

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
Spire Global, Inc.)	File No. SAT-LOA-20151123-00078
)	Call Sign S2946
)	
Application for Authorization)	
to Launch and Operate a)	
Non-Geostationary (“NGSO”) Satellite)	
System to Provide Maritime Monitoring,)	
Meteorological Monitoring, and Earth)	
Imaging Services)	

PETITION TO DISMISS, DENY, OR HOLD IN ABEYANCE

ORBCOMM License Corp. (“ORBCOMM”) hereby requests that the Commission dismiss or deny the above-captioned application (“Application”) filed by Spire Global, Inc. (“Spire”) due to the absence of an adequate demonstration that the non-geostationary orbit (“NGSO”) satellite constellation proposed by Spire (the “Spire System”) will not create an unacceptable risk of collision with ORBCOMM’s NGSO satellite system or impose unreasonable obligations on ORBCOMM to avoid such collisions. In the alternative, the Commission should hold the Application in abeyance pending submission of an amendment that sufficiently demonstrates that the Spire System will not pose an unacceptable risk of collisions or impose an unacceptable burden on ORBCOMM to avoid such collisions.

Of particular concern to ORBCOMM -- although it is not entirely clear from the information provided thus far -- the Application appears to propose an undetermined number of Spire satellite deployments in one or more orbital planes that would intersect with the authorized 47 degree-inclined 715 km target operational orbits of the entire fleet of ORBCOMM Generation

2 (“OG2”) satellites. In the narrative description of the Application,¹ Spire provides the following information:

The Phase II constellation will employ up to 175 technically identical satellites operating simultaneously and will have launch parameters within the following bounds:

- Minimum Circular Altitude: 400 km
- Maximum Circular Altitude: 650 km
- ***Maximum Apogee: 720 km (in the case of an elliptical orbit)***
- Inclination: equatorial to polar sun-synchronous (98 degrees)

The listed 720 km maximum apogee elliptical orbit would intersect with ORBCOMM's constellation. Elsewhere in the application, Spire indicates that, ... "Phase II will employ up to 175 technically identical satellites, operating at orbital altitudes from 400 to 650 km and inclinations ranging from equatorial to polar sun-synchronous (98 degrees)..."² However, the Schedule S submitted with the Application specifies four orbital planes, three of which would be 500 km circular, and one that would be 600 km circular.³ Due to the above-described ambiguities in the Application, it is not possible to clearly ascertain the proposed deployment plan for the Spire System. To the extent, however, that Spire is requesting authority to launch

¹ Spire Narrative Description at pp. 6-7 (emphasis added).

² *Ibid.* at p. 1.

³ Spire Schedule S at S.4. Spire did broadly request a waiver of Schedule S, asserting at p. 25 that:

For example, the Schedule S requests orbital information for all satellites. Given the number of satellites in the constellation and Spire's status as a secondary payload customer, Spire cannot practicably provide this information. Spire has provided representative data that will allow the Commission to conduct an accurate technical assessment of Spire's system.

While providing detailed information on each satellite may be difficult when Spire does not know how many satellites will be launched into each plane, neither the Commission nor ORBCOMM can assess collision risk without some information on the specific planes and maximum number of satellites in each of those planes. Thus, a broad waiver of the Schedule S orbit parameter requirements cannot be justified and would be contrary to the public interest.

satellites into an elliptical plane that intersects with the OG2 satellite orbits, ORBCOMM has legitimate collision risk concerns.

The Application does not appear to have addressed that risk of collision, however. The Debris Assessment (at p. 3) indicates that "[a]ll LEMUR satellites will be launched to an altitude of 650km or lower." So presumably the Debris Assessment ignored the requested elliptical plane(s) that intersect with ORBCOMM. Spire's failure to assess the risk of collision with ORBCOMM's intersecting satellites is inconsistent with its orbital debris mitigation obligations:

We conclude, however, that in some instances the public interest would be served by a more detailed discussion of how an operator will avoid potential collisions. The first of these instances, as described in the Notice, is where a system will be launched into a low-Earth orbit that is identical, or very similar, to an orbit used by other systems. In such an instance we believe that the operator should submit, as part of its debris mitigation disclosure, an analysis of the potential risk of collision between the LEO systems and a description of what measures the operator plans to take to avoid in-orbit collisions. If the operator is relying on coordination with another system, the operator should indicate what steps have been taken to contact, and to ascertain the likelihood of successful coordination of physical operations with, the other system.⁴

It is impossible for ORBCOMM to adequately conduct its own analyses of the collision risk posed by Spire's contemplated satellite constellation due to the exceedingly vague nature of the orbital deployment plan provided in the Application. The Commission's Rules require that an NGSO applicant specify, *inter alia*, the orbital parameters for its proposed constellation.⁵ But rather than specify these parameters, Spire apparently seeks authority to launch its satellites into a wide range of potential orbits, because it intends to launch its satellites as secondary payloads.⁶

⁴ *Mitigation of Orbital Debris*, 19 FCC Rcd 11567 (2004) at ¶ 50 (footnote omitted).

⁵ 47 C.F.R. §25.114(c)(6).

⁶ Spire Narrative Description at p. 25: "Given the number of satellites in the constellation and Spire's status as a secondary payload customer, Spire cannot practicably provide this information."

Of specific concern to ORBCOMM, the Application provides no clear indication as to exactly how many of the 900 satellites Spire is requesting authorization to launch could be deployed in orbits that intersect with the ORBCOMM constellation. Without knowing the specifics of the proposed Spire constellation orbit plans, it is impossible to adequately assess the risk of collision with ORBCOMM satellites.

ORBCOMM's concerns are further exacerbated by the fact that the current proposed design of the Spire satellites could make effective collision avoidance coordination difficult or impossible. Spire indicates that its satellites will incorporate GPS receivers, so accurate positioning information should be available while the satellites are operational. However, it appears that accurate location information will not be available for non-operational spacecraft. According to the Application, Spire intends to launch up to 900 satellites to maintain a constellation of 175 operational spacecraft. Consequently, there could be more than 700 non-operational Spire satellites in orbit with no available accurate location information. This could make it difficult or impossible to conduct meaningful conjunction assessments necessary for collision avoidance coordination with other satellite systems like ORBCOMM's.

But even when it is possible to conduct meaningful conjunction assessments, an inequitable collision avoidance burden could be imposed upon ORBCOMM because Spire is not incorporating any propulsion capabilities on its satellites: "The satellites do not carry active propulsion, but can perform station-keeping and collision-avoidance maneuvers using differential drag and an on-board attitude determination and control system."⁷ Based on more than twenty years of experience operating the first-generation ORBCOMM satellites, ORBCOMM is

⁷ Narrative Description at pp. 5-6 and p. 18.

very skeptical that Spire's intention to rely entirely on differential drag maneuvering will be responsive enough to be an effective collision avoidance technique. Thus, at a minimum, ORBCOMM could be forced to assume an unjustifiably imbalanced proportion of the responsibility for maneuvers to avoid collisions. Moreover, this unnecessary burden could be very significant, because using fuel for such avoidance maneuvers would shorten the lifetime of the ORBCOMM satellites. It would be unacceptable and contrary to the public interest to impose inequitable collision avoidance obligations on ORBCOMM simply because Spire chooses not to incorporate propulsion capabilities into its satellites that would allow it to undertake collision avoidance maneuvers, or lower the altitude of satellites launched as secondary payloads on missions with deployment orbits that intersect with the ORBCOMM constellation.⁸

From ORBCOMM's perspective, the simplest solution would be for Spire to select orbits that do not intersect with ORBCOMM's authorized orbits.⁹ There is precedent for such a

⁸ Cf., BLACKSKY GLOBAL, LLC, FCC Experimental License, FCC Call Sign WH2XPT, File No. 0829-EX-PL-2014 (new experimental to operate in 401.00 - 402.00 MHz and on 8080.00 MHz for testing a Cubesat):

Pathfinder is a commercial Earth observation satellite. Two Pathfinder satellites, Pathfinder-1 and Pathfinder-2, will be deployed from a SpaceX Falcon 9 as secondary payloads. They will be deployed into a 720 x 450 km, 97.4° inclination orbit. After deployment into orbit and initial satellite checkout is complete, the satellites' propulsion systems (warm gas) will be used to lower the altitude to an orbit of 450 x 500 km.

⁹ Spire did not contact ORBCOMM prior to filing the Application. However, following the appearance of the Application on Public Notice, Spire did accept ORBCOMM's invitation to engage in a preliminary discussion regarding possible measures that may allow for effective collision avoidance coordination. ORBCOMM stands ready to continue these discussions and is willing to consider any amendment to the Spire System design or deployment plan that provides an effective and equitable solution for sharing the scarce non-Geostationary orbit resource. At this time, however, ORBCOMM is not yet convinced that a collision avoidance coordination agreement with Spire is possible.

resolution,¹⁰ and ORBCOMM would have no objection to a Spire license limited to lower apogee orbits that do not overlap with ORBCOMM's. However, given the ambiguous, open-ended nature of the Spire Application as currently constituted -- with potentially as many as 900 satellites overlapping with ORBCOMM's constellation -- as well as the absence of any specific analyses of the risk of collisions that such overlaps would create, the Commission should deny or dismiss the Spire Application. At the very least, the Commission should defer grant of the Application until it can be demonstrated to ORBCOMM's reasonable satisfaction that there is no unacceptable risk of collision with the ORBCOMM system, or that Spire will not impose unacceptable burdens on ORBCOMM to avoid such collisions. Grant of the Spire Application as currently presented before the Commission, however, would disserve the public interest.

Respectfully submitted,



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¹⁰ *Orbital Communications Corporation*, 17 FCC Rcd 6337 (2002) at ¶ 13.

CERTIFICATE OF SERVICE

I, Walter H. Sonnenfeldt, hereby certify that on this 22nd day of February, 2016, I served a true and correct copy of the foregoing Petition to Dismiss, Deny, or Hold in Abeyance of ORBCOMM License Corp. via first-class postage prepaid mail upon the following:

Trey Hanbury
Hogan Lovells US LLP
555 Thirteenth Street, NW
Columbia Square
Washington, D.C. 20004

A handwritten signature in blue ink, appearing to read "Walter H. Sonnenfeldt", is written over a horizontal line.