

5 June 2019

**Ex Parte**

Marlene H. Dortch  
Secretary, Federal Communications Commission  
445 12th Street, SW  
Washington, DC 20554

*Re: IBFS File No. SAT-LOA-20181221-00094, ELS File No. 0340-EX-CN-2019, and ELS File No. 0961-EX-CN-2018*

Dear Ms. Dortch:

This letter responds to a recent *ex parte* filed by ORBCOMM concerning three applications (one for a commercial license and two for experimental authorizations) filed by Swarm Technologies, Inc. (“Swarm”).<sup>1</sup> Nothing ORBCOMM has said provides any reason to defer the testing, or the launch and operation, of Swarm’s satellite system. Accordingly, the Commission should grant promptly Swarm’s pending applications. Further, the Commission should instruct ORBCOMM finally to live up to its obligation to coordinate in good faith on Swarm’s proposed experimental operations.

***Swarm’s sharing capabilities provide further justification for first-come, first-serve licensing.***

According to ORBCOMM, the Commission should require Swarm to pursue alternatives to the advanced co-frequency sharing capabilities already planned for its network so that Swarm can more easily share spectrum with ORBCOMM’s incumbent system.<sup>2</sup> This is an absurd request. ORBCOMM is barred from co-frequency operations with new entrants like Swarm, and for good reason: it would be fundamentally anticompetitive to allow a single incumbent to operate as a primary user literally everywhere in the NVNG MSS bands.<sup>3</sup> Thus, whether Swarm’s proposed system can share spectrum effectively with ORBCOMM is beside the point—Swarm need not share spectrum with ORBCOMM at all. The only question here is whether Swarm’s proposed system can coexist with *future entrants*, thus making a processing round unnecessary.

And the quick answer is that Swarm’s system can coexist with future entrants. Not only has Swarm requested access to only a fraction of available NVNG MSS spectrum, it has designed its network to ensure compatibility with a number of established mechanisms for co-frequency

---

<sup>1</sup> See Letter from Walter H. Sonnenfeldt, Regulatory Counsel, ORBCOMM to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-LOA-20181221-00094 (filed May 23, 2019) (“ORBCOMM May 23 Letter”).

<sup>2</sup> *Id.* at 3 (asking the Commission to require Swarm to “modify[] its proposed system to . . . facilitate . . . co-frequency sharing of MES uplink spectrum between ORBCOMM and Swarm”).

<sup>3</sup> See Consolidated Opposition and Response of Swarm Technologies, Inc. at 2-8, 12-16 IBFS File No. SAT-LOA-20181221-00094 (filed Apr. 15, 2019) (“Swarm Consolidated Opposition and Response”).

sharing. As explained in its May 17 *ex parte*,<sup>4</sup> Swarm uses a Carrier-Sense Multiple Access protocol with Collision Avoidance (CSMA/CA) that allows transmitters to verify the absence of other traffic before communicating. Swarm is also capable of sharing channels using Time-Division Multiple Access (TDMA). In addition, even with transmission or reception occurring at the same time, and even with significant channel overlap, Swarm's unique wireless technology allows it to share with one or more similar systems without unduly compromising network performance.

ORBCOMM quibbles that CSMA/CA alone cannot address all interference scenarios.<sup>5</sup> But, as noted, CSMA/CA is just one of several sharing methods available. In combination with other techniques, Swarm's system is capable of coordinating with a variety of new entrants who may seek to share spectrum in the future. Moreover, while CSMA/CA is intended primarily to prevent interference into nearby terrestrial operations, it is also helpful for deconflicting operations among multiple NVNG MSS systems. Collision avoidance reduces the likelihood that satellite reception of another system's transmissions will result in link unavailability. It also reduces the potential for aggregate interference from simultaneous transmissions emanating from within a narrow geographic area.

Thus, the Commission does not need a processing round to accommodate entry by possible future systems.<sup>6</sup> Swarm can share with future entrants, there is a coordination rule in place to facilitate such sharing, and—in any case—no one else has applied to use this persistently underutilized spectrum in more than a decade. Indeed, even after Swarm's application was submitted, accepted for filing, and placed on public notice, not a single party has come forward with an application to operate in the VHF NVNG band. Put simply, all a processing round would accomplish is to delay the entry of the first new NVNG MSS entrant in over 25 years.

***Swarm's sharing capabilities are irrelevant to the terms of ORBCOMM's existing authorizations.***

Oddly, after expressing skepticism about Swarm's sharing capabilities, ORBCOMM proceeds to argue that the Commission should avoid granting Swarm "exclusive" access to uplink spectrum because Swarm is, in fact, able to share spectrum effectively. To be clear, Swarm has not asked for an exclusive uplink spectrum assignment. As Swarm explained in its Consolidated Response and Opposition, it fully understands that there is a coordination rule in place to facilitate sharing among multiple NVNG MSS systems,<sup>7</sup> and will coordinate in good faith with any new entrant that applies to operate in overlapping frequencies in the future.<sup>8</sup>

But—and this is critical—none of this means that Swarm must share spectrum with the incumbent ORBCOMM. To reiterate, Swarm has not applied to use *any* spectrum assigned to

---

<sup>4</sup> See Letter from Kalpak Gude, General Counsel, Swarm Technologies, Inc., to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-LOA-20181221-00094 (filed May 17, 2019) ("Swarm May 17 Letter").

<sup>5</sup> ORBCOMM May 23 Letter at 2-3.

<sup>6</sup> See generally Swarm May 17 Letter.

<sup>7</sup> See 47 C.F.R. 25.142(b)(3).

<sup>8</sup> Swarm Consolidated Opposition and Response at 21; see also 47 C.F.R. 25.142(b)(3).

ORBCOMM on a primary basis.<sup>9</sup> Moreover, to the extent ORBCOMM uses any of the spectrum identified in Swarm’s application, it is required to terminate such usage “upon commencement of operations by another U.S.-licensed non-voice, non-geostationary mobile satellite system.”<sup>10</sup> Thus, ORBCOMM has no right to operate alongside Swarm in the frequencies it seeks. And even if ORBCOMM did, it would have no right to interference protection.<sup>11</sup>

Perhaps ORBCOMM believes that the Commission should set aside the *ORBCOMM 2008 Order* and change its authorization to grant primary rights to operate in Swarm’s requested spectrum. If so, the Commission has no reason to consider the question, because ORBCOMM has not explicitly applied for any such modification of its licenses.<sup>12</sup> Moreover, even if the Commission could consider the question, it would have every reason to reject ORBCOMM’s request. If the Commission’s concern is to ensure that the spectrum environment remains compatible with robust competition, it would make no sense to expand ORBCOMM’s already significant spectrum position even further.<sup>13</sup>

***Swarm’s requests for experimental authority are fully justified and will have no impact on ORBCOMM’s commercial operations.***

ORBCOMM objects to Swarm’s pending experimental application for authority to launch 12 satellites.<sup>14</sup> ORBCOMM also opposes Swarm’s recently granted application to deploy additional mobile earth stations to communicate with satellites already licensed for experimental testing.<sup>15</sup> As explained below, the Commission should grant Swarm’s pending application and require ORBCOMM to live up to its obligation to coordinate with Swarm in good faith.

First, ORBCOMM claims that Swarm has no need to launch 12 satellites and can rely instead on simulation modelling to test its network. While simulation can serve a valuable role in the design of space systems, all satellite engineers know that there is no substitute for real-world testing of integrated hardware in a space environment. It is critical for Swarm to conduct in-space testing and flight qualify its network so that it can achieve a high level of technology readiness prior to deploying a constellation of 150 satellites for commercial operations.

---

<sup>9</sup> See Swarm Consolidated Opposition and Response at 2-10.

<sup>10</sup> *Applications by ORBCOMM License Corp.*, Order and Authorization, 23 FCC Rcd. 4804 ¶¶ 11, 22, 23 (Int’l Bur. and Office of Eng’g & Tech. Mar. 21, 2008) (“*2008 ORBCOMM Order*”).

<sup>11</sup> *Id.* ¶ 11 (explaining that “Orbcomm operations using frequencies other than its primary assigned frequencies are on a non-harmful interference basis with respect to any other lawfully operating radiofrequency operations”).

<sup>12</sup> Swarm Consolidated Opposition and Response at 10-12.

<sup>13</sup> See *2008 ORBCOMM Order* ¶¶ 10, 23 (granting ORBCOMM additional primary assignments in System 1 frequencies).

<sup>14</sup> *Application of Swarm Technologies*, ELS File No. 0340-EX-CN-2019 (filed Apr. 23, 2019) (“Swarm Apr. 23, 2019 Experimental Application”).

<sup>15</sup> *Application of Swarm Technologies*, ELS File No. 0961-EX-CN-2018 (filed Dec. 1, 2018) (“Swarm Dec. 1, 2018 Experimental Application”).

Swarm's experimental objectives demonstrate why simulations cannot suffice. As Swarm explained in its application, launching 12 satellites is necessary for Swarm to study the spreading of the spacecraft within an orbital plane and the effectiveness of multi-channel operations.<sup>16</sup> It also will enable the first flight test of a full 12-satellite deployer, which will be necessary for all future commercial flights. In addition to flight-validating the critical deployment sequence with a full stack of satellites, the subsequent recovery of separation impulses and post-deploy attitude dynamics at each dispenser position will inform Swarm's effort to rapidly identify and detumble all satellites on future commercial missions. In addition, the mission for which Swarm seeks experimental authorization will launch the first set of 1/4U satellites capable of active attitude determination and attitude control, which is part of Swarm's collision avoidance strategy. Launch and operation of these satellites will enable the first in-space measurements of ballistic coefficient vs. controlled orientation in the true environment, which is very difficult to forecast accurately.

In addition, contrary to ORBCOMM's unsupported assertion, launching 12 satellites will have no material "spectrum occupancy impact" on ORBCOMM's commercial operations.<sup>17</sup> As Swarm explained in its application, the total spectrum utilization of the entire fleet of 12 satellites would be no more than 1.17% of the available time, thus any interference into ORBCOMM services is highly unlikely.<sup>18</sup> Accordingly, ORBCOMM's generalized observation that Swarm will use spectrum is insufficient justification to deny Swarm the opportunity to conduct essential testing.

ORBCOMM also objects to Swarm's application to add sites to the list of available locations with which Swarm's previously licensed spacecraft (SpaceBees 1-7) can communicate for experimental purposes.<sup>19</sup> ORBCOMM expresses concern that Swarm does not have an "active" interference avoidance technology and does not "need to deploy so many experimental mobile earth stations."<sup>20</sup> But, of course, the Commission nevertheless approved the application, subject to coordination with ORBCOMM, on May 29, 2019.

Now that the Commission has granted Swarm's experimental authorizations over ORBCOMM's objections, it must exercise oversight to ensure that ORBCOMM does not refuse or delay coordination based on those overruled objections. For example, Swarm has determined how many earth stations it needs for testing, and the Commission has validated that determination. The Commission cannot allow ORBCOMM to delay coordination just based on its continued displeasure with the number of sites that Swarm plans to deploy. Similarly, ORBCOMM cannot use meritless concerns about the impact on its operations to delay or deny coordination. As an initial matter, Swarm has explained that transmissions can be "immediately terminated by ground command if interference is detected or reported."<sup>21</sup> Moreover, under its experimental

---

<sup>16</sup> Swarm Apr. 23, 2019 Experimental Application, Exhibit A at 2-4.

<sup>17</sup> ORBCOMM May 23 Letter at 3.

<sup>18</sup> Swarm Apr. 23, 2019 Experimental Application, Exhibit C at n.7.

<sup>19</sup> See Swarm Dec. 1, 2018 Experimental Application.

<sup>20</sup> ORBCOMM May 23 Letter at 4.

<sup>21</sup> Swarm Apr. 23, 2019 Experimental Application, Exhibit A at 4.

authorization for these additional earth stations, Swarm's uplink operations will be limited to the same number of spacecraft that were previously authorized and coordinated with ORBCOMM. As stated in the application, communication from the additional sites with SpaceBees 1-4 will be for the sole purpose of downlinking telemetry data, while communications with SpaceBees 5-7 will be conducted pursuant to previously authorized conditions.<sup>22</sup> Given these constraints, there is no reason to believe that the addition of more ground sites will materially increase the risk of interference.

\* \* \*

ORBCOMM continues to claim that Swarm cannot share effectively with ORBCOMM, even though Swarm has not applied to use any of ORBCOMM's primary spectrum. ORBCOMM continues to seek delay through the initiation of a processing round, even though no new entrant has indicated an interest in the spectrum Swarm seeks to use, and Swarm could share with such a new entrant if one were to file in the future. And ORBCOMM continues to delay and object to Swarm's limited experimental applications, even in the face of Swarm's successful experimental operations to date without a single claim of interference.

Collectively, ORBCOMM's continued challenges to Swarm's experimental and commercial applications show a pattern of behavior designed to delay the entry of a competitor, regardless how frivolous the legal or technical justification. Swarm thus urges the Commission (1) to approve Swarm's commercial application without a processing round, (2) to grant Swarm's pending experimental application to launch additional satellites for testing purposes, and (3) to encourage ORBCOMM to approve the standing coordination requests in both of the above-referenced experimental proceedings.

Respectfully submitted,

/s/

Kalpak Gude  
General Counsel, Head of Regulatory, and Compliance Officer  
Swarm Technologies, Inc.

+1-202-630-3848  
kalpak@swarm.space

---

<sup>22</sup> Swarm Dec. 1, 2018 Experimental Application, Exhibit A at 1.