

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)	

REPLY TO OPPOSITION

ORBCOMM License Corp. (“ORBCOMM”), pursuant to Sections 25.154(d) and 1.4(h) of the Commission's Rules, hereby replies to the Opposition filed by Spire Global, Inc. (“Spire”) with regard to ORBCOMM's Petition¹ seeking to deny, dismiss, or hold in abeyance the above-captioned Spire application (the “Application”). As explained below, ORBCOMM continues to have concerns with regard to the Application insofar as it could allow Spire to launch as many as 900 satellites – lacking propulsion – into orbits that intersect with the authorized ORBCOMM Generation 2 (“OG2”) 47 degree-inclined 715 km target operational orbits, thus creating an unacceptable risk of collisions with the entire fleet of OG2 satellites, or imposing unreasonable obligations on ORBCOMM to avoid such collisions. Spire’s Opposition does not allay those concerns.

¹ ORBCOMM License Corp. Petition to Dismiss, Deny, or Hold in Abeyance, File No. SAT-LOA-20151123-00078 (filed Feb. 22, 2016) (“ORBCOMM Petition”).

In its Application, Spire included an Orbital Debris Assessment Report (“ODAR”) for 175 satellites operating at a 650 km circular orbit. The Spire Opposition characterizes this as a “worst-case scenario.”² But certainly from ORBCOMM’s perspective, that is not the “worst-case.” Given that Spire seeks authority to launch up to 900 satellites into a variety of potential orbits – with no limits on how many satellites they could launch into any of those orbits – the “worst case” would be launching 900 satellites into the requested 450 x 720 km orbit, *all of which* would intersect with the ORBCOMM OG2 satellites on-orbit at 715 km. While that may not be the present intent of Spire, such a scenario could arise under the broad authority requested in the Application, which includes no restrictions on the number of satellites launched into any of the requested orbits.

As explained in the ORBCOMM Petition, the ODAR included in the Application did not consider the risk of collisions with the ORBCOMM OG2 satellites, because it assessed a circular 650 km orbit.³ In the Opposition, Spire included an ODAR it had previously filed for a much smaller experimental constellation, including, *inter alia*, ten satellites in a 450 x 750 km sun synchronous orbit.⁴ However, the Application does not limit the number of satellites that Spire could deploy in any of the requested orbits to only ten or fewer. The Spire Opposition also improperly attempts to cross-reference a collision risk study submitted by another applicant assessing the probability of conjunction between the OG2 satellites and a maximum of 120

² Spire Opposition at p. 5.

³ ORBCOMM Petition at p. 3.

⁴ Spire Opposition, Attachment 1, Technical Appendix at Table 2.

assumed satellites operating in a 450 x 720 km orbit.⁵ However, the satellites proposed by the other applicant do not appear to have the same physical characteristics as those proposed in the Application,⁶ so the cross-referenced study must be disregarded by the Commission. Thus, the two additional ODARs cited in the Spire Opposition still fail to adequately address the risk of collision with OG2 satellites posed by the Application's broad request for authority to launch up to 900 satellites into a variety of orbits, or into any one of the requested orbits – including an orbit that would intersect with ORBCOMM's OG2 satellites.⁷

⁵ Spire Opposition at p. 6. *See, also*, Application of Planet Labs, File No. SAT-MOD-20150802-00053 ("Planet Labs Application"), Supplemental ODAR (filed November 25, 2015).

⁶ *Compare* Planet Labs Application at Schedule S, Item S15 - Spacecraft Physical Characteristics (5 kg mass; .156 m² deployed solar array; and .34m x .62m x .1m spacecraft dimensions) *with* Spire ODAR Section 2 (4.5 kg mass; Envelope Deployed 1 m x 1m x .3 m). ORBCOMM observes that the Schedule S submitted with the Spire Application inconsistently indicates a 5 kg spacecraft mass, and does not include values for the dimensions of the proposed Spire satellites. Moreover, ORBCOMM has raised legitimate questions regarding the adequacy of the Planet Labs supplemental ODAR referenced in the Spire Opposition, given inconsistencies between values in the Planet Labs Application versus the values used in the supplemental ODAR. *See*, ORBCOMM Reply to Planet Labs Opposition, File No. SAT-MOD-20150802-00053, filed February 16, 2016 at pp. 2-3. ORBCOMM's questions remain unanswered on the record of the above-referenced Planet Labs application.

⁷ Spire also asserts in its Opposition that "the FCC has allowed satellite applicants to identify ranges for both the number of satellites and their orbital deployments in the case where the proposed satellites would be launched as secondary payloads." Opposition at pp. 4-5. Spire can offer no citation to any provision of the Commission's satellite Rules or policies to support this assertion because no such satellite Rule or policy exists. The two cases cited by Spire as support for this purported policy involved unopposed "Stamp Grant" applications for earth imagery satellites to be deployed in orbits well below the altitudes of all current commercial NGSO communication satellite systems. Moreover, these Stamp Grant authorizations were issued without any discussion of applicable Rules, policies, or waiver requests. The Commission should reject Spire's attempt to rely on grants of unopposed NGSO applications as a justification for authorizing the deployment of an indeterminate number of Spire satellites in orbits that intersect with ORBCOMM's OG2 satellites using a satellite design that places an inordinate unprecedented burden of collision avoidance on ORBCOMM.

Spire also incorrectly asserts that ORBCOMM's concerns are a "moving target," because with respect to another applicant that had proposed use of a similar 450 x 720 km orbit, ORBCOMM had also criticized the absence of GPS receivers on the other applicant's satellites.⁸ To the contrary, ORBCOMM has been fully consistent in its submissions regarding the Application and the Planet Labs Application. ORBCOMM recognizes that Spire's use of GPS receivers can provide more accurate location information than relying solely on radio ranging, which should help to minimize false conjunction alarms. However, that benefit of more accurate location information would be present only for operational Spire spacecraft, and it is possible that there could be as many as 725 non-operational Spire satellites on orbit. In any event, ORBCOMM continues to have legitimate concerns because of the lack of propulsion on the Spire satellites.

Incorporating propulsion capability in the Spire spacecraft design would allow Spire to undertake collision avoidance maneuvers or to adjust the altitude of Spire satellites initially deployed with apogees exceeding 715 to operational orbits that are below ORBCOMM's constellation.⁹ And contrary to Spire's assertion, a well designed propulsion system should not

⁸ Spire Opposition at n. 38.

⁹ *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.

create any increased risk of on-board explosions.¹⁰ Regardless, the absence of propulsion on the Spire satellites places an unjustifiable and inordinate burden on ORBCOMM to undertake evasive maneuvers to avoid collisions with Spire spacecraft, which would consume precious fuel on-board the ORBCOMM satellites, thus shortening the life of ORBCOMM's constellation. In seeking to justify its lack of propulsion, Spire asserts: "Nor do the FCC's rules preclude the licensing of satellites without propulsion systems. Indeed, in a prior rulemaking proceeding, the Commission specifically rejected such proposals."¹¹ But ORBCOMM is not seeking belated reconsideration of that earlier Commission rulemaking.¹² ORBCOMM's opposition is perfectly consistent with that rulemaking. In that decision the Commission did decline to require propulsion for post-mission disposal -- given the lack of operational experience -- but also indicated it would continue to evaluate orbital debris assessment for systems without propulsion capability on a case-by-case basis until it acquired more experience.¹³ And that decision also imposed heightened obligations on NGSO satellite system applicants that propose constellations that overlap with incumbent (or soon-to-be-launched) satellite systems.¹⁴

¹⁰ Cf., Spire Opposition at p. 8.

¹¹ Spire Opposition at pp. 7-8, citing *Mitigation of Orbital Debris* at ¶ 86.

¹² Cf., Spire Opposition at n. 36.

¹³ *Orbital Debris Order* at para. 86:

Although we agree that each of the measures proposed would appear to be a reasonable means by which a space station operator could mitigate debris under the circumstances presented by the commenters, we do not believe that adopting detailed rules of this type is appropriate at this time. We anticipate that as experience with debris mitigation measures grows, it may be possible to provide more detailed guidelines of this type. For now, however, we believe it is appropriate to address cases involving NGSO disposal as they arise.

¹⁴ *Mitigation of Orbital Debris*, 19 FCC Rcd 11567 (2004) at ¶ 50

ORBCOMM is not asking for a “veto right.”¹⁵ But, given the potential overlaps at least with respect to one of the requested orbits, Spire should have approached ORBCOMM for coordination discussions before filing its application. Such discussions would have allowed the parties to vet the effectiveness of Spire’s collision avoidance capabilities, and might have led to a mutually acceptable agreement between ORBCOMM and Spire.

But that was not the route that Spire chose. Instead, it filed the Application and now insists that its desire to take advantage of secondary payload capacity on opportunistic launches is somehow a sufficient justification to forcibly impose an inordinate burden on ORBCOMM to perform any necessary collision avoidance maneuvers. ORBCOMM does not believe that Spire’s unilateral business decision serves the public interest, or comports with the Commission’s Rules. ORBCOMM thus continues to urge the Commission to deny, dismiss or hold in abeyance Spire’s Application.

Respectfully submitted,



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¹⁵ Spire Opposition at p. 8.

CERTIFICATE OF SERVICE

I, Walter H. Sonnenfeldt, hereby certify that on this 18th day of March, 2016, I served a true and correct copy of the foregoing Reply to Opposition of ORBCOMM License Corp. via first-class postage prepaid mail upon the following:

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