

20 February 2024

Mark Arkell
Manager
Space Systems Section
Australian Communications and Media Authority
PO Box 78
Belconnen ACT 2616

RE: Technical design features and allocation considerations for the 2 GHz MSS band

Dear Mr. Arkell,

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, “Technical design features and allocation considerations for the 2 GHz MSS band” (“the consultation paper”). As the technical design, band plan, and spectrum allocation will be important to the success of Omnispace’s mobile-satellite service (“MSS”) business in Australia, Omnispace applauds the ACMA’s efforts to seek guidance from the satellite industry on these important issues.

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 in order to provide MSS and hybrid connectivity via Non-Terrestrial Networks (NTN).

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 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.

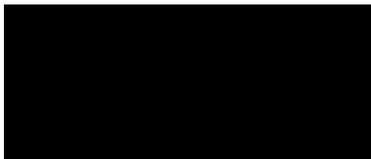
On February 9, 2024, Omnispace joined Viasat, Inc., Terrestar Solutions, Ligado Networks and Al Yah Satellite Communications Company PJSC (Yahsat), as a founding member of the Mobile Satellite Services Association (MSSA) (www.mss-association.org). MSSA will bring significant scale and choice to promote 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 3rd Generation Partnership Project (3GPP) standards to extend terrestrial mobile coverage for both Mobile Network Operator (MNO) and Over-the-Top (OTT) internet services.

Thank you again for the opportunity to provide comments on the technical design features and allocation considerations for the 2 GHz MSS band consultation paper.

Please contact me at [REDACTED] 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 Australia Pty Ltd ("Omnispace") appreciates the opportunity to provide comments on the Australian Communications and Media Authority's consultation on the technical design features, coordination, and allocation considerations for the 2 GHz MSS band.

Issues for Comment

Omnispace is pleased that the ACMA is seeking comment on the ACMA draft technical parameters, coordination requirements, and allocation issues to support 2 GHz MSS, and also on the extent of demand for the spectrum in this band, and the availability of equipment.

Omnispace's comments on the issues are below and utilise the ACMA consultation "Issues for comment" numbering for those that are included in these comments.

2 GHz MSS parameters (section 2 of the consultation paper)

1. *What are your views on the proposal to develop technical requirements for mobile earth stations and CGC systems based on the 2 GHz spectrum licensing technical framework. Are there alternative approaches that could be used and different resulting values for key parameters such as power and unwanted emissions that we should consider?*

Omnispace supports the ACMA's proposal to develop technical requirements for mobile earth stations as this is relevant for the decision on the allocation method and assignment of licenses for the 2 GHz band. The ACMA recently pointed out in its recent "Satellite direct-to-mobile services: regulatory issues consultation," that there are no outstanding regulatory issues pending access to the 2 GHz MSS spectrum. There are already satellite systems that have been brought into use and operating in the 2 GHz spectrum, such as Omnispace's MEO F2 and M5L2SATLEO satellites that will provide benefits to Australian businesses and consumers once an appropriate authorisation and licensing regime is implemented. By implementing such a regime, Australia will improve its attractiveness for satellite operators to deploy and test new and innovative satellite systems, services and capabilities and propel Australia towards improving national communications² and space economy objectives³.

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 minimising the timeframes involved as much as possible in order 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 in order to arrive at

² As outlined in the December 2022 Ministerial Statement of Expectations, such improvements include enhancing regional connectivity and promoting investment, innovation and adoption of new and emerging technologies.

³ *Advancing Space Australian Civil Space Strategy 2019–2028* and *Australia in Space: a decadal plan for Australian space science 2021–2030*.

licensing in 2024 – 2025. We recommend that this timeframe be maintained or even accelerated, and licensing be enabled as early as is practicable.

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. These satellite systems include the complementary ground component (CGC) although Omnispace notes that the use-cases and business models for incorporating CGC within MSS in 2 GHz CGC are becoming less relevant (see answer to question 3 below) given the direct-to-device (D2D) trend. Therefore, CGC may be an optional feature in the design of the allocation procedure, so the ACMA may want to inquire of interested licensees if they intend to deploy the CGC.

Omnispace supports the principle of introducing the least restrictive technical and regulatory conditions required to protect the operation of incumbent systems whilst maintaining a technology neutral approach to allow deployment of the widest range of new and innovative MSS systems. This principle is in line with the ACMA's approach when developing the technical design for 2 GHz MSS spectrum which is to utilise harmonised spectrum allocated to the MSS that is identified for the satellite component of IMT, the ECC Report 233, and the 3GPP 5G NTN specifications.

Aligning with the ECC Report 223 will ensure that existing satellite systems (and associated adjacent channel issues) are taken into account, and encompassing 3GPP 5G NTN specifications will ensure that 5G NTN satellite systems being developed and launched in the 2 MHz band (3GPP band class n256) are catered for, including Omnispace's next generation LEO satellites.

With regard to 3GPP, Omnispace proposes the ACMA allow the power levels supported by 3GPP up to -10 dBW/ 3.75 kHz.

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 WP4B 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 WP4B, the only candidate interface technology currently under consideration is 3GPP 5G NTN per Release 17.⁴ This evaluation process is scheduled to be completed in 2024.

- 2. Having arrangements based on the 2 GHz spectrum licensing technical framework means including support for active antenna systems. We seek views about the inclusion of active antenna systems in the technical framework for 2 GHz MSS.*

Active antenna systems (AAS) are a terrestrial base-station design element in FR1 spectrum and are not contemplated for 3GPP 5G NTN solutions, hence accommodation for AAS is not required for NTN in the 2 GHz MSS band.

⁴ Document ITU-R WP4B/4.

3. *What are your views on developing technical parameters for aeronautical transmitters in CGC/DA2GC systems based on ECC report 233?⁵ Are there alternative parameters that should be used?*

Omnispace is of the view that the commercial conditions that once favored CGC deployments are being eroded in favor of D2D. Specifically, as the capabilities of 5G NTN have been specified and are now being enhanced, 5G NTN is increasingly considered as a coverage enhancement for terrestrial networks where 3GPP compliant terrestrial and NTN user equipment will be capable of roaming between 5G New Radio (NR) and 5G NTN networks thus largely negating the need for an MSS CGC. The currently favored commercial model is for MSS operators to collaborate with Mobile Network Operators (MNOs) and enter formal roaming arrangements with them. This model means that MSS operators are operating synergistically with MNOs rather than competitively, and that for this new paradigm may not require a CGC.

Given that the 2 GHz MSS band is standardised for the satellite component of IMT, fully specified for 5G NTN by 3GPP, and that 5G NTN encompasses enhanced mobile broadband, high reliability communications, and massive machine type communication, it is clear that the highest value is MSS with connection directly to terrestrial devices (D2D).

4. *What are your views on the proposal to reduce the current the emission limit at the 2010 MHz boundary from of -66 to -60 dBW/MHz EIRP intended to provide protection for TOB receivers operating above 2010 MHz?*

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.

5. *For 2 GHz MSS emission limits above 2010 MHz and 2200 MHz, which are intended to protect TOB receivers, do the limits achieve that objective? If not, please explain why and outline what the limits should be.*

When the emission limit was established, Omnispace provided the ACMA with information indicating that the study undertaken to arrive at -66 dBW/MHz EIRP was overly conservative (in relation to protecting TOB). In particular we noted that the study:

- relied on worst case input parameters,
- used assumptions sourced from an input contribution to WP4C that were not agreed within the working party,
- used a propagation model that did not include allowances for terrain and clutter loss,
- assumed that all MSS user devices would transmit simultaneously,
- assumed the TOB receive antenna gain was omnidirectional and 27 dBi over a 120 km radius area

This resulted in the over-protection for adjacent band TOB reception and in the unnecessary denial of spectrum for MSS.

6. *For 2 GHz MSS emission limits above 2010 MHz and 2200 MHz, we seek views on the merits of applying more relaxed limits in areas of lower TOB usage and views on relevant emissions limits to apply in areas on low TOB usage.*

Aligning the emission limits above 2010 MHz and 2200 MHz with ETSI Report 233, i.e., -60 dBW/MHz EIRP, will allow a larger choice of equipment designed and built for overseas markets, which will facilitate greater uptake of services, enable greater downstream economic and social benefits for Australian consumers and businesses, and open greater opportunities for innovation in the Australian space and related industries.

Coordination requirements: 2 GHz MSS with other services (section 3)

7. *Views are sought on the coordination requirements outlined in section 3.*

Omnispace understands the need to coordinate the 2 GHz MSS service with existing licenced services including Fixed point-to-point links, wireless broadband services, TOB services, 2 GHz space operations Earth stations, the Australian radio quiet zone, and the Australian Defence AMT systems.

Omnispace supports the coordination requirements summarised in Table 2 (pg 3) of the consultation paper with the following comments.

For coordination with adjacent band wireless broadband services, i.e., terrestrial mobile services, Omnispace notes that ECC Report 233 was developed with protection of adjacent band terrestrial mobile services in mind. Adopting the values in this report will ensure the protection of incumbents and future adjacent band services eliminating the need for coordination.

Furthermore, coexistence with adjacent band terrestrial mobile services (notably band n1 that is utilised in Australia) was taken into account when 3GPP specified band n256. Adopting 3GPP 5G NTN specifications, including the in-band power requirements, will not pose a problem or cause interference to 3GPP compliant terrestrial mobile services.

Because of the overlapping nature (and in some cases, reverse duplex) of some 1.9 GHz terrestrial frequency arrangements (with the 2 GHz MSS band per Recommendation ITU-R 1036), WRC-19 updated Resolution 212 to provide guidance on best practice spectrum planning when configuring terrestrial and satellite frequency arrangements in the 2 GHz range. Furthermore, the APT Wireless Group studied coexistence in the 2 GHz range specifically for the APAC region and provided additional guidance in APT/AWG/REP-04(Rev.2) on compatible frequency arrangements and additional interference mitigation techniques to be applied in the event they are required.

Coordination requirements: 2 GHz MSS with 2 GHz MSS

10. *No coordination requirements are considered necessary between co-channel and adjacent channel MSS services. We are interested in views on this proposal, including views on any alternative coordination requirements considered necessary.*

ITU-R coordination and notification, and development of the associated commercial coordination agreements, is undertaken so that MSS operators may use the same spectrum bands, with overlapping coverage areas nationally and internationally. No additional coordination is required on a national basis.

Reconsideration of 2 GHz narrowband requirements (section 4)

11. We propose that the current the emission limit at the 2010 MHz boundary could reduce from -66 to -60 dBW/MHz EIRP. Are there other elements of arrangements for narrowband MSS that would be beneficial to review?

Omnispace stongly supports the proposed emission limit of -60 dBW/MHz EIRP at the 2010 MHz boundary – see answer to question 5 above.

Licence allocation design (section 5)

13. We are interested in views about the intended uses of the 2 GHz MSS spectrum, as well as the availability of suitable equipment.

Existing satellite networks and user equipment have been developed and deployed in alignment with ECC Report 233 and the ecosystem for this equipment is growing – the utilisation technologies such as; Wi-Fi, Bluetooth and LoraWan to connect satellite user equipment to third party devices, has enabled a rapid expansion of the ecosystem and applications connecting to existing operational MSS networks as the following (non-exhaustive) slide focussing only on LoRaWAN devices for environmental & resource management solutions shows:



THE THINGS CONFERENCE Wall of Fame of LoRaWAN® solutions

Environmental & Resource Management

- Livestock monitoring**: eChickens's smart ear tag lets producers monitor cattle, sheep, pig, poultry, enhancing farm biosecurity, ensuring health, and optimizing grazing.
- NFC RFID Button Solution powered by LoRaWAN®**: Our smart, web-enabled allows you to monitor deployment of RFID-LoRa Buttons, handle events and collect statistics about data usage. Other LoRaWAN products can be monitored using the same dashboard.
- Industrial IoT applications made easier to build and use**: The platform for IoT appliances for manufacturing to improve automation, remote monitoring, safety risk profiles, and predictive maintenance. Add an sensor and produce to custom ingest and analytics.
- LoRaWAN® LPG Level Management Solution**: With LoRa LoRaWAN level sensor (LPG), users can monitor the LPG level remotely so that they can receive an alert when it's low, and also monitor the tank's consumption statistics and analytics.
- Quantz**: Optimize your bottle delivery chain. We predict 18 items for bottles that will arrive at any other job, hours, days, allowing this expertise to provide a confidence supply for your customers.
- Living with Dementia: Citywide BLE-LoRa Location Precision System**: With near-100% compatibility, compact BLE-LoRa trackers enable to precisely pinpoint their location. LoRa through LoRaWAN enables BLE through mobile devices. Customizable for different networks.
- Drain clogging detection**: Detects and alerts about potential drain clogs for timely maintenance.
- SCADA reading**: Automates SCADA data collection for real-time monitoring and control.
- Space Usage Optimization**: Improves the efficiency of base station energy and resource use.
- Automated cold chain monitoring**: Ensures temperature sensitive goods are stored and transported within safe limits.
- Building wear**: Monitors building wear and tear for timely maintenance and remedial design.
- Agriculture fertilizing**: Optimizes fertilizer use in agriculture, reducing waste and environmental impact.
- Wildfire detection**: Allows early detection of wildfires, enabling quicker response to save lives and property.
- Transformer Station Monitoring**: Ensures the reliable operation of electrical transformer stations.
- Smart Street Light**: Automates street lighting based on real-time needs, saving energy.
- Irrigation in agriculture**: Optimizes irrigation schedules to save water and improve yields.

For planned 3GPP 5G NTN satellite networks, there is already support from across the industry from chipset vendors, satellite hardware and software vendors, and device vendors. Successful completion of the ITU-R WP4B process to evaluate 3GPP 5G NTN as the current sole candidate for the satellite component of IMT-2020 in 2024 will provide a strong indication to vendors to complete their development processes and release new devices. We expect to see a rapid development of a device ecosystem in the 2025 timeframe.

14. *What is the minimum viable amount of spectrum for 2 GHz MSS services? Is a 2x5 MHz allocation useable or is a minimum of 2x10 MHz required?*

Omnispace has advised ACMA that it considers that 2x10 MHz is the minimum allocation required to provide a viable MSS service to Australia. A minimum of 10 MHz will ensure that the 3 major use cases of 3GPP 5G NTN (reflected in Report ITU-R M.2514 Vision, requirements and evaluation guidelines for satellite radio interfaces of IMT-2020) can be deployed. These include enhanced mobile broadband over satellite, high-reliability communications, and massive machine type communications. However, 2 x 15 MHz is optimal for 3GPP 5G NTN and will enable increased system capacity and robustness.

15. *Which of the following options is the most appropriate frequency lot configuration for the 2 GHz MSS spectrum?*

Configuration 1

- *2 x 15 MHz, paired (1980-1995 MHz with 2170–2185 MHz)*
- *2 x 10 MHz, paired (1995–2005 MHz with 2185–2195 MHz).*

Configuration 2

- *5 generic 2 x 5 MHz paired lots which would provide participants in the allocation the opportunity to bid for as many blocks as suits their use case.*

Noting our answer to question 14, Omnispace's preference is for configuration 1.
