

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20554**

In the Matter of

SWARM TECHNOLOGIES INC.

Application for Authority for a Blanket Mobile
Earth Station License to Operate with a Non-
Voice, Non-Geostationary Low-Earth Orbit
Satellite System in the Mobile-Satellite Services

File No. SES-LIC-20190612-00769

OPPOSITION OF SWARM TECHNOLOGIES INC.

Introduction

Swarm Technologies, Inc. (“Swarm”) has applied to launch and operate an innovative constellation of 150 small two-way communications satellites in the non-voice, non-geostationary (“NVNG”) Mobile-Satellite Service (“MSS”).¹ Swarm’s proposed satellite constellation will provide global data services to industry, government, nonprofit, and research and development users. By leveraging advances in small satellite technology and the increased availability of launch opportunities, the Swarm constellation will be deployed rapidly and will provide connectivity at far lower costs than have been previously possible.

Demand for this new technology is significant. In response to Swarm’s space station application, over 20 entities, large and small, filed letters of support indicating that the technology that Swarm would bring to the market, at a lower cost than anything currently available, will help to meet a growing demand for low-cost IoT solutions around the globe.²

¹ Swarm Technologies, Inc., Application for Authority to Launch and Operate Non-Voice, Non-Geostationary Lower Earth Orbit Satellite System in the Mobile-Satellite Services, IBFS File No. SAT-LOA-20181221-00094 (filed Dec. 21, 2018) (“Space Station Application”).

² See, e.g., Letter from David Herzl, Aclima, to Chairman Ajit Pai, FCC, IBFS File No. SAT-LOA-20181221-00094 (filed Mar. 30, 2019); Letter from Nick Pallesen, Bluetown, to Chairman Ajit Pai, FCC, IBFS File No.

Swarm filed an application pursuant to 47 C.F.R. § 25.115(d) seeking blanket authorization for operation of up to 1,000,000 Customer Mobile Earth Station (“CMES”) devices that end users will employ to communicate with Swarm’s satellite constellation. The devices will operate on frequencies in the 148-149.95 MHz (uplink) and 137-138 MHz (downlink) bands, consistent with Swarm’s space station application.³ Swarm seeks authorization for CMES devices to be deployed and operated throughout the continental United States, Alaska, Hawaii, Puerto Rico, Guam, the U.S. Virgin Islands, all U.S. territories and possessions, and all U.S. territorial waters.

Just as in Swarm’s space station application proceeding, ORBCOMM Licensee Corp. (“Orbcomm”) was the only party to file an opposition. It filed a Petition to Dismiss, Deny or Hold in Abeyance claiming that Swarm’s Space Station Application has “significant material defects at a minimum, [and] is not ‘ripe’ for processing at this time.”⁴ Orbcomm argues that Swarm’s claim in its Space Station Application that it will have no spectrum overlap with Orbcomm is incorrect and that Orbcomm has primary rights to spectrum that Swarm has requested.⁵ Orbcomm thus claims that Swarm must “revise its proposed spectrum utilization plan to demonstrate how it will be able to implement its proposed NVNG MSS FDMA uplink operations sharing spectrum with ORBCOMM on a co-frequency co-coverage basis to operate without causing harmful

SAT-LOA-20181221-00094 (filed Apr. 1, 2019); Letter from Donald J. Lough, Ford Smart Mobility LLC, to Chairman Ajit Pai, FCC, IBFS File No. SAT-LOA-20181221-00094 (filed Apr. 1, 2019); Letter from Dr. Barbara Block, Stanford University, to Chairman Ajit Pai, FCC, IBFS File No. SAT-LOA-20181221-00094 (filed Apr. 1, 2019); Letter from Edgar A. Bering III, University of Houston, to Chairman Ajit Pai, FCC, IBFS File No. SAT-LOA-20181221-00094 (filed Mar. 29, 2019).

³ Space Station Application, Narrative Exhibit at 9.

⁴ ORBCOMM License Corp., Petition to Dismiss, Deny, Or Hold in Abeyance, IBFS File No. SES-LIC-20190612-00769 at 1-2 (filed Sept. 27, 2019).

⁵ *Id.* at 2.

interference to ORBCOMM” or “to propose a CDMA system that comports with the Commission’s NVNG MSS licensing Rules and policies.”⁶

Discussion

Orbcomm’s arguments are identical to ones it already raised, and Swarm responded to, in Swarm’s space station application proceeding. Orbcomm continues to misstate the spectrum rights that the FCC provided to Orbcomm in the bands that Swarm has filed for, in a continued effort to prevent or delay the emergence of the first competitive satellite service it will face in the VHF band. Orbcomm raises no new arguments in its latest opposition and provides no evidence for its unsupported claims that the FCC’s various orders sought to protect Orbcomm’s monopoly.

Orbcomm’s Spectrum Rights:

Swarm has already demonstrated in the Space Station Application proceeding that the Swarm system will be able to coexist with Orbcomm’s incumbent operations without causing harmful interference to Orbcomm’s operations—because there would be no spectrum overlap between the two systems.⁷ Despite Orbcomm’s increasingly hysterical claims to the contrary, the FCC never gave Orbcomm primary rights to the entire NVNG spectrum. While Orbcomm has primary status in portions of the band, the Commission was always clear that it only had secondary status in the rest of the band.⁸ Further, the FCC said that where Orbcomm has secondary rights, it would need to vacate upon the licensing and operation of a new entrant.⁹ Relying upon this clear direction, Swarm filed *only* for portions of the band where Orbcomm has secondary rights. Unlike

⁶ *Id.* at 2-3.

⁷ *See* Consolidated Opposition and Response of Swarm Technologies, Inc., IBFS File No. SAT-LOA-20181221-00094, at 2-10 (Apr. 15, 2019) (“Swarm Response”).

⁸ *See* Figure 3 below.

⁹ *Applications by ORBCOMM License Corp.*, Order and Authorization, 23 FCC Rcd. 4804, ¶ 11 (Int’l Bur. and Office of Eng’g & Tech. Mar. 21, 2008) (“*ORBCOMM 2008 Order*”).

Orbcomm's evidence-free assertions, Swarm has documented Commission actions over a two-decade period demonstrating that Orbcomm has only secondary rights to the relevant spectrum, and that Orbcomm must vacate that spectrum with the arrival of a new licensee.¹⁰

The Commission's efforts in licensing NVNG MSS satellite services in the VHF band essentially began with the *1993 Order* which allocated the 148-150 MHz band on a primary basis for earth-to-space communications with NVNG MSS satellites.¹¹ That same year, in the *Little LEO Order*, based on the needs of several launched or proposed systems, the Commission assigned (1) certain segments of the 148-150 MHz band to a single applicant on an exclusive basis, and (2) additional segments to two or more applicants to be shared on a co-equal basis.¹² The Commission also did not assign all spectrum available in the band to these NVNG MSS applicants. Some of the 148-150 MHz band spectrum remained unlicensed and available for future use by other systems.¹³

To implement the *Little LEO Order*, the Commission modified Orbcomm's initial space station authorization in the *ORBCOMM 1998 Modification Order*.¹⁴ Figure 1 shows the frequencies allocated to Orbcomm after the *1998 Modification Order*.

¹⁰ See generally Swarm Response.

¹¹ *Amendment of Section 2.106 of the Commission's Rules To Allocate Spectrum to the Fixed Satellite Service and the Mobile Satellite Service for Low-Earth Orbiting Satellites*, Report and Order, 8 FCC Rcd 1812 ¶ 1 (1993) ("*1993 Order*").

¹² *Amendment of Part 25 of the Commission's Rules To Establish Rules and Policies Pertaining to the Second Processing Round of the Non-Voice, Non-Geostationary Mobile Satellite Service*, Report and Order, 13 FCC Rcd. 9111 ¶¶ 25-75 (1997) ("*Little LEO Order*") (discussing uplink assignments). The Commission referred to the proposed systems of Leo One, Final Analysis, and E-SAT as "System 1," "System 2," and "System 3," respectively. See *id.* ¶¶ 28, 31, 38.

¹³ See *id.* ¶¶ 54-66.

¹⁴ *Orbital Communications Corp.*, Order and Authorization, 13 FCC Rcd. 10828 (Int'l Bur. 1998) ("*ORBCOMM 1998 Modification Order*").

Figure 1:

ORBCOMM Assignments in 148-150 MHz After the *ORBCOMM 1998 Modification Order*

Segment (MHz)	Status	Mode	Term
148.000-148.250	Primary	Shared	10 years
148.750-148.855	Primary	Shared	10 years
148.905-149.585	Primary	Shared	10 years
149.585-149.635	Primary	Exclusive	10 years, but must migrate to 150.000-150.050 MHz if and when available. ¹⁵
149.635-149.810	Primary	Shared	10 years
149.810-149.900	Primary	Shared	10 years

In subsequent years, other licensees failed to launch their systems and surrendered their licenses. Orbcomm was then granted additional spectrum rights in the *Orbcomm 2008 Order*, although the Commission was careful to ensure spectrum remained available for future entrants.¹⁶ The Commission subsequently expanded Orbcomm’s primary bands in 2013 to permit Orbcomm to add a feeder uplink channel in 150.000-150.050 MHz, but nothing in the 2013 grant altered the Commission’s decision to allow Orbcomm to operate in outside of its primary assignments on a temporary and secondary basis.¹⁷ Figure 2 shows Orbcomm’s current spectrum rights in the 148-150 MHz band, including the portions of the band where Orbcomm is required to vacate upon the entry of another provider.

¹⁵ See *id.* ¶ 13.

¹⁶ *ORBCOMM 2008 Order* ¶¶ 10, 11, 22(a), 23(a) (expanding Orbcomm’s primary assignments to include only spectrum previously assigned to Leo One, and allowing Orbcomm to operate only “on a non-harmful interference basis,” with the secondary rights terminating upon the launch of a second U.S.-licensed system, in frequencies outside its primary assignments).

¹⁷ See Stamp Grant, File Nos. SAT-MOD-20111021-00207, SAT-AMD-20120809-00125 & SAT-AMD-20130212-00020, Report No. SAT00945 (rel. Apr. 26, 2013) (“*2013 Stamp Grant*”).

Figure 2:

**ORBCOMM Assignments in 148-150 MHz After the ORBCOMM 2008 Order and 2013 Modification¹⁸
(new additions in blue)**

Segment (MHz)	Status	Sharing	Term
148.000-148.250	Primary	Shared	15 years
148.250-148.750 ¹⁹	Secondary	Temporary	Terminates upon entry by 2 nd provider.
148.750-148.855	Primary	Shared	15 years
148.855-148.905 ²⁰	Secondary	Temporary	Terminates upon entry by 2 nd provider.
148.905-149.585	Primary	Shared	15 years
149.585-149.635	Primary	Exclusive	15 years ²¹
149.635-149.810	Primary	Shared	15 years
149.810-149.900	Primary	Shared	15 years
149.900-149.950 ²²	Secondary	Temporary	Terminates upon entry by 2 nd provider.
149.950-150.000 ²³	Primary	Exclusive	15 years
150.000-150.500 ²⁴	Primary	Exclusive	15 years

As illustrated in Figure 3 below, Swarm did not request any of the frequencies assigned to Orbcomm on a primary basis, including the portions that are subject to sharing. Swarm only requested spectrum where Orbcomm's rights were secondary and for which its rights to operate would terminate upon the entry of a new licensee. Orbcomm thus has no right to demand protection from Swarm.

¹⁸ See *ORBCOMM 2008 Order* ¶¶ 11, 22(a), 23(a).

¹⁹ Previously assigned to E-SAT. See *Little LEO Order* ¶¶ 39, 58. Authorized for use by ORBCOMM on a temporary, secondary basis in 2008. See *ORBCOMM 2008 Order* ¶¶ 11, 22(a), 23(a).

²⁰ Previously assigned to E-SAT. See *Little LEO Order* ¶¶ 39, 58. Authorized for use by ORBCOMM on a temporary, secondary basis in 2008. See *ORBCOMM 2008 Order* ¶¶ 11, 22(a), 23(a).

²¹ When it assigned ORBCOMM feeder-link spectrum in 150.000-150.500 MHz in 2013, the Commission did not terminate ORBCOMM's assignment to operate in 149.585-149.635 MHz, even though the *Little LEO Order* and *ORBCOMM 1998 Order* contemplated that ORBCOMM would operate in one segment or the other, and not both. See *supra* note 7.

²² Left unassigned under the *Little LEO Order*. Authorized for use by ORBCOMM on a temporary, secondary basis in 2008. See *ORBCOMM 2008 Order* ¶¶ 11, 22(a), 23(a).

²³ Previously assigned to Leo One; assigned to ORBCOMM in 2008. See *ORBCOMM 2008 Order* ¶¶ 11, 23(a). See also *Little LEO Order* ¶ 29 (discussing Leo One uplink assignments).

²⁴ Previously assigned to E-SAT. See *Little LEO Order* ¶ 32. Assigned to ORBCOMM in 2013. See *2013 Stamp Grant*.

Figure 3:

**Frequencies Requested by Swarm Compared to ORBCOMM Assignments in 148-150 MHz
(bands containing Swarm requests in orange)**

Segment (MHz)	Swarm Request	ORBCOMM Status	Mode	Term
148.000-148.250	None	Primary	Shared	15 years
148.250-148.750	148.250-148.585, 148.635-148.75	Secondary	Temporary	Terminates upon entry by 2 nd provider.
148.750-148.855	None	Primary	Shared	15 years
148.855-148.905	None	Secondary	Temporary	Terminates upon entry by 2 nd provider.
148.905-149.585	None	Primary	Shared	15 years
149.585-149.635	None	Primary	Exclusive	15 years
149.635-149.810	None	Primary	Shared	15 years
149.810-149.900	None	Primary	Shared	15 years
149.900-149.950	149.900-149.950	Secondary	Temporary	Terminates upon entry by 2 nd provider.
149.950-150.000	None	Primary	Exclusive	15 years
150.000-150.500	None	Primary	Exclusive	15 years

Spectrum Sharing:

Orbcomm also repeats its claim that Swarm must demonstrate an ability to share uplink spectrum with Orbcomm prior to the Commission granting a license. Orbcomm, after selectively reviewing Swarm’s May 17, 2019 *ex parte* filing, argues that because Swarm’s ability to use Carrier-Sense Multiple Access (CSMA) Media Access Control (MAC) protocol with Collision Avoidance (CSMA/CA) will not necessarily solve all potential sharing issues, Swarm cannot share with Orbcomm’s existing services.

As noted, Orbcomm is incorrect in both the claim that it has primary rights to the uplink spectrum that Swarm seeks, and the claim that it does not have to vacate the spectrum once Swarm deploys satellites. Swarm is thus not required to protect Orbcomm’s co-frequency/co-coverage services. Swarm has made clear that it is willing and able to share its spectrum with other new

entrants by using not just CSMA/CA technology, but also time-division multiple access (TDMA) techniques. Further, Swarm made clear that geographic sharing may also be used to share spectrum with other new entrants if necessary. Finally, Swarm's unique wireless technology can co-exist with one or more similar systems, even with transmission or reception occurring at the same time and with significant channel overlap. Swarm is, as it has said repeatedly, both willing and able to share spectrum with future licensees. However, as the FCC's decisions over the last almost 30 years have made clear: Swarm is not required to share with the Orbcomm incumbent monopoly the very spectrum that Orbcomm is required to vacate. Swarm is the first new entrant to file for VHF MSS satellite spectrum in many decades, and as the Commission contemplated, should be allowed to operate in the bands that were always kept available for a future entrant.

Conclusion

Swarm has designed a unique NGSO MSS system using the smallest commercial satellites ever developed to bring satellite communications for IoT services to every corner of the globe at a price that will dramatically increase the accessibility of satellite communications and expand the possibilities of IoT. In this proceeding, Swarm has filed for a blanket authorization for operation of up to 1,000,000 CMES devices to communicate with Swarm's satellite constellation from all U.S. jurisdictions. The only party that has opposed Swarm's application is the long-standing incumbent and monopoly operator of MSS services in the VHF band, Orbcomm. It is understandable that a monopolist would seek to protect its market position, but as demonstrated above and in Swarm's previous filings in response to Orbcomm, the public interest is not benefited by maintaining that monopoly. Swarm has shown that the Commission's rules and its previous licensing of spectrum rights to Orbcomm enable the Commission to provide Orbcomm and Swarm access to non-overlapping spectrum that resolves any and all of the claimed interference concerns

raised by Orbcomm and promotes the kind of robust competition that will benefit the public interest.

The Commission should grant Swarm's license promptly so that Swarm can bring the benefits of competition and lower cost to the public as rapidly as possible, to both revitalize satellite IoT services and expand the reach of satellite services.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that, on this 10th day of October, 2019, a copy of the foregoing pleading was served via First Class mail upon:

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