

6 May 2024

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

RE: Draft Five-year spectrum outlook (FYSO) 2024-29 and 2024-25 work program

Dear Sir/Madam,

Omnispace Australia Pty Ltd ("Omnispace") sincerely appreciates the opportunity to submit a response (see attachment 1) to the Australian Communications and Media Authority's ("ACMA") Consultation Paper, *"Five-year spectrum outlook 2024–29 and 2024–25 work program: Draft for consultation"* ("FYSO"). As government spectrum planning is integral to the availability and success of Omnispace's mobile-satellite service ("MSS") business in Australia, Omnispace applauds ACMA's efforts to develop a transparent spectrum management work program with public participation.

Background on Omnispace

Omnispace has far ranging and specific interests in the 2 GHz S-band given that it operates a global non-geostationary orbit ("NGSO") satellite system in the 2 GHz S-band (1980-2025 MHz Earth-to-space / 2170-2200 MHz space-to-Earth) with feeder links in the 5-7 GHz band. Omnispace's NGSO system has been brought into use in accordance with applicable International Telecommunication Union ("ITU") regulations. Omnispace is leveraging over AUD\$1 billion of assets that the company acquired to deploy its NGSO system to provide MSS.

Omnispace currently offers MSS capacity in various markets through its existing operational on-orbit F2 satellite network. The F2 satellite network is the first element of the NGSO constellation that will be capable of providing 24 x 7 coverage and connectivity around the globe ("Omnispace System"). In 2022, Omnispace launched two S-band capable LEO satellites into space to test the company's next generation 5G Non-Terrestrial Network (NTN), which will be a significant expansion of the Omnispace NGSO system.

The Omnispace next-generation constellation will power critical global communications, including 3GPP Release 17 compliant 5G NTN and Internet of Things (IoT) connectivity, directly from its satellites in space to mobile devices around the world. Omnispace is building upon the investments it has already made to validate 3GPP standards-based 5G products and technologies and to demonstrate 5G connectivity from space.

Omnispace continues to invest in Australia and obtain authorisations to provide MSS in Australia, therefore Omnispace has a specific interest in this proceeding. Omnispace Australia was granted an Apparatus Licence for Space Service in Low and Remote Density Areas on July 4, 2023. In addition, Omnispace Australia has an operational satellite Earth station at Ningi QLD with MSS feeder links for its F2 satellite network in the 5 GHz and 7 GHz frequency bands. Ningi also provides Fixed Satellite System (FSS) feeder links for the ASIABSS satellite network in the 7 GHz segment. In 2022, Omnispace was added as a satellite operator on the Radiocommunications (Foreign Space Objects) Determination Amendment 2022 (No.1)¹.

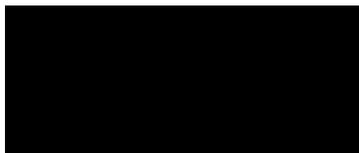
On February 9, 2024, Omnispace joined Viasat, Inc., Terrestar Solutions, Ligado Networks and Al Yah Satellite Communications Company PJSC (Yahsat), as a founding member of the Mobile Satellite Services Association (MSSA) (www.mss-association.org). MSSA will bring significant scale and choice to promote and advance the emerging Direct-to-Device (D2D) ecosystem.

MSSA seeks to develop a global ecosystem utilizing over 100 MHz of L- and S-band spectrum already allocated and licensed for MSS, which is well-suited for integration into a broad range of mobile devices. The non-profit industry association intends to align with 3GPP specifications to extend terrestrial mobile coverage for Mobile Network Operator (MNO) coverage.

Thank you again for the opportunity to provide comments on the “*Five-year spectrum outlook 2024-29 and 2024-25 work program: Draft for consultation.*”

Please contact me should there be a need for clarification or additional information.

Sincerely,



Les Davey


Managing Director
Omnispace Australia Pty Ltd

¹ <https://www.legislation.gov.au/Details/F2022L00701>

ATTACHMENT 1

Introduction

Omnispace is pleased to have the opportunity to provide these comments on the Australian Communications and Media Authority's consultation on the "*Five-year spectrum outlook 2024–29 and 2024–25 work program: Draft for consultation*" (FYSO).

Omnispace has a global operational non-geostationary orbit ("NGSO") satellite system in the 2 GHz S-band (1980-2025 MHz Earth-to-space / 2170-2200 MHz space-to-Earth) with licenced MSS feeder links in the 5175-5250 MHz (uplink) and 7010-7075 MHz (downlink) bands in Australia. Omnispace has an operational Earth station at Ningi in Queensland and is interested in acquiring a nationwide licence to provide MSS / CGC service throughout Australia. In the United States and Canada, Omnispace has entered into an MoU with Ligado networks to utilise up to 40 MHz of L-band spectrum and 60 MHz of S-band spectrum for a space based, direct-to-device 5G NTN compliant network. Therefore, Omnispace's comments to the FYSO focus on the L-band, 2 GHz S-band, satellite direct-to-mobile communications, the 6 GHz band and the importance of international engagement at the ITU and the APT.

Issues for Comment

Spectrum Management

Omnispace agrees with the ACMA that it is important to provide clarity to stakeholders on its approach to licensing and allocation decisions and that it would be timely to update its [guidance document](#) especially considering that earlier this year it conducted a consultation on "Satellite direct-to-mobile services: regulatory issues," the outcome of which will have direct impact on issues covered in the guidance document such as when to undertake spectrum, apparatus, and class licensing.

As noted on page 10 of the FYSO, when significant excess demand for spectrum has exceeded supply, the ACMA has typically utilised spectrum auctions to achieve efficiency in assigning spectrum to those who value it the most. Exclusive access is an appropriate spectrum management approach for terrestrial mobile spectrum where certainty of quality-of-service objectives are required as in the case of mobile cellular services.

The ACMA highlights that administrative allocation approaches are used when they will best meet spectrum management objectives. Shared spectrum access prevails in most satellite services and in these cases, auctions (and other competitive allocation schemes) decrease allocative efficiency and stymie downstream innovation. Many shared access technologies like unlicensed RLAN/WAS access include spectrum contention mechanisms within the technology specifications while satellite constellations include spectrum management mandates sharing by negotiation under ITU Radio Regulations Articles 9, 11 and 21 for satellite coordination and notification.

The spectrum utilisation from GSO and NGSO orbits differ significantly from that of terrestrial mobile operators, particularly concerning the exclusivity of spectrum usage over defined terms of the license. Satellite systems are designed to operate to coordinate with other satellite constellations within the same frequency band, employing coordination mechanisms to prevent harmful interference and use the same

frequency bands across large geographic regions on a shared basis. Therefore, the concept of exclusive spectrum use as commonly applied in the mobile industry does not apply to the satellite industry, necessitating the need for different approaches to spectrum allocation and management.

For satellite operators aiming to provide affordable, ubiquitous services, it is crucial to seek economies of scale and obtain spectrum across multiple global administrations. The cost and complexity of navigating diverse licensing regimes are already significant, but auctions introduce uncertainty and expense to the global licensing model. If the Australian government's priority is digital inclusivity, particularly for Australia's first nation citizens, auctioning spectrum could result in services becoming prohibitively expensive or, worse still, entirely unavailable for these underserved consumers.

Finally, increased spectrum access costs, typically resulting from auctions, can pose significant challenges to emerging space-tech start-ups, potentially stifling innovation and growth in Australia's nascent space industry.

International engagement

Omnispace congratulates the ACMA's staff in the involvement and achievements at the ITU's WRC-23 in Dubai and looks forward to participating in the WRC-27 preparatory process to provide information and assist developing positions on the agenda items below so that Australia and its citizens and businesses benefit to the maximum extent possible. An inclusive policy for participation in the process and attendance at regional and relevant international meetings will ensure that Australia maximises the intellectual resources, perspectives and creativity available for solving issues across all agenda items.

The WRC-27 agenda items below are related to the MSS and are interlinked across several dimensions; overlapping frequency bands, potentially overlapping technologies and applications and potential overlaps in regulatory mechanisms towards their solution. If one of these agenda items is prioritized in the FYSO then it would be prudent to include all three to ensure that a disconnect is not inadvertently created.

Agenda Item 1.5

Omnispace brings WRC-27 Agenda Item 1.5 to the ACMA's attention which is "to consider regulatory measures, and implementability thereof, to limit the unauthorized operations of non-geostationary-satellite orbit earth stations in the fixed-satellite and mobile-satellite services and associated issues related to the service area of non-geostationary-satellite orbit satellite systems in the fixed-satellite and mobile-satellite services, in accordance with Resolution 14 (**WRC-23**)."

This item is not mentioned in the FYSO and but has developed its own prominence at early ITU-R WP 4C meetings, as it may have far reaching consequences to all satellite services in all bands and all systems utilising the NGSO and will have an impact on satellite coordination and notification procedures.

At the April meeting of ITU-R WP 4C, several liaison statements to other ITU-R working parties were approved to progress work on WRC-23 Agenda Items 1.11, 1.12, 1.13 and 1.14. Those liaison statements included the statement "Working Party 4C notes that there may be a connection between WRC-27 agenda items 1.11 (possibly), 1.12, 1.13 and 1.14 and MSS non-GSO earth station issues that

may need to be addressed by WP 4A under WRC-27 AI 1.5 in accordance with CA/270”² Furthermore, at the time of writing, initial discussions had revealed that there was considerable regulatory complexity, difficulties and uncertainty related to how this agenda item would be approached and hence also the outcome of this agenda item especially related to coverage and service areas and implementation. For example, how would exclusive authorisation be granted, monitored for compliance, implemented in both the Earth-to-space and space-to-Earth directions and be enforced.

Omnispace’s initial analysis of these regulatory complexities shows that use of ITU Radio Regulations Article No. 4.4 to enable satellite operations exacerbates these issues. Additional intricacies may be identified as the ITU-R studies progress. At this stage it is unclear how deeply this agenda item will impact the initiation of new NGSO satellite services and their commercial viability even if they are fully coordinated, notified, and brought into use and licensed under RR Articles 9, 11, 21, 18 and 22 and especially in relation to their operation under RR No. 4.4.

Agenda Item 1.12

WRC-27 Agenda Item 1.12 “to consider, based on the results of studies, possible new allocations to the mobile-satellite service and possible regulatory actions in the frequency bands 1 427-1 432 MHz (space-to-Earth), 1 645.5-1 646.5 MHz (space-to-Earth) (Earth-to-space), 1 880-1 920 MHz (space-to-Earth) (Earth-to-space) and 2 010-2 025 MHz (space-to-Earth) (Earth-to-space) required for the future development of low-data-rate non-geostationary mobile-satellite systems, in accordance with Resolution 252 (WRC-23)” will likely encounter similar issues to that encountered with WRC-23 Agenda Item 1.18 inasmuch as both items use ambiguous and uncertain terminology, i.e. “narrowband” and “low-data-rate” respectively. Recognizing c) of Resolution 252 (WRC-23) includes only a qualitative description of “low-data-rate” and until a quantitative description of this term is agreed it may not be possible to progress the required technical, operational and coexistence studies to protect co- and adjacent frequency services.

The ACMA has segmented the 2 GHz MSS band into a 2 x 25 MHz portion for generic MSS and a 2 x 5 MHz portion (2005-2010 MHz paired with 2195-2200 MHz) for “narrow-band” MSS operations (for which Omnispace has obtained a license). The 2 x 5 MHz band does not overlap with the spectrum under consideration under Agenda Item 1.12 which means that if a specific slice of spectrum is reserved for low-data-rate operations, the market for this kind of satellite operations will be fragmented and Australian investment in its spectrum will be stranded.

Agenda Item 1.13

Omnispace is pleased that the ACMA has identified this WRC-27 agenda item in the latest FYSO. ITU-R WP 4C is the responsible working party with WP 5D as a contributing working party. At WRC-23, the development of this agenda item was controversial and the contention continued in the April meeting of WP 4C.

The nuanced wording of the agenda item “to consider studies on possible new allocations to the mobile-satellite service for direct connectivity between space stations and International Mobile Telecommunications (IMT) user equipment to complement terrestrial IMT network coverage, in accordance with Resolution 253 (WRC-23)” is of particular interest as this does not follow typical

² <https://www.itu.int/md/R00-CA-CIR-0270/en>

wording, such as that in Agenda Item 1.12 and Agenda Item 1.14 for which the object of the agenda item is the consideration of possible additional allocations. Whereas for Agenda Item 1.13 the object is to consider the studies which leaves the action to be undertaken by WRC-27 based on these studies yet to be decided – novel regulatory solutions may be required.

After the WP 4C meeting, no agreement was reached on which bands are to be studied, nor if TDD technology is to be studied. WP 4C was converging on a consensus that the directionality (i.e. duplex arrangements) for satellite connectivity should match that for terrestrial connectivity, however, it is noted that some FDD frequency arrangements in Recommendation ITU-R M.1036 covered the same spectrum but with different duplex directions and some TDD frequency arrangements overlapped FDD frequency arrangements, and it remains to be seen how this will be tackled in the studies. It is important that the ACMA actively engage in these studies.

Agenda Item 1.14

WRC-27 Agenda Item 1.14 “to consider possible additional allocations to the mobile-satellite service, in accordance with Resolution 254 (WRC-23)” is very specific in terms of frequency ranges, and the directionality of spectrum use (Earth-to-space and space-to-Earth ranges being clearly identified). It is focused on establishing additional globally harmonized spectrum for generic MSS services thus accommodating applications envisaged in Agenda Items 1.12 and 1.13. Unlike Agenda Item 1.13 it will not require consideration of novel regulatory measures or agreement on the frequency bands, arrangements, and types of technology (TDD/FDD) and unlike Agenda Item 1.12 there are no ambiguous qualitative terms that require definition.

Satellite direct-to-mobile services

At present, around the world there is considerable and increasing interest in direct-to-mobile communications (D2M) (also known as direct-to-cell (D2C), direct-to-device (D2D) or supplementary coverage from space (SCS) with the end objective of seamless global personal communications. It is a complex international and national issue, where mobile and satellite technology, functionality, use-cases, specifications, standards and regulation may be combined in innovative ways to implement solutions that will facilitate economic and social development. The issue is currently being evaluated in multiple regulatory and technical fora.

In the ITU-R studies being undertaken relative to Agenda Items 1.5, 1.13 and 1.14 (see above) may eventually form the basis of international regulation for D2M. In the United States, the FCC has recently completed a rulemaking procedure for SCS. As noted in the FYSO, the ACMA is considering whether Australia’s current regulatory framework is fit-for-purpose.

Omnispace makes the following observations regarding the FCC’s new rules as the FCC has taken aspects related to international comity and the ITU Radio Regulations quite seriously:

- There are MSS systems in which satellites are communicating with terrestrial devices (direct-to-device / D2D) and operating within bands already allocated to MSS. In contrast, the FCC’s SCS rulemaking involves satellite networks being integrated with the terrestrial carrier’s standard network using terrestrial spectrum.
 - The provision of MSS to terrestrial devices in MSS-allocated spectrum does not raise the same novel legal and technical complexities as does SCS using terrestrial spectrum.
 - The SCS framework is separate from the existing framework for MSS direct-to-device systems which are already successfully performing operations within an existing

regulatory framework. As such, the FCC rules for SCS do not impact current service rules for MSS operators or in any way change the terms of authorization for existing MSS systems. Any measures for service rules for MSS or related earth stations is outside the scope of the FCC's SCS proceeding.

- The FCC Single Network Future establishes a national regulatory framework for only the United States, that enables expanded coverage to a terrestrial licensee's subscribers through a collaboration via lease agreement or arrangement with a satellite operator. The satellite operator would be able to offer D2D connectivity to the terrestrial licensee's subscribers using spectrum previously allocated only to terrestrial service, on a secondary or non-interference basis.
- The FCC has determined that all MSS allocations in the SCS bands will be on a secondary basis. This means that the SCS stations shall not cause harmful interference to stations of a primary service nor claim protection from harmful interference from those stations operating on a primary basis. SCS operations cannot cause interference to those licensed services, domestically and internationally operating in conformity with the ITU Radio Regulations.
- The FCC makes it clear that the new secondary MSS allocations are subject to the U.S. international obligations under treaties, bilateral or multilateral agreements, the International Radio Regulations, and other instruments of the ITU.
- SCS operations shall not cause harmful interference to other countries' operations (where Omnispace is licensed) that conform to the ITU Radio Regulations and shall eliminate any harmful interference immediately.
- Terrestrial service providers and satellite operators collaborating to provide SCS will be required to protect adjacent band and cross border operations.
- Many parties expressed interference concerns in the FCC SCS proceeding specifically with regards to SpaceX's request to utilize T-Mobile's PCS G block frequencies in the 1990-1995 MHz band: in other words, downlink MSS operations within the United States may cause interference in-band and in adjacent bands to MSS operations outside the United States that conform with ITU global MSS uplink allocation. For the first time ever, SpaceX's request to use the T-Mobile G block in the 1990-1995 MHz band will create satellite-to-satellite interference thousands of km away, which is a novel aspect of the FCC's SCS proceeding.
- It has also been noted in the FCC's SCS proceeding that proposed operations would create harmful interference to the U.S. National Radio Quiet Zone for radioastronomy.
- For additional assurance there are no unintended consequences arising from its new rules, the FCC has requested additional interference demonstrations for applicants to conduct sound detailed interference analyses to evaluate the potential for satellite-to-satellite interference for proposed SCS on a case-by-case basis showing that requested operations will not cause harmful interference to stations operating in accordance with the ITU Radio Regulations.
- The FCC's rulemaking implements OOB limits and enforces those limits on the ground to ensure adjacent band devices are protected from the risk of harmful interference.
- All SCS operations must be on a non-harmful interference basis and any harmful interference must be immediately eliminated pursuant to No. 4.4 of the ITU Radio Regulations. Article 4.4. states that, "*Administrations of the Member States shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations in this Chapter or the other provisions of these Regulations, except on the express condition that such a station, when using such a frequency assignment, shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the Constitution, the Convention and these Regulations.*"

The FCC requirements as part of SCS license conditions are on a case-by case basis to ensure that:

- certification includes steps that were taken to address harmful interference concerns and that provision of SCS will not result in harmful interference to operations that are in conformity with the ITU Radio Regulations in neighbouring or nearby countries;
- certification must also be accompanied by a demonstration specifying the measures that the U.S. licensee or applicant will take to eliminate any harmful interference immediately, in the event that it is notified of harmful interference resulting from such SCS operations.

Considering the complexity and uncertainty provided inherent in the FCC's rulemaking, Omnispace recommends that, prior to authorizing commercial D2M communications in Australia, the ACMA implement a suitable period for testing and evaluation of cross border and space-to-space interference in order to bring unforeseen issues to light.

2 GHz MSS

Omnispace responded to the ACMA's "*Technical design features and allocation considerations for the 2 GHz MSS band*" consultation paper earlier this year highlighting several important considerations including that:

- there are no outstanding regulatory issues pending access to the 2 GHz MSS spectrum;
- existing satellite systems have been brought into use and operate in the 2 GHz spectrum today such as Omnispace's MEO F2 and M5L2SATLEO satellites that will provide benefits to Australian businesses and consumers once an appropriate authorization and licensing regime is implemented;
- when developing the technical criteria, the ACMA should ensure that existing satellite systems and planned satellite systems for the 2 GHz MSS bands fall within its technical design features;
- an important international standards consideration is alignment with ITU-R Radio Regulations (RR) and associated reports and recommendations. The full 2 x 30 MHz of the 2 GHz MSS band has been identified in the RR for the satellite component of IMT and is aligned with 3GPP band class n256. Furthermore ITU-R WP 4B is currently evaluating candidate Radio Interface Technologies (RITs) and Sets of Radio Interface Technologies (SRITs) for the satellite component of IMT-2020. At the January 2024 meeting of WP 4B, the only candidate interface technology currently under consideration is 3GPP 5G NTN per Release 17.4. This evaluation was reported as proceeding on track at the May 2024 meeting of WP4B and the process is scheduled to be completed in 2024;
- Omnispace proposes the ACMA allow the power levels supported by 3GPP up to -10 dBW/3.75 kHz;
- Omnispace strongly supports this relaxation of the current emission limit at the 2010 MHz boundary from of -66 to -60 dBW/MHz EIRP. This relaxation brings the MSS NB-IoT band emission limit in line with ETSI EN 302 574-3, Table 3a for unwanted emissions outside the band 1980 MHz to 2010 MHz; and
- 2 x 15 MHz is optimal for 3GPP 5G NTN and will enable increased system capacity and robustness. Omnispace prefers *Configuration 1 of 2 x 15 MHz paired (1980-1995 MHz with 2170-2185 MHz) and 2 x 10 MHz paired (1995-2005 MHz with 2185-2195 MHz).*

At Omnispace, we understand that a step-by-step consideration of technical and allocation aspects is important to arrive at a robust licensing regime for communications services. And, on the other hand, delays in the development process deny Australians, especially those in rural and underserved areas,

the benefits of those services and creates uncertainty for businesses intending to provide them. Therefore, it is important to balance the need for a considered approach with minimizing the timeframes involved as much as possible to bring services to market. Originally the ACMA proposed a second quarter 2024 commencement of the formal consultation on technical framework and allocation design which has been delayed until the third quarter 2024 to arrive at licensing in 2024-2025. We recommend that this timeframe be maintained or even accelerated, and licensing be enabled as early as is practicable.
