28 May 2020

VIA EMAIL TO Radio.Spectrum@mbie.govt.nz

1710-2300 MHz Discussion document
Radio Spectrum Management Policy and Planning
Ministry of Business, Innovation and Employment
PO Box 2847
WELLINGTON 6140

Re: *Comments* on
1710-2300 MHz Discussion Document

Dear Radio Spectrum Management:

Planet Labs Inc. ("Planet") applauds the office of Radio Spectrum Management (RSM) for its continued efforts to improve its legislative, regulatory, and business frameworks by seeking input from industry and the public on the "1700 – 2300 MHz Discussion Document".

RSM published the discussion document at the end of February 2020 to address proposals for select sub-bands of the 1700-2300 MHz band because the management rights (MR) had been set to expire on March 31, 2021. The original submission period was extended to May 29, 2020, in light of the COVID-19 pandemic. Planet respectfully submits these comments for consideration.

Planet is a U.S.-based commercial satellite designer, manufacturer, and operator. Planet designs, builds, and operates a fleet of commercial, remote sensing satellites, which include the

Dove series of satellites and the SkySat series of satellites, all of which service commercial interests. Planet is the sole owner and operator of the Dove and SkySat satellites, and the imagery products are licensed by Planet to a variety of customers, including governments like New Zealand, commercial clients, and non-profit organizations. Uses of the data include mapping, agriculture, and environmental change detection.

To date, Planet has successfully launched and operated over three hundred (300) satellites *via* a variety of launch vehicles, including launch vehicles like New Zealand's Rocket Lab Electron rocket. Planet has also operated its Awarua ground station for over six years and has, to date, invested approximately NZ$ 1.5 million in assets, with an annual operating cost of approximately NZ$ 160,000.

RSM has proposed a globally leading dedicated band for space operations in the upper sub-band 2081.5 to 2110 MHz. However, Planet has concerns about opening the lower sub-band 2025 to 2081.5 MHz to fixed wireless links.

Specifically, Planet responds to Questions 4 and 7-10, and provides a general comment.

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4. Do you agree with RSM's proposal to use the lower portions of the Paired 2200 MHz band (2025-2081.5 MHz and 2200-2256.5 MHz) available for fixed links to enable clearing of the 'L' and 'LL' bands (1427-1524 MHz)?

RSM's proposal to make the lower sub-band available for fixed link wireless will have a negative impact on critical space operations in New Zealand.

The lower sub-band is heavily used by small satellites for telemetry, tracking, and control (TT&C), more so than the upper sub-band.[1] Planet specifically uses frequencies in this sub-band for its Dove satellites, which form a constellation of up-to 200 cubesats that image the entire land mass of the Earth every day. In addition, Planet uses frequencies at the border between the upper and lower sub-bands for its SkySat satellites, which provide high-resolution imagery. Planet's use of these frequencies is critical as Planet strives to improve upon its capabilities and continues to build upon these constellations.

Second, Planet maintains multiple ground stations around the world to communicate with its satellites. All of Planet's ground stations and satellites are harmonized to use the same frequencies.

If the lower sub-band is made available to fixed wireless links, incumbent space operators, like Planet, may be forced to operate on a non-interference basis, which would create and increase technical and operational difficulties just to ensure we can communicate with our satellites.

[1] https://www.itu.int/online/sns/freqtest.sh?ie=y&plan_id=&categ=N&l1=-180&l2=180&jv=18&fr1=2200&fr2=2290&iv=90

This problem is caused by the fact that fixed wireless links may receive significant interference from space operation ground stations, depending how the fixed wireless links are deployed. In fact, Planet has withdrawn consideration of a foreign ground station because of the potential of interference claims when not given primary rights in the band. It is not viable to conduct space operations under the limitations of a non-interference requirement.

In the alternative, it would cause considerable disruption to the operation of the satellites if Planet were forced to change frequencies within the band for the ground station in New Zealand.

Not only would every satellite need to be altered to communicate on a different frequency, but each satellite would also need to be programmed to change frequencies depending on what ground station was in range. This would require extensive work hours from our engineers to design and re-task every satellite. In addition, even if Planet were able to implement such programming changes, this solution would significantly increase the risk of error and increases the likelihood of losing communication with the satellites.

Planet does not support RSM's proposal to open the lower sub-band because of the increase of risk, the significant operational disruption, as well as the real and practical costs involved in designing and re-tasking each satellite to change frequencies.

If the lower sub-band is opened, Planet urges RSM to protect the incumbent space operators by granting them priority rights over incoming fixed wireless operators.
Use of the 2025-2110 MHz band for fixed wireless links would be consistent with the ITU allocation table, as well as other domestic governments including the United States. However, it should be noted that the ITU allocated those bands to space operations on a primary basis and

recognized the importance of space operations in the band. The ITU stipulated that future high-density land systems would cause unacceptable interference, and recommended phasing in only low density land systems into the band so that their aggregate interference levels on existing space operations would be limited.[2]

Finally, fixed wireless is typically used in low density areas, which also means that interference patterns are predictable. New operators will have the opportunity to position their operations to minimize the interference caused to existing satellite ground stations, but also protect themselves from interference. One possibility would be the use of exclusion zones around ground stations, as proposed by Great South and Rocket Lab.

7. Are there better uses for the lower portions of spectrum in the Paired 2200 MHz band? If so, what?

Planet supports expanding the dedicated band for space operations to the entire 2025-2110 MHz band as the best use, considering the long-term investment and use of the band for space operations, including both government civil and military agencies, as well as commercial companies.

Expanding the dedicated band for space operations to the entire 2025-2110 MHz band should incentivize more space operators to choose New Zealand over other jurisdictions because of the reduced regulatory and operational hurdles.

[2] R-REC-SA.1154-0-199510.

8. Do you agree with RSM's proposal to reserve 2081.5-2110 MHz and 2256.5-2290 MHz exclusively for space operation in New Zealand? If not, why not?

As discussed, Planet supports the creation of a dedicated band for space operations, and suggests expanding the proposal to the entire 2025-2110 MHz band. The entire band is heavily used by smallsat operators and allocating the entire 2025-2110 MHz band for space operations would be consistent with the ITU and foreign frequency allocations.

9. Do you agree that the reserved spectrum would be adequate to support the growing demand in space activities?

Planet does not support the conclusion that reserving spectrum in the upper-band, specifically 2081.5-2110, will be adequate to support the growing demand in space activities.

As discussed in Answer to Question 4, Planet specifically uses frequencies in the lower band for a single satellite constellation, and frequencies on the border of the lower and upper sub-bands for a second constellation. Planet has operated as many as 3 satellite constellations, all using different frequencies across the entire band. If a single company needs to use frequencies across the entire band, then the space industry will need to as well.

Furthermore, Planet reiterates that changing the frequencies currently used for satellites already on-orbit would be impracticable. One such problem would be coordinating the satellites to use different frequencies depending on which ground station they communicated with. This

highlights the global nature of frequency allocation. Many countries have followed the ITU allocation by allowing space operations in the entire band. Limiting space operations in New Zealand would be inconsistent with other jurisdictions, as well as current space activities.

Based on current use, Planet does not support the conclusion that reserving the upper-band would be adequate to support the growing demand in space activities, and supports dedicating the entire band to space operations.

10. Is there a better use for the spectrum between 2081.5-2110 MHz and 2256.5-2290 MHz? If so, what?

Planet reiterates its support for the continued use of the upper-band for space operations, which have always depended on this spectrum.

Comment

Planet would also like to take the opportunity to comment on a discrepancy in the original Consultation publication. On page 11, RSM refers to range 2081.5-2110 MHz as space-to-Earth, and 2256.5-2290 MHz as Earth-to-space.

These allocations are in reverse assignment from the ITU allocation.

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In conclusion, Planet applauds RSM for its continued efforts to improve its legislative, regulatory, and business frameworks by seeking input from industry, and specifically for including and supporting the growing aerospace industry in New Zealand. RSM has taken a global leadership position by proposing a dedicated band for space operations, and Planet supports extending that dedication to the entire band. Reserving the upper-band for space operations is simply not enough to support the growing demand in space activities; therefore, opening the lower sub-band to fixed wireless links could have severe negative impact on space operations. Planet also urges RSM to grant incumbent space operations priority rights.

Planet appreciates the opportunity to provide comment on this discussion document and contribute to the space industry in New Zealand.

Respectfully submitted,
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