CORRECTED ON 11/08/19
to include 27.5-28.35 GHz band that was inadvertently omitted.

GRANTED IN PART / DEFERRED IN PART

GRANTED*
International Bureau
*with conditions

File # SAT-STA-20190924-00098
S2983
Call Sign S3018 Grant Date 11/07/19
(or other identifier)
From See conditions To: Period of 60 days
Approved: Stephen J. Duall
Stephen J. Duall
Chief, Satellite Policy Branch

Approved by OMB
3060-0678

Date & Time Filed: Sep 24 2019 4:07:10:780PM
File Number: SAT-STA-20190924-00098
Callsign:

FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SPACE STATION SPECIAL TEMPORARY AUTHORITY

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APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:
Respacing MOD STA Request

1. Applicant

Name:	Space Exploration Holdings, LLC	**Phone Number:**	202-649-2700
DBA Name:		**Fax Number:**	202-649-2701
Street:	1155 F Street, N.W. Suite 475	**E-Mail:**	patricia.cooper@spacex.com
City:	Washington	**State:**	DC
Country:	USA	**Zipcode:**	20004 -
Attention:	Ms Patricia Cooper		

ATTACHMENT TO GRANT

Space Exploration Holdings, LLC
IBFS File No. SAT-STA-20190924-00098

IBFS File No(s):	SAT-STA-20190924-00098	**GRANTED IN PART--DEFERRED IN PART With Conditions**
Licensee/Grantee:	Space Exploration Holdings, LLC	
Call Sign:	S2983/S3018	
Satellite Name:	SpaceX Ku/Ka-band Starlink Constellation	
Orbital Location: (required station-keeping tolerance)	Non-geostationary orbit (NGSO)	
Administration:	United States of America	
Nature of Service:	Telemetry, Tracking, and Command (TT&C); Testing	**International Bureau Satellite Division**
Scope of Grant:	Special temporary authority (STA) for a period of 60 days to conduct Launch and Early Orbit-Phase (LEOP) operations (1) to perform TT&C necessary for orbit-raising of each of the 60 satellites to be imminently launched from the insertion altitude of 280 km to an altitude of 350 km for initial payload testing and then to raise 20 of those satellites to a previously authorized orbital plane at an altitude of 550 km,[1] and (2) to test the communications payload on each of the 60 satellites.[2] SpaceX's request for authority to conduct LEOP operations and payload testing in planes proposed in the pending modification is deferred.[3]	
Service Area(s):	Not Applicable	
Frequencies:	TT&C Frequencies 12.221 GHz (space-to-Earth) and 13.925 GHz (Earth-to-space) Payload Testing Frequencies Ku-band: 10.7-12.7 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space) Ka-band: 17.8-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz (space-to-Earth); and 27.5-28.35 GHz, 28.35-29.1 GHz and 29.5-30.0 GHz (Earth-to-space).	

Operations under this grant must comport with the legal and technical specifications set forth by the applicant or petitioner and with Federal Communication Commission's rules not waived herein. This grant is also subject to the following conditions:

1. All operations under this grant of special temporary authority must be on an unprotected and non-harmful interference basis, *i.e.,* SpaceX must not cause harmful interference to, and must not claim protection from interference caused to it by, any other lawfully operating station.

2. In the event of any harmful interference under this grant of special temporary authority, SpaceX must immediately cease operations upon notification of such interference and inform the Commission, in writing, of such an event.

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[1] See Space Exploration Holdings, LLC, Order and Authorization, DA 19-342 (IB rel. Apr. 26, 2019) (*SpaceX Modification Order*). SpaceX intends to raise the additional 40 satellites to 550 km at least 40 days after completion of initial testing at 350 KM. *See* Letter from William M. Wiltshire, Counsel to SpaceX, to Marlene H. Dortch, Secretary, FCC, dated October 24, 2019 (SpaceX Supplement).

[2] We address the various outstanding concerns raised by commenters on this STA below. *See* Basis for Grant, set forth on pages 3-5 of this Attachment.

[3] IBFS File No. SAT-MOD-20190830-00087.

ATTACHMENT TO GRANT
Space Exploration Holdings, LLC
IBFS File No. SAT-STA-20190924-00098

3. SpaceX's payload-frequency operations must be limited to testing and must not include provision of commercial services.

4. During LEOP operations SpaceX must operate only the TT&C frequencies and test frequencies specified above.

5. SpaceX must make available to any requesting party the data used as input to the ITU-approved validation software to demonstrate compliance with applicable equivalent power flux density (EPFD) limits.

6. Operations authorized in this grant of STA must comport with any conditions imposed as a result of action on SpaceX's pending modification application (IBFS File No. SAT-MOD-20190830-00087) and grant of STA is without prejudice to any action taken on the pending modification application.

7. The term of this authorization commences on the date of launch of the satellites covered by this grant. SpaceX must notify the Chief of the Satellite Division, in writing, of the date of launch and the commencement of this grant of special temporary authority.

Licensee/grantee is afforded thirty (30) days from the date of release of this action to decline the grant as conditioned. Failure to respond within this period will constitute formal acceptance of the grant as conditioned.

This action is taken pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 CFR § 0.261, and is effective upon release.

Station licenses are subject to the conditions specified in Section 309(h) of the Communications Act of 1934, as amended, 47 U.S.C. § 309(h).

Action Date:	November 7, 2019	
Term Dates	**From:** see conditions	**To:** period of 60 days

Approved:

Stephen J. Duall
Chief, Satellite Policy Branch

ATTACHMENT TO GRANT
Space Exploration Holdings, LLC
IBFS File No. SAT-STA-20190924-00098

Basis for Grant

Various petitions were filed to deny or defer SpaceX's request for special temporary authority (STA).[4] SpaceX filed a consolidated opposition to these petitions,[5] and it submitted supplemental information in support of its STA request.[6] For the reasons set forth below, grant of SpaceX's request for STA, subject to conditions, is in the public interest despite petitions to deny or defer.

First, Kepler urges the Commission to deny this STA because it fundamentally does not meet the extraordinary circumstances requirement of section 25.120(b)(1) of the Commission's rules.[7] The authority SpaceX seeks to conduct launch and early orbit operations (LEOP) and testing prior to commencement of commercial services, however, is for special operations of a temporary nature. Such LEOP and testing operations have been granted routinely through STAs in the past for NGSO satellites.[8] The ability to communicate with satellites while conducting orbit-raising maneuvers is important to ensure proper functioning and to identify and correct any issues before satellites reach operational orbit. Given that this grant of authority only allows SpaceX to conduct LEOP operations and testing and not to place its satellites in the new orbital planes, this STA is similar to other STAs routinely granted for this purpose, and grant of this STA serves the public interest.

Second, EchoStar, Hughes, Intelsat, and AT&T (the GSO Operators) oppose any grant of STA without a condition requiring SpaceX to submit the data used as input to demonstrate compliance with applicable equivalent power flux density (EPFD) limits.[9] WorldVu Satellites Limited (OneWeb) also opposes grant of the STA without these conditions.[10] SpaceX has provided the current EPFD input data to SES/O3b under the pending modification application file.[11] In response to the concerns of the GSO

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[4] Written *Ex Parte* Presentation of EchoStar Satellite Operating Corp., Hughes Network Systems, Intelsat, and AT&T (filed Oct. 9, 2019) (GSO Operators *Ex Parte*); Letter from Nickolas G. Spina, Counsel to Kepler Communications, Inc., to Marlene H. Dortch, Secretary, FCC (filed Oct. 15, 2019) (Kepler Petition); Notice of Written Ex Parte of WorldVu Satellites Limited (filed Oct. 17, 2019) (OneWeb *Ex Parte*).

[5] Consolidated Opposition of Space Exploration Holdings, LLC, IBFS File No. SAT-STA-20190924-00098 (filed Oct. 30, 2019) (SpaceX Consolidated Opposition).

[6] Letter from William M. Wiltshire, Counsel to SpaceX, to Marlene H. Dortch, Secretary, FCC (filed Oct. 24, 2019) (SpaceX Supplement).

[7] *See* Kepler Petition at 15; *see* also 47 CFR § 25.120(b)(1) (stating that an STA may only be granted "upon a finding that there are extraordinary circumstances requiring temporary operations in the public interest and that delay in the institution of these temporary operations would seriously prejudice the public interest. Convenience to the applicant, such as marketing considerations or meeting scheduled customer in-service dates, will not be deemed sufficient for this purpose").

[8] The Satellite Division has previously granted special temporary authority for launch and early operation phase (LEOP) for NGSO space stations. *See, e.g.,* IBFS File No. SAT-STA-20170726-00109 & SAT-STA-20180724-00055 (granting 180-day STAs to Terra Bella for LEOPs); *see also* IBFS file no. SAT-STA-20190405-00023 (granted May 9, 2019) (granting a 60-day STA to SpaceX for LEOPs and testing for its first tranche of Starlink satellites). While certain temporary operations are already permitted by rule for satellites authorized to operate in the geostationary orbit, without the need to seek further Commission authorization, 47 CFR § 25.282, there is no similar rule automatically authorizing the temporary operations of non-geostationary orbit satellites.

[9] GSO Operators *Ex Parte* at 1.

[10] OneWeb *Ex Parte* at 3.

[11] *See* Letter from William M. Wiltshire, Counsel to SpaceX, to Suzanne Malloy, Petra Vorwig, and Noah Cherry, Counsel to SES/O3b, IBFS File No. SAT-MOD-20181108-00083 (filed Oct. 30, 2019). SpaceX also provided links to its EPFD input

Operators, OneWeb, and Kepler, we have conditioned this grant to require SpaceX to provide current EPFD input data to any satellite operator that requests it.

Third, OneWeb and Kepler Communications, Inc. (Kepler) oppose SpaceX's request for special temporary authority to place its second tranche of satellites in new orbital planes that are being separately requested in SpaceX's pending modification application.[12] OneWeb and Kepler argue that the public comments period on the modification application is still ongoing and that "serious concerns" have already been raised by commenters about SpaceX's proposed modification.[13] Both argue that SpaceX is attempting to "shortcut" or "skip" the Commission's review of its modification application.[14] SpaceX submitted supplemental information regarding its STA request on October 24, 2019, in which it clarified that it plans to initially raise only 20 of its satellites to 550 km and to place them in the previously authorized plane.[15] SpaceX also clarified that it does not intend to raise its other 40 satellites to 550 km until at least 40 days after completion of testing at 350 km.[16] Because this grant of STA does not authorize SpaceX to place these 40 satellites in the new orbital planes proposed in its modification, we find that the grant of STA does not prejudice any review of the separate modification application and this alleviates the concerns raised by OneWeb and Kepler.

Finally, Kepler and OneWeb both seek reconsideration of the Commission's April 2019 grant of the first SpaceX Modification.[17] Both ask the Commission to defer action on SpaceX's current STA request until the Commission addresses these petitions for reconsideration.[18] Kepler's petition focuses mainly on orbital debris concerns[19] and requests that SpaceX be responsible for conducting any maneuvers that may be necessary to avoid collisions with Kepler's satellites, on the grounds that the orbital altitude proposed by SpaceX in the first modification application significantly raises the risk of such collisions.[20] The effect of any decision that the Commission may take in this respect will not be altered by the grant of the instant STA. OneWeb's petition for reconsideration requests the inclusion of three additional conditions in the first SpaceX Modification authorization. Two of these conditions relate to gateway earth stations using Ku-band frequencies[21] and are not relevant to the matter being addressed here because communications between the 60 satellites being now launched and gateway

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data for the *SpaceX Modification Order*. *See* Consolidated Opposition to Petitions of Space Exploration Holdings, LLC, IBFS File Nos. SAT-MOD-20181108-00083 and SAT-MOD-20190830-00087, at n.13 (filed Oct. 30, 2019) (SpaceX Consolidated Opposition to Petitions).

[12] OneWeb *Ex Parte* at 3-4.

[13] OneWeb *Ex Parte* at 2; *see also* Kepler Petition at 1-2, 5,16.

[14] OneWeb *Ex Parte* at 1-2; *see also* Kepler Petition at 16.

[15] *See* SpaceX Supplement at 1.

[16] *See id.*

[17] See Kepler Petition at 1-2, 5-13; WorldVu Satellites Limited, *Petition to Reconsider and Petition to Condition, IBFS file no. SAT-MOD-20181108-00083 (filed May 28, 2019) (One-Web Petition for Reconsideration); Space Exploration Holdings, LLC, Request for Modification of the Authorization for the SpaceX NGSO Satellite System*, DA 19-342, Order and Authorization, (April 26, 2019) (SpaceX *Modification Order*).

[18] Kepler Petition at 2-3; One-Web Ex Parte at 4.

[19] *See Kepler Petition* at 5-13.

[20] *See id.* at 5-6.

[21] *See One-Web Petition for Reconsideration* at 7, 9.

earth stations will be conducted using Ka-band frequencies. The third condition would require SpaceX to accept additional uplink interference for those satellites deployed at a lower altitude than contemplated in the first SpaceX application.[22] This condition, if accepted by the Commission when acting on the OneWeb petition, would only be implemented when OneWeb and SpaceX are coordinating their operations. Acting on SpaceX's STA request now does not preclude this from happening. Therefore, the concerns of both OneWeb and Kepler relate to operations of SpaceX satellites and not the orbit raising and testing that we grant here, and thus these concerns do not prejudice OneWeb's and Kepler's petitions for reconsideration.

In conclusion, Kepler's, OneWeb's, and the GSO Operator's arguments do not form the basis for denial or deferral of SpaceX's STA request, and grant of this STA request serves the public interest.

[22] *See One-Web Petition for Reconsideration* at 5, 9-10.

2. Contact

Name:	William M. Wiltshire	**Phone Number:**	202-730-1350
Company:	Harris, Wiltshire & Grannis LLP	**Fax Number:**	202-730-1301
Street:	1919 M Street, NW Suite 800	**E-Mail:**	wwiltshire@hwglaw.com
City:	Washington	**State:**	DC
Country:	USA	**Zipcode:**	20036 -
Attention:		**Relationship:**	Legal Counsel

(If your application is related to an application filed with the Commission, enter either the file number or the IB Submission ID of the related application. Please enter only one.)

3. Reference File Number SATMOD2019083000087 or Submission ID

4a. Is a fee submitted with this application?

(●) If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R.Section 1.1114).

( ) Governmental Entity ( ) Noncommercial educational licensee

( ) Other(please explain):

4b. Fee Classification CXW - Space Station (Non-Geostationary)

5. Type Request

( ) Change Station Location ( ) Extend Expiration Date (●) Other

6. Temporary Orbit Location	7. Requested Extended Expiration Date

8. Description (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

SpaceX requests a 60-day STA to place spacecraft in the orbital planes requested in its pending modification and to communicate with gateway earth stations during early operations while the Commission is considering the underlying applications.

9. By checking Yes, the undersigned certifies that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes. (●) Yes ( ) No

10. Name of Person Signing	11. Title of Person Signing
Patricia Cooper	Vice President, Satellite Government Affairs

12. Please supply any need attachments.

Attachment 1: STA Request	Attachment 2:	Attachment 3:

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

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THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104–13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.

REQUEST FOR SPECIAL TEMPORARY AUTHORITY

Space Exploration Holdings, LLC ("SpaceX"), pursuant to Section 25.120 of the Commission's rules, hereby requests Special Temporary Authority ("STA") for 60 days covering satellites soon to be launched into its non-geostationary orbit ("NGSO") Starlink constellation. This request has two distinct components. One relates to the orbital positioning of space stations, while the other relates to communications with earth stations during early phases of operation. For the reasons discussed below, the Commission should find that these temporary operations would serve the public interest and grant both aspects of this request.

1. Orbital Positioning

Earlier this year, the Commission authorized SpaceX to relocate 1,584 of the satellites in its NGSO system to an altitude of 550 km, where they would be able to achieve better performance and orbital debris mitigation characteristics without increasing interference to any other licensed user of the relevant spectrum.[1] SpaceX has begun the process of deploying its system by launching 60 satellites in May. Recently, SpaceX proposed an incremental modification that will adjust the orbital spacing of its satellites as currently authorized in a way that will accelerate its timetable for providing high speed, low latency, competitively priced consumer broadband service throughout more of the United States.[2] Notably, that application does not request any change in the number of satellites, their orbital altitude or inclination, or their operational characteristics in order to achieve more rapid coverage of U.S. consumers, and also will not present any significant interference issues for any other licensed user of the Ku/Ka-band spectrum.

SpaceX currently anticipates that the next Starlink launch will take place before the end of October. In order to achieve the public interest benefits of accelerated deployment, SpaceX needs to be able to start populating the new orbital plane structure proposed in the pending modification application as soon as possible. Accordingly, SpaceX requests a 60-day STA to place spacecraft in these new planes while the Commission is considering that application.

Grant of this aspect of SpaceX's request would serve the public interest by enabling SpaceX to begin to place spacecraft where they will be able to provide service more quickly to more of the United States. This will accelerate the pace at which SpaceX can introduce robust broadband service to those Americans in underserved or completely unserved areas. As demonstrated in its modification application, the small change in satellite spacing will have no material impact on other spectrum users, including NGSO and GSO satellite systems and Ka-band terrestrial links. SpaceX understands that positioning its satellites under this STA would be at its own risk. In the unlikely event that the proposed modification is denied, SpaceX would be able to relocate satellites to locations authorized under its existing license.

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1 *See Space Exploration Holdings, LLC*, 34 FCC Rcd. 2526 (IB 2019) ("SpaceX Modification").

2 *See* IBFS File No. SAT-MOD-20190830-00087 (Aug. 30, 2019). The Commission has accepted that application for filing. *See* Public Notice, Rep. No. SAT-01412 (Sep. 13, 2019).

2. Earth Station Communications

SpaceX also seeks an STA to communicate with earth stations operated by its sister company, SpaceX Services, Inc. ("SpaceX Services") during the orbit-raising phase and early operations of its satellites. Applications for all of those earth stations are currently pending.[3]

These operations fall into three categories. First, SpaceX would communicate with a TT&C earth station to conduct telemetry, tracking, and control ("TT&C") functions during orbit raising[4] and on-orbit operations while its earth station application is pending. These transmissions would occur in the following frequencies: 12.221 GHz (downlink) and 13.925 GHz (uplink). Second, SpaceX would communicate with six Ku-band earth stations to test the communications payload on each of its satellites. These operations would take place throughout the 10.7-12.7 GHz (downlink) and 14.0-14.5 GHz (uplink) bands. Third, SpaceX would communicate with five Ka-band gateway earth stations to test the communications payload on each of its satellites. These operations would take place throughout the 28.35-29.1 GHz and 29.5-30.0 GHz (uplink) and 17.8-18.6 GHz, 18.8-19.3 GHz, and 19.7-20.2 GHz (downlink) bands at all sites, and also in the 27.5-28.35 GHz (uplink) band at the Conrad, MT and Loring, ME sites.

The Commission has good cause to approve this request to enhance the safety of space. Specifically, the requested STA would cover TT&C functions that are essential to commanding the spacecraft and ensuring the health and safety of SpaceX's nascent constellation. The STA would also allow SpaceX to confirm the operational status of its satellites immediately upon insertion, rather than waiting weeks while the satellites are obit raising to ensure proper functioning. This testing would yield a number of public interest benefits. For instance, SpaceX could act quickly in the unlikely event of a performance issue with one of its spacecraft to identify and correct the problem even before the satellite reaches operational orbit. By continuing testing even after the satellites have reached their intended orbits, SpaceX will ensure ongoing capabilities and be better able to prepare for accelerated launch of service. Accordingly, the STA will serve the public interest by enhancing space safety and promoting the health and safety of SpaceX's NGSO constellation.

* * *

With respect to both aspects of this STA request, SpaceX will operate on a non-interference basis. Consistent with its authorization, SpaceX will observe the applicable equivalent power flux-density ("EPFD") limits set forth in Article 22 and Resolution 76 of the ITU Radio Regulations and the applicable power flux-density ("PFD") limits set forth in the Commission's rules and

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[3] SpaceX Services currently has applications pending for six Ku-band gateway earth stations (located in North Bend, WA; Conrad, MT; Merrillan, WI; Greenville, PA; Redmond, WA; and Hawthorne, CA); one Ku-band TT&C earth station (located in Brewster, WA); and five Ka-band gateway earth stations (located in Conrad, MT; Loring, ME; Redmond, WA; Greenville, PA; and Merrillan, WI). *See* Public Notice, Rep. No. SAT-01388 (rel. May 10, 2019); IBFS File Nos. SES-LIC-20190816-01062 and -01063, SES-LIC-20190827-01110, SES-LIC-20190906-01170 and -01171. SpaceX Services will file complementary STA requests for these earth stations.

[4] Although the Commission by rule authorizes TT&C operations for GSO satellites during the orbit-raising phase, it has not yet adopted a similar rule for NGSO systems (though one is currently under consideration). *See* 47 C.F.R. § 25.282; *Mitigation of Orbital Debris in the New Space Age*, 33 FCC 11352, ¶ 70 (2018).

Article 21 of the ITU Radio Regulations, which the Commission has found sufficient to protect GSO systems and terrestrial systems, respectively, against harmful interference. Nonetheless, in the extremely unlikely event that harmful interference should occur due to transmissions to or from its spacecraft, SpaceX will take all reasonable steps to eliminate the interference. Should an issue arise, SpaceX can be reached at satellite-operators-pager@spacex.com, which links to the pagers of appropriate technical personnel 24/7.

The next tranche of SpaceX satellites is currently scheduled to be launched by the end of October 2019. Accordingly, SpaceX requests that the Commission issue an STA structured to begin on the launch date and remain in force for up to 60 days thereafter.