July 12, 2017

BY ELECTRONIC FILING

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

Re: Space Exploration Holdings, LLC, IBFS File No. SAT-LOA-20161115-00118

Dear Ms. Dortch:

In the above referenced proceeding, Space Exploration Holdings, LLC (“SpaceX”) seeks operating authority for a non-geostationary orbit (“NGSO”) satellite system in the Fixed-Satellite Service using Ka- and Ku-band frequencies. In support of that application, SpaceX has provided an analysis to demonstrate that its system will comply with the applicable equivalent power flux-density (“EPFD”) limits adopted by the Commission and the International Telecommunication Union. Section 25.146(a) of the Commission’s rules, 47 C.F.R. § 25.146(a), requires that an applicant provide a computer program for determining compliance the EPFD validation limits, along with the necessary input parameters for its system to be used with that program.

For this purpose, SpaceX has used EPFD testing software created by Transfinite Systems (“Transfinite”). Because that software was still in the development stage and is the proprietary information of Transfinite, SpaceX submitted an executable copy of the latest version of the Transfinite program, as well as the supporting files necessary to run the EPFD validation software, on a confidential basis along with its other application materials. With this letter, SpaceX submits for the public record the data files that would enable interested parties with access to the Transfinite software to review the EPFD analysis.

In reviewing the data previously submitted, SpaceX identified a few instances in which the data does not match the description in the EPFD analysis provided in SpaceX’s application. These minor discrepancies (discussed below) have been corrected in the database provided with this letter. Using this corrected database with the Transfinite software yields seven graphic outputs that differ somewhat from the ones submitted with the original application. Those figures, provided in Exhibit 1 attached hereto, demonstrate that the SpaceX NGSO system will operate well within all applicable EPFD limits. Thus, the data corrections do not affect the technical analysis submitted with SpaceX’s application or the ultimate compliance conclusion of that analysis.
The following corrections have been made to the database submitted herewith:

1. The original database indicated that SpaceX would operate 3,200 satellites at 53° inclination. The data has been corrected to reflect that 1,600 satellites will operate at 53° inclination and the other 1,600 satellites will operate at 53.8° inclination. (All other orbital parameters were aligned in the original database and have not been adjusted.)

2. As explained in the EPFD analysis, the parameter entitled “nbr_op_sat” is defined as the maximum number of non-geostationary satellites transmitting with overlapping frequencies to a given location within the latitude range. With respect to Ka-band gateway links, this parameter should have been set to 4 for purposes of the EPFD validation analysis.\(^1\) However, the original database varied this parameter by latitude as follows:
   - for -90° ≤ θlat < -50°, parameter value of 2
   - for -50° ≤ θlat < -20°, parameter value of 4
   - for -20° ≤ θlat < 20°, parameter value of 2
   - for 20° ≤ θlat < 50°, parameter value of 4
   - for 50° ≤ θlat < 90°, parameter value of 2

   This parameter has been set to 4 for all cases in the corrected database.

3. As explained in the EPFD analysis, the parameter entitled “elev_min” is defined as the minimum elevation angle at which any associated earth station can transmit to a non-geostationary satellite.
   a. With respect to Ku-band TT&C uplinks, this parameter should have been set to 5° as TT&C links only operate at elevations above that angle.\(^2\) The original database assigned a value of 40° (i.e., the minimum elevation angle for uplinks from user terminals). This parameter has been set to 5° in the corrected database.
   b. With respect to Ka-band TT&C downlinks, this parameter should have been set to 0° in order to capture a worst case. The original database assigned a value of 40° (i.e., the minimum elevation angle for uplinks from gateway earth stations). This parameter has been set to 0° in the corrected database.

4. As explained in the EPFD analysis, SpaceX will turn off its gateway and user links whenever the angle between the boresight of a GSO earth station (assumed to be collocated

---

\(^1\) See SpaceX Application, Technical Attachment, Annex 2 at 3.
\(^2\) See id., Annex 1 at 19.
with the SpaceX earth station) and the direction of the SpaceX satellite beam is 22 degrees or less. However, its Ka-band TT&C downlink beams use omni-directional antennas, which must be assumed to radiate toward the GSO arc in order to capture a worst case.\(^3\) The original database assigned a value of 22° for the exclusion zone of TT&C links. This parameter has been set to 0° in the corrected database.

Should you have any questions, please do not hesitate to contact me.

Sincerely,

William M. Wiltshire  
*Counsel to SpaceX*

Attachment

---

\(^3\) See *id.*, Annex 2 at 12.
EXHIBIT 1

EPFD_{down} Compliance for Ku-band User Links
EPFD\textsubscript{up} Compliance for Ku-band TT&C Links

EPFD\textsubscript{down} Compliance for Ka-band Gateway Links
EPFD_{down} Compliance for Ka-band TT&C Links