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Radio Spectrum Management Policy and Planning  
Ministry of Business, Innovation and Employment  
PO Box 2847, Wellington 6140, New Zealand  
Email: [Radio.Spectrum@mbie.govt.nz](mailto:Radio.Spectrum@mbie.govt.nz)

## **RE: 24 – 30 GHz use in New Zealand**

Space Exploration Technologies Corp. (SpaceX) appreciates this opportunity to provide input to the Ministry of Business, Innovation and Employment (MBIE) in response to the consultation “24 - 30 GHz use in New Zealand”.

### **Summary of Arguments**

SpaceX applauds the MBIE recognition that the Ka spectrum band is of growing importance for satellite services. SpaceX encourages MBIE to consider the following:

1. To avoid interference between terrestrial networks and satellite-based services, establish a guard band allowing terrestrial use below 27.0 GHz and satellite uses above 27.5 GHz.
2. Establish fixed satellite service as the primary use of the 27.5 - 30 GHz band, whose operators can coordinate via operator-to-operator agreements.
3. Establish a license exemption regime for fixed satellite service ground station antenna that is built on of a strong set of practical policies governing the sharing of the 28 GHz band.

### **Background**

SpaceX is rapidly deploying a Non-Geostationary Satellite (NGSO) system to provide fixed satellite service. The system currently provides direct to consumer broadband for users in New Zealand and around the world. In March 2018, the United States Federal Communications Commission (FCC) authorized SpaceX to construct, launch, and operate a constellation of over 4,400 NGSO satellites operating close to the Earth. Since then, SpaceX has accelerated its efforts to design, develop, and deploy an innovative and spectrum-efficient satellite system to deliver broadband service directly to consumers. Just one year after receiving its license, SpaceX launched the first 60 satellites in its broadband constellation. Since then, SpaceX has continued an aggressive launch cadence and has 1,735 satellites in orbit as of this submittal. SpaceX is now the operator of the most extensive satellite broadband network in the world, and is already providing satellite internet services to hundreds of users in New Zealand.

SpaceX operates in the following frequency bands in New Zealand:

- 10.7 – 12.7 GHz downlink
- 14.0 – 14.5 GHz uplink
- 17.8 – 18.55 GHz downlink
- 18.8 – 19.3 GHz downlink
- 27.5 – 29.1 GHz uplink
- 29.5 – 30.0 GHz uplink

Access to these bands is critical for fixed satellite service constellations such as Starlink to bring broadband services to New Zealanders. SpaceX’s satellites use the 10.7 – 14.5 GHz band to transmit to user terminal antennae located at individual customer homes and businesses. The satellites use the 17.8 – 30.0 GHz band to transmit to earth stations that connect to the Internet backbone via terrestrial fiber lines.

## **Responses to the MBIE Paper**

SpaceX applauds the MBIE's recognition of the ongoing explosion in demand for satellite services that are driving technological development and demand for spectrum. A successful spectrum policy will encourage operators, terrestrial and satellite, to design and deploy systems that increase efficiency and better share limited spectral resources.

### *27 GHz Guard Band*

Without sufficient protection, terrestrial services can cause interference that harms the service for customers of satellite services in the adjacent bands. SpaceX therefore urges MBIE to establish a guard band between the terrestrial uses in the 26 GHz Band and the satellite uses in the 27 GHz Band. Specifically, terrestrial uses should operate below 27.0 GHz, while satellite services operate above 27.5 GHz. As both satellite and terrestrial operators intensify their use of the Ka-band, and this guard band can ensure consumers enjoy uninterrupted service using both technologies.

### *28 GHz Allocation and Sharing*

SpaceX urges MBIE to allocate fixed satellite service as the primary use of the 27.5 - 30 GHz band. The 28 GHz band (27.5 - 29.5 GHz) is currently used for fixed satellite service earth stations, and this use is expected to continue for the foreseeable future. In fact, the band is receiving increasing attention as a new generation of satellite services are being developed and deployed. Next-generation satellite operators like SpaceX are already developing and deploying ground station antenna that use the 27.5 - 29.1 GHz spectrum band for uplink to constellations designed to provide broadband service across New Zealand and around the world. To ensure that consumers—especially those in the most rural and remote areas of New Zealand—reap the benefits of this new cutting-edge technology, the MBIE must ensure continued access to the 28 GHz band for fixed satellite service use.

SpaceX agrees with the International Telecommunications Union and other regulators, including the U.S. Federal Communications Commission, that private coordination between operators is the most efficient means for two NGSO satellite operators to manage shared spectrum. Because operators themselves are best positioned to understand the capabilities of their systems and their business objectives, successful coordination ensures the most efficient use of shared spectrum. To encourage effective coordination, MBIE should adopt a band-splitting model that rewards systems that use spectrum most efficiently. Towards that end, SpaceX's band-splitting proposals are designed to drive the best results from those negotiations by encouraging operators to employ technologies and techniques that use spectrum efficiently and to come to quick resolution in their coordination discussions. Ideally, any spectrum policies primarily set the terms for successful coordination between operators.

With respect to sharing between NGSO and Geostationary (GSO) satellite operators, MBIE should continue to recognize equivalent power flux density (EPFD) limits as the appropriate method for operators to avoid mutual interference. EPFD limits are a practical and proven method for spectrum sharing between NGSO and GSO operators.

In bands that have shared use between fixed satellite service ground stations and terrestrial services, MBIE could establish power flux density ("PFD") protection limits. These PFD limits set a "border" between fixed satellite earth stations and terrestrial operations in a given geographic area. By identifying appropriate well-balanced power protection limits, based on technical inputs from both mobile and satellite users, the MBIE can ensure that both emerging terrestrial broadband networks and fixed satellite earth station operators can operate and augment the broadband services available to rural, unserved, and underserved consumers.

*28 GHz Licensing for Fixed Satellite Services*

SpaceX encourages MBIE to consider a license exemption regime for fixed satellite service ground station antenna. When bands are effectively allocated between services and strong sharing rules within the same band are established, the licensing system can rely on these rules to ensure low chances of interference without a requirement for the management of individual licenses. Instead of licensing an individual satellite ground station, MBIE can create a license exemption for antenna that comply with the foundation rules of frequency sharing within the band. MBIE has already done this for Very Small Aperture Terminals (VSAT) in the Ku band, which can be a model for satellite ground station antenna in the 28 GHz band.

Underlying such proposals is a straightforward principle: strong standards set by the regulator incentivize efficient use of the limited resource of radio frequency spectrum. SpaceX has invested in developing technologies that maximize efficiencies and bring superior service to consumers. Policies that reward efficiency can create a race to the top, where all operators compete to design the most spectrally efficient systems.

SpaceX appreciates the opportunity to provide comments in response to the consultation. Please do not hesitate to contact us with any questions. We look forward to working with the MBIE as we both strive toward a goal of connecting all of New Zealand's citizens to high-speed Internet services.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Brian Schepis', written in a cursive style.

Brian Schepis  
Sr. Manager, Starlink Market Access