

September 9, 2019

Doug Young  
Federal Communications Commission  
445 12th Street, SW  
Washington, DC 20554

**Re: File # 1228-EX-ST-2019 – Frequency, Ground Station, and Orbital Parameter Specifics**

Dear Mr. Young:

Spire Global, Inc. (“Spire”) hereby provides the specific frequencies, ground stations, and orbital parameters for the one (1) LEMUR-2 satellite bus that will host the one (1) KeyW payload in the above-captioned experimental operation.

Frequencies

The LEMUR-2 satellite bus will only use the following frequencies as permitted under its recent Part 25 Stamp Grant, which is attached as Exhibit A.

- 402.6-402.8 MHz (See Stamp Grant, Spire, IBFS File No. SAT-AMD-20180102-00001 at Conditions 12-13, 15, 17 (granted Nov. 29, 2018)).
- 2200-2201 MHz (See Stamp Grant, Spire, IBFS File No. SAT-AMD-20180102-00001 at Condition 19 (granted Nov. 29, 2018)).
- 8170-8230 MHz (See Stamp Grant, Spire, IBFS File No. SAT-AMD-20180102-00001 at Conditions 20-21 (granted Nov. 29, 2018)). Spire is finalizing its X-band Coordination Memorandum with the National Aeronautics and Space Administration (on behalf of the Spectrum Frequency Coordination Group).

Ground stations

Attached as Exhibit B is the list of pre-coordinated ground stations that Spire will use for this experimental operation.

Orbital parameters

The LEMUR-2 satellite and incorporated KeyW payload will be deployed from the International Space Station at 400 km, 51.6 deg.

Please direct any questions concerning this filing to me.

Respectfully submitted,

**/s/ Ananda Martin**

Ananda Martin  
General Counsel  
ananda.martin@spire.com  
+1 415-356-3400

**EXHIBIT A**

**\*\* GRANT IN PART / DEFER IN PART \*\***

SAT-LOA-20151123-00078

File # SAT-AMD-20180102-00001

S2946 SAT-AMD-20180102-00001 IB2018000001  
Spire Global, Inc.  
LEMUR



Call Sign S2946 Grant Date 11/29/18  
(or other Identifier)

From 11/29/18 Term Dates see conditions  
To: conditions

Approved by OMB  
3060-0678

Approved: Steph J Duall

Steph J. Duall  
Chief, Satellite Policy Branch

Date & Time Filed: Jan 2 2018 3:26:50:640AM  
File Number: SAT-AMD-20180102-00001

FCC APPLICATION FOR SPACE AND EARTH STATION:MOD OR AMD – MAIN FORM	FCC Use Only
FCC 312 MAIN FORM FOR OFFICIAL USE ONLY	

**APPLICANT INFORMATION**

Enter a description of this application to identify it on the main menu:  
Phase IB/IC and Phase II Space Station License Amendment Application


1-8. Legal Name of Applicant

<b>Name:</b>	Spire Global, Inc.	<b>Phone Number:</b>	202-747-2619
<b>DBA Name:</b>		<b>Fax Number:</b>	
<b>Street:</b>	575 Florida Street Suite 150	<b>E-Mail:</b>	
<b>City:</b>	San Francisco	<b>State:</b>	CA
<b>Country:</b>	USA	<b>Zipcode:</b>	94110 -
<b>Attention:</b>			

## ATTACHMENT TO GRANT

Spire Global, Inc.

IBFS File No. SAT-LOA-20151123-00078 & SAT-AMD-20180102-00001

<b>IBFS File No(s):</b>	SAT-LOA-20151123-00078 SAT-AMD-20180102-00001 <sup>1</sup>	<p><b>GRANT IN PART / DEFER IN PART – With Conditions</b></p>  <p><b>International Bureau Satellite Division</b></p>
<b>Licensee/Grantee:</b>	Spire Global, Inc.	
<b>Call Sign:</b>	S2946	
<b>Satellite Name:</b>	LEMUR constellation	
<b>Orbital Location: (required station- keeping tolerance)</b>	NGSO at altitudes up to 600 km (see scope of grant below)	
<b>Administration:</b>	United States of America	
<b>Nature of Service:</b>	Earth Exploration Satellite Service (EESS)	
<b>Scope of Grant:</b>	Authority to construct, deploy, and operate up to 872 LEMUR Phase II satellites, initially deployed to altitudes from 385 to 650 km with inclinations ranging from equatorial to polar sun-synchronous (98 degrees). <sup>2</sup>	
<b>Previous Grant(s)</b>	<p>Authority to construct, deploy, and operate up to 72 Phase IC satellites, initially deployed to circular orbits of no greater than 600 km in altitude.<sup>3</sup></p> <p>Authority to construct, deploy, and operate up to 24 technically identical Phase IB satellites, initially deployed to circular orbits of no greater than 600 km in altitude.<sup>4</sup></p> <p>Authority to construct, deploy, and operate up to 4 technically identical Phase IB satellites, initially deployed to circular orbits of no greater than 500 km in altitude.<sup>5</sup></p> <p>Authority to construct, deploy and operate 28 technically identical satellites for what the applicant describes as “Phase IA” deployment, initially deployed to orbital altitudes of no greater than 650 km.<sup>6</sup></p>	
<b>Service Area(s):</b>	Global. See Schedule S Tech Report at Item S6	
<b>Frequencies:</b>	8025-8400 MHz (space-to-Earth) (primary data downlink) 2020-2025 MHz (space-to-Earth) (data downlink)	

<sup>1</sup> The application was placed on Public Notice as accepted for filing on June 29, 2018. See *Policy Branch Information, Applications Accepted for Filing*, Public Notice, Report No. SAT-01325 (IBFS File No. SAT-AMD-20180102-00001).

<sup>2</sup> In its application, Spire states that it plans to host payloads on its satellites for educational, government, and commercial customers, and will work with the Commission to license such payloads when it has sufficient details. Amendment at 9-10. Accordingly, Spire does not seek authorization for satellites with hosted payloads as part of its application, and no authority is granted. Accordingly, our action here is with respect to satellites having a nominal mass configuration 4.5 kg, rather than the maximum mass of 6 kg that Spire contemplates for satellites with hosted payloads. In addition, we defer action on Spire’s request to construct, deploy, and operate satellites in the 399.9-400.05 MHz (Earth-to-space) frequency band.

<sup>3</sup> See *Policy Branch Information, Satellite Space Applications Actions Taken*, Public Notice, DA 17-673, Report No. SAT-01253 (IBFS File Nos. SAT-AMD-20161114-00107). We deferred action on the remainder of Spire’s application as amended to add Phase II satellites and to operate in additional frequency bands.

<sup>4</sup> IBFS File No. SAT-AMD-20161114-00107 (granted in part May 18, 2017). Spire was also permitted to elect to use Phase IB satellites for the Orbital/Minotaur4 launch, initially deployed to 400x600 km orbital altitude.

<sup>5</sup> IBFS File No. SAT-AMD-20161114-00107 (granted in part Apr. 7, 2017).

<sup>6</sup> IBFS File No. SAT-LOA-20151123-00078 (granted in part Mar. 18, 2016); IBFS File No. SAT-LOA-20151123-00078 (granted in part June 16, 2016); IBFS File No. SAT-LOA-20151123-00078 (granted in part Oct. 14, 2016). Spire has deployed all 28 of its Phase IA satellites and has not sought any change to the parameters of these satellites. Application at 5 & 6.

## ATTACHMENT TO GRANT

Spire Global, Inc.

IBFS File No. SAT-LOA-20151123-00078 & SAT-AMD-20180102-00001

2025-2110 MHz (Earth-to-space) (primary data uplink)  
2200-2290 MHz (space-to-Earth) (data downlink) (Phase IB and 1C and Phase II only)  
402-403 MHz (Earth-to-space) (space-to-Earth (data back up only))

Telemetry, Tracking, and Command:

401-402 MHz (space-to-Earth)  
402-403 MHz (Earth-to-space and space-to-Earth)  
449.75-450.25 MHz (Earth-to-space) (Phase IC and Phase II only)  
2025-2110 MHz (Earth-to-space)

Receive Only Frequencies:

156.7625-156.7875 MHz (Automatic Identification System (AIS) (AIS 3)) (Phase IB and IC and Phase II only)  
156.8125-156.8375 MHz (AIS 4) (Phase IB and IC and Phase II only)  
161.9625-161.9875 MHz (AIS 1)  
162.0125-162.0375 MHz (AIS 2)  
161.9375-161.9625 MHz (Application Specific Messages (ASM) (ASM 1)) (Phase IB and IC and Phase II only)  
161.9875-162.0125 MHz (ASM 2) (Phase IB and IC and Phase II only)  
1087.7-1092.3 MHz ((Earth-to-space) Automatic Dependent Surveillance-Broadcast (ADS-B)) (Phase IC and Phase II only)  
1575.42 MHz and 1227.60 MHz (center frequencies, GPS reception)  
1559-1591 MHz (Galileo E1 signal) (Phase IB and IC and Phase II only)  
1164-1219 MHz (Galileo E5 signal) (Phase IB and IC and Phase II only)

**Unless otherwise specified herein, 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. Spire must prepare the necessary information, as may be required, for submission to the International Telecommunication Union (ITU) to initiate and complete the advance publication, coordination, due diligence, and notification process for these space stations, in accordance with the ITU Radio Regulations. Spire will be held responsible for all cost-recovery fees associated with ITU filings. No protection from interference caused by radio stations authorized by other administrations is guaranteed unless coordination and notification procedures are timely completed or, with respect to individual administrations, by successfully completing coordination agreements. Any radio station authorization for which coordination has not been completed may be subject to additional terms and conditions as required to effect coordination of the frequency assignments of other administrations. *See* 47 CFR § 25.111(b).

2. Upon receipt of a conjunction warning from the Joint Space Operation Center or other source, Spire must review the warning and take all possible steps to assess and, if necessary, to mitigate collision risk, including, but not limited to: contacting the operator of any active spacecraft involved in such warning; sharing ephemeris data and other appropriate operational information with any such operator; modifying spacecraft attitude and/or operations.

3. The number of simultaneously operational satellites must not exceed 175.<sup>7</sup>

4. The information provided by Spire supports a finding that some portion of the requested number of satellites is in the public interest, but it does not resolve all material questions of fact concerning whether

<sup>7</sup> We note that the total number of simultaneously operational satellites refers specifically to those satellites operating in frequencies other than TT&C frequencies and does not include non-operational satellites that continue to operate in TT&C frequency bands as part of approved post-mission disposal plans.

## ATTACHMENT TO GRANT

Spire Global, Inc.

IBFS File No. SAT-LOA-20151123-00078 & SAT-AMD-20180102-00001

deployment of the full constellation over the 15-year license term would involve debris mitigation plans sufficient to support a finding that the full deployment is in the public interest. Accordingly, prior to deploying Phase II satellites in excess of 100 satellites, Spire must supplement the information provided in its orbital debris mitigation plan and must obtain FCC approval of the supplemented orbital debris mitigation plan. In particular, the supplement should clarify and expand the information provided regarding the aggregate collision risk for its proposed system at all altitudes requested, based on launches completed and planned.

5. Spire must comply with any new rules adopted by the Commission as a result of the rulemaking in IB Docket No. 18-13.<sup>8</sup>

6. Spire must notify the Commission in writing at least 30 days prior to launch of a satellite that will be part of the Lemur constellation, but which is licensed by another Administration. This notification must include the name of the Administration that has licensed the satellite, the anticipated launch date and launch vehicle, as well as the apogee, perigee, and inclination of the satellite, as intended to be deployed and intended to be operated. Any satellite in the Lemur constellation, whether licensed by the U.S. or another Administration, will count towards the number of satellites authorized under this grant and such satellites licensed by other Administrations will count towards the maximum number of simultaneously operational satellites allowed under Condition 3 of this grant and towards the maximum number of satellites that may be deployed prior to the additional approval specified in condition 4 of this grant.

7. Deployment into an orbit with an inclination of 51.6 degrees, plus or minus 0.1 degree, other than directly from the ISS, is only authorized for satellites to be launched on Cygnus re-supply missions and is subject to the following:

- a. Deployment shall be into an orbit that, if from below the ISS altitude, is not closer than 15 km below and 15 km in front of ISS and, if above the ISS altitude, is to an orbit acceptable to NASA, which is currently defined as a co-elliptic orbit above the ISS semi-major axis with a relative perigee greater than 45km. If deployment is planned from an altitude above the ISS, not later than 10 business days prior to launch of the resupply mission, Spire shall provide documentation from NASA confirming that deployment from the Cygnus capsule is acceptable to NASA.
- b. Deployment above the ISS altitude may proceed only if it is confirmed in a manner acceptable to NASA that, following launch and docking operations, there is sufficient fuel on Cygnus to execute both the planned satellite deployment and planned Cygnus disposal operations.

8. Spire's request for waiver of the U.S. Table of Frequency Allocations, Section 2.106, to receive ASM transmissions in the 161.9375-161.9625 MHz (ASM 1), and 161.9875-162.0125 MHz (ASM 2), frequency bands, on a non-conforming, non-harmful interference basis, IS GRANTED. In addition, we waive Section 25.112(a)(3) to permit consideration of Spire's request for operations on the channels 161.9375-161.9625 MHz (ASM 1), and 161.9875-162.0125 MHz (ASM 2), which are not allocated internationally for satellite service. In 2003, the Commission determined to return as "premature" such applications seeking to operate in frequencies for which there is no international allocation, because it can take several years for the ITU to adopt an international frequency allocation. The Commission also expressed concern that such applications would constitute "place holders."<sup>9</sup> In this case, however, the lack of a current MSS allocation in these bands does not necessarily preclude initiation of service, as transmissions may be conducted under other allocations.<sup>10</sup> Accordingly, we do not believe it would serve the public interest to prohibit Spire the flexibility of including the capability to receive ASM messages on frequencies not allocated to satellite services. We note that all reception in this band must

<sup>8</sup> *Mitigation of Orbital Debris in the New Space Age*, Notice of Proposed Rulemaking, FCC 18-159 (rel. Nov. 19, 2018).

<sup>9</sup> *Amendment of the Commission's Space Station Licensing Rules and Policies*, First Report and Order, 18 FCC Rcd 10760, 10783 and 10809, paras. 49 and 124 (2003).

<sup>10</sup> *Iridium Constellation LLC*, Order and Authorization, 31 FCC Rcd 8675, 8683-84, para. 22.

## ATTACHMENT TO GRANT

Spire Global, Inc.

IBFS File No. SAT-LOA-20151123-00078 & SAT-AMD-20180102-00001

comport with the requirements on unauthorized publication or use of communications in Section 705 of the Communications Act of 1934, as amended.<sup>11</sup>

9. Spire may claim protection for reception in the 156.7625-162.0375 MHz or 1087.7-1092.3 MHz bands only to the extent permitted under the U.S. Table of Frequency Allocations for domestic operations or the ITU Radio Regulations for international operations, as of the time of operation. Operations in the 156.7625-162.0375 MHz and 1087.7-1092.3 MHz bands must be in accordance with any Commission rulemakings subsequent to the release of this license that implement any new domestic allocations or service rules for these bands.<sup>12</sup>

10. Spire may not claim any harmful interference protection rights for receiver operations with the Galileo E1 signal beyond that already afforded to non-Federal receivers that operate with the GPS L1 signal.<sup>13</sup>

11. We find it is in the public interest to grant a waiver of the U.S. Table for Spire's receiver operations with the Galileo E5 signal in the 1215-1219 GHz frequency band (space-to-space), where such operations would be on a non-conforming basis and Spire's Galileo E5 receivers must accept harmful interference from authorized services in the 1215-1240 MHz band.<sup>14</sup>

12. Spire shall tune TT&C UHF links in the 401-403 MHz frequency band to an agreed frequency range with the National Oceanographic and Atmospheric Administration (NOAA) as soon as possible to minimize interference to NOAA GOES Data Collection System and radiosonde operations and to work closely with NOAA to identify and implement any further measures needed to avoid radiofrequency interference to the systems mentioned earlier. This initial tuning would be an interim frequency range for Spire to use for upcoming launches. For future mission planning, transition out of 401-406 MHz to avoid interference to DCS and radiosonde is recommended. Spire and NOAA shall work jointly to explore future mitigation strategies to avoid interference to NOAA missions.

13. Spire's request for a waiver of the United States Table of Frequency Allocations, 47 CFR § 2.106, is GRANTED to permit operations in the 402-403 MHz (Earth-to-space and space-to-Earth (TT&C and data back up only)) and 2020-2025 MHz (space-to-Earth) frequency bands on a non-conforming, non-harmful interference basis. Spire must immediately terminate non-conforming operations upon notification of harmful interference.

14. Operations in the 449.75-450.25 MHz band may be used for space telecommand (Earth-to-space) at specific locations, subject to conditions as may be applied on a case-by-case basis, pursuant to US87 of the Table of Frequency Allocations, 47 CFR § 2.106. Spire must take all practical steps to keep the carrier frequency between 450.15 and 450.25 MHz.

15. Based upon information provided by the National Telecommunication and Information Administration (NTIA) as part of the frequency coordination process, future non-federal licenses for additional satellites will only be exceptionally considered for requests of downlink operations in the band 402-403 MHz, and Spire shall have no expectations that future licenses will be approved. Spire and DOC/NOAA shall work jointly to explore mitigation strategies to avoid interference to NOAA missions. For future missions, transition of TT&C links out of the 402-403 MHz band is required such that operations within the frequency band do not

<sup>11</sup> 47 U.S.C. § 605.

<sup>12</sup> *Iridium Order and Authorization*, 31 FCC Rcd at 8689, para. 50.

<sup>13</sup> *See Waiver of Part 25 Licensing Requirements for Receive-Only Earth Stations Operating with the Galileo Radionavigation-Satellite Service*, IB Docket No. 17-16, Order, FCC 18-158, para. 31, fn. 121 (Nov. 16, 2018).

<sup>14</sup> To the extent that Spire receivers have a front end that receives transmissions outside of the bands allocated for RNSS in the U.S. Table of Frequency Allocations (in bands between 1240 MHz and 1559 MHz), such receivers will not be afforded any harmful interference protection rights with respect to the signals received outside of these RNSS bands. *Id.* at para. 41, fn. 161.



## ATTACHMENT TO GRANT

Spire Global, Inc.

IBFS File No. SAT-LOA-20151123-00078 & SAT-AMD-20180102-00001

extend beyond October 31, 2020. Spire shall coordinate new ground station locations operating in 402-403 MHz with DOC/NOAA by providing the location of such stations for DOC/NOAA's review for interference concerns and approval prior to operation of those ground stations.

16. Spire must maintain a U.S. point of contact available by telephone 24 hours per day, seven days per week, with the authority and ability to terminate operations authorized herein. The telephone number for this U.S. point of contact must be provided to NTIA ([bmitchell@ntia.doc.gov](mailto:bmitchell@ntia.doc.gov)) and DOC/NOAA ([dfranc@doc.gov](mailto:dfranc@doc.gov)).

17. The maximum bandwidth of any transmission in the 402-403 MHz frequency band is limited to 15 kHz, and all transmissions in these frequencies shall be within a 200 kHz frequency band centered on 402.7 MHz, i.e., within the 402.6-402.8 MHz frequency band, except as necessary for a period immediately following (i) the deployment of the satellites or (ii) a satellite software reset, resulting in satellite transmissions returning to the default transmission channels, in both cases to allow for the retuning of transmissions, or unless otherwise agreed in a Memorandum of Agreement with DOC/NOAA.

18. Operations pursuant to this authorization must not cause harmful interference to stations operating in the 2025-2110 MHz band in accordance with the United States Table of Frequency Allocations. *See* 47 CFR § 2.106, Footnote US347.

19. Spire's request for a waiver of the United States Table of Frequency Allocations, 47 CFR § 2.106, to permit United States and Possessions (US&P) operations in the 2200-2290 MHz (space-to-Earth) frequency band is DEFERRED. Operations in the 2200-2290 MHz frequency band are permitted for use only outside of the US&P. Spire is required to successfully coordinate with NTIA prior to submitting any ITU filing involving any ground stations outside of the US&P that operate in the frequency band 2200-2290 MHz. NTIA will consider the request by Spire for accessing to the 2200-2290 MHz for ground stations located outside of US&P on a case-by-case coordinated basis with appropriate EMC analysis to NTIA ([bmitchell@ntia.doc.gov](mailto:bmitchell@ntia.doc.gov)), AFSMO ([jimmy.nguyen@us.af.mil](mailto:jimmy.nguyen@us.af.mil)), NASA ([john.e.zuzek@nasa.gov](mailto:john.e.zuzek@nasa.gov)) and DOC ([david.franc@doc.gov](mailto:david.franc@doc.gov)) to ensure compatibility of operations with the Federal government. Transmissions in the 2200-2290 MHz band to any single earth station must have a bandwidth no greater than one megahertz.

20. Transmissions of remote-sensing data in the 8025-8400 MHz frequency band may only be made to earth stations coordinated with the National Aeronautics and Space Administration (NASA). Spire shall provide the FCC the list of coordinated earth stations.

21. Power flux-density limits from operation in the 8025-8400 MHz band must not exceed the limits in No. 22.5 and Table 21-4 of the International Telecommunication Union's Radio Regulations, the limits/protection criteria in Recommendation IUT-R SA.1157-1 must be met, and the guidelines in Recommendation ITU-R SA.1810 must be followed.

22. This authorization will become null and void if, at any time during the license term, there are no Spire satellites operating.

23. Spire is subject to milestone and bond obligations imposed as conditions to a previous grant of authority to operate up to nine NGSO satellites in the 2020-2025 MHz frequency band. *See supra*, note [7]. We find that, following the discharge of the bond requirement associated with this previous grant, warehousing concerns are addressed in this situation through the imposition of condition [18] above.

24. Within 30 days after deployment of each satellite pursuant to this authorization, Spire must file a notification with the Commission specifying its apogee and perigee altitudes and orbital inclination.

25. The license term is 15 years, which commenced upon Spire's notification of the deployment of the first four Spire satellites on May 23, 2016.<sup>15</sup>

<sup>15</sup> Letter from Trey Hanbury, Counsel to Spire Global, Inc., to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-LOA-20151123-00078 (filed May 23, 2016).



**ATTACHMENT TO GRANT**

Spire Global, Inc.

IBFS File No. SAT-LOA-20151123-00078 & SAT-AMD-20180102-00001

26. Spire's request for a waiver of Section 25.114(c) of the Commission's rules, 47 CFR § 25.114(c), to the extent described in its application with respect to certain information to be provided in the Schedule S, IS GRANTED. We find that a waiver is warranted for the requirement for orbital information on the Schedule S for each satellite because the information Spire provided in its Narrative is sufficient to fulfill the relevant informational requirements.

27. Spire's request for processing of its amendment on a first-come, first-serve basis pursuant to Section 25.158 of the Commission's rules, is GRANTED. Spire's request for waiver of Sections 25.156 and 25.157 of the Commission's rules, IS MOOT.

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).

<b>Action Date:</b>	November 29, 2018
---------------------	-------------------

<b>Term Dates</b>	<b>From:</b> November 29, 2018	<b>To:</b> see conditions
-------------------	--------------------------------	---------------------------

**Approved:**



Stephen J. Duall  
Chief, Satellite Policy Branch

9-16. Name of Contact Representative

<b>Name:</b>	George John	<b>Phone Number:</b>	202-747-2619
<b>Company:</b>	Spire Global, Inc.	<b>Fax Number:</b>	
<b>Street:</b>	575 Florida Street Suite 150	<b>E-Mail:</b>	george.john@spire.com
<b>City:</b>	San Francisco	<b>State:</b>	CA
<b>Country:</b>	USA	<b>Zipcode:</b>	94110-
<b>Attention:</b>		<b>Relationship:</b>	

CLASSIFICATION OF FILING

17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b.

- a1. Earth Station
- a2. Space Station

- (N/A) b1. Application for License of New Station
- (N/A) b2. Application for Registration of New Domestic Receive-Only Station
- b3. Amendment to a Pending Application
- b4. Modification of License or Registration
- b5. Assignment of License or Registration
- b6. Transfer of Control of License or Registration
- b7. Notification of Minor Modification
- (N/A) b8. Application for License of New Receive-Only Station Using Non-U.S. Licensed Satellite
- (N/A) b9. Letter of Intent to Use Non-U.S. Licensed Satellite to Provide Service in the United States
- (N/A) b10. Other (Please specify)
- (N/A) b11. Application for Earth Station to Access a Non-U.S. satellite Not Currently Authorized to Provide the Proposed Service in the Proposed Frequencies in the United States
- (N/A) b12. Application for Database Entry
- b13. Amendment to a Pending Database Entry Application
- b14. Modification of Database Entry



**TYPE OF SERVICE**

<p>20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:</p> <p><input type="checkbox"/> a. Fixed Satellite</p> <p><input checked="" type="checkbox"/> b. Mobile Satellite</p> <p><input type="checkbox"/> c. Radiodetermination Satellite</p> <p><input checked="" type="checkbox"/> d. Earth Exploration Satellite</p> <p><input type="checkbox"/> e. Direct to Home Fixed Satellite</p> <p><input type="checkbox"/> f. Digital Audio Radio Service</p> <p><input checked="" type="checkbox"/> g. Other (please specify)                      METS and Space Ops</p>	
<p>21. STATUS: Choose the button next to the applicable status. Choose only one.</p> <p><input type="radio"/> Common Carrier    <input checked="" type="radio"/> Non-Common Carrier</p>	<p>22. If earth station applicant, check all that apply.</p> <p><input checked="" type="checkbox"/> Using U.S. licensed satellites</p> <p><input type="checkbox"/> Using Non-U.S. licensed satellites</p>
<p>23. If applicant is providing INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities:</p> <p><input type="radio"/> Connected to a Public Switched Network    <input type="radio"/> Not connected to a Public Switched Network    <input checked="" type="radio"/> N/A</p>	
<p>24. FREQUENCY BAND(S): Place an 'X' in the box(es) next to all applicable frequency band(s).</p> <p><input type="checkbox"/> a. C-Band (4/6 GHz)    <input type="checkbox"/> b. Ku-Band (12/14 GHz)</p> <p><input checked="" type="checkbox"/> c. Other (Please specify upper and lower frequencies in MHz.)</p> <p>                    Frequency Lower: 399.9                      Frequency Upper: 8325                      (Please specify additional frequencies in an attachment)</p>	

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

- a. Fixed Earth Station
- b. Temporary-Fixed Earth Station
- c. 12/14 GHz VSAT Network
- d. Mobile Earth Station
- e. Geostationary Space Station
- f. Non-Geostationary Space Station
- g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY:

- Transmit/Receive     Transmit-Only     Receive-Only     N/A

"For Space Station applications, select N/A."

PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an 'X' in the box(es) next to all that apply.)

- a — authorization to add new emission designator and related service
- b — authorization to change emission designator and related service
- c — authorization to increase EIRP and EIRP density
- d — authorization to replace antenna
- e — authorization to add antenna
- f — authorization to relocate fixed station
- g — authorization to change frequency(ies)
- h — authorization to add frequency
- i — authorization to add Points of Communication (satellites & countries)
- j — authorization to change Points of Communication (satellites & countries)
- k — authorization for facilities for which environmental assessment and radiation hazard reporting is required
- l — authorization to change orbit location
- m — authorization to perform fleet management
- n — authorization to extend milestones
- o — Other (Please specify)

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. 1.1308 and 1.1311, as an exhibit to this application. A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments.  Yes  No

ALIEN OWNERSHIP Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30–34.

29. Is the applicant a foreign government or the representative of any foreign government?	<input type="radio"/> Yes <input checked="" type="radio"/> No
30. Is the applicant an alien or the representative of an alien?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
31. Is the applicant a corporation organized under the laws of any foreign government?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
32. Is the applicant a corporation of which more than one-fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> N/A



33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one-fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?

Yes  No  N/A

34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.

#### BASIC QUALIFICATIONS

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules?  
If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.

Yes  No

36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explanation of circumstances.

Yes  No

37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explanation of circumstances.

Yes  No

38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attempting unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition? If Yes, attach as an exhibit, an explanation of circumstances

Yes  No

39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhibit, an explanation of the circumstances.

Yes  No

40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.

Exhibit D

41. 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

42a. Does the applicant intend to use a non-U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. 25.137, as appropriate. If No, proceed to question 43.

Yes  No

Exhibit C

42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station?N/A

43. Description. (Summarize the nature of the application and the services to be provided). (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Applicant seeks to amend its pending applications and requests authority to (i) measure signals (readily accessible to the general public) for the purpose of inferring atmospheric and land surface properties and (ii) deploy Phase II satellites, which have updated technical information.

Exhibit B

43a. Geographic Service Rule Certification

By selecting A, the undersigned certifies that the applicant is not subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25.

A

By selecting B, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will comply with such requirements.

B

By selecting C, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will not comply with such requirements because it is not feasible as a technical matter to do so, or that, while technically feasible, such services would require so many compromises in satellite design and operation as to make it economically unreasonable. A narrative description and technical analysis demonstrating this claim are attached.

C

Exhibit A

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- Individual
- Unincorporated Association
- Partnership
- Corporation
- Governmental Entity
- Other (please specify)

45. Name of Person Signing  
George John

→

46. Title of Person Signing  
Legal & Regulatory Counsel

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).

**FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT**

The public reporting for this collection of information is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the required data, and completing and reviewing the collection of information. If you have any comments on this burden estimate, or how we can improve the collection and reduce the burden it causes you, please write to the Federal Communications Commission, AMD-PERM, Paperwork Reduction Project (3060-0678), Washington, DC 20554. We will also accept your comments regarding the Paperwork Reduction Act aspects of this collection via the Internet if you send them to [PRA@fcc.gov](mailto:PRA@fcc.gov). PLEASE DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.

Remember – You are not required to respond to a collection of information sponsored by the Federal government, and the government may not conduct or sponsor this collection, unless it displays a currently valid OMB control number or if we fail to provide you with this notice. This collection has been assigned an OMB control number of 3060-0678.

**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.**

**EXHIBIT B**

Ground Station ID	Physical Location	Lat/Long	UHF Tx/Rx (402.6-402.8 MHz)	Sband Rx (2020-2025 MHz)	Sband Rx (2200-2201 MHz)	Sband Tx (2030-2035MHz)	Xband Rx (8170-8230 MHz)
ANCGS	2347 Azurite Court Anchorage, AK 99507, USA	61.1458402, -149.8382968		X			
BDAGS	1 Middle Road Smiths, Bermuda	32.313396, -64.7495561	X	X			
BDLGS	155 Locust Street Hartford, CT 06114, USA	41.7449458, -72.6655108	X	X			
BDUGS	Bygården Hans Karolius vei 6 9300 Finnsnes, Norway	69.2288585, 17.9878923	X	X			
CLTGS	5821 Fairview Road Charlotte, NC 28209, USA	35.1523289, -80.8437301	X	X			
CMBGS	SupremeSAT Teleport Kandy, Sri Lanka	7.2763493, 80.7231033	X	X			
DALGS	904 Quality Way Richardson, TX 75081, USA	32.966196, -96.711516	X	X			
DLHGS	3401 Technology Drive Duluth, MN 55811, USA	46.827484, -92.130394	X	X			
GLAGS	5B, Skypark 5 45 Finnieston Street Glasgow G3 8JU, United Kingdom	55.860667, -4.278919	X	X			
GUMGS	312 Route 2A, Shell Fuel Farm Road Piti, Guam, 96925, USA	13.415647, 144.687508	X	X			
HLEGS	15°56'S 005°43'W	-15.9419444, -5.705278	X	X			
HNDGS	36°25'33.91"N 138°57'17.20"E	36.426164, 138.954789				X	



Ground Station ID	Physical Location	Lat/Long	UHF Tx/Rx (402.6-402.8 MHz)	Sband Rx (2020-2025 MHz)	Sband Rx (2200-2201 MHz)	Sband Tx (2030-2035MHz)	Xband Rx (8170-8230 MHz)
ITOGS	93-1704 South Point Road Naalehu, HI 96772-0842, USA	19.014291, -155.662856	X	X			
IVCGS	41 Smith Road Lochiel, Winton 9781, New Zealand	-46.20608, 168.336741	X	X			
JNBGS	Farm 502 JQ Hartebeesthoek District Krugersdorp Gauteng, South Africa	-25.886747, 27.712694	X	X			
JNUGS	MXAK 1050 Harbor Way Juneau, AK 99824, USA	58.301165, -134.42561	X	X			
ORKGS	Elfordstown Teleport Elfordstown, Co. Cork, Ireland	51.953995, -8.174661	X	X			
PSYGS	51°42'S 57°51'W	-51.7, -57.85	X	X			
PUQGS	Ruta 9, KM 28 Punta Arenas, Chile	-52.937706, -70.857453			X		
SEAGS	Telx Seattle 3433 S 120th Place Tukwila, Washington 98168, USA	47.492632, -122.288627	X	X			
SFOGS	466 8th Street San Francisco, CA, USA	37.772808, -122.407737	X				
SINGS	Bukit Timah, Singtel, Singapore	1.351834, 103.790956	X	X			
SMAGS	ESA Satellite Ground Station Rua Assomada, 9580-471 Vila do Porto, Santa Maria, Açores	36.997241, -25.136215	X	X			

Ground Station ID	Physical Location	Lat/Long	UHF Tx/Rx (402.6-402.8 MHz)	Sband Rx (2020-2025 MHz)	Sband Rx (2200-2201 MHz)	Sband Tx (2030-2035MHz)	Xband Rx (8170-8230 MHz)
STXGS	23 Estate Northside Frederiksted, VI 00840, St. Croix, USA	17.761931, -64.885011	X	X			
TOSGS	Prestvannveien 38, 9011 Tromsø, Norway	69.662829, 18.941422			X	X	X
TUSGS	Involta 1215 E Pennsylvania Street Tucson, AZ 85714, USA	32.17245, -110.954498	X	X			
VNTGS	University of Ventpils Inženieru 101a Ventpils, LV-3601, Latvia	57.559788, 21.861274		X			
WBUGS	1825 33rd St. Suite 100, Boulder, CO 80301	40.018538, -105.25113	X	X			
XSPGS	11 Seletar Satellite Station Road Singapore 788508	1.397026, 103.83503	X	X			