



UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

RADIO STATION AUTHORIZATION

Name: Swarm Technologies, Inc.

Call Sign: E190861

Authorization Type: License

File Number: SES-LIC-20191022-01367

Non Common Carrier

Grant date: 09/18/2020

Expiration Date: 09/18/2035

Nature of Service: Mobile Satellite Service

Class of Station: Fixed Earth Stations

A) Site Location(s)

| # | Site ID | Address | Latitude | Longitude | Elevation (Meters) | Special Provisions NAD (Refer to Section H) |
|----|---------------------|--|-------------|---------------|--------------------|---|
| 1) | Brewster WA Gateway | 66C Teleport Drive Brewster, Okanogan, WA 98812 | 48°8'49.2"N | 119°41'45.6"W | 380 | 83 |

Subject to the provisions of the Communications Act of 1934, The Communications Satellite Act of 1962, subsequent acts and treaties, and all present and future regulations made by this Commission, and further subject to the conditions and requirements set forth in this license, the grantee is authorized to construct, use and operate the radio facilities described below for radio communications for the term beginning September 18, 2020 (3 AM Eastern Standard Time) and ending September 18, 2035 (3 AM Eastern Standard Time) . The required date of completion of construction and commencement of operation is September 18, 2021 (3 AM Eastern Standard Time) . Grantee must file with the Commission a certification upon completion of construction and commencement of operation.

B) Particulars of Operations

The General Provision 1010 applies to all receiving frequency bands.

The General Provision 1900 applies to all transmitting frequency bands.

For the text of these provisions, refer to Section H.

| # | Frequency (MHz) | Polarization Code | Emission | Tx/Rx Mode | Max EIRP /Carrier (dBW) | Max EIRP Density /Carrier (dBW/4kHz) | Associated Antenna | Special Provisions (Refer to Section H) | Modulation/ Services |
|----|-------------------|-------------------|----------|------------|-------------------------|--------------------------------------|--------------------|---|------------------------|
| 1) | 148.0000-149.9500 | V | 250KF1D | Tx | 15.50 | -2.50 | COLINEAR | | FSK / data (non-voice) |
| 2) | 148.0000-149.9500 | V | 7K80F1D | Tx | 15.50 | 12.60 | COLINEAR | | FSK / data (non-voice) |
| 3) | 137.0000-138.0000 | V | 125KF1D | Rx | 0.00 | 0.00 | COLINEAR | | FSK / data (non-voice) |
| 4) | 137.0000-138.0000 | V | 7K80F1D | Rx | 0.00 | 0.00 | COLINEAR | | FSK / data (non-voice) |
| 5) | 148.0000-149.9500 | L | 7K80F1D | Tx | 10.00 | 7.10 | QFH | | FSK / data (non-voice) |
| 6) | 148.0000-149.9500 | L | 250KF1D | Tx | 10.00 | -8.00 | QFH | | FSK / data (non-voice) |
| 7) | 137.0000-138.0000 | L | 125KF1D | Rx | 0.00 | 0.00 | QFH | | FSK / data (non-voice) |
| 8) | 137.0000-138.0000 | L | 7K80F1D | Rx | 0.00 | 0.00 | QFH | | FSK / data (non-voice) |
| 9) | 148.0000-149.9500 | V | 7K80F1D | Tx | 12.00 | 9.10 | W1/2 | | FSK / data (non-voice) |



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|-----|-------------------|-------------------|----------|------------|-------------------------|--------------------------------------|--------------------|---|------------------------|
| 10) | 148.0000-149.9500 | V | 250KF1D | Tx | 12.00 | -6.00 | W1/2 | | FSK / data (non-voice) |
| 11) | 137.0000-138.0000 | V | 125KF1D | Rx | 0.00 | 0.00 | W1/2 | | FSK / data (non-voice) |
| 12) | 137.0000-138.0000 | V | 7K80F1D | Rx | 0.00 | 0.00 | W1/2 | | FSK / data (non-voice) |
| 13) | 148.0000-149.9500 | V | 7K80F1D | Tx | 12.00 | 9.10 | W1/4 | | FSK / data (non-voice) |
| 14) | 148.0000-149.9500 | V | 250KF1D | Tx | 12.00 | -6.00 | W1/4 | | FSK / data (non-voice) |
| 15) | 137.0000-138.0000 | V | 125KF1D | Rx | 0.00 | 0.00 | W1/4 | | FSK / data (non-voice) |
| 16) | 137.0000-138.0000 | V | 7K80F1D | Rx | 0.00 | 0.00 | W1/4 | | FSK / data (non-voice) |
| 17) | 148.0000-149.9500 | V | 250KF1D | Tx | 21.00 | 3.00 | YAGI | | FSK / data (non-voice) |
| 18) | 148.0000-149.9500 | V | 7K80F1D | Tx | 21.00 | 18.10 | YAGI | | FSK / data (non-voice) |
| 19) | 137.0000-138.0000 | V | 125KF1D | Rx | 0.00 | 0.00 | YAGI | | FSK / data (non-voice) |
| 20) | 137.0000-138.0000 | V | 7K80F1D | Rx | 0.00 | 0.00 | YAGI | | FSK / data (non-voice) |

C) Frequency Coordination Limits

| # | Frequency Limits (MHz) | Satellite Arc (Deg. Long.) | | Elevation (Degrees) | | Azimuth (Degrees) | | Max EIRP Density toward Horizon (dBW/4kHz) | Associated Antenna(s) |
|-----|------------------------|----------------------------|------------|---------------------|------------|-------------------|------------|--|-----------------------|
| | | East Limit | West Limit | East Limit | West Limit | East Limit | West Limit | | |
| 1) | 148.0000-149.9500 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | -39.9 | W1/2 |
| 2) | 137.0000-138.0000 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | 0 | W1/2 |
| 3) | 148.0000-149.9500 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | -44.9 | COLINEAR |
| 4) | 137.0000-138.0000 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | 0 | COLINEAR |
| 5) | 148.0000-149.9500 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | -35.9 | QFH |
| 6) | 137.0000-138.0000 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | 0 | QFH |
| 7) | 137.0000-138.0000 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | 0 | YAGI |
| 8) | 148.0000-149.9500 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | -47.9 | YAGI |
| 9) | 148.0000-149.9500 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | -39.9 | W1/4 |
| 10) | 137.0000-138.0000 | | NGSO | 05.0 | -05.0 | 000.0 | -000.0 | 0 | W1/4 |



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D) Points of Communications

The following stations located in the Satellite orbits consistent with Sections B and C of this Entry:

- 1) Brewster WA Gateway to Swarm Constellation (S3041) satellites [300 to 500 km circular orbit @ 45°, 10° & 97° Inclination in 9 orbital planes]

E) Antenna Facilities

| Site ID | Antenna ID | Units | Diameter (meters) | Manufacturer | Model number | Site Elevation (Meters) | Max Antenna Height (Meters) | Special Provisions (Refer to Section H) |
|--|------------|------------|-------------------|--------------|--------------|-------------------------|-----------------------------|---|
| Brewster WA Gateway | COLINEAR | 1 | 3 | Swarm | 002 | 380 | 9 AGL/ 389 AMSL | |
| Max Gains(s): | | 5.5 dBi @ | 0.1380 GHz | 5.5 dBi @ | 0.1480 GHz | | | |
| Maximum total input power at antenna flange (Watts) = | | | | | | 10.00 | | |
| Maximum aggregate output EIRP for all carriers (dBW) = | | | | | | 15.50 | | |
| Brewster WA Gateway | QFH | 1 | 1.6 | Swarm | 003 | 380 | 7.6 AGL/ 387.6 AMSL | |
| Max Gains(s): | | 0.0 dBi @ | 0.1380 GHz | 0.0 dBi @ | 0.1480 GHz | | | |
| Maximum total input power at antenna flange (Watts) = | | | | | | 10.00 | | |
| Maximum aggregate output EIRP for all carriers (dBW) = | | | | | | 10.00 | | |
| Brewster WA Gateway | W1/2 | 1 | 1.1 | Swarm | 001 | 380 | 7.1 AGL/ 387.1 AMSL | |
| Max Gains(s): | | 2.0 dBi @ | 0.1380 GHz | 2.0 dBi @ | 0.1480 GHz | | | |
| Maximum total input power at antenna flange (Watts) = | | | | | | 10.00 | | |
| Maximum aggregate output EIRP for all carriers (dBW) = | | | | | | 12.00 | | |
| Brewster WA Gateway | W1/4 | 1 | 0.55 | Swarm | 005 | 380 | 6.6 AGL/ 386.6 AMSL | |
| Max Gains(s): | | 2.0 dBi @ | 0.1380 GHz | 2.0 dBi @ | 0.1480 GHz | | | |
| Maximum total input power at antenna flange (Watts) = | | | | | | 10.00 | | |
| Maximum aggregate output EIRP for all carriers (dBW) = | | | | | | 12.00 | | |
| Brewster WA Gateway | YAGI | 1 | 1.7 | Swarm | 004 | 380 | 7.7 AGL/ 387.7 AMSL | |
| Max Gains(s): | | 11.0 dBi @ | 0.1380 GHz | 11.0 dBi @ | 0.1480 GHz | | | |
| Maximum total input power at antenna flange (Watts) = | | | | | | 10.00 | | |
| Maximum aggregate output EIRP for all carriers (dBW) = | | | | | | 21.00 | | |



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F) Remote Control Point:

Brewster WA 435 N Whisman Road Ste. 100
Gateway

Call Sign: E190610

Mountain View, Santa Clara, CA 94043
608-225-3173

G) Antenna Structure marking and lighting requirements:

None unless otherwise specified under Special and General Provisions

H) Special and General Provisions

A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:

4 --- Licensee must ensure that a current listing of the name, title, mailing address, email address, and telephone number of the responsible point of contact are on file at the FCC. Any changes must be filed electronically in the International Bureau Filing System (MyIBFS) using the "Pleadings and Comments" link on the MyIBFS homepage within 10 days of the change.

6 --- Licensee must comply with the license modification and notification requirements of 47 CFR § 25.118 to change the coordinates of its authorized earth station.

8 --- Licensee must notify the Commission when all earth stations operating under this authorization are no longer operational or when they have not been used to provide any service during any 6-month operation.

90398 --- Changes to previously authorized transmitting facilities, operations and devices regulated by the Commission that may have significant environmental impact, and are not excluded by §1.1306, require the preparation of an Environmental Assessment (EA) by the licensee. (See 47 C.F.R. §§1.1307, 1.1308 and 1.1311)

90399 --- The licensee shall, at all times, take all necessary measures to ensure that operation of this (these) authorized earth station(s) does not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 CFR §§ 1.1307(b) and 1.1310. Physical measures must be taken to ensure compliance with limits for both occupational/controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Compliance can be accomplished in most cases by appropriate restrictions, such as fencing. Requirements for restrictions can be determined by predictions based on calculations, modeling, or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for workers.

90550 --- Swarm Technologies, Inc. must comply with the terms and conditions of its space station authorization, IBFS File No. SAT-LOA-20181221-00094 (granted on Oct. 17, 2019) in operating the authorized user terminals.

90551 --- Swarm Technologies' earth stations are subject to the requirements of Footnote US323 of the U.S. Table of Frequency Allocations, 47 CFR § 2.106, Footnote US323.



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H) Special and General Provisions

A) This RADIO STATION AUTHORIZATION is granted subject to the following special provisions and general conditions:

900438 --- Waiver of the Frequency Allocations Table Footnote 5.218 is granted. Operations of emissions up to 250 KHz for any individual transmission in the frequency band 148.0-149.9 MHz is approved under the condition that the effective isotropic radiated power ("EIRP") density would be equal to or less than the EIRP density for emissions emission operating up to 25 KHz in bandwidth.

B) This RADIO STATION AUTHORIZATION is granted subject to the additional conditions specified below:

This authorization is issued on the grantee's representation that the statements contained in the application are true and that the undertakings described will be carried out in good faith.

This authorization shall not be construed in any manner as a finding by the Commission on the question of marking or lighting of the antenna system should future conditions require. The grantee expressly agrees to install such marking or lighting as the Commission may require under the provisions of Section 303(q) of the Communications Act. 47 U.S.C. § 303(q).

Neither this authorization nor the right granted by this authorization shall be assigned or otherwise transferred to any person, firm, company or corporation without the written consent of the Commission. This authorization is subject to the right of use or control by the government of the United States conferred by Section 706 of the Communications Act. 47 U.S.C. § 706. Operation of this station is governed by Part 25 of the Commission's Rules. 47 C.F.R. Part 25.

This authorization shall not vest in the licensee any right to operate this station nor any right in the use of the designated frequencies beyond the term of this license, nor in any other manner than authorized herein.

This authorization is issued on the grantee's representation that the station is in compliance with environmental requirements set forth in Section 1.1307 of the Commission's Rules. 47 C.F.R. § 1.1307.

This authorization is issued on the grantee's representation that the station is in compliance with the Federal Aviation Administration (FAA) requirements as set forth in Section 17.4 of the Commission's Rules. 47 C.F.R. § 17.4.

The following condition applies when this authorization permits construction of or modifies the construction permit of a radio station.

This authorization shall be automatically forfeited if the station is not ready for operation by the required date of completion of construction unless an application for modification of authorization to request additional time to complete construction is filed by that date, together with a showing that failure to complete construction by the required date was due to factors not under control of the grantee.

Licensees are required to pay annual regulatory fees related to this authorization. The requirement to collect annual regulatory fees from regulatees is contained in Public Law 103-66, "The Omnibus Budget Reconciliation Act of 1993." These regulatory fees, which are likely to change each fiscal year, are used to offset costs associated with the Commission's enforcement, public service, international and policy and rulemaking activities. The Commission issues a Report and Order each year, setting the new regulatory fee rates. Receive only earth stations are exempt from payment of regulatory fees.