

21 February 2024

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

**RE: COMMENTS REGARDING TECHNICAL DESIGN FEATURES AND ALLOCATION  
CONSIDERATIONS FOR THE 2 GHZ MSS BAND (1980-2005 AND 2170-2195 MHZ)**

Thank you for the opportunity to comment on the Australian Communications and Media Authority ("ACMA") Discussion Paper regarding the technical design features and allocation considerations for the 2 GHz MSS band (1980-2005 and 2170-2195 MHz). As an established entity in the Australian space industry, Fleet Space Technologies Pty Ltd ("Fleet Space" or "Fleet") is committed to working with the ACMA to ensure that the Australian satellite radiocommunications regulatory regime remains relevant and effective.

Fleet Space supports this initiative by the ACMA and commends their diligence in the drafting of the technical framework and allocation method for licences in the 2 GHz MSS band.

Fleet's general views on the discussion paper can be summarised as follows:

- Fleet cautions the ACMA against pursuing competitive price-based bidding for satellite spectrum licences. This type of allocation method for satellite spectrum has demonstrably stifled market competition and innovation in other regions and has resulted in limited long-term public interest benefit derived from the use of the spectrum.
- Fleet is of the view that the ACMA should focus on designing a technical framework and allocation method that promotes the shared use of the 2 GHz MSS band.
- Fleet encourages the ACMA to make a holistic assessment of prospective licence applicants and the proposed spectrum utilisation, particularly with respect to the ability of the applicants to share spectrum as well as the national and public interest benefit.
- Fleet supports technology-neutral technical frameworks to enable the rapid adoption of a wide array of technologies to promote digital inclusion and technological innovation, and promote shared use of precious and finite national spectrum resources.
- Fleet supports modifications to the 2 GHz Narrowband MSS requirements that improve the technology neutrality of the allocation.

Specific Fleet Space comments on the Discussion Paper can be found in **Attachment A**.

# FLEET

If you require any further information or wish to discuss any aspects of the comments contained in this submission, please contact the Director of Telecommunications Strategy, Mike Kenneally at [REDACTED]

Yours sincerely

[REDACTED]

**Federico Tata Nardini**

Chief Financial Officer & Director

Fleet Space Technologies

[REDACTED]

**ATTACHMENT A – SPECIFIC COMMENTS ON THE CONSULTATION PAPER****2 GHz MSS Parameters**

- 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?**

Fleet does not support the ACMA's proposal to develop technical requirements in this band based on the 2 GHz spectrum licensing framework. Fleet is of the view that the technical requirements introduced to the band in this scenario would be a prelude to the band being limited to 3GPP 5G Non-Terrestrial Networks (NTN) equipment which requires exclusive spectrum use over a service area to ensure the appropriate link quality.<sup>1</sup> Such an arrangement would preclude the various other readily deployable MSS technologies that can operate on a shared basis in the band including Machine-type-communication (M2M), Internet-of-Things (IoT), LoRa, and other generic MSS applications.<sup>2</sup>

Given the harmonisation of the 3GPP 5G NTN equipment standards with the adjacent band 2 GHz spectrum licensing technical framework, Fleet is of the view that the 5G NTN MSS application could be appropriately supported within the adjacent 1920-1980 MHz spectrum band (particularly in the Earth-to-space direction) through spectrum access agreements between incumbent mobile carriers and satellite operators. This approach renders the requirement to support 3GPP 5G NTN equipment in the 1980-2005 MHz band unnecessary. Instead, these systems could fulfil their spectrum requirements by reusing the available 60 MHz of spectrum currently utilized by 3GPP 5G terrestrial networks. This would enable complementary service coverage from space in areas where deploying terrestrial services is either unfeasible or too costly, without any risk of interference to the incumbent 5G terrestrial networks and maximising the spectrum efficiency of the 1920-1980 MHz band.

To the extent that is practically necessary, Fleet is of the view that any technical requirements should be scoped around the protection of the adjacent band systems through out-of-band emission limits rather than attempting to harmonise the equipment used across adjacent mobile and satellite spectrum allocations. Such technical requirements would create delays and add costs to network deployment. Further, Australian-specific licence conditions will hinder the ability for MSS operators to deploy services in a cost-effective and timely manner. To that end, Fleet encourages the ACMA to avoid overly prescriptive technical requirements for the 2 GHz MSS band in order to accommodate a wide range of MSS technologies, thereby ensuring the technology neutrality of the allocation and creating a competitive MSS industry in Australia.

---

<sup>1</sup> See RSPG23-042: Draft RSPG Opinion on assessment of different possible scenarios for the use of the frequency bands 1980-2010 MHz and 2170-2200 MHz by the Mobile Satellite Service beyond 2027. *Radio Spectrum Policy Group, European Commission*. 25 October, 2023

<sup>2</sup> See i.d.

**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.**

Noting that Fleet does not support basing the arrangements on the 2 GHz spectrum licensing technical framework, and is of the view that 3GPP 5G NTN systems are more appropriately suited to operating in the adjacent 1920-1980 MHz band, Fleet Space has no further comment on the inclusion of active antenna systems.

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

Fleet does not have a view on this issue.

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

Fleet supports the reduction of the current emission limit at the 2010 MHz boundary from -66 to -60 dBW/MHz EIRP.

**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.**

Fleet believes that the current emission limits effectively fulfil their intended purpose. However, in many situations, especially in regions with minimal TOB usage, the emission limits tend to overly protect TOB receivers. Fleet suggests that the ACMA explore the possibility of easing requirements for MSS systems in regions with low TOB usage, especially regarding the 1 MHz guard band (2009-2010 MHz).

**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.**

Noting that most MSS operations take place outside terrestrial coverage zones, frequently in low and remote-density regions, and drawing from experience in conducting compatibility studies and coordinating such with 2 GHz TOB systems, Fleet is of the view that the emission limits intended to safeguard TOB receivers are overly conservative.

**Coordination Requirements: 2 GHz MSS with other services**

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

**Fixed Point-to-Point Links**

Fleet supports the proposed coordination requirements between fixed point-to-point links and 2 GHz MSS.

**Wireless Broadband Services**

Fleet opposes the suggested coordination requirements between wireless broadband services and 2 GHz MSS services. This opposition stems from the proposal to synchronize the technical framework for 2 GHz MSS with the 2 GHz spectrum licensing framework, which primarily revolves around terrestrial 3GPP operators. Fleet considers this coordination requirement excessively restrictive and favours a specific type of MSS technology. Instead, Fleet suggests that the coordination requirements for 2 GHz MSS operators to safeguard adjacent spectrum licensees can be adequately addressed through out-of-band emission limits.

**Television Outside Broadcasting Services**

Notwithstanding our response to Issue 5 and Issue 6 of the Discussion Paper, Fleet supports the proposed coordination requirements between TOB systems and 2 GHz MSS systems.

**Earth Stations**

Fleet supports the proposed coordination principles between Earth stations and 2 GHz MSS systems.

**Australian Radio Quiet Zones**

Fleet supports the proposed coordination principles for the protection of Australian Radio Quiet Zones.

**Defence Aeronautical Mobile Telemetry Systems**

Fleet supports the ACMA proposal to not require coordination procedures between AMT systems and MSS systems.

**8. Views are sought on the approach of coordinating CGC transmitters operating in the band 2170–2195 MHz with earth station receivers using the level of CGC unwanted emissions at the earth station receiver. What are appropriate earth station protection levels under such a methodology? Are there alternative approaches that we should consider?**

Fleet does not have a view on this issue.

**9. Views are sought on the suitability of the arrangement for coordination with the radio quiet zone, and what requirements should apply for aeronautical transmitters in 1980–2005 MHz with respect to the radio quiet zone.**

Fleet supports the proposed arrangements for coordination with radio quiet zones. MSS earth stations would be expected to include a GPS subsystem which will enable operators

to track their equipment and monitor their network to mitigate the risk of mobile earth stations operating in the defined area around the radio quiet zone.

Fleet has no comment on what requirements should apply for aeronautical transmitters in the 1980-2005 MHz band.

## 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.**

Fleet is of the view that coordination among operators offers the best opportunity for efficient spectrum sharing in the 2 GHz MSS band. To that end, Fleet encourages the ACMA to devise a framework that fosters a sharing environment among 2 GHz MSS systems without being overly prescriptive in terms of the technical requirements. Such an approach was successfully implemented by the Federal Communications Commission (FCC) through the processing round for NGSO FSS systems.<sup>3</sup>

Under this framework, lead applications establish a cut-off date for competing satellite systems, and all applicants are considered on equal footing with respect to coordination, regardless of ITU filing date of receipts.<sup>4</sup> In the event that the operators are unable to reach an agreement, the ACMA would divide the spectrum equally among the applicants.<sup>5</sup> This incentivisation has proved successful in the U.S. To date, all processing rounds for satellite spectrum have been resolved by the operators coordinating in good faith to maximise the spectrum utilisation of the band.

## Reconsideration of 2 GHz Narrowband Requirements

**11. We propose that the current 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?**

Fleet supports the reduction of the emission limit at the 2010 MHz boundary from -66 to -60 dBW/MHz EIRP. Fleet believes the ACMA should go further and allow space receive licences in the 2009-2010 MHz band for MSS operations in areas of low TOB usage, such as low and remote-density access areas. Fleet is of the view that this guard band is an unnecessary overprotection of TOB services given the inherent geographic separation between mobile earth stations in low-and-remote density areas and the fixed receiver sites defined in RALI FX 21.

<sup>3</sup> See Order and Authorisation. In the matter of Kuiper Systems, LLC, Application for Authority to Deploy and Operate a Ka-Band Non-Geostationary Satellite Orbit System. IBFS File No. SAT-LOA-20190704-00057. Call Sign S3051. July 30, 2020.

<sup>4</sup> See *i.d.*

<sup>5</sup> 2003 Space Station Licensing Reform Order, 18 FCC Rcd 10760, 10783, para 48.

Fleet also supports a review of the following narrowband MSS CSO class licence requirements:<sup>6</sup>

- A. *The EIRP of transmitting earth station must not exceed -7 dBW*
  - Fleet proposes that this requirement be rescinded, and replaced with a requirement that limits the EIRPsd of the emissions in the 2005-2010 MHz band to 17.3 dBW/Hz
- B. *For EIRP power spectral densities greater than 0.5 dBW/Hz...the duty cycle may not exceed/is limited to...% average over a 15-minute period.*
  - Fleet proposes that the duty cycle requirement should be rated as an average percentage over a 24-hour period rather than over a 15 minutes period.

**12. We are considering whether ITU-R Recommendation P.1812 configured to 10% time (percentage of average year for which the calculated signal level is exceeded) and 10% location (percentage of locations for which the calculated signal level is exceeded) is an appropriate propagation model to use if arrangements are reviewed. What are your views on this proposal?**

Fleet has no issues with the proposed propagation model, though Fleet would seek clarification from the ACMA on how the 10% time and 10% location metrics were derived.

## Licence Allocation Design

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

The excellent propagation characteristics and globally harmonised nature of the band make this piece of spectrum highly attractive for numerous MSS technologies including direct-to-device, M2M, IoT, LoRa, aeronautical complimentary ground component and other generic MSS applications.

Small satellite technology in particular is well suited to use this band to deploy new and innovative satellite-connected technologies, particularly in the field of M2M, IoT and LoRa applications. Suitable equipment for these technologies is readily available through off-the-shelf Radiofrequency System-on-Chip (RFSoc) platforms.<sup>7</sup> Further, the 2 GHz MSS band synergises with the spacecraft size, weight and power constraints of small low-earth orbit satellites.

The low power spectral density and latency insensitive characteristics of M2M, IoT and LoRa technologies allow for these MSS applications to share spectrum with other systems and support genuine market opportunities - analysts estimate that the global satellite M2M/IoT market is projected to grow from approximately \$2.20 billion AUD in 2017 to \$3.94 billion AUD in the next 10 years.<sup>8</sup>

<sup>6</sup> See Business Operating Procedure: Submission and Processing of Applications for space and space receive apparatus licences. Australian Communications and Media Authority. Dec. 2023.

<sup>7</sup> See Direct S-Band Communication Using Xilinx's RFSoc and Design-In of its Microwave Interfaces. Dr Rajan Bedi, CEO Spaceships Ltd. ARMMS RF & Microwave Society. Nov. 2019

<sup>8</sup> See Northern Sky Research: "M2M and IoT via satellite", 9th Edition, September 2018

**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?**

For each of the M2M, IoT and LoRa MSS applications, the minimum amount of available spectrum affects the overall network capacity of the system. Considering that these systems are latency insensitive and are well suited to operating in interference-limited environments, the minimum amount of viable spectrum of these applications should be considered through the lens of a shared band. That is, in a shared band, there is a greater need for bandwidth to support collision deconfliction (e.g., through frequency hopping, frequency reuse etc.) than what would be required if these applications were the sole operators in the band. In effort to minimise the amount of spectrum allocated on an exclusive, limited basis, Fleet is of the view that a minimum of 2x 15 MHz should be allocated as a shared-use band.

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

Fleet does not support the proposed competitive price-based allocation mechanism for the 2 GHz MSS spectrum. Whilst Fleet acknowledges the difficulties regulators face when spectrum demand exceeds supply, Fleet has strong concerns about the effectiveness and efficiency of price-based competitive bidding for exclusive allocations of satellite spectrum.

The European Union (EU) presents a useful case study to further understand the merits (or lack thereof) of a price-based exclusive spectrum allocation. In 2009, Inmarsat and Echostar (formally Solaris) were granted exclusive pan-EU wide licences for the 2 GHz MSS band by the European Commission through a price-based allocation.<sup>9</sup> To date, each operator's 2x 15 MHz allocation has been underutilised with only limited aeronautical services being introduced by one of the operators in 2017.<sup>10</sup> The other operator has not declared any collected revenue after holding the licence for 13 years.<sup>11</sup> Over this time, new entrants with readily deployable, innovative technology were precluded from using this spectrum due to the exclusive allocation of the licence.

In the United States, Congress has expressly prohibited "competitive bidding [for] orbital locations or spectrum used for the provision of international or global satellite communication services",<sup>12</sup> due to concerns that successive spectrum auctions in numerous countries could threaten the viability and availability of global satellite services.<sup>13</sup> In addition, the multi-year period required for the design, construction and launch of satellite systems requires significant upfront investment prior to licencing. The high uncertainty created by spectrum auctions could disrupt the availability of capital for such projects.<sup>14</sup>

<sup>9</sup> See RSPG23-042: Draft RSPG Opinion on assessment of different possible scenarios for the use of the frequency bands 1980-2010 MHz and 2170-2200 MHz by the Mobile Satellite Service beyond 2027. *Radio Spectrum Policy Group, European Commission*. 25 October, 2023

<sup>10</sup> See *i.d.*

<sup>11</sup> See *i.d.*

<sup>12</sup> See Commercial Launch FNPRM at n.210 (citing 47 U.S.C. § 765(f)).

<sup>13</sup> See Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency range, et al., Memorandum Opinion and Order and Second Report and Order, 17 FCC Rcd 15849 at n.600 (2002) (citing Report of Committee on Commerce, Communications Satellite Competition and Privatization Act of 1998, H.R. Rep. No. 494, 105 Cong., 2nd Sess. 64-65 (1998)).

<sup>14</sup> See *i.d.*

To that end, Fleet cautions the ACMA against proceeding with a price-based allocation and encourages the ACMA to instead consider a more holistic mechanism of allocating the spectrum. First and foremost, Fleet is of the view that the amount of spectrum allocated to an operator on an exclusive and limited basis should be minimised. Maximising the amount of 2 GHz MSS spectrum allocated for shared use between satellite operators will promote healthy market competition and incentivise incumbent operators to maximize their use of the available spectrum by investing in newer spectrally efficient technologies to improve capacity. Spectral efficiency plays a critical role in steering competition in downstream markets. In the absence of effective competition, market power can be leveraged by operators to the detriment of consumers and lead to inefficient outcomes.

MSS technologies like 3GPP 5G NTN, aim to offer supplementary coverage for terrestrial 5G/6G networks and necessitate exclusive band usage. For these types of MSS applications, Fleet believes it is more appropriate for these direct-to-smartphone devices to operate in the same technical framework and same bands as existing LTE equipment, through spectrum access agreements with the incumbent mobile carriers. Simply reusing the available 60 MHz spectrum of the adjacent 1920-1980 MHz band for earth-to-space links would be a spectrally efficient solution and would open up the entire 2x 25 MHz of 2 GHz MSS spectrum for shared licensing purposes.

To manage the competing demand for the spectrum, Fleet would propose a holistic assessment of an operator's proposed spectrum utilisation. Particularly with respect to the MSS operator's ability and motivation to share spectrum as well as the public and national interest benefit to Australia. This approach would be akin to the Processing Round procedure implemented by the Federal Communications Commission for NGSO-like satellite systems which was used effectively to establish and promote a sharing environment among NGSO systems that would provide a measure of certainty.<sup>15</sup>

Regarding the two configuration options proposed by the ACMA, Fleet's preference would align closer with Configuration 2 (5 generic 2x 5 MHz paired lots) to allow operators to bid for as many blocks as suits their use case.

---

<sup>15</sup> See Order and Authorisation. In the matter of Kuiper Systems, LLC, Application for Authority to Deploy and Operate a Ka-Band Non-Geostationary Satellite Orbit System. IBFS File No. SAT-LOA-20190704-00057. Call Sign S3051. July 30, 2020.