SPACEX

February 28, 2022

Draft Five Year Spectrum Outlook 2022-2026
Radio Spectrum Management Policy and Planning
Ministry of Business, Innovation and Employment
PO Box 2847
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Re: *Draft Five Year Spectrum Outlook 2022-2026*

To Whom It May Concern:

Starlink New Zealand ("SpaceX") appreciates the opportunity to provide comments on the Radio Spectrum Management Policy and Planning ("RSM") Draft Five Year Spectrum Outlook 2022-2026 (the "Consultation").[1] Below is a general overview of SpaceX and its Starlink product, along with specific responses to the Consultation.

I. Background

SpaceX is a private company founded in 2002 to revolutionize space technologies, with the ultimate goal of enabling humanity to become a multi-planetary species. SpaceX has achieved a series of historic milestones and is proud to have become the first private company in history to send astronauts to orbit, safely returning them to Earth. To date, SpaceX has successfully launched more than 140 missions to space.

SpaceX is leveraging its accumulated expertise in space system manufacturing, design, and operations, to develop Starlink, a constellation of satellites designed to provide high-speed, low-latency, competitively priced broadband service to locations in New Zealand and anywhere around the globe. SpaceX's first-generation constellation consists of over 4,400 non-geostationary orbit ("NGSO") satellites and extensive ground infrastructure employing advanced communications and space operations technology. SpaceX has invested billions of dollars in this system and is currently launching 120 satellites per month on average, along with building gateway and end-user terminal antennas. Starlink is designed to make efficient use of radio spectrum resources by optimizing its ability to flexibly share spectrum with other licensed satellite and terrestrial users, including through advanced beam-forming and digital processing technologies. SpaceX currently links satellites to the customer user terminals in the Ku-band for both uplink and downlink frequencies, with gateway links in the Ka-band.

The events of the past two years have reminded us all of the importance of being able to connect people and businesses through high-speed Internet service, whether to complete school

[1] *See* Radio Spectrum Management, "Draft Five Year Spectrum Outlook 2022-2026," December 2021.

lessons, connect with distant family and friends, conduct business, or even to run a government. Powerful next-generation satellite systems supported by robust backhaul connectivity will enable all consumers across New Zealand to use the bandwidth-intensive, real-time applications that have become essential to accessing remote work, school, and public services. To meet these evolving consumer needs, whether in the suburbs or the most remote corner of the country, SpaceX is currently building and deploying its next iteration of its Starlink commercial satellite service. This next-generation technology includes upgraded end-user terminals, new satellite technology, and improved gateway ground stations that will provide customers with even higher speeds. For example, ground stations in this next generation of deployment will be able to use 71-76 GHz and 81-86 GHz frequencies (the "70/80 GHz band") for gateway earth station communications and will support higher capacity and faster speeds for the Starlink network.

SpaceX began Starlink service in New Zealand on March 11, 2021. Today, Starlink is capable of serving the entire country and operates two first-generation gateways. Starlink customers in New Zealand typically experience speeds exceeding 100 Mbps, with reliability nearing 100 percent. In the coming months, SpaceX is excited to expand its customer base in the country, with a particular desire to reach those who are currently unserved or underserved by broadband.

II. Response to Consultation

Question 1. Have we identified the range of technological advancements and probable new demands relevant to New Zealand?

SpaceX appreciates the inclusion of next-generation NGSO satellite systems and their many use cases in RSM's draft five-year spectrum outlook. High-speed, low-latency satellite networks will play a critical role in enabling people across New Zealand—including in rural and remote areas underserved by terrestrial networks—to connect to essential services and bandwidth-intensive, real-time applications. In addition, SpaceX agrees with RSM that earth stations in motion ("ESIMs") will extend the value of next-generation satellite networks to support even more use cases, including on ships, aircraft, and large automobiles.

As explained below, to best meet growing consumer demand for high-speed, low-latency satellite broadband, RSM should expeditiously make available spectrum allocated on a co-primary basis to the fixed-satellite service in higher frequency bands—such as the 70/80 GHz band—and adopt a rapid, flexible, and administratively efficient approach to spectrum licensing that promotes coexistence and consumer benefit.

Question 2. Have we prioritised the right issues that we will need to actively manage through our work programme (to the extent this is possible to predict now)?

SpaceX offers the following comments on RSM's work programme priorities to ensure that next-generation satellite services have timely and equitable access to spectrum to meet the growing demands of consumers for high-speed, low-latency connectivity:

First, RSM should include the 70/80 GHz band in its satellite and higher frequency work programme priorities.[2] The 70/80 GHz band is important for fixed-satellite service operators to meet growing consumer demand, including in rural and remote areas where terrestrial infrastructure is lacking. The ITU has allocated the 70/80 GHz band to the fixed-satellite service on a co-primary basis, and footnote 5.561 of the ITU table requires fixed, mobile, and broadcasting services in the 74-76 GHz band to protect stations of the fixed-satellite service. Importantly, 70/80 GHz fixed-satellite service systems are poised for deployment in the near-term and will form an essential part of next-generation satellite services that can directly benefit New Zealand consumers. To maximize the promise of this band for consumers, RSM should include a work programme priority to formally allocate the 70/80 GHz band to the fixed-satellite service and to expeditiously adopt service and licensing rules that will enable those services to benefit New Zealand consumers.

Second, RSM should ensure that consideration of mobile spectrum rights does not harm consumers of current or future co-primary satellite networks.[3] SpaceX appreciates RSM's recognition that "spectrum identified for IMT at an ITU level, almost always has incumbent users."[4] For example, Starlink uses the 28 GHz band (27.5 – 30 GHz)—which has a co-primary allocation for the fixed-satellite service—for its gateway earth stations, including several currently operating gateways in New Zealand. These earth stations require access to the full 28 GHz band allocation to provide robust backhaul for the high-speed data traffic used by New Zealand consumers. RSM should ensure that assignment of spectrum rights for 5G—including fixed 5G backhaul—does not undermine critical spectrum for next-generation fixed-satellite services, which would harm consumers that rely on these networks for connectivity. By striking a careful balance, RSM can ensure all New Zealand consumers and businesses have access to broadband connectivity in even the farthest reaches of the country.

Third, as it considers sharing models for higher frequency spectrum bands,[5] RSM should prioritise a "unified" light-licensing approach that enables rapid, software-driven coordination between point-to-point fixed links and fixed-satellite service gateways. This technology neutral approach would extend well-established light-licensing models—e.g., in Australia and the United States in the 70/80 GHz band—allowing operators to register new ground equipment on a first-come, first-served basis and requiring only minor changes to currently available software tools. A multi-service light-licensing approach in higher frequency bands has several benefits: it speeds review and approval time by automating basic compliance and coexistence checks; reduces administrative cost and labor associated with manual reviews for all but the most complex interference scenarios; facilitates coordination between different co-primary services through a common platform; and promotes rapid deployment of ground equipment for high-speed, low-latency wireless networks, benefitting people and businesses alike. Critically, a software-driven

[2] *See id.* at Sections 2.1 & 3.2.
[3] *See id.* at Section 2.2.
[4] *See id.*
[5] *See id.* at Section 3.1.2.

process also would reduce the demands placed on Approved Radio Engineers and alleviate the projected shortage of skills and capability in the radio sector.[6]

Question 3. Are there other matters that we should cover?

SpaceX has no comment on this question at this time.

III. Conclusion

SpaceX is very grateful for RSM's consideration and collaboration and looks forward to continuing to serve New Zealand customers with even faster speeds as we continue to launch more satellites and deploy more ground infrastructure around the world.

Respectfully submitted,

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[6] *See id.* at Section 3.4.3.