SPACEX

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The Manager
Spectrum Licensing Policy Section
Australian Communications and Media Authority
PO Box 13112
Law Courts
Melbourne Vic 8010

Via email: spectrumworkprogram@acma.gov.au

Re: *Response to Draft frequency coordination requirements review work program 2023-24*

To whom it may concern:

Starlink Australia Pty Ltd ("SpaceX") appreciates the opportunity to respond to the Australian Communications and Media Authority's ("ACMA") draft frequency coordination requirements review 2023-2024 work program (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 and safely return them to Earth. To date, SpaceX has successfully launched more than 190 missions to space.

SpaceX is leveraging its accumulated expertise in space system manufacturing, design, and operations, to develop Starlink, which is served by a constellation of satellites designed to provide high-speed, low-latency, competitively priced broadband service to locations in Australia and anywhere around the globe. SpaceX's first-generation constellation consists of over 4,400 non-geostationary orbit ("NGSO") fixed-satellite service ("FSS") 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

[1] *See* ACMA, "Draft frequency coordination requirements review work program 2023-24," Draft for Consultation (June 2023) ("Draft Work Program").

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 recent 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 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 Australia 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 of Sydney or the most remote parts of Western Australia, 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, in addition to the Ku- and Ka-bands, SpaceX has developed satellites capable of also utilizing the 71-76 GHz and 81-86 GHz band (the "E-band"). In doing so, SpaceX can leverage the high-gain, narrow beam characteristics of E-band links to expand backhaul link capacity to meet ever-increasing consumer demand. SpaceX has also designed its gateway earth stations to utilize these spectral features to efficiently co-exist with terrestrial services using minimal separation and common frequency coordination techniques.

II. Response to the Draft Work Program

SpaceX appreciates the ACMA's focus in the Draft Work Program on ensuring that next-generation satellite systems have the spectrum resources necessary to meet growing consumer demand for high-speed, low-latency broadband to connect to real-time applications for work, school, health care, and government services. In particular, SpaceX urges the ACMA to consider the revisions of RALI FX20[2] as a top priority for the expedient deployment of satellite services using E-band. SpaceX requests the ACMA's kind inclusion of SpaceX in the revision process of RALI FX20 during the planned revision period in Q3-Q4 of 2023 to help bring more and better connectivity to Australians no matter where they are in the country.

SpaceX intends to work closely with the ACMA on the detailed technical changes of RALI FX20 during its revision period. In the meantime, SpaceX urges the ACMA to consider the following high-level points in their approach to the revision of RALI FX20:

1. Maintain the ACMA's successful light-touch approach to satellite regulation that rightly encourages private operator-to-operator coordination to drive efficient outcomes without massive administrative overhead that would harm consumers, competition, and innovation;
2. Adopt light-licensing for FSS gateways in E-band.

[2] See ACMA, "RALI FX20 - Millimetre wave point-to-point (self-coordinated) stations operating in the 58 GHz, 75 GHz and 85 GHz bands," ("RALI FX20").

A. Maintain the ACMA's successful light-touch regulatory approach

The ACMA's long-standing policy of "encourag[ing] cooperation and coordination between satellite networks to achieve mutual benefit, without the burden and delays of additional prescriptive regulation,"[3] has been a boon for Australians, and a model for policy frameworks around the world. The ACMA's approach has been the gold standard for maximizing use of spectrum, as operators themselves are in the best position to understand how their systems can cooperate with each other to provide the best services and the most choices for Australian consumers.

Maintaining the ACMA's current approach would be consistent with most other regulators that have considered how best to encourage cooperation among operators. SpaceX is currently operating in more than 70 countries and has engaged deeply with the governments and operators in each. While some operators have requested regulators step into coordination discussions, nearly every time the regulator has decided that these issues are best handled by the operators directly without regulatory intervention. For example, when the Chilean government was asked to intercede in a negotiation over placement of gateways between two operators, the regulator evaluated the request and opted to issue only a brief statement summarily dismissing the request. The regulator correctly determined that it should not relieve the parties of the burden to coordinate in good faith, and ultimately the discussions resulted in an agreement.

SpaceX is not aware of a case that merits changes to the existing licensing framework. A departure from the ACMA's successful light-touch approach would harm consumers by raising barriers to entry for innovative companies and delaying service deployment, particularly in rural and remote areas that lack terrestrial service. Moreover, designing and managing complex regulatory regimes such as public consultations, auctions, and beauty contests would require massive additional administrative overhead for speculative or no benefit compared to the existing, successful model. Finally, adopting an interventionist approach would directly contravene the Deregulation Agenda as it applies to satellite regulation and spectrum management, reversing the many strides that the ACMA has taken over the last several years to foster a robust, competitive, and consumer-focused satellite market.

Rather than adopt interventionist policies that require the ACMA to intermediate private coordination discussions, SpaceX recommends light-touch policies that create incentives for timely, good faith coordination without delaying serving provision to consumers. For example, the ACMA should permit next-generation satellite systems to operate in Australia on a non-interference, non-protection basis while undertaking coordination with other operators, so long as the operators are coordinating in good faith. In addition, the ACMA should adopt "default" spectrum-splitting rules to encourage efficient resolution of coordination discussions. For example, the United States also has adopted a default spectrum-sharing rule as a backstop under which, if two operators have failed to reach a coordination agreement by the time they are operational, the operators will split the available spectrum. This "Solomonic" spectrum-splitting approach presents certain advantages. First, because no operator desires to operate with access to

[3] *Id.*

less than a full allotment of spectrum, all operators will have the incentive to reach a coordination agreement quickly that is better suited to its particular system. Second, this straightforward resolution limits the degree to which the ACMA would need to involve itself in operator-to-operator negotiations. Of course, the ACMA also has the opportunity to tailor it own approach to maximize preferred public policy outcomes. For example, the ACMA can give first choice of spectrum to the operator with the more efficient system, creating an incentive to invest in spectral efficiency. Alternatively, the ACMA could require both operators to split any encumbered spectrum evenly once operational, making all spectrum truly fungible. If the ACMA does alter its current, successful light-touch approach, this spectrum-splitting model would create the proper incentives for operators to build more efficient systems, to coordinate in good faith, and ultimately to offer competitive services for Australian consumers.

B. Adopt light-licensing for FSS gateways in E-band

To best serve the needs of consumers and businesses across Australia, the ACMA should extend its database-assisted light-licensing framework in E-band (71-76 GHz / 81-86 GHz) to enable both fixed links and FSS sites to register ground equipment on a first-come, first-served basis through a self-coordinated process. This process could build upon existing rules, regulations, and licensing mechanisms for apparatus licensing above the Ku and Ka bands, while streamlining the review process through self-coordination using the same process that is currently available to fixed links in the band.

A unified light-licensing approach in E-band to drive next-generation satellite connectivity for Australian consumers and businesses is warranted for several reasons. First, a unified light-licensing approach would respect the co-primary allocation of FSS in E-band. The ITU Radio Regulations and the ACMA have already allocated E-band on a co-primary basis to the FSS, with specific protections for the FSS band viz-a-viz terrestrial services. To respect this co-primary allocation and ensure that future deployments of FSSs in the band stand on equal footing with terrestrial deployments, it is important that the ACMA develop a common approach that allows both services to deploy with equal ease. Since fixed links can currently avail themselves of a rapid self-coordinated licensing process, the same process should be available to FSS gateways.

Second, regulatory bodies around the world, including the ACMA, have recognized that the unique properties of E-band links permit coexistence with minimal physical and angular separation, justifying a self-coordinated approach to licensing.[4] Like fixed links, FSS gateway

[4] *See* ITU Recommendation ITU-R F.2006, 1 (rev. Mar. 15, 2012) (noting that in the E-band "high directivity antennas are achievable even with small size antennas, increasing the density of equipment and further reducing risk of interference with same and other services."); ECC Rec. (05)07, 1 (rev. 2013) (finding that due to the "inherent reduced interference occurrence probability" in the E-band, "[m]ultiple services and applications can be implemented, with simplified coordination mechanisms, ensuring highly efficient re-use of the frequency band."); *Allocations and Service Rules for 71–76 GHz, 81–86 GHz and 92–95 GHz Bands*, 18 FCC Rcd 23318, ¶ 45 (2003) (noting that links in the band "may be engineered to operate in close proximity to other systems so that many operations can co-exist in the same vicinity without

antennas will use high-gain, directional "pencil" beams that an coexist in close proximity to other users. While gateway antennas require higher main-beam power levels than fixed links to close links with faraway satellites, they also typically use high minimum elevation angles (e.g., 25 degrees), nearly eliminating the risk of inline events with terrestrial links. Moreover, using techniques such as shielding and low sidelobes toward the horizon, satellite operators can dramatically reduce EIRP toward the horizon—the operative metric for measuring gateway interference risk to terrestrial links. In this way, FSS gateways will present an interference risk comparable to the fixed links under RALI FX20, supporting a common approach to E-band licensing.

Third, unified light-licensing is the most administratively efficient means of expanding access to the E-band and driving rapid deployment to benefit consumers, including in rural and remote areas. The ACMA has already allocated the E-band to the fixed satellite service and has adopted technical, licensing, and fee frameworks that apply to apparatus above Ku and Ka bands. A multi-service, self-coordinated light-licensing approach in the E-band would further speed review and approval time, reducing administrative cost and labor associated with manual reviews for all but the most complex interference scenarios. Moreover, a self-coordinated approach would facilitate coordination between different co-primary services in a manner that permits efficient deployment of both services to the benefit of people and businesses alike. This model could dramatically improve the satellite earth station licensing process in Australia while providing better connectivity for Australian consumers.

Together, these factors more than justify advancing authorization discussions and swiftly moving toward implementation of rules to permit NGSO FSS networks to license gateway earth stations in E-band through a self-coordinated light-licensing framework.

IV. Conclusion

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

causing interference to one another"); "Millimetre Wave Point to Point (Self-Coordinated) Stations," RALI FX20, § 2.1 (May 19, 2016).

Respectfully submitted,

/Brett Tarnutzer/

Brett Tarnutzer
Director, Satellite Policy

SPACE EXPLORATION TECHNOLOGIES CORP.
1 Rocket Road
Hawthorne, CA 90250
Email: brett.tarnutzer@spacex.com
Phone: +1 323 240 3916