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

In the Matter of)
)
Planet Labs Inc.)
)
Application for Modification of its	
Authorization to Operate a	
Non-Geostationary ("NGSO") Earth)
Imagery Satellite System)

File No. SAT-MOD-20150802-00053 Call Sign S2912

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 Planet Labs Inc. ("Planet Labs") with regard to ORBCOMM's Petition seeking to deny, dismiss, or hold in abeyance the above-captioned Planet Labs authorization modification application (the "Application"). ORBCOMM was compelled to file its Petition because the Application requests authority to launch a substantial indeterminate number of the 600 proposed new Planet Labs satellites into an elliptical orbit that intersects with the authorized orbits of the entire fleet of ORBCOMM's Generation 2 ("OG2") satellites. ORBCOMM's concern is exacerbated by the fact that the satellites Planet Labs proposes to deploy will not have onboard propulsion or sufficiently accurate position location capability, and would thus impose an inordinate and unjustifiable burden of collision avoidance on ORBCOMM. As explained below, the Planet Labs Opposition fails to assuage these concerns, so ORBCOMM continues to urge the Commission not to grant the Application as presently structured.

As an initial matter, the new collision risk analysis referred to in the Planet Labs Opposition raises more questions than it answers. There are several material inconsistencies between assumed parameters used in various Planet Labs analyses (including the new analysis discussed in the Opposition) and the satellite deployment plan presented in the Application. In their Opposition, Planet Labs asserts that their previous, supplemental debris analysis "clarified that ... more than 80 percent of its proposed satellites, *i.e.*, more than 480 of the 600 proposed satellites proposed for deployment (over the term of the license), would be launched in a circular, sun-synchronous orbit at an altitude of 475 km and an inclination of 97.3 degrees."¹ However, the information presented in the Application is not so limited,² and no amendment of the Application appears to have been filed. Thus, if the Commission were to grant the Application as presently structured, there does not appear to be anything to stop Planet Labs from launching all 600 satellites into an orbit that intersects with the OG2 satellite orbits.³

¹ Opposition at p. 3.

² Planet Labs Exhibit 43 at p. 2. Planet Labs also claims in the Opposition that the Commission, "for years has allowed satellite applicants to identify ranges for both the number of satellites and their orbital deployments in the case where the proposed satellites will be launched as secondary payloads." (Opposition at p. 5) Planet Labs 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 Planet Labs 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 Planet Labs' attempt to rely on grants of unopposed NGSO applications as a justification for authorizing the deployment of an indeterminate number of Planet Labs 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.

³ On the other hand, in contrast to the request in the Narrative Description for a broad range of orbits, Planet Labs' Schedule S only specifies a single plane of 200 satellites in a circular orbit at 475 km and an inclination of 97.3 degrees.

ORBCOMM also continues to have concerns regarding whether the Planet Labs use of ranging will provide positional accuracies that are sufficient to produce meaningful collision estimates and/or "actionable" warnings. In their previous analyses, Planet Labs used uncertainty covariances of 3.0 / 0.5 / 0.5 (in-track/cross-track/radial, in km). In the Technical Appendix of their Opposition, they use an uncertainty covariance of 1.0 / 0.1 / 0.1 (in-track/cross-track/radial, in km). It is unclear whether this change reflects a change in the proposed Planet Labs satellite design that will afford an actual positioning accuracy improvement, or just an arbitrary change in the assumption used for their analyses.⁴

But even assuming, *arguendo*, that the probabilistic analyses of collision risk presented by Planet Labs properly comport with the applicable guidelines, ORBCOMM continues to have significant legitimate concerns with regard to the notable lack of collision avoidance capability inherent to the proposed Planet Labs satellite design. ORBCOMM acknowledges that space is vast, and the risk of collision is generally very low. However, the risk is not merely theoretical, it has occurred for other LEO systems with catastrophic results.⁵ The same would be true if a Planet Labs satellite collided with an ORBCOMM satellite -- not only would two valuable satellites be destroyed, but the debris resulting from a collision would create a significantly increased risk of additional collisions and satellite losses for both systems. Thus, avoiding in-

⁴ It appears clear that no ranging data will be available for any inoperative Planet Labs satellites. According to the Planet Labs website link provided in their Opposition concerning the availability of satellite ephemerides -- <u>http://ephemerides.planet-labs.com/</u> -- for inoperative satellites it merely states: "The following satellites are still in orbit...; orbit information may be obtained from Space Track".

⁵ See, <u>http://apod.nasa.gov/apod/ap090218.html</u>

orbit collisions is a critical Commission public policy objective⁶ that ORBCOMM wholeheartedly supports, and continually takes extensive active measures to comply with.

As Planet Labs readily acknowledges in its Opposition: "It is inevitable over time that high risk conjunctions will occur."⁷ Planet Labs' attempt to impose an unjustifiably disproportionate burden of actual collision avoidance on ORBCOMM seems inconsistent with its claim that it "takes seriously its civic obligation to operate openly and responsibly in space and to ensure sustainable and universal access to low-Earth orbit, which is a limited and shared resource."⁸ As ORBCOMM explained previously, any use of fuel for OG2 satellite maneuvers to avoid collisions with Planet Labs satellites will shorten the useful life of the ORBCOMM satellites. Moreover, the absence of accurate positioning information on the Planet Labs satellites is likely to create more high risk conjunction alarms, possibly necessitating more ORBCOMM avoidance maneuvers than might otherwise be required.⁹ Regardless, Planet Labs somehow appears to believe that the Commission should deem it acceptable to allow Planet Labs to "offload" the costs of collision avoidance by authorizing Planet Labs to deploy satellites lacking propulsion or high-accuracy position location capability into an orbit that intersects with

⁶ See, e.g., Mitigation of Orbital Debris, 19 FCC Rcd 11567 (2004) at ¶ 14.

⁷ Opposition, Technical Appendix at p. A-2.

⁸ Opposition at p. 8.

⁹ Planet Labs asserts that its satellites might be able to prevent collisions using "drag" and "tuck" maneuvers. Opposition, at 3, Opposition Technical Appendix at pp. A-2 & A-3. ORBCOMM is highly skeptical of the efficacy of such capabilities. Among other things, the lack of positioning accuracy inherent to the current Planet Labs satellite design would likely make if difficult if not impossible to implement "drag" and "tuck" techniques as a timely or effective means of collision avoidance.

the OG2 satellites. In contrast, other "cubesat" operators have incorporated propulsion¹⁰ and GPS receivers,¹¹ demonstrating that such capabilities are feasible for cubesats.

Contrary to Planet Labs' blithe assertion, ORBCOMM has not, and would never claim to "have property rights to the 715 km orbital altitude".¹² However, it cannot be disputed that ORBCOMM does own a constellation of NGSO satellites authorized by the Commission to operate in designated orbits. Furthermore the Commission's satellite Rules and policies correctly place the burden on an NGSO system applicant to take into account the risks of collisions and to incorporate reasonable collision avoidance measures in the design and operational plan for a proposed NGSO satellite system.¹³ It makes sense to place such responsibility on the new applicant, because incumbents cannot otherwise be expected to understand or plan for a new applicant's plans or requirements. The public interest is clearly well-served by requiring all satellite operators to take active measures to effectively mitigate collision risks, either through the selection of non-conflicting orbits, or the inclusion of propulsion or other effective collision avoidance capabilities. In this case, Planet Labs desire to deploy its satellites into an orbit intersecting with the authorized OG2 satellite orbits appears to

¹⁰ See e.g., 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.

¹¹ See, e.g., Spire Global Inc., File No. SAT-LOA-20151123-00078, Exhibit A at p. 18.

¹² Opposition at p. 9.

¹³ *Mitigation of Orbital Debris*, 19 FCC Rcd 11567 (2004) at ¶ 50.

be driven solely by its own cost saving motivations, including the availability of an opportunistic launch. Similarly, Planet Labs' decision not to incorporate GPS receivers or propulsion capabilities in its proposed satellite design transfers the costs of collision avoidance measures entirely on ORBCOMM. These proposals are patently unfair, unacceptable to ORBCOMM, and more importantly, inconsistent with the public interest. ORBCOMM stands ready to continue discussions with Planet Labs, and to consider any amendment to Planet Labs proposed satellite 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 must continue to urge the Commission to deny, dismiss or hold in abeyance Planet Labs' Application.

Respectfully submitted,

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February 16, 2016

CERTIFICATE OF SERVICE

I, Walter H. Sonnenfeldt, hereby certify that on this 16th day of February, 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:

> Michael Safyan Planet Labs Inc. 346 9th St. San Francisco, CA 94103

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