Federal Communications Commission
Washington, D.C. 20554

June 22, 2017

Elisabeth Neasmith
Telesat Canada
1601 Telesat Court
Ottawa, Canada

Re: Telesat Canada, IBFS File No. SAT-LOI-20170301-00023 (Call Sign S2991)

Dear Ms. Neasmith:

On March 1, 2017, Telesat Canada (Telesat) filed the above-captioned petition for a declaratory ruling requesting access to the U.S. market for a non-geostationary orbit (NGSO) low earth orbit (LEO) fixed-satellite service (FSS) system utilizing V-band frequencies. To aid in the Commission's evaluation of Telesat's petition, please provide the following additional items or information:[1]

1. Telesat describes its V-band NGSO constellation as a "second-generation overlay" to its proposed Ka-band NGSO constellation.[2] Please provide more information about the relationship between Telesat's proposed V-band and Ka-band constellations, including whether the V-band NGSO constellation will be composed of entirely new satellites or if Telesat intends to host V-band payloads on the satellites of its Ka-band NGSO constellation.
2. Section 25.114(d)(1) of the Commission's rules requires that applicants provide an explanation of how the uplink frequency bands would be connected to the downlink frequency bands on their proposed satellite system.[3] In order to better understand the beam and channel connections on the Telesat V-band NGSO constellation, we request that Telesat supplement its petition with a showing (*e.g.*, a strapping table, chart, or spreadsheet) that clearly presents this information. If Telesat is using dynamic channel allocation, please describe the algorithm that will be used for the connections.
3. Please provide the minimum elevation angle at which gateway and user terminals will be operated.
4. Please indicate the date by which Telesat anticipates that its V-band NGSO constellation will be operational.

If in response to Question 1 Telesat indicates that the V-band NGSO constellation will be composed of new satellites separate from Telesat's proposed Ka-band NGSO constellation, please respond to the following additional questions:

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[1] 47 CFR § 25.111(a).

[2] Telesat Petition at 4; IBFS File No. SAT-LOI-20161115-00108 (Telesat Ka-band NGSO petition).

[3] 47 CFR § 25.114(d)(1).

5. A statement concerning whether it is Telesat's intent to seek registration of the Telesat V-band NGSO constellation by Canada consistent with the Convention on the Registration of Objects Launched into Outer Space.

6. Commission rules require petitioners requesting U.S. market access for non-U.S. licensed space stations to provide a narrative description of the design and operational strategies that will be used to mitigate orbital debris.[4] Alternatively, an applicant seeking market access for a non-U.S. licensed system can satisfy this requirement "by demonstrating that debris mitigation plans for the space station(s) for which U.S. market access is requested are subject to direct and effective regulatory oversight by the national licensing authority."[5] Telesat states that it satisfies this requirement because the operations of its V-band NGSO constellation are subject to direct and effective regulatory oversight by the Canadian licensing authority – Innovation, Science and Economic Development Canada (formerly Industry Canada).[6] Telesat states that Canadian regulations require that space debris mitigation measures be implemented "in accordance with best industry practices so as to minimize adverse effects on the orbital environment," and that Telesat's pending Canadian approval will ultimately specify the same condition.[7] Telesat also disclosed certain information concerning its orbital debris mitigation plans pursuant to section 25.114(d)(14) of the Commission's rules.[8] In order to assist in our assessment of whether Telesat has demonstrated that it is subject to direct and effective regulatory oversight, or alternatively, to permit analysis of the debris mitigation plans for the constellation, we request the following additional information:

    a. Any additional information concerning the scope of oversight to which Telesat is subject, supported if possible by publicly available materials discussing the criteria applied by the Canadian regulatory authority. If an Orbital Debris Assessment Report or other documentation for the Telesat constellation has been prepared for or submitted to ISED, please submit a copy of that report.

    b. The accuracy within which the space station orbital parameters will be maintained for any orbit in which Telesat V-band NGSO satellites will operate, including apogee, perigee, inclination, and the right ascension of the ascending node(s).[9]

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[4] 47 CFR § 25.114(d)(14); 47 CFR § 25.137 (b), (d).

[5] 47 CFR § 25.114(d)(14)(v).

[6] Telesat Petition at 20-21.

[7] Telesat Petition at 21. We note that the ISED materials and the condition referenced by Telesat to support its demonstration appear to focus on post mission disposal. *See* Industry Canada Client Procedures Manual "Licensing of Space Stations" CPS-2-6-02, Issue 3 (Provisional), November 2013, § 3.3.3. Other matters, such as operational debris, prevention of accidental explosions, and collision risk, appear to be beyond the scope of the ISED-required material.

[8] Telesat Technical Exhibit, Section A9.

[9] *See* 47 CFR § 25.114(d)(14)(iii). Telesat's petition states that station-keeping will be maintained "with a level of accuracy sufficient to avoid collision with other non-geostationary satellites," but provides no specific information regarding the accuracy of the space station orbital parameters. Telesat Technical Appendix at 17. Telesat also describes how satellites will be able to be moved within their "control box," but provides limited detail on the dimensions of this control box. Telesat Technical Exhibit, Section A9.

c. Whether or not Telesat's assessments of collision risk, including the stated "minimum close approach of 10 km with other satellites," takes into account the satellites in Telesat's proposed Ka-band NGSO constellation.[10]

d. The intended orbital parameters of the "Decaying Lower Orbit" to be used for end-of-life disposal, or, if range of possible orbits depending on available fuel is intended, a characterization of the likely distribution of satellites within that range.

e. Please provide an analysis of collision risk for satellites during the passive disposal phase, *i.e.*, after all propellant is consumed, for a 117 satellite deployment, assuming 100% reliability. As part of that analysis, please take into account the satellites of the proposed Telesat Ka-band NGSO constellation and provide an assessment of how many conjunctions and/or collision avoidance maneuvers might be required of the International Space Station, assuming it is in operation throughout the period in which disposals occur. To the extent replenishment or deployment rates can be expected to involve more than 117 satellites through 2035, please also provide an analysis assuming such rates.

f. Please provide an analysis of collision risk, assuming rates of satellite failure resulting in the inability to perform collision avoidance procedures of 10, 5, and 1 percent. This analysis should include a study performed assuming all failures occur at the mission altitude and should take into account the satellites of the proposed Telesat Ka-band NGSO constellation. The analysis may also include additional studies specifying alternative assumptions concerning the other orbital locations (such as injection altitude) at which failures might occur.

g. Any additional information you may wish to provide concerning human casualty risk resulting from satellite disposal, such as outcomes based on higher fidelity analysis, or any risk or loss mitigation strategies under development.

h. Any information or analysis you may wish to provide with respect to treatment of this application under the Commission's environmental processing rules.[11]

7. For optical inter-satellite links, please provide the wavelength, power, duty cycle, beam diameter at emitter, and beam divergence. In addition, please provide the power margin at the receiver at maximum operating distance.

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[10] *See* IBFS File No. SAT-LOI-20161115-00108 (Telesat Ka-band NGSO petition)

[11] 47 C.F.R. §§ 1.1301-1.1309. *Cf.* Space Data Corporation, 16 FCC Rcd 16421, ¶¶ 24-27 (WTB 2001).

8. Please indicate whether optical inter-satellite links will be coordinated with other systems proposed in FCC applications and with the U.S. Department of Defense's laser clearing house, and, if such coordination has commenced, please address the status of coordination.

Telesat must file a letter providing this information by **July 24, 2017**. Failure to do so may result in the dismissal of Telesat's request pursuant to section 25.112(c) of the Commission's rules, 47 CFR § 25.112(c).

Sincerely,

Jose Albuquerque

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