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July 19, 2019

BY ELECTRONIC FILING

Jose P. Albuquerque
Chief, Satellite Division
International Bureau
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

Re: *Myriota Pty Ltd., IBFS File No. SAT-PDR-20190328-00020*

Dear Mr. Albuquerque:

On behalf of Myriota Pty Ltd. ("Myriota"), we hereby respond to your letter dated June 20, 2019, in which you have requested additional information with respect to the above referenced application for authority to deploy and operate a non-voice, non-geostationary ("NVNG") mobile-satellite service ("MSS") system in the 399.9-400.05 MHz and 400.15-401 MHz bands.[1]

1. Please specify the number of 3U and 6U satellites in Myriota's constellation.

Myriota's constellation consists of 26 satellites in total. To be clear, in this application, Myriota currently seeks authorization for all 26 satellites with 3U form factor. Like many satellite operators, Myriota continues to explore options for deploying even more capable spacecraft. As a result, in the future, Myriota may upgrade some satellite capabilities to the 6U form factor. If and when a decision is made to implement such a change, Myriota will request modification of its authorization.

2. Myriota states that in the event a satellite is launched but fails, and remains in stowed configuration, it would have an expected orbital lifetime of 24.7 years. Given this relatively long orbital lifetime, please provide test or heritage data regarding the reliability of the deployment mechanism.

Myriota understands the threat of the accumulation of orbital debris and the risk this poses on future satellite operations. Myriota will not launch a satellite for the proposed constellation

[1] Letter from Jose P. Albuquerque to William M. Wiltshire, IBFS File No. SAT-PDR-20190328-00020 (June 20, 2019).

into an orbit with a predicted lifetime greater than 25 years, regardless of the likelihood of failure. In addition, Myriota expects that its spacecraft will be designed to meet the highest level of reliability. For example, the first satellites contracted for launch will use melt-bridge and hold-down mechanisms that have significant test and flight heritage, and were successfully implemented on at least six previously flown Tyvak satellites.[2]

The Myriota satellites will employ a solar panel configuration with two triple-fold wings. The two separate wings provide physical redundancy at a sub-system level, further reducing the likelihood of the solar array remaining stowed. The solar panel deployment will occur as soon as possible following deployment into orbit.

3. Myriota states that the 3U satellites can perform differential drag maneuvers for the purpose of collision avoidance. If possible, provide more detailed information regarding these maneuvers, i.e., is collision avoidance the only function for which drag maneuvers will be used?

The Myriota satellites will include GNSS receivers to ensure precise ephemeris is available throughout the mission. Myriota will share this data with the Joint Space Operations Center (JSpOC).

The Myriota 3U satellites will have a large deployable array and antenna. The minimum attitude surface area (0.0308 m^2) is 15% of the maximum attitude area (0.2099 m^2). The radio payload for customer operations is attitude independent. The typical attitude will aim the solar array at the sun or the high gain antenna at a ground station. Myriota plans to characterize the differential drag effect on the satellite orbits by measuring the change to the predicted orbit (velocity) when compared to the minimum, typical and maximum drag attitudes. This operational

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2 *See* Tyvak Missions, available at https://www.tyvak.com/missions/.

experience will be used to inform strategies of the best approach in the event of conjunction alert. This approach is similar to operators of satellites with significant differential areas.[3]

4. For post-mission disposal, explain if an increased drag is the only end-of-life configuration planned.

Increased drag is the only end-of-life configuration planned, with no additional systems to accelerate this process. This will be accomplished by either (1) actively maximizing the area in the velocity direction; or (2) ceasing active attitude control leading to the accumulation of angular momentum due to naturally occurring disturbance torques. Either approach will result in increasing the average drag area resulting in accelerated disposal via atmospheric reentry. There is no plan to use tethers or similar devices to accelerate the deorbiting process.

5. For its 6U satellites, Myriota specifies that added propulsion will be used to conduct orbital station keeping, plane phasing, collision avoidance and de-orbit maneuvers. Please state if there are any other planned uses and provide, if possible, additional information regarding the propulsion system on the 6U satellites including, for example, what propulsive liquid is being used, the possibility of persistent droplets, and any prior use in other spacecraft.

As discussed in response to Question 1, at some stage in the future, Myriota may upgrade some satellite capabilities to the 6U form factor. Myriota would consider the addition of propulsion to 6U satellites, and any request to modify its authorization to include such 6U satellites would include further information on those spacecraft and their capabilities.

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[3] *See, e.g.,* Cyrus Foster, Henry Hallam, and James Mason, "Orbit Determination and Differential-Drag Control of Planet Labs Cubesat Constellations" (2015), available at https://arxiv.org/pdf/1509.03270.pdf.

6. If available, provide additional information regarding how the 6U satellites will impact Myriota's orbital debris mitigation calculations.

In the future, if Myriota requests modification of its authorization to include 6U satellites, it will provide further information regarding how 6U satellites will impact orbital debris mitigation calculations.

7. Myriota's orbital debris mitigation plan does not include the aggregate collision risk for constellation. Please provide this information.

The following table shows the aggregate collision risk of a constellation of 26 satellites with 3U form factor, as calculated using NASA's Debris Assessment Software. The aggregate collision probability is less than 0.001, consistent with Requirement 4.5-1 of NASA-STD-8719.14.

Property \ Configuration	**Stowed 3U**	**Deployed 3U**
Mass (kg)	7	7
Mean CSA (m^2)	0.040841	0.131743
Area-to-Mass (m^2/kg)	0.005834	0.018820
Release Year	2019.9	2019.9
Orbital Lifetime* (yrs)	24.78	5.52
Probability of Collision*	0.000004	0.000004
Aggregate Collision Probability	0.000104	0.000104

* Solar Flux Table Dated April 9th, 2019

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Should you have any questions, please do not hesitate to contact me.

Sincerely,

William M. Wiltshire

William M. Wiltshire
Counsel to Myriota