

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)
Telesat Canada) IBFS File No. SAT-PDR-20170301-00023
Petition for Declaratory Ruling to Grant Access to) Call Sign S2991
the U.S. Market for Telesat’s V-Band NGSO)
Constellation)

ORDER AND DECLARATORY RULING

Adopted: November 15, 2018

Released: November 19, 2018

By the Commission: Chairman Pai and Commissioners O’Rielly, Carr, and Rosenworcel issuing separate statements.

I. INTRODUCTION

1. In this Order and Declaratory Ruling, we grant the request of Telesat Canada (Telesat) for a declaratory ruling concerning the conditions under which it will be permitted to access the U.S. market using frequencies in the V-band through a proposed constellation of 117 satellites authorized by Canada. In granting this request, we address concerns expressed by commenters seeking various conditions on the grant. This grant of market access for a non-geostationary orbit, fixed-satellite service (NGSO FSS) system advances the Commission’s mandate “to make available, so far as possible, to all the people of the United States . . . rapid, efficient, Nation-wide, and world-wide” communication services and will enhance competition among existing and future FSS satellite systems.

II. BACKGROUND

2. Petition. On March 1, 2017, Telesat filed a petition for declaratory ruling seeking access to the U.S. market for a proposed NGSO FSS satellite system in the V-band to provide broadband service. The proposed Telesat system consists of a constellation of 117 satellites in 11 orbital planes. In

1 For purposes of this Order and Declaratory Ruling, we use the term “V-band” to refer to frequencies ranging from 37.5 GHz to 52.4 GHz.

2 Telesat Canada, Petition for Declaratory Ruling to Grant Access to the U.S. Market for Telesat’s V-Band NGSO Constellation, IBFS File No. SAT-PDR-20170301-00023 (filed March 1, 2017) (Telesat Petition). Although the Telesat Petition was originally filed as IBFS File No. SAT-LOI-20170301-00023, the Commission made an administrative change to the IBFS file number from a Letter of Intent (LOI) to a Petition for Declaratory Ruling (PDR) to reflect the nature of Telesat’s request. We defer action on Telesat’s request for U.S. market access in the 50.4-51.4 GHz band.

3 47 U.S.C. § 151; Telesat Petition, Narrative at 5.

4 The Commission developed the market access procedure we follow here to facilitate the participation of non-U.S.-licensed satellite systems in the FCC licensing process, even though such systems do not seek a U.S. space station license. As such, favorable action on such a request is in the nature of a policy statement or declaratory ruling with respect to the availability of spectrum and other public interest considerations for future licensing of U.S. earth stations that would operate with the non-U.S.-licensed space station. See Amendment of the Commission’s Regulatory Policies to Allow Non-U.S. Licensed Satellites to Provide Domestic and International Service in the United States, Report and Order, 12 FCC Rcd 24094, 24106, para. 29, 24173-74, paras. 184-88 (1997) (1997 Report

6 of the 11 planes (12 satellites per plane), which are inclined 99.5 degrees, satellites will be in a circular orbit at an approximate altitude of 1,000 kilometers. In the other 5 planes (9 satellites per plane), which are inclined 37.4 degrees, satellites will be in a circular orbit at an approximate altitude of 1,248 kilometers.⁵ Operation of the satellites is authorized by Canada and will be conducted in the 37.5-40.0 GHz (space-to-Earth), 40.0-42.0 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space), and 50.4-51.4 GHz (Earth-to-space) frequency bands.⁶ In its Petition, Telesat sought certain waivers of the Commission's rules.⁷

3. *Comments.* On August 25, 2017, the Telesat Petition was accepted for filing.⁸ Hughes Network Systems, LLC (Hughes) supported Telesat's request for a waiver of Section 25.156(d)(5) of the Commission's rules, but urged the Commission to impose single-entry and aggregate Equivalent Power Flux Density (EPFD) limits to protect GSO systems, and to condition grant on compliance with any future EPFD limits or technical requirements adopted by the Commission or ITU for sharing and operations in the V-band.⁹ SES S.A. and O3b Limited (SES and O3b) urged the Commission to defer action on V-band NGSO systems until a comprehensive GSO-NGSO sharing framework is in place, suggested that sharing among NGSO operators can be achieved through coordination, and requested that "standard operating conditions" be applied to Telesat's NGSO operations.¹⁰ Space Exploration Holdings, LLC (SpaceX) expressed concern about the potential for interference from earth station emissions with high power levels into satellite receivers of other systems operating in low-earth orbit (LEO).¹¹ ViaSat, Inc. (ViaSat) requested that any grant include conditions for the protection of GSO networks operating in the V-band, and that grant be subject to the outcome of any future proceeding regarding V-band

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and Order). In addition to the present Petition, Telesat must file and the Commission must approve corresponding earth station applications before Telesat may provide its proposed services in the United States. Telesat filed this Petition in response to an International Bureau public notice that initiated a "processing round" for additional NGSO applications in the 37.5-40.0 GHz, 40-42 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz frequency bands. *Boeing Application Accepted for Filing in Part, IBFS File No. SAT-LOA-20160622-00058; Cut-off Established for Additional NGSO-Like Satellite Applications or Petitions for Operations in the 37.5-40.0 GHz, 40.0-42.0 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz Bands*, Public Notice, 31 FCC Rcd 11957 (IB 2016).

⁵ Telesat Petition, Technical Exhibit at 1. Telesat provided corrected values for the planned right ascension of the ascending node (RAAN) in an erratum. *See* Letter from Elisabeth Neasmith, Director, Spectrum Management and Development, Telesat Canada, to Jose P. Albuquerque, Chief, Satellite Division, International Bureau, FCC (filed July 19, 2017) (Telesat Erratum). Additionally, we note that in response to a Commission request Telesat clarified that its proposed V-band system will be separate from the Ka-band NGSO system for which Telesat received a grant of U.S. market access in 2017. *See* Letter from Elisabeth Neasmith, Director, Spectrum Management and Development, Telesat Canada, to Jose P. Albuquerque, Chief, Satellite Division, International Bureau, FCC (filed July 24, 2017); *Telesat Canada, Petition for Declaratory Ruling to Grant Access to the U.S. Market for Telesat's NGSO Constellation*, Order and Declaratory Ruling, 32 FCC Rcd 9663 (2017) (*Telesat Ka-band Order*).

⁶ *Id.* at 5.

⁷ Telesat Petition, Narrative at 25-28. Specifically, Telesat requests waivers of Sections 25.156(d)(5), 25.157(e), and 25.202(a)(1) of the Commission's rules. *Id.* In comments Telesat also requested a waiver of Section 25.164(b). Telesat Response at 5 (filed Oct. 11, 2017).

⁸ *Policy Branch Information, Space Stations Accepted for Filing*, Public Notice, Report No. SAT-01262 (IB Sat. Div. Aug. 25, 2017).

⁹ Hughes Network Systems, LLC Comments (filed Sept. 25, 2017) (Hughes). Note that Hughes refers in its comments to the "Q/V-band," which has the same meaning as "V-band" as used in this Order and Declaratory Ruling. To the extent that Hughes' comments include a request for the Commission to initiate a rulemaking in the V-band, we decline to consider such a request when submitted as part of a comment on an individual system application.

¹⁰ SES S.A. and O3b Limited Comments (Sept. 25, 2017) (SES and O3b).

¹¹ Space Exploration Holdings, LLC Comments (Sept. 25, 2017) (SpaceX); SpaceX Reply (Oct. 23, 2017).

operations.¹² Telesat filed a response to the comments, and also requested that the bond and milestone requirement be suspended until the ITU develops GSO-NGSO sharing criteria due to the uncertainty about the details of a sharing framework.¹³ SES and O3b supported this proposal.¹⁴

4. *Developments Subsequent to Telesat Petition.* In September 2017, following the close of the comment cycles in this proceeding, the Commission adopted the *NGSO FSS R&O*, updating several rules and policies governing NGSO FSS systems.¹⁵ The Order adopted, among other things, spectrum sharing rules and a more flexible milestone schedule for NGSO systems.¹⁶ In November 2017, the Commission adopted the *Spectrum Frontiers Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order*,¹⁷ which, among other things, made or affirmed determinations that the 40-42 GHz and 48.2-50.2 GHz bands will be reserved for FSS use,¹⁸ while limiting satellite operations to communications with individually licensed earth stations in the 37.5-40.0 GHz and 47.2-48.2 GHz frequency bands.¹⁹ The Commission also affirmed the existing Power Flux Density (PFD) limit applicable to satellite operations in the 37.5-40.0 GHz band.²⁰ Where rules are modified as a result of the *Spectrum Frontiers* proceeding, the *NGSO FSS* proceeding, or in other relevant proceedings, Telesat's FSS operations will be subject to those modified rules. We discuss these matters with greater specificity below.

III. DISCUSSION

5. After review of the record, we conclude that grant of the Telesat Petition will serve the public interest, subject to the requirements and conditions specified herein.²¹ Our public interest analysis considers the effect of the proposed Telesat system on competition in the United States, as well as issues

¹² ViaSat, Inc. Comments (Sept. 25, 2017) (ViaSat); ViaSat Reply (Oct. 23, 2017).

¹³ Telesat Response.

¹⁴ SES and O3b Reply (Oct. 23, 2017).

¹⁵ *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809 (2017) (*NGSO FSS R&O*).

¹⁶ Most of these rule changes went into effect on January 17, 2018. *See* 82 Fed. Reg. 59972 (Dec. 18, 2017). The amendments to Sections 25.114, 25.115, 25.146, and 25.164, however, contained new and modified information collection requirements that required approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, and these amendments therefore did not become effective until May 31, 2018. *See Updates Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, 83 Fed. Reg. 22391 (May 15, 2018) (announcing OMB approval of information collection requirements and setting effective date for rule amendments containing those requirements).

¹⁷ *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services et. al.*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988 (2017). When citing to the *Second Report and Order* portion of the document, we will refer to the *Second R&O*, when citing to the *Second Further Notice of Proposed Rulemaking* portion of the document, we will refer to the *Second FNPRM*, and when citing to the *Memorandum Opinion and Order* portion of the document, we will refer to the *MO&O*.

¹⁸ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11050-51, paras. 189, 192.

¹⁹ *Spectrum Frontiers Second R&O and MO&O*, 32 FCC Rcd at 11005, 11061, paras. 55, 220.

²⁰ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11058-60, paras 214-216.

²¹ SES and O3b requested that the Commission include in any Telesat authorization standard operating conditions and specifically, several of the same grant conditions included on O3b's initial market access. *See* SES and O3b Comments at 6-7. To the extent that the Telesat petition raises the same concerns as other authorized NGSO FSS systems, we impose substantially identical conditions on Telesat as we did in those orders, including O3b's recent grant, which also included V-band frequencies. In addition, since O3b's initial market access grant, the Commission has adopted significant revisions to its rules and policies governing NGSO FSS systems. The conditions herein are consistent with these rule changes.

of spectrum availability, eligibility requirements and operating requirements, and national security, law enforcement, foreign policy, and trade.²² Below, we address the various outstanding issues raised by commenters on the Petition. We also address Telesat's waiver requests. Where appropriate, we defer matters of general applicability to ongoing or potential future rulemakings.

6. *Earth Station Uplink Power Limits.* SpaceX suggests that Telesat's system, as proposed, would use earth stations with high equivalent isotropically radiated power (EIRP) that pose a significant risk to other NGSO systems operating at lower power levels and requested that we consider limitations on earth station transmission power to ensure that spectrum is used efficiently.²³ This concern is similar to comments that SpaceX filed on other NGSO FSS systems, such as Telesat's Ka-band NGSO system.²⁴ We note that earth station power limits were considered in the *NGSO FSS R&O*, and that the Commission declined in that order to adopt any such limits.²⁵ We decline to revisit the issue here and deny the request of SpaceX.

7. *Request for FSS Operations in the 37.5-40.0 GHz Band.* The 37.5-40.0 GHz band is currently allocated to the fixed and mobile services on a primary basis.²⁶ While this band is also allocated to the FSS (space-to-Earth), Part 25 of the Commission's rules limits all FSS operations to communications with individually licensed earth stations.²⁷ Part 25 further states that earth stations in this band must not be ubiquitously deployed and must not be used to serve individual consumers.²⁸ In addition, earth station operations in the FSS shall not claim interference protection from stations in the fixed and mobile services, except where the individually licensed earth stations are authorized under Section 25.136 of the Commission's rules.²⁹ Part 25 also includes PFD limits applicable to operations in the 37.5-40.0 GHz frequency band.³⁰ Section 25.208(r) includes limits for NGSO operations both under assumed free space conditions³¹ and during periods when the FSS system raises power to compensate for rain-fade conditions at the earth station.³² In the *Spectrum Frontiers Second Report and Order*, the Commission found that the record did not establish conditions under which FSS could operate at a higher PFD consistent with terrestrial use of the band.³³ However, that Order did not delete a note to Section 25.208(r), which states that the conditions under which satellites may exceed the PFD limits for free space conditions to compensate for the effects of rain fading have not yet been defined and provides that the

²² *Id.* Except as otherwise discussed herein, we conclude that the Telesat Petition satisfies these basic requirements for U.S. market access.

²³ SpaceX Comments at 2-5; SpaceX Reply at 1-2.

²⁴ *See, e.g.*, Telesat Canada, IBFS File No. SAT-PDR-20161115-00108, SpaceX Comments at 2-5 (filed June 26, 2017).

²⁵ *NGSO FSS R&O*, 32 FCC Rcd at 7827, para. 55.

²⁶ U.S. Table of Frequency Allocations, 47 CFR § 2.106.

²⁷ 47 CFR § 25.202(a)(1)(ii).

²⁸ *Id.*

²⁹ 47 CFR § 2.106, footnote NG63. Section 25.136 specifies processes for earth station applicants in the 37.5-40.0 GHz band and includes procedures to enable sharing with Upper Microwave Flexible Use Service (UMFUS) licensees. 47 CFR § 25.136.

³⁰ 47 CFR § 25.208(r). These limits were adopted alongside the limitations on FSS earth station operations, in implementing the Commission's soft segmentation plan for the V-band, to accommodate high density fixed service in the 37.5-40.0 GHz band and FSS in the 40-42 GHz band. *Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz, and 48.2-50.2 GHz Frequency Bands, et. al.*, Second Report and Order, 18 FCC Rcd 25428, 25439-40, paras. 23-24 (2003) (*V-band Second R&O*).

³¹ 47 CFR § 25.208(r)(1).

³² 47 CFR § 25.208(r)(2). *See V-band Second R&O*, 18 FCC Rcd at 25440-41, paras. 28-29.

³³ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11058-60, paras. 214-216.

conditions and extent to which the free space limits can be exceeded will be the subject of a further rulemaking by the Commission.³⁴ Telesat states that its operations in the 37.5-40.0 GHz band will be in conformance with the Commission's rules and the Table of Frequency Allocations, and that it will comply with FCC mechanisms for sharing with Upper Microwave Flexible Use Service (UMFUS).³⁵ We grant Telesat's request for market access in the 37.5-40 GHz band and condition access in this band accordingly.

8. *Request for FSS Operations in the 40-42 GHz Band.* In the *Spectrum Frontiers* proceeding, the Commission reserved the 40-42 GHz band for FSS use.³⁶ Telesat's proposed use of the 40-42 GHz band is consistent with the Commission's rules and the Table of Frequency allocation.³⁷ We therefore grant Telesat's request for market access in this band.

9. *Request for FSS Operations in the 47.2-50.2 GHz Band.* The 47.2-48.2 GHz portion of the V-band is currently allocated in the U.S. Table of Allocations for FSS, fixed service, and mobile service, limited to non-Federal stations, and the 48.2-50.2 GHz portion is allocated for these same services for both Federal and non-Federal stations.³⁸ In the *Spectrum Frontiers Second R&O*, the Commission decided to limit operations to individually-licensed earth stations in the 47.2-48.2 GHz portion of the band, which will also be authorized for terrestrial UMFUS operations,³⁹ and it declined to provide any mechanism for satellite end user equipment in that band.⁴⁰ In addition, earth station operations in the FSS in the 47.2-48.2 GHz band must not cause interference to stations in the fixed and mobile services, except where the individually licensed earth stations are authorized under Section 25.136 of the Commission's rules.⁴¹ In the *Spectrum Frontiers Second Report and Order*, the Commission indicated that the 48.2-50.2 GHz portion of the band will be reserved for FSS use, including for deployment of satellite user terminals.⁴² We grant Telesat's request for market access in the 47.2-50.2 GHz band, subject to the rules adopted in the *Spectrum Frontiers* proceeding.

10. *Limits on Emissions into the 50.2-50.4 GHz Band.* In authorizing Telesat's operations in

³⁴ 47 CFR § 25.208(r), NOTE TO PARAGRAPH (r). There appears to be a typographical error in the note to paragraph (r). The note refers to paragraph (q)(1), but should refer to paragraph (r)(1) for the PFD limits applicable to NGSO systems under assumed free space conditions.

³⁵ Telesat Petition, Narrative at 13-14; Technical Exhibit at 5-6, 9-11.

³⁶ *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11051, para. 192.

³⁷ U.S. Table of Frequency Allocations, 47 CFR § 2.106.

³⁸ Historically, the 47.2-50.2 GHz band has been subject to a band plan for sharing between wireless services and FSS. In 1998, as part of the V-band plan, the Commission designated the lower segment of the band, 47.2-48.2 GHz, for wireless services use, and the upper 48.2-50.2 GHz segment for FSS use. *Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands, et. al.*, First Report and Order, 13 FCC Rcd 24649, 24651, para. 2 (1998) (*V-band First R&O*). In 2003, the Commission noted that it was preserving the 47.2-48.2 GHz FSS uplink allocation for gateway operations, pairing with downlink operations in the 37.5-40.0 GHz band. *V-band Second R&O*, 18 FCC Rcd at 25457, para. 67. The upper 48.2-50.2 GHz (Earth-to-space) portion of the band is identified in international footnote 5.516B for use by high-density applications in the FSS in ITU Region 2. International Table of Frequency Allocations, 47 CFR § 2.106, footnote 5.516B. Telesat's earth station operations in the 47.2-50.2 GHz band, including limitations on such operations, will be addressed as part of the earth station licensing process.

³⁹ *Spectrum Frontiers Second R&O*, 32 FCC Rcd at 11005-6, paras. 54-56.

⁴⁰ *Id.* at 11006, para. 55. The Commission also noted that it was making 2 gigahertz of spectrum available for satellite end user devices in the adjacent 48.2-50.2 GHz band, where it refrained from adopting service rules for terrestrial mobile service providers. *Id.* at 11005-6, paras. 54-56.

⁴¹ Section 25.136 specifies processes for earth station applicants in the 47.2-48.2 GHz band and includes procedures to enable sharing with UMFUS. 47 CFR § 25.136(d).

⁴² *Spectrum Frontiers MO&O*, 32 FCC Rcd at 11050, para. 189.

the 47.2-50.2 band, we have also taken into consideration concerns raised by some Federal agencies. The National Telecommunications and Information Administration (NTIA), on behalf of the National Aeronautics and Space Administration, the Department of Commerce, and the National Science Foundation, has expressed concerns about any proposed authorized out-of-band emission limits in the 50.2-50.4 GHz band that is designated for the Earth exploration-satellite service (EESS) (passive) use.⁴³ The NTIA indicated that these Federal agencies strongly opposed the future grant of NGSO FSS earth station licenses in the 49.7-50.2 GHz or 50.4-50.9 GHz bands operating in accordance with footnote US156 to Section 2.106 of the Commission's rules,⁴⁴ stating that out-of-band emissions from such earth stations would result in harmful interference to the operations of U.S. government assets in the adjacent 50.2-50.4 GHz band.⁴⁵ The NTIA requested that more stringent out-of-band limits be placed on such earth station operations to ensure that the Federal government's EESS operations at 50.2-50.4 GHz—particularly those aspects that are critical to its prediction of meteorological phenomena—are not compromised. As in other *O3b Order* and the *Audacy Order*,⁴⁶ the Commission acknowledges the significant concerns expressed by the NTIA and notes that this unwanted emissions issue could be considered in a future Commission action. Therefore, although we require Telesat to comply with the out of band emission limits currently in footnote US156 to Section 2.106 of the Commission's rules for its operations in the 49.7-50.2 GHz and 50.4-50.9 GHz bands,⁴⁷ we also explicitly condition Telesat's authorization upon compliance with any future limits applicable to unwanted emissions in the 50.2-50.4 GHz band that may be adopted, either because of modifications approved by the 2019 World Radiocommunication Conference (WRC-19), or as a result of any future Commission rulemaking, independent of any ITU deliberation.⁴⁸

11. *Sharing with GSO FSS systems.* The Commission does not currently have service rules relevant to sharing between NGSO and GSO FSS systems in the frequency bands that Telesat requested in its Petition. There are currently no FCC-licensed GSO FSS systems operating in the bands Telesat has requested, although one GSO satellite application was recently granted.⁴⁹ ViaSat requested that grant be conditioned on compliance with No. 22.2 of the ITU Radio Regulations and the results of international coordination until the Commission adopts specific limits to protect GSO systems from interference by

⁴³ NTIA raised this concern during the coordination of certain requests to operate in portions of the V-band. See "Memorandum of Understanding between the Federal Communications Commission and the National Telecommunications and Information Administration," January 31, 2003 (MOU), available at http://apps.fcc.gov/edocs_public/attachmatch/DOC-230835A2.pdf.

⁴⁴ 47 CFR § 2.106, footnote US156. The same limits are also included in Section 25.202(j) of the Commission's rules, 47 CFR § 25.202(j).

⁴⁵ Specifically, the NTIA asserts that out-of-band emissions would degrade data collection capability, and would impact both domestic and international weather forecasting such as hurricane trajectories and the probability of tornado development.

⁴⁶ *O3b Limited, Request for Modification of U.S. Market Access for O3b Limited's Non-Geostationary Satellite Orbit System in the Fixed-Satellite Service and in the Mobile-Satellite Service*, Order and Declaratory Ruling, FCC 18-70, para. 30 (June 6, 2018) (*O3b Order*); *Audacy Corporation, Application for Authority to Launch and Operate a Non-Geostationary Medium Earth Orbit Satellite System in the Fixed- and Inter-Satellite Services*, Order and Authorization, FCC 18-72, para. 20 (June 6, 2018) (*Audacy Order*).

⁴⁷ 47 CFR § 2.106, footnote US156.

⁴⁸ A possible revision to the limits applicable to unwanted emissions in the 50.2-50.4 GHz band was included in ITU Resolution 750 (REV. WRC-15) and is being considered under WRC-19 Agenda Item 1.6.

⁴⁹ Hughes Network Systems, LLC was authorized to launch and operate a GSO satellite that includes operations in the 40-42 GHz (space-to-Earth) and 47.2-50.2 GHz (Earth-to-space) bands. Hughes Network Systems, IBFS File Nos. SAT-LOA-20170621-00092 and SAT-AMD-20170908-00128 (granted in part and deferred in part Mar. 20, 2018). The Commission deferred consideration of Hughes's request for operations in the 50.4-51.4 GHz band. *Id.*

NGSO systems in the V-band.⁵⁰ SES and O3b requested that the Commission defer action on NGSO V-band applications until adequate sharing mechanisms are in place to avoid interference to GSO systems.⁵¹ Hughes requested that the Commission condition any grant of the Telesat Petition upon compliance with any applicable EPFD or technical limits that may be adopted by the Commission or ITU in the future, and that the Commission consider applying interim or default EPFD limits comparable to those in Article 22 of the ITU Radio Regulations.⁵²

12. In the *NGSO FSS R&O*, the Commission adopted a new rule in Section 25.289 requiring that, unless otherwise provided in the rules, an NGSO system licensee must not cause unacceptable interference to, or claim protection from, a GSO FSS or Broadcasting-Satellite Service (BSS) network.⁵³ Accordingly, a condition requiring compliance with Section 25.289 is included in this grant. Article 22 of the ITU Radio Regulations contains provisions to ensure compatibility of NGSO FSS operations with GSO networks.⁵⁴ However, we recognize that within the 37.5 GHz to 51.4 GHz range there are currently no ITU EPFD limits or specific coordination mechanisms for NGSO FSS systems. Telesat's grant will be subject to modification to bring it into conformance with any rules or policies adopted by the Commission in the future. Therefore, if relevant EPFD limits or other procedures are adopted by the Commission, or to the extent applicable, by the ITU in the future, Telesat's operations subject to this grant of U.S. market access must comply with those limits or procedures. We believe that these conditions adequately address the concerns raised by the commenters about spectrum sharing among GSO and NGSO systems. Additionally, given the initiation of studies at the ITU of technical and operational issues and regulatory provisions related to sharing between NGSO and GSO systems,⁵⁵ we decline the request by Hughes to develop our own interim or default EPFD limits for the Telesat system. Because of the global nature of most NGSO systems, we find it is more appropriate for these limits to be developed internationally.

13. *Orbital Debris Mitigation.* An applicant for a space station authorization must submit a description of the design and operational strategies that it will use to mitigate orbital debris, including a statement detailing post-mission disposal plans for space stations at the end of their operating life.⁵⁶ Telesat provided a preliminary orbital debris mitigation analysis as part of its Petition⁵⁷ and subsequently provided additional details about its plans,⁵⁸ but indicates throughout its application that the debris

⁵⁰ ViaSat Comments at 5-7; ViaSat Reply at 1-3. ITU Radio Regulation No. 22.2 states that NGSO systems shall not cause unacceptable interference to, and shall not claim protection from, GSO FSS and broadcasting-satellite service (BSS) networks operating in accordance with the Radio Regulations. ITU R.R. No. 22.2.

⁵¹ SES and O3b Comments at 3-5.

⁵² Hughes Comments at 2. In connection with this request, Hughes generally proposes that the Commission initiate a rulemaking to adopt NGSO/GSO sharing criteria and band-specific service rules for the 37.5-42.0 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz frequency bands. *Id.* at 1. It further requests that the Commission conduct an independent assessment of the appropriate single-entry and aggregate EPFD limits for these frequency bands. *Id.* at 2. For the reasons set forth in paragraph 12 *infra*, we have concluded that initiation of such a rulemaking and independent assessment is unwarranted and unnecessary, particularly in light of the adoption in the *NGSO FSS R&O* of Section 25.289 of the Commission's rules (which post-dated the filing of the Hughes Comments) and the conditions we are placing on this grant of market access.

⁵³ 47 CFR § 25.289.

⁵⁴ *See generally* ITU R.R. Article 22, Section II.

⁵⁵ ITU-R Resolution 159 (WRC-15).

⁵⁶ *Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567, 11619 (2004); 47 CFR §25.114(d)(14).

⁵⁷ Telesat Petition, Technical Exhibit at 16-19.

⁵⁸ Letter from Elisabeth Neasmith, Director, Spectrum Management and Development, Telesat Canada, to Jose P. Albuquerque, Chief, Satellite Division, International Bureau, FCC (filed July 24, 2017).

mitigation plan is a preliminary assessment pending the final constellation design.⁵⁹ Accordingly, we condition grant of the Telesat Petition on Telesat presenting and the Commission granting a modification of this market access grant to include a final orbital debris mitigation plan.⁶⁰ The modification should include, among other things, a discussion of any steps that Telesat has taken to coordinate physical operations with authorized and proposed NGSO systems at similar orbital altitudes (both for the main mission and disposal phases); a discussion of the level of data-sharing that would be required with other operators, including analysis of likely requirements for ephemeris refresh rates and time frames for coordination of planned maneuvers (both for the main mission and disposal phases); and whether Telesat has considered alternative orbital altitudes for its operations and whether those altitudes would materially affect Telesat's ability to provide service.⁶¹ Also, we note that the Commission recently opened a proceeding that proposes to update the current orbital debris rules.⁶² Telesat's updated orbital debris mitigation plan must comply with any new rules adopted by the Commission in this proceeding.

14. Additionally, Telesat will be subject to the same orbital debris mitigation conditions as other authorized NGSO systems, including a requirement that it coordinate its physical operations with space stations of NGSO systems operating at similar orbital altitudes.⁶³ To the extent that Telesat and other NGSO operators fail to come to an agreement regarding physical coordination, the Commission may intervene as appropriate.

15. *Waiver Standard.* Telesat seeks waivers of several of the Commission's rules.⁶⁴ Generally, the Commission may waive any rule for good cause shown.⁶⁵ Waiver is appropriate where the particular facts make strict compliance inconsistent with the public interest.⁶⁶ In making this determination, we may take into account considerations of hardship, equity, or more effective implementation of overall policy on an individual basis.⁶⁷ Waiver is therefore appropriate if special circumstances warrant a deviation from the general rule, such deviation will serve the public interest, and

⁵⁹ See, e.g., Telesat Petition, Technical Exhibit at 16 (noting that satellites "will be designed" to satisfy debris mitigation requirements).

⁶⁰ The International Bureau has previously required applicants to file a modification application including updated orbital debris mitigation information in some instances. See *Telesat Ka-band Order*, 32 FCC Rcd at 9668-69, 9675-76; *Northrop Grumman Space & Mission Systems Corp.*, Order and Authorization, 24 FCC Rcd 2330, 2363-64, para. 102 (IB 2009) (Northrop Grumman Order); *ContactMEO Communications, LLC*, Order and Authorization, 21 FCC Rcd 4035, 4052-53, para. 47 (IB 2006).

⁶¹ In light of this condition, we do not reach a conclusion at this time as to whether Telesat has demonstrated that it is subject to direct and effective oversight by Canada concerning debris mitigation.

⁶² *Mitigation of Orbital Debris in the New Space Age*, Notice of Proposed Rulemaking, FCC 18-159 (rel. Nov. 19, 2018).

⁶³ See, e.g., *Telesat Ka-band Order*, 32 FCC Rcd at 9675.

⁶⁴ Telesat requests waivers of Sections 25.156(d)(5), 25.157(e), 25.164(b), and 25.202(a)(1) of the Commission's rules, and also asks the Commission to "temporarily suspend bond requirements and its associated milestone clock until the ITU has developed NGSO-GSO sharing criteria... and the Commission has adopted sharing criteria for U.S. operations." Telesat Petition at 25-28; Telesat Response at 5. In addition, Telesat states in its Petition that its system is "capable of operating with both fixed terminals and mobile terminals," which suggests that it plans to operate both types of terminals pursuant to this authorization. *Telesat Petition* at 16. To the extent that Telesat seeks to provide service to mobile terminals in the United States, we note that such earth station operations would require a waiver of Section 2.106 of the Commission's rules, 47 CFR § 2.106, because there is no mobile-satellite service allocation in most of the bands to be used by Telesat. Because Telesat did not request a waiver of Section 2.106 in its Petition, this grant of U.S. market access does not permit Telesat to operate with mobile terminals.

⁶⁵ 47 CFR § 1.3.

⁶⁶ *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

⁶⁷ *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969), cert. denied, 409 U.S. 1027 (1972); *Northeast Cellular*, 897 F.2d at 1166.

the waiver does not undermine the validity of the general rule.⁶⁸ We address the specific requests for waivers below.

16. *Request for FSS Operations in the 50.4-51.4 GHz Band and Associated Waivers.* Telesat requests access to the U.S. market using the 50.4-51.4 GHz band.⁶⁹ Telesat notes that the U.S. Table of Allocations and the Commission's V-band designations include limitations on its proposed use.⁷⁰ This band is allocated for FSS uplinks in the U.S. Table of Frequency Allocations, but at the time Telesat filed its application the 50.4-51.4 GHz band was not listed among the available frequencies for FSS in Section 25.202(a)(1) of the rules. Telesat requested a waiver of the Section 25.202(a)(1) list of available frequencies for FSS.⁷¹ The Commission has since removed the list of frequencies in Section 25.202(a)(1) as unnecessary,⁷² thereby eliminating this barrier against applying for FSS use of the frequencies in the 50.4-51.4 GHz band. Accordingly, Telesat's request for a waiver of Section 25.202(a)(1) is dismissed as moot.

17. In the *V-band First R&O*, the Commission designated the 50.4-51.4 GHz segment for use by fixed and mobile service.⁷³ The Commission recently proposed authorizing fixed and mobile use under the UMFUS rules in the 50.4-51.4 GHz band in the *Spectrum Frontiers Order and Further Notice*,⁷⁴ but has not yet acted on this issue.⁷⁵ Rather than act on access to this band prematurely, we defer action until sharing between terrestrial and satellite operations in the band, as well as other uses of the band, are addressed in the context of the *Spectrum Frontiers Proceeding*. After such sharing and other uses are addressed, we will act on the request for operation in 50.4-51.4 GHz without the need for any further filing from Telesat.

18. *Sharing with NGSO Systems and Waiver of Band-Splitting Procedure.* Until recently, Section 25.157(e) of the Commission's rules provided that "available spectrum" be "divided equally" among the applications granted as the result of a processing round.⁷⁶ This rule presumed that NGSO operators could not use the same frequencies without causing harmful interference to each other, and therefore must be assigned discrete segments of the requested band. Telesat requests a waiver of Section 25.157(e), stating that its system can share spectrum with other NGSO FSS systems.⁷⁷ In the *NGSO FSS R&O* the Commission adopted rule changes that apply a spectrum sharing mechanism to all authorized NGSO FSS systems that include a condition of grant requiring compliance with Section 25.261.⁷⁸ As in other NGSO FSS authorizations, we include such a condition requiring Telesat to comply with the spectrum sharing requirements specified in Section 25.261 with respect to any other NGSO system licensed or granted U.S. market access pursuant to the processing round in which Telesat participated for

⁶⁸ *NetworkIP, LLC v. FCC*, 548 F.3d 116, 125-28 (D.C. Cir. 2008); *Northeast Cellular*, 897 F.2d at 1166; *WAIT Radio*, 418 F.2d at 1158.

⁶⁹ Telesat Petition, Narrative at 25-26. SpaceX supports Telesat's waiver request regarding operations in the 50.4-51.4 GHz band. SpaceX Comments at 5.

⁷⁰ Telesat Petition, Narrative at 25-26.

⁷¹ *Id.*

⁷² *NGSO FSS R&O*, 32 FCC Rcd at 7817-18, para. 27.

^e *V-band First R&O*, 13 FCC Rcd at 24651 (jointly referring to fixed and mobile services as "wireless service").

⁷⁴ *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services et. al.*, First Report and Order, First Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8158 (2016) (*Spectrum Frontiers First FNPRM*).

⁷⁵ *Spectrum Frontiers Second R&O*, 32 FCC Rcd at 10994, n.35.

⁷⁶ 47 CFR § 25.157(e).

⁷⁷ Telesat Petition, Narrative at 27-28.

⁷⁸ *NGSO FSS R&O*, 32 FCC Rcd at 7825-26, paras. 48-50.

all operations within the United States.⁷⁹ Accordingly, Telesat's request for waiver of Section 25.157(e) is no longer needed and is dismissed as moot.

19. *Bond and Milestone Requirement.* Although Telesat stated in its Petition that it would comply with the Commission's bond and milestone requirements,⁸⁰ Telesat indicated in its response to comments on its Petition that the Commission should suspend the application of Section 25.164(b) of the Commission's rules, which requires NGSO systems authorized in the United States to launch space stations, place them into the assigned orbits, and operate them in accordance with the station authorization within six years of grant of the authorization.⁸¹ Telesat states that unlike the Ka-band where there are international sharing criteria for GSO-NGSO systems, no such criteria exist for the V-band and that without such criteria satellite operators will not be able to begin work on their systems.⁸² Telesat therefore requests that the bond and "milestone clock" be suspended until 2019, when international sharing criteria are expected to be adopted by the ITU.⁸³ SES and O3b support Telesat's suggestion that the Commission grant Telesat's request so long as all V-band NGSO systems authorized in the United States are provided with similar relief from the bond and milestone requirement.⁸⁴ To the extent that Telesat intended by its comments to request a waiver of the bond and milestone requirement, Telesat has failed to provide sufficient justification in support of such a waiver and we deny Telesat's request. However, we note that the Commission reevaluated and revised its bond and milestone requirements in the NGSO FSS rulemaking to provide NGSO FSS operators with greater flexibility to deploy their systems, including an extension of the time in which an operator must deploy its full system.⁸⁵ As this grant of market access is subject to those modified rules, we expect that the increased deployment flexibility will help address Telesat's concerns about timing. Telesat can resubmit this request in the future, when it will have more information about the progress of the construction and launching of its satellites and will therefore be in a better position to assess the need and justification for a waiver.

20. *Section 25.156(d)(5) Waiver.* Telesat requests a waiver of Section 25.156(d)(5) of the Commission's rules.⁸⁶ Section 25.156(d)(5) stated that in frequency bands where the Commission has not adopted band specific service rules it will not consider applications for NGSO-like operation after it has granted an application for GSO-like operation, and vice-versa, unless and until the Commission establishes NGSO/GSO sharing criteria for that frequency band.⁸⁷ The Commission eliminated Section 25.156(d)(5) in the *NGSO FSS R&O*⁸⁸ and this rule change is now in effect. Consequently, Telesat's request for a waiver of this requirement is moot.

IV. ORDERING CLAUSES

21. Accordingly, IT IS ORDERED, that the Petition for Declaratory Ruling filed by Telesat Canada, IS GRANTED IN PART, DISMISSED IN PART, DENIED IN PART, AND DEFERRED IN PART, pursuant to Section 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. § 303(r),

⁷⁹ 47 CFR § 25.261. See also *Audacy Order* at para. 42; *O3b Order* at para. 51.

⁸⁰ Telesat Petition, Narrative at 19-20.

⁸¹ Telesat Response at 5; 47 CFR § 25.164(b).

⁸² Telesat Response at 5.

⁸³ *Id.*

⁸⁴ SES and O3b Reply at 4-5.

⁸⁵ *NGSO FSS R&O*, 32 FCC Rcd at 7830-31, paras. 66-67; see also *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Notice of Proposed Rulemaking, 31 FCC Rcd 13651, at 13663-64, paras. 32-33 (2016).

⁸⁶ Telesat Petition, Narrative at 27.

⁸⁷ 47 CFR § 25.156(d)(5).

⁸⁸ Telesat Response at 5; *NGSO FSS R&O*, 32 FCC Rcd at 7821-22, para. 39.

and Section 25.137(c) of the Federal Communication Commission's rules, 47 CFR § 25.137(c), as set forth below.

22. IT IS FURTHER ORDERED that any future grant of earth station licenses for operations with the Telesat system will be subject to the following conditions:

- a. Communications between U.S.-licensed earth stations and Telesat space stations must comport with all existing and future space station coordination agreements reached between Canada and other administrations, including all coordination agreements reached between Canada and the United States. In the absence of a coordination agreement, such communications must comport with applicable provisions of the ITU Radio Regulations.
- b. Operations in the 37.5-40.0 GHz band are unprotected with respect to the non-federal fixed and mobile services, except as authorized pursuant to 47 CFR § 25.136.
- c. Operations in the 37.5-40.0 GHz band are authorized up to the power flux-density limits in 47 CFR § 25.208(r)(1).
- d. Operations in the 37.5-38.0 GHz and 40.0-40.5 GHz bands must be successfully coordinated with Federal Space Research Service (SRS) facilities, pursuant to Recommendation ITU-R SA.1396, "Protection Criteria for the Space Research Service in the 37-38 GHz and 40.0-40.5 GHz Bands."
- e. Operations in the 40-42 GHz band are authorized up to the power-flux density limits in 47 CFR § 25.208(s) and (t).
- f. In accordance with footnote US211 to 47 CFR § 2.106, Telesat is urged to take all practicable steps to protect radio astronomy observations in the adjacent bands from harmful interference from its operations in the 40.5-42 GHz band.
- g. Operations in the 47.2-48.2 GHz band must provide interference protection to the fixed and mobile services, except as authorized pursuant to 47 CFR § 25.136.
- h. Any future grant of earth station licenses for operations with the Telesat system will be subject to the following condition, unless the condition is satisfied prior to such license grant: in the 48.94-49.04 GHz band, operations must be coordinated with radio astronomy stations operating on a co-primary basis in this band.
- i. In accordance with footnote US342 to 47 CFR § 2.106, Telesat is urged to take all practicable steps to protect radio astronomy observations from harmful interference from its operations in the 48.94-49.04 GHz band.
- j. Operations in the 47.2-50.2 GHz band will be subject to the rules adopted in the *Spectrum Frontiers Proceeding*, GN Docket 14-177.
- k. Earth station emissions into the 50.2-50.4 GHz band must comport with the limits contained in ITU-R Resolution 750 (REV. WRC-15) and/or footnote US156 to Section 2.106 of the Commission's rules, 47 CFR § 2.106, footnote US156, including any future revisions of footnote US156 to Section 2.106. Such revisions may be introduced either because of modifications that may be approved by WRC-19 to Resolution 750, or as a result of a Commission rulemaking proceeding, independent of any ITU deliberation.
- l. Operations must comply with the spectrum sharing procedures among NGSO FSS space stations specified in 47 CFR § 25.261 with respect to any NGSO system licensed or granted U.S. market access pursuant to the processing round initiated in Public Notice, DA 16-1244. Spectrum sharing between Telesat's operations and operations of NGSO systems licensed or granted U.S. market access, where such operations do not include communications to or from U.S. territory, are governed only by the ITU Radio Regulations and are not subject to Section 25.261.

- m. Operations shall not cause interference to, and shall not claim protection from, GSO networks operating in the FSS and BSS in accordance with Section 25.289 of the Commission's rules, 47 CFR § 25.289. In the event that relevant EPFD limits or procedures related to sharing between GSO and NGSO networks are adopted by the Commission or the ITU, operations must be in conformance with such limits and procedures.
- n. Telesat must comply with the sharing of ephemeris data procedures described in new Section 25.146 of the Commission's rules, 47 CFR § 25.146(e).⁸⁹
- o. Telesat must coordinate physical operations of spacecraft with any operator using similar orbits, for the purpose of eliminating collision risk and minimizing operational impacts. The orbital parameters specified in this grant are subject to change based on such coordination.
- p. Upon finalization of its space station design and prior to initiation of service, Telesat must seek and obtain the Commission's approval of a modification containing an updated description of the orbital debris mitigation plans for its system, as discussed in paragraph 13 above.

23. IT IS FURTHER ORDERED that this grant of U.S. market access and any earth station licenses granted in the future are subject to modification to bring them into conformance with any rules or policies adopted by the Commission in the future. Accordingly, any investments made toward operations in the bands authorized in this order by Telesat in the United States assume the risk that operations may be subject to additional conditions or requirements as a result of any future Commission actions.

24. IT IS FURTHER ORDERED that this grant of U.S. market access does not address the provision of any Direct-to-Home (DTH) service, Direct Broadcast Satellite Service (DBS)⁹⁰ or Digital Audio Radio Service (DARS) to, from, or within the United States.

25. IT IS FURTHER ORDERED that this grant is subject to the following requirements:

- a. Telesat must post a surety bond in satisfaction of 47 CFR §§ 25.165(a)(1) & (b) no later than **December 19, 2018**, and thereafter maintain on file a surety bond requiring payment in the event of a default in an amount, at minimum, determined according to the formula set forth in 47 CFR § 25.165(a)(1); and
- b. Telesat must launch 50 percent of the maximum number of proposed space stations, place them in the assigned orbits, and operate them in accordance with this grant of U.S. market access no later than **November 19, 2024**, and must launch the remaining space stations necessary to complete its authorized service constellation, place them in their assigned orbits, and operate them in accordance with the grant of U.S. market access no later than **November 19, 2027**. 47 CFR § 25.164(b).

Failure to post and maintain a surety bond will render this grant of U.S. market access null and void automatically, without further Commission action. Failure to meet the milestone requirements of 47 CFR § 25.164(b) may result in Telesat's authorization being reduced to the number of satellites in use at the milestone date. Failure to comply with the milestone requirements of 47 CFR § 25.164(b)(1) will also result in forfeiture of Telesat's surety bond. By **December 4, 2024**, Telesat must either demonstrate compliance with this milestone requirement or notify the Commission in writing that the requirement was not met. 47 CFR § 25.164(f).

26. IT IS FURTHER ORDERED that the request for waiver of 47 CFR § 25.202(a)(1),

⁸⁹ In the *NGSO FSS R&O*, we extended the requirement for NGSO FSS operators to share ephemeris data to all frequency bands in which NGSO FSS systems operate. See *NGSO FSS R&O*, 32 FCC Rcd at 7815-16, 7826, 7828, paras. 18, 20, 52, 58, and n.131.

⁹⁰ With respect to DBS and DTH, this paragraph excludes from the scope of the grant those services specified in 47 CFR § 25.701(a)(1)-(5).

concerning the availability of the 50.4-51.4 GHz band for FSS, IS DISMISSED as MOOT.

27. IT IS FURTHER ORDERED that, based on paragraph 22(l) above, which presumes grants on a co-frequency basis with other satellites systems, the request for a waiver of the band segmentation provision of 47 CFR § 25.157(e) IS DISMISSED as MOOT.

28. IT IS FURTHER ORDERED that the request for waiver of 47 CFR § 25.156(d)(5), concerning processing of NGSO applications, IS DISMISSED as MOOT.

29. IT IS FURTHER ORDERED that the request for suspension of the 47 CFR § 25.164(b) satellite construction milestones for final deployment IS DENIED.

30. IT IS FURTHER ORDERED that the request for U.S. market access for operations in the 50.4-51.4 GHz band IS DEFERRED pending Commission action in the *Spectrum Frontiers Proceeding*, GN Docket 14-177.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

**STATEMENT OF
CHAIRMAN AJIT PAI**

Re: *Space Exploration Holdings, LLC Application for Approval for Orbital Deployment and Operating Authority for the SpaceX V-band NGSO Satellite System, IBFS File No. SAT-LOA-20170301-00027; In the Matter of Kepler Corporation Petition for Declaratory Ruling to Grant Access to the U.S. Market for Kepler's NGSO FSS System, IBFS File No. SAT-PDR-20161115-00114; In the Matter of Telesat Canada Petition for Declaratory Ruling to Grant Access to the U.S. Market for Telesat's V-band NGSO Constellation, IBFS File No. SAT-PDR-20170301-00023; In the Matter of LeoSat MA, Inc., Petition for Declaratory Ruling Concerning U.S. Market Access for the LeoSat Ka-band Low-Earth Orbit Satellite System, IBFS File No. SAT-PDR-20161115-00112.*

Today, we're considering applications involving four proposed constellations of non-geostationary orbit satellites. Two of them involve repeat players; two involve startups. One proposed constellation would be authorized by the United States; three would be authorized by foreign governments and receive U.S. market access. But what they all have in common is the promise of variety in the burgeoning field of non-geostationary satellite services and innovative solutions to bridging the digital divide.

From providing high-speed broadband services in remote areas to offering global connectivity to the Internet of Things through "routers in space" for data backhaul, I'm excited to see what services these proposed constellations have to offer. Our approach to these applications reflects this Commission's fundamental approach: encourage the private sector to invest and innovate and allow market forces to deliver value to American consumers.

I'd also like to take a moment to recognize the staff of the International Bureau, not just for their efforts in bringing up to the Commission the items we're considering at this meeting, but for their ongoing efforts over these past two years. Since last June, the Commission has approved 13 market access requests and satellite applications to nine companies for NGSO systems, including the four that we add to the list today. This productivity is primarily due to your hard work and expertise. Thanks to your efforts, I'm optimistic that the American people will benefit from new satellite-based services.

In particular, I'd like to express my gratitude to Jose Albuquerque, Christopher Bair, Jennifer Balatan, Curtrisha Banks, Stephen Duall, Jennifer Gilson, Joseph Hill, Karl Kensinger, Sylvia Lam, Julia Malette, Kathryn Medley, Sankar Persaud, Cindy Spiers, Tom Sullivan, Troy Tanner, and Jay Whaley from the International Bureau. I'd also thank those from other Bureaus and Offices who have played a critical role in advancing these items: Michael Ha, Nick Oros, and Jamison Prime from the Office of Engineering and Technology; Stephen Buenzow, John Schauble, and Becky Schwartz from the Wireless Telecommunications Bureau; and Deborah Broderon, David Horowitz, and Bill Richardson from the Office of General Counsel.

**STATEMENT OF
COMMISSIONER MICHAEL O'RIELLY**

Re: *Space Exploration Holdings, LLC Application for Approval for Orbital Deployment and Operating Authority for the SpaceX V-band NGSO Satellite System, IBFS File No. SAT-LOA-20170301-00027; In the Matter of Kepler Corporation Petition for Declaratory Ruling to Grant Access to the U.S. Market for Kepler's NGSO FSS System, IBFS File No. SAT-PDR-20161115-00114; In the Matter of Telesat Canada Petition for Declaratory Ruling to Grant Access to the U.S. Market for Telesat's V-band NGSO Constellation, IBFS File No. SAT-PDR-20170301-00023; In the Matter of LeoSat MA, Inc., Petition for Declaratory Ruling Concerning U.S. Market Access for the LeoSat Ka-band Low-Earth Orbit Satellite System, IBFS File No. SAT-PDR-20161115-00112.*

These are exciting times in the development and deployment of new global satellite constellations that will serve consumers. Not since the early 1990s have satellite systems received such attention and captured the imagination of what new technologies, including high-speed broadband offerings, may bring. This also comes with some apprehension as few can predict which satellite systems, if any, will succeed or make money, and existing satellite offerings are indeed being subject to greater scrutiny. But, this new race to satellite orbit provides a first-class seat to the dreams of visionaries, and I look forward to seeing what NGSO systems develop and what services are eventually offered. Quite frankly, our job at the Commission is to approve the qualified applications and then let the market work its will.

In these four items, the Commission approves four additional systems, which will add at least another 7,859 satellites into orbit, if everything goes according to the submitted plans; and this comes on top of the nine applications and petitions the Commission has approved over the last 17 months. Between SpaceX's current application and the one previously consented to by the Commission, SpaceX alone is envisioning a future constellation of an unprecedented 11,943 satellites. As I said earlier today, new technologies – especially ones that revolutionize an industry model – oftentimes require the Commission to modernize and streamline our rules to provide a limited, but sound, framework to deal with accompanying policy issues. That is what today is all about.

I support granting the SpaceX application and the Kepler, LeoSat, and Telesat petitions for market access. While there are still issues to be explored, including communications with ESIMs and orbital debris, and policy calls that we may not have gotten quite right, such as how we handle in-line interference, the Commission continues to take the necessary steps to allow investment and future deployment of these ambitious projects.

I approve.

**STATEMENT OF
COMMISSIONER BRENDAN CARR**

Re: *Space Exploration Holdings, LLC Application for Approval for Orbital Deployment and Operating Authority for the SpaceX V-band NGSO Satellite System, IBFS File No. SAT-LOA-20170301-00027; In the Matter of Kepler Corporation Petition for Declaratory Ruling to Grant Access to the U.S. Market for Kepler's NGSO FSS System, IBFS File No. SAT-PDR-20161115-00114; In the Matter of Telesat Canada Petition for Declaratory Ruling to Grant Access to the U.S. Market for Telesat's V-band NGSO Constellation, IBFS File No. SAT-PDR-20170301-00023; In the Matter of LeoSat MA, Inc., Petition for Declaratory Ruling Concerning U.S. Market Access for the LeoSat Ka-band Low-Earth Orbit Satellite System, IBFS File No. SAT-PDR-20161115-00112.*

Never before have there been so many companies using such diverse technologies to connect Americans—and that is phenomenal news. We used to focus on improved speeds over copper, and then fiber, and then over the air using LTE. Today, the buzz includes fixed wireless and gigabit connections powered by high-band spectrum and 5G. With these four decisions, we authorize another tool in the broadband toolbox: large constellations of satellites in low-earth orbit.

These satellites are smaller and less expensive to launch than the traditional geostationary satellites that have been going up since the 1960s. They promise lower latency connections because they typically orbit only a few hundred miles above Earth, as opposed to many thousands. Many corners of our country that don't have broadband today, or don't have many broadband choices, could soon see new, high-speed services thanks to these low-earth orbit satellites. At least two of the applicants we consider today plan to offer services that could enable IoT devices—powering smart cities and smart ag. And those use cases complement the many connections satellites make today on ships, airplanes, and other vehicles.

The broader point is that, at this moment, innovation in tech and telecom has the extraordinary potential to benefit everyday Americans. As we move towards 5G, satellite, fiber, cable, fixed wireless, and a range of other offerings are all going to compete for your broadband dollars. And we can help move competition in that direction through smart policies.

That's what we're doing today. We're not picking winners and losers in the competition to provide more broadband to more Americans. We don't have the foresight to centrally plan the particular mode of connectivity everyone will use. Recognizing this is a good thing. After all, if your family is getting fast, affordable broadband, you probably don't care whether that connection is through a low-earth satellite or high-band spectrum. So that's the approach we take here. We let these four companies move forward and allow the market to decide their success.

For my part, I am excited to see what services these four companies will offer. And I'm glad we're clearing the way for more choices and more connections for Americans, regardless of where they live. Once again, I want to thank the International Bureau for its work on these items. They have my support.

**STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL**

Re: *Space Exploration Holdings, LLC Application for Approval for Orbital Deployment and Operating Authority for the SpaceX V-band NGSO Satellite System, IBFS File No. SAT-LOA-20170301-00027; In the Matter of Kepler Corporation Petition for Declaratory Ruling to Grant Access to the U.S. Market for Kepler's NGSO FSS System, IBFS File No. SAT-PDR-20161115-00114; In the Matter of Telesat Canada Petition for Declaratory Ruling to Grant Access to the U.S. Market for Telesat's V-band NGSO Constellation, IBFS File No. SAT-PDR-20170301-00023; In the Matter of LeoSat MA, Inc., Petition for Declaratory Ruling Concerning U.S. Market Access for the LeoSat Ka-band Low-Earth Orbit Satellite System, IBFS File No. SAT-PDR-20161115-00112.*

The United Nations is well known for its Human Development Index. It's a lot like a national report card. It's a composite of indicators involving life expectancy, education, and per capita income. As indices go, this one gets all the glory at the General Assembly. But there's another United Nations index that deserves some time in the spotlight—and that's the Index of Objects Launched into Outer Space. Moreover, it's one that directly informs our satellite work at the Federal Communications Commission.

According to this index, there are currently 4,857 satellites orbiting the globe. If you start counting from the fall of 1957, when Russia's Sputnik became earth's first artificial star, a total of 8,126 objects have been launched into space.

Now consider this. Today this agency is approving more than 7,500 new satellites for orbit. That's on top of more than 4,500 new satellites already authorized this year. Then consider that we have another 1,200 proposed satellites still in our pipeline for review.

Do the math. It adds up to a next-generation space race. New commercial models, players, and technologies are coming together and rapidly multiplying the range of satellite services. With these services come all kinds of opportunities. They include new capacities to connect more people in more places, use scarce resources more efficiently, support expanded access to education and health care, and grow economies beyond the limits of today's terrestrial networks. In other words, they could help with improving the very sorts of things that are measured by the United Nations in its Human Development Index. This is exciting.

Of course, increasing the number of satellites in orbit like this brings new challenges. That's because left unchecked, the growing amount of debris in orbit could make some regions of space unusable for decades to come. This should concern us all—because junking up our far altitudes will constrain our ability to innovate, connect, and make progress with satellite systems.