

**** GRANTED IN PART / DEFERRED IN PART ****



GRANTED *

*with conditions

File # SAT-MOD-20200501-00040, as amended by
SAT-AMD-20200504-00041

Call Sign S3041 Grant Date July 1, 2021
(or other identifier)

Approved by OMB
3060-0678

Term Dates

From July 1, 2021 To Sept. 8, 2035

Merissa L. Velez
Merissa L. Velez
Chief, Satellite Policy Branch

Date & Time Filed: May 1 2020 2:29:00:863PM
File Number: SAT-MOD-20200501-00040

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:
Application to Modify the Authorization for the Swarm NGSO Satellite System

1-8. Legal Name of Applicant

Name:	Swarm Technologies, Inc.	Phone Number:	608-225-3173
DBA Name:		Fax Number:	608-225-3173
Street:	845 Madonna Way	E-Mail:	sara@swarm-technologies.com
City:	Los Altos	State:	CA
Country:	USA	Zipcode:	94024 -
Attention:	Dr Sara Spangelo		

ATTACHMENT TO GRANT
Swarm Technologies, Inc.
IBFS File Nos. SAT-MOD-20200501-00040, SAT-AMD-20200504-00041

IBFS File No(s):	SAT-MOD-20200501-00040 and SAT-AMD-20200504-00041 ¹	<p>GRANTED IN PART/DEFERRED IN PART With Conditions</p>  <p>International Bureau Satellite Division</p>
Licensee/Grantee:	Swarm Technologies, Inc.	
Call Sign:	S3041	
Satellite Name:	Swarm NGSO constellation	
Orbital Location: (required station-keeping tolerance)	Non-geostationary satellite orbit (NGSO). ² Full constellation is authorized for inclinations ranging from equatorial to polar, deployment and operational altitudes between 300-550 kilometers.	
Administration:	United States of America	
Nature of Service:	Non-voice, non-geostationary (NVNG) mobile-satellite service (MSS) in the low-earth orbit (LEO)	
Scope of Grant:	Modification of license to authorize construction, deployment, and operation of satellites authorized in DA 19-1044, ³ with changes to technical specifications including the addition of a propulsion system. ⁴	
Prior Grant(s):	Construct, deploy, and operate a constellation of 150 technically identical NVNG satellites for the provision of MSS using frequencies in portions of the 137-138 MHz (space-to-Earth) and 148-149.95 MHz (Earth-to-space) frequency bands. <i>See</i> IBFS File No. SAT-LOA-2181221-00094, granted in part, deferred in part in Memorandum Opinion, Order and Authorization, DA 19-1044, 34 FCC Rcd 9469 (Int'l Bur. Oct. 17, 2019).	

¹ This application, including amendment, was placed on public notice in Satellite Policy Branch Information, Report No. SAT-01482 (July 17, 2020). In response, Space Exploration Holdings, LLC filed comments supporting Swarm's request in its modification application to use a propulsion system on its satellites. Comments of Space Exploration Holdings, LLC (Aug. 17, 2020). Myriota Pty Ltd. filed comments addressing the amendment, and ORBCOMM License Corp. filed a Petition to Dismiss or Deny requests set forth in the amendment. Comments of Myriota Pty. Ltd. (filed Aug. 17, 2020) and Petition to Dismiss or Deny of ORBCOMM License Corp. (filed Aug. 17, 2020). We defer action on all the requests specified in the amendment to Swarm's modification application, IBFS File No. SAT-AMD-20200504-00041, which includes proposals to increase the number of satellites and use additional frequencies. Additionally, Swarm's modification application requests a change in the range of deployment altitudes from 400-550 km to 300-585 km and change in operational altitudes from 300-550 km to 300-585 km. Swarm states, however, that for purposes of an upcoming launch, the satellites will be deployed within the previously authorized orbital altitude range. *See* Letter to Marlene H. Dortch, Secretary, FCC, from Shiva Goel, Counsel to Swarm Technologies, Inc. (June 30, 2021). In this grant, we defer Swarm's request to increase the upper orbital altitude range for deployment and operations.

² Swarm plans to use propulsion capabilities to avoid collisions in response to conjunction alerts, to minimize dwell time at the altitude of the International Space Station, and for de-orbiting. *See* Letter from Shiva Goel, Counsel to Swarm Technologies, to Jose P. Albuquerque, Chief, Satellite Division, International Bureau, FCC, at 2 (July 8, 2020). Swarm states that while it may use orbital maneuvers for station-keeping, it does not intend to maintain specific tolerances for apogee and perigee altitudes, inclination, right ascension of the ascending node (RAAN), or the local time at the descending node (LTDN). *Id.*

³ Swarm Technologies, Inc., Memorandum Opinion, Order and Authorization, DA 19-1044, 34 FCC Rcd 9496 (Int'l Bur. Oct. 17, 2019) (*Swarm MOO&A*).

⁴ At least 30 days in advance of a planned launch, Swarm must provide the Commission with information regarding the anticipated launch date and launch vehicle, as well as inclination and deployment and operational altitudes.

ATTACHMENT TO GRANT
Swarm Technologies, Inc.
IBFS File Nos. SAT-MOD-20200501-00040, SAT-AMD-20200504-00041

	IBFS File Nos. SAT-MOD-2020501-00040 and SAT-AMD-20200504-00041, granted in part, deferred in part, Dec. 7, 2020 (to launch up to 16 propulsion-equipped satellites over three launches beginning in December 2020). ⁵
Service areas	Global
Frequencies	137.0250-137.1750 MHz, 137.3275-137.3750 MHz, 137.4725-137.5350, 137.5850-137.6500 MHz, and 137.8125-138.0000 MHz (space-to Earth); and 148.2500-148.5850 MHz, 148.6350-148.7500 MHz, and 149.9000-149.9500 MHz (Earth-to-space) Global Positioning System (L1 signal) reception: 1575.42 MHz, ± 12 MHz.
<p>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:</p> <ol style="list-style-type: none"> 1. This grant is subject to modification to bring it into conformance with any rules and policies adopted by the Commission in the future, including as a result of the rulemaking in IB Docket No. 18-313.⁶ 2. The grant of this modification is subject to the terms and conditions set forth in Swarm Technologies, Inc., Memorandum Opinion, Order and Authorization, DA 19-1044 (Int’l Bur., Sat. Div. rel. Oct. 17, 2019), unless modified herein.⁷ 3. Upon receipt of a conjunction warning from the 18th Space Control Squadron or other source, Swarm must review and take all possible steps to assess the collision risk and mitigate collision risk if necessary. As appropriate, steps to assess and mitigate should include, but are 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; and modifying spacecraft attitude and/or operations.⁸ 4. This grant of this modification is without prejudice to any action the Commission may take regarding requests specified in the modification and amendment to the modification application, IBFS File Nos. SAT-MOD-20200501-00040, SAT-AMD-20200502-00041 not granted herein, or in IBFS File No. SAT-LOA-20181224-00094.⁹ 5. Swarm is authorized to continue to launch satellites without propulsion capabilities as part of its constellation authorized in DA 19-1044, however, at least 30 days prior to any launch, Swarm must 	

⁵ See Swarm Technologies, Inc., IBFS File Nos. SAT-MOD-2020501-00040 and SAT-AMD-20200504-00041, granted in part, deferred in part, Dec. 7, 2020.

⁶ See *Mitigation of Orbital Debris in the New Space Age*, Notice of Proposed Rulemaking, FCC 18-159, 33 FCC Rcd 11352 (2018); *Mitigation of Orbital Debris in the New Space Age*, Report and Order and Further Notice of Proposed Rulemaking, FCC 20-54, 35 FCC Rcd 4156 (2020).

⁷ Although satellites deployed following grant of this modification will have different technical specifications from previously deployed satellites, all the satellites shall be deemed “technically identical” for purposes of Swarm’s license conditions. See *Swarm MOO&O*, 34 FCC Rcd 9496, paras. 1, 18.e.

⁸ See Letter from Shiva Goel, Swarm Technologies, Inc. to Jose P. Albuquerque, Chief, Satellite Division, International Bureau, FCC (filed Aug 4, 2020) (describing the capabilities of the proposed propulsion system, including the extent to which the propulsion system would enable collision avoidance maneuvers).

⁹ See Public Notice, Satellite Policy Branch Information, Myriota Pty. Ltd., Petition Accepted for Filing, IBFS File No. SAT-PDR-20191118-00135 Cut-Off Established for Additional NVNG MSS Application or Petitions for Operations in the 137-138 MHz and 148-150.5 MHz Bands, DA 20-238 (March 5, 2020).

ATTACHMENT TO GRANT
Swarm Technologies, Inc.
IBFS File Nos. SAT-MOD-20200501-00040, SAT-AMD-20200504-00041

inform the Commission of the number of satellites included in the launch that have and do not have propulsion capabilities.¹⁰ This authority to launch satellites without propulsion does not apply to replacement satellites authorized as part of DA 19-1044.

6. The license term for the Swarm NGSO constellation is 15 years, which commenced upon Swarm's notification of the deployment of the first Swarm satellites on September 8, 2020.¹¹ Nothing in this modification grant alters the license term for the Swarm NGSO constellation.

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:	July 1, 2021	
Term Dates	From: July 1, 2021	To: September 8, 2035

Approved:



Merissa L. Velez
Chief, Satellite Policy Branch

¹⁰ See Letter to Marlene H. Dortch, Secretary, FCC, from Shiva Goel, Counsel to Swarm Technologies (April 7, 2021). This information may be included with the filing required in footnote 4, *supra*.

¹¹ See IBFS File No. SAT-LOA-20181221-00094, Letter from Kyle Wesson, Regulatory Engineer, Swarm Technologies, Inc. to FCC (Sept. 8, 2020).

9-16. Name of Contact Representative

Name:	Shiva Goel	Phone Number:	202-730-1304
Company:	Harris, Wiltshire & Grannis	Fax Number:	202-730-1301
Street:	1919 M Street NW Suite 800	E-Mail:	SGoel@hwglaw.com
City:	Washington	State:	DC
Country:	USA	Zipcode:	20036-
Attention:		Relationship:	Legal Counsel

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

<p>17c. Is a fee submitted with this application?</p> <p><input checked="" type="radio"/> If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R.Section 1.1114).</p> <p><input type="radio"/> Governmental Entity <input type="radio"/> Noncommercial educational licensee</p> <p><input type="radio"/> Other(please explain):</p>	
<p>17d.</p> <p>Fee Classification CGW – Space Station Modification(Non–Geostationary)</p>	
<p>18. If this filing is in reference to an existing station, enter:</p> <p>(a) Call sign of station: S3041</p>	<p>19. If this filing is an amendment to a pending application enter both fields, if this filing is a modification please enter only the file number:</p> <p>(a) Date pending application was filed:</p> <p>(b) File number: SATLOA2018122100094</p>

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 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 type="checkbox"/> g. Other (please specify)</p>	
<p>21. STATUS: Choose the button next to the applicable status. Choose only one.</p> <p><input checked="" 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 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 checked="" type="radio"/> Connected to a Public Switched Network <input checked="" 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: 137 Frequency Upper: 150.05 (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

<p>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.</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No Ex. A – ODAR</p>
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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.

<p>29. Is the applicant a foreign government or the representative of any foreign government?</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No</p>
<p>30. Is the applicant an alien or the representative of an alien?</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> N/A</p>
<p>31. Is the applicant a corporation organized under the laws of any foreign government?</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> N/A</p>
<p>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?</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A</p>

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.

Ex. D – Qs 32 & 40

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

Ex. E – Q36

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

Ex. B – Trackability

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

Ex. C – LeoLabs

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.

Ex. D – Qs 32 & 40

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

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? United States

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.)

Application to Modify the Authorization for the Swarm NGSO Satellite System (Call sign

Narrative

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

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 Dr. Sara Spangelo	46. Title of Person Signing CEO
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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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