’s] satellites,”<sup>12</sup> including during orbit raising and end-of-life de-orbiting. As a result of this commitment, SpaceX asserts that it has fully addressed Petitioners’ concerns that SpaceX’s system, as modified, would have any impact on Petitioners’ respective operations.<sup>13</sup> Although the Petitioners commend SpaceX for its willingness to accommodate commercial development of space by smallsat operators, the commitment alone is not sufficient to justify grant of the SpaceX Modification.

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<sup>10</sup> SpaceX is wrong in asserting that the Commission does not defer applications based on concerns of general applicability that will be addressed in ongoing rulemaking proceedings. *See* SpaceX Opposition at 4. Rather, longstanding Commission precedent provides that, as a general matter, a rulemaking is a better, fairer, and more effective method of implementing a new industry-wide policy than is the *ad hoc* and potentially uneven application of conditions in an isolated proceeding affecting a single party. *See, e.g., Stockholders of Renaissance Communications Corp. and Tribune Co.*, 12 FCC Rcd 11866, 11887-88 ¶ 50 (1997) (citing *Community Television of Southern California v. Gottfried*, 459 U.S. 498, 511 (1983)).

<sup>11</sup> For this reason, among others, the Petitioners have a direct interest in participating in this application proceeding and cannot simply wait until policy matters are resolved in rulemaking proceedings, as SpaceX suggests. *See* SpaceX Opposition at 5. Further, as Petitioners have explained, they have experienced specific efforts by operators in other application proceedings to preclude the deployment of smallsat systems on physical coordination grounds. *See* CSSMA Comments at 4, n.14 (referencing IBFS File Nos. SAT-MOD-20150802-00053 and SAT-STA-20150821-00060).

<sup>12</sup> *See* SpaceX Opposition at 8.

<sup>13</sup> *See* SpaceX Opposition at 9.

SpaceX is proposing to operate roughly the equivalent of 129,000 3U cubesats in terms of cross-sectional area<sup>14</sup> in a region that historically has been the primary operating home of hundreds of smallsats, many of which operate without propulsion.<sup>15</sup> Such an extraordinary change to the orbital environment warrants the submission of collision risk analysis to determine whether SpaceX's commitment is operationally practical and credible.<sup>16</sup>

The orbital environment in the 400-600 km orbital region is substantially different from the 1,150 km orbital region. Petitioners estimate that currently there are only several dozen satellites operating in the 1,150 km orbital region,<sup>17</sup> and in the future the only other operators in this region are likely to be other kilo-constellation operators. Accordingly, while imposing conditions requiring kilo-constellation operators to comply with future rulemaking conditions and to coordinate primarily with other kilo-constellation operators may have been an appropriate licensing solution for deployment in the 1,150 km orbital region, it is not a solution by itself for

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<sup>14</sup> Each of SpaceX's proposed 1,584 satellites has an average cross-sectional vehicle area of 15.45 m<sup>2</sup>, compared with an estimated cross-sectional vehicle area of 0.19 m<sup>2</sup> for a typical 3U cubesat with solar arrays. *See* Application of Space Exploration Holdings, LLC for Authority to Launch and Operate an NGSO Satellite System, File Nos. SAT-LOA-20161115-00118, Attachment A at 54 (Nov. 15, 2016); *compare, e.g.*, Planet Labs, Inc. File No. SAT-MOD-20170713-00103, Attachment ODAR at 19. Comparing the SpaceX system using other orbital parameters, such as maximum vehicle area, minimum vehicle area or average total area, does not materially change the magnitude of the differences between the SpaceX system and typical 3U cubesat systems.

<sup>15</sup> *See, e.g.*, CSSMA Comments at 3.

<sup>16</sup> For example, what would be the expected number of conjunction warning alerts or expected collision avoidance maneuvers per satellite per year? What operational impact would such expected parameters have on the SpaceX system? *See* CSSMA Comments, Technical Appendix at 4-5.

<sup>17</sup> *See, e.g.*, UCS Satellite Database *available at* <https://www.ucsusa.org/nuclear-weapons/space-weapons/satellite-database>.

the more heavily used and spatially dense 400-600 km orbital region.<sup>18</sup> SpaceX must also submit a collision risk analysis to show the impact to the orbital region.

To the extent that the collision risk analysis shows that SpaceX's commitment to take active measures to avoid smallsats operating in the 400-600 km orbital region, including those without propulsion, is operationally practical and credible, the Petitioners would withdraw their objections to the SpaceX modification application subject to the adoption of an appropriate condition requiring SpaceX to abide by its commitments.<sup>19</sup> Specifically, Petitioners propose the following condition based on SpaceX's commitment:

“Pending the adoption of rules in applicable orbital debris rulemaking proceedings, including IB Docket No. 18-313, SpaceX shall conduct, throughout the life of each of its satellites (including during orbit raising and de-orbiting), active maneuvers to avoid collisions with non-kilo-constellation space stations operating in the 400-600 km orbital region, unless such space stations are specifically excluded by the FCC from this obligation. With respect to other kilo-constellation space stations, SpaceX shall be required to coordinate its physical operations with such space stations at similar orbital altitudes.”

Adoption of an appropriate condition would eliminate the need to defer consideration of the application pending conclusion of relevant orbital debris mitigation rulemaking proceedings.

Petitioners support innovation and growth of the satellite industry for all space actors and believes that grant of the modification application, as conditioned, would allow SpaceX, a recognized innovator and leader in the industry, to move forward (if otherwise permitted by the Bureau) with its proposed deployment while preserving the ability of current and prospective

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<sup>18</sup> See SpaceX Opposition at 7-9. Despite SpaceX's arguments to the contrary, the Petitioners are not seeking to “reserve” the 400-600 km orbital region for smallsat systems. See SpaceX Opposition at 5-6. Rather, the Petitioners support a public debate regarding the appropriate shared use of this orbital resource in appropriate rulemaking proceedings and wish to ensure that this application proceeding does not inadvertently preempt that discussion.

<sup>19</sup> See SpaceX Opposition at 8-9.

smallsat operators to continue to use and share valuable orbital resources.<sup>20</sup> For all of the above reasons and those stated by Petitioners in prior filings in this proceeding, the Petitioners request that the Bureau take action consistent with Petitioners' pleadings.

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<sup>20</sup> Neither the CSSMA nor the signing members of this Joint Reply take a position on whether the Bureau should grant the SpaceX Modification and/or consider the application within the relevant satellite processing round. *See, e.g.*, CSSMA Comments at 2, n.6.

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**CERTIFICATE OF SERVICE**

I, Craig Scheffler, hereby certify that on February 22, 2019, a true and correct copy of the Joint Reply was sent via U.S. Mail, first class postage prepaid, to the following:

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