



May 6, 2024

Starlink Australia Pty Ltd ("SpaceX") appreciates the opportunity to share comments to the Australia Communications and Media Authority ("ACMA") regarding its draft Five Year Spectrum Outlook ("FYSO").

Background

SpaceX is a privately-held company revolutionizing space technologies, with the ultimate goal of enabling humanity to become a multi-planetary species. As the world's leading provider of launch services and the only provider with an orbital class reusable rocket – SpaceX has deep experience with both spacecraft and on-orbit operations, and has now launched deployed Starlink - the world's most advanced broadband network in space.

Starlink is a global, low earth orbit constellation of over 5,900+ satellites providing high-speed, low-latency broadband services anywhere on earth. Whether a subscriber is at home, at school, or in-motion at sea or in flight, Starlink is delivering fiber-like broadband connectivity to subscribers, helping to reduce the digital divide and providing critical connectivity when communities are impacted by crises.

Since 2021, Australian consumers have used Starlink for reliable, low latency satellite broadband, spanning everyday use cases to innovative applications in disaster response, school connectivity, remote work, and telehealth. -- During the flooding in New South Wales in 2022, Starlink restored connectivity to cut-off communities to support disaster-relief efforts. Starlink technology has also been leveraged by social impact organizations including the Foundation for Indigenous Sustainable Health to provide access to health technology in both the Muludja and Bawoorrooga Remote communities and by the Royal Flying Doctor Service to enable the first virtual emergency centre in the outback town of William Creek. Today, Starlink has over 200,000 active broadband subscribers in Australia and is available in over 95+ markets around the world.

Expanding the reach of its connectivity initiatives beyond satellite broadband, last year, SpaceX announced its first Direct to Cell mobile operator partnerships ("D2C") to deliver mobile connectivity to subscribers at times and in areas when terrestrial capabilities are otherwise not available. Direct to Cell will deliver space-based capability to existing mobile devices with no hardware modifications. This is made possible by D2C-enabled Starlink satellites using a portion of its mobile partner's exclusive spectrum. This transformative service will offer consumers the safety and peace of mind of a phone call or SMS message to loved ones or first responders during times of crisis or in remote locations. In Australia, SpaceX is working with Optus and looks forward to delivering D2C SMS followed by voice and data services to Optus subscribers in Australia soon-after.

Response to the Draft Five Year Spectrum Outlook 2024-2029

SpaceX commends the ACMA's commitment to the inclusion of industry views throughout its policy development process, and is encouraged by the ACMA's outlined workplan, notably in its continued commitment for regulatory arrangements to realize the transformative capability of satellite technologies.

As the ACMA finalizes its draft FYSO and work-plan, SpaceX respectfully provides the following points for consideration:

i. Satellite Spectrum and Future Opportunities



Starlink relies on access to “workhorse” shared satellite spectrum, including the Ku- and Ka- bands, around the world. Following the introduction of Starlink in Australia in 2021, SpaceX rapidly built Starlink ground stations across Australia, leveraging the Ka- and most recently, E-band enabled antennas, while deploying intersatellite links in space at scale throughout the Starlink constellation. Combined, these efforts made it possible for Starlink to reach 100% of Australia’s landmass and surrounding territories, and to reach rapid growth of Starlink’s subscriber base in Oceania.

Starlink, and other satellite service providers, are increasingly looking towards additional spectrum resourcing as both consumer and operator demand quickly outpace the existing supply of shared bandwidth in the Ku- and Ka- bands. SpaceX recognizes the ACMA’s supportive efforts in this endeavor, including its adoption of the interim licensing arrangements in the Q/V- bands through Embargo 80 last year, and stresses the importance of continued efforts to enable satellite use in additional spectrum bands.

E-band

Notably, the ACMA should consider replicating its successful development of interim satellite arrangements in the E-band to additional frequency ranges.

SpaceX supports the use of interim arrangements in parallel to the consideration of permanent rules for new use cases. Thanks to the ACMA’s expedient regulatory actions and progressive frameworks, Australia is now part of a now significant and growing contingency of countries including the United States, Germany, and Mexico, deploying satellite gateways in E-band. SpaceX looks forward to supporting the ACMA’s envisaged plan to introduce permanent arrangements for satellite use in e-band within 2024.

SpaceX also agrees with the ACMA’s practice to focus on existing, deployed technologies in E-band as opposed to nominal licensees when considering the risk of harmful interference to incumbents. This practical lens is especially important in higher frequency ranges where allocations and technologies have not yet proven viable.

Q/V-band and Terahertz Spectrum

In the Q/V bands, SpaceX recommends the ACMA to provide regulatory assurances to prospective satellite earth station operations and to consider alternatives to non-incumbent conditions on interim satellite gateway licenses. While re-planning may be underway in parts of the band, satellite uses in Q/V band are already here today. Non-incumbent licensing, especially on an interim basis, unnecessarily forces satellite operators to deploy costly earth station investments at risk or to look elsewhere to increasingly crowded, workhorse bands to serve consumers.

The ACMA should instead consider site-specific coordination arrangements or adopting a first-deployed approach to coexistence equitably applied across form factors. This is especially true in ultra-high frequency ranges Q/V, E, and terahertz bands where the use of highly directive antennas and narrow beams enable greater co-existence of services.

Most importantly, SpaceX urges the ACMA to adopt a light-licensing framework for currently under- or completely un-used spectrum, including in the terahertz bands. While the FYSO notes that the wide-spread use of terahertz frequencies for satellite is still in its nascency, D- and W-band frequencies are highly promising for much-needed backhaul for future satellite systems. Early adopters will overcome engineering challenges ranging from the lack of commercially available antennas to the physical property of these bands in order to utilize these under-used bands. The ACMA should therefore, encourage prospective use of these bands and reduce the barriers of entry by developing clear and flexible licensing



guidance and a first-deployed approach to incumbent protections. By doing so, the ACMA will take an actionable step to support prospective innovation that optimizes the use ultra-high band frequencies.

ii. ***Considerations for Next Generation Satellite Services***

SpaceX is eager to collaborate with the ACMA in regards to future regulatory arrangements to enable next generation services. As consumers increasingly rely on low latency bandwidth as much as high speeds and throughput, low latency satellite broadband will be important to meet changing consumer needs and to help to reduce the urban-rural digital divide.

In January of this year, SpaceX began a network improvement push, including reaching a goal of stable 20 millisecond latency service here in Australia and around the world. Over the course of the past four months, SpaceX has achieved meaningful improvements in median and worst-case latency for Starlink customers around the world, including achieving a reduction of median latency by more than 30% to a median of 33ms in the United States during peak hours of usage.

We have learned key principles and best practices that drive latency for the Starlink network and more broadly for wireless satellite systems. Should this be helpful, the Starlink team is ready to discuss these learnings with the ACMA and its current initiatives to pursue improved quality service for Starlink customers around the world.

iii. ***Satellite Direct-to-Mobile***

As noted in SpaceX's Satellite Direct-to-Mobile consultation response earlier this year, we strongly support and agree with the ACMA's technology neutral view towards spectrum licensing and satellite direct to cell arrangements. SpaceX is eager to further engage along with its Direct-to-Cell partner, Optus, to realize the vision of its D2C partnership in Australia.

SpaceX also continues to advocate for technology neutral policies in the S- and L-bands that supports future flexibility. We will continue collaborating with ACMA in seeking opportunities to incorporate adaptive and future-proof policies that empower both innovative commercial arrangements to deliver high quality service for consumers and enable reasonable interference management rules that balance new and incumbent uses of spectrum.

Conclusion

SpaceX again appreciates this opportunity to provide feedback to the ACMA. We urge the ACMA to prioritize potential arrangements for satellite use cases in spectrum bands in the Q/V and 100+ GHz ranges. We are eager to support the proliferation of ACMA's light-touch approach to satellite regulation both in future spectrum license opportunities and in the consideration of regulatory arrangements for satellite direct-to-mobile.

Thank you and respectfully submitted.

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