



TELSTRA GROUP LIMITED

Submission to ACMA Consultation:

Technical design and allocation considerations for the 2 GHz MSS band

Public Submission

20 February 2024



1 Introduction

We welcome the opportunity to provide our views to the ACMA's consultation on **Technical design and allocation considerations for the 2 GHz Mobile Satellite Service (MSS) band**. Satellite-based communication for consumers is fast becoming a reality. Previously only accessible for more specialist applications, today there are over one hundred thousand regular residential consumers with fixed broadband services from low-earth-orbit (**LEO**) satellites in Australia,¹ and the media regularly reports new achievements working toward LEO satellites communicating directly with unmodified consumer mobile devices. The 2 GHz MSS band represents an exciting opportunity for Australia to augment Satellite Direct to Mobile (**Satellite DTM**) capabilities in the next 3-5 years.

We welcome the Third Generation Public Partnership (**3GPP**) organisation developing standards in Release 17, 18 and beyond for regular mobile handsets and devices to communicate in MSS bands such as the 2 GHz band, and we strongly support the ACMA's preliminary view that base stations and user terminals operating in the 2 GHz MSS band should be 3GPP compliant. This is especially important for compatibility with International Mobile Telecommunications (**IMT**) devices operating in the adjacent 2 GHz IMT band.

We consider the minimum channel size for any new channels in the 2 GHz MSS band should be 2x10 MHz. There is already one 2x5 MHz channel in the 2 GHz MSS band, and while 2x5 MHz channels are suitable for Internet of Things (**IoT**) and Machine-to-Machine (**M2M**) communication, they are not optimal for wider-bandwidth communication. We consider the flexibility that wider channels bring is the best approach for channel configuration going forward.

We strongly support the use of the 2 GHz MSS band for 3GPP compliant Satellite DTM services. While we have no inherent objection to the use of this band for Direct-Air-to-Ground (**DA2G**) or Complementary Ground Component (**CGC**) purposes in Australia, we consider both the CGC and DA2G/CGC use cases not to be the best (i.e., optimal) use of this band. In the CGC use case, the need to coordinate satellite and terrestrial base stations operating on the same frequencies is likely to lead to a geographic guard space between the two modes of operation, thereby negating the opportunity for seamless coverage. And in the DA2G/CGC use case, we consider domestic airlines are well served by satellite-to-aircraft communications for the provision of on-board Wi-Fi services, and access to this small quantity of additional spectrum in the S-band will not significantly enhance in-flight experience.

We are aware that DA2G/CGC can coexist on the same frequency as satellite-to-aircraft, and on the assumption that DA2G/CGC can operate on the *same frequency* and *at the same location* as Satellite DTM, then we have no objection to the concurrent operation of DA2G/CGC with Satellite DTM. However, if DA2G/CGC were to cause harmful interference to Satellite DTM in this band (i.e., MSS directly communicating with mobile user terminals on the ground), then we strongly prefer the use of this band for Satellite DTM. We also consider the ACMA should not set aside any of the spectrum in the 2 GHz MSS band for exclusive use for the DA2G/CGC use case.

Given the likely commercial demand for this spectrum we are of the view that the 2 GHz MSS band is best assigned through spectrum licensing and a market price allocation process. We consider the ACMA's proposed preliminary view of a price-based allocation of the Space apparatus licence(s) under section 106 is not the appropriate mechanism for licensing operation in the 2 GHz MSS band. Instead, we propose that terrestrial spectrum (i.e., below the stratosphere) used for ubiquitous mobile services (such as consumer mobile devices and handset), where demand for the spectrum exceeds supply, is

¹ AFR article, 6 July 2023. "Starlink has told government roundtables it has 120,000 customers in Australia, suggesting it has won users from several sources that could include Telstra's copper-based broadband services as well as the NBN". <https://www.afr.com/companies/telecommunications/nbn-aims-to-match-elon-musk-s-starlink-but-may-have-to-write-off-620m-20230704-p5d1on>



best assigned through spectrum licensing and a market price allocation process, i.e. the starting point should be a spectrum licence auction.

We also consider satellites (operating above the stratosphere) communicating with mobile devices should be licensed, and that the ACMA should only issue Space and Space Receive apparatus licences once an Inter-Operator agreement has been established between the 2 GHz terrestrial spectrum licensee and the satellite operator.

Our submission is structured as follows:

- Section 2 contains our comments on the technical design of the 2 GHz MSS band.
- Section 3 contains our comments on coordination with other users of, and adjacent to, the proposed 2 GHz MSS band.
- Section 4 contains our comments on the licence allocation and design, and explains why we consider this band is best assigned through spectrum licensing and a market price allocation process. We also consider that satellites should be apparatus licensed (Space and Space Receive apparatus licences).
- Section 5 explains the change to the approach we suggested over four years ago on the use of this band for DA2G/CGC.
- We do not have any views to offer on the proposed remaking of the narrowband (IoT) in-band power limits for the existing 2005-2010 MHz band.
- Appendix 1 contains our answers to the fifteen consultation questions.

2 Comments on the technical design of the 2 GHz MSS band

This section contains our comments on the broad themes of the proposed technical framework. We support the use of the 2 GHz MSS band for 3GPP compliant MSS services, but we do not see a need for this band to be configured for either CGC or DA2G/CGC, as we do not see any rationale for the introduction of these use cases in Australia (see also section 5 of our response). That said, we are not opposed to the technical parameters associated with DA2G, provided DA2G does not cause harmful interference to Satellite DTM in this band. In summary, our key point is that the technical parameters for the 2 GHz MSS band should be aligned to 3GPP, and that either CGC or DA2G/CGC can be allowed, so long as they do not cause harmful interference to Satellite DTM.

2.1. 2 GHz MSS parameters

The ACMA proposes the technical parameters for user terminals (other than those parameters associated with DA2G) should align with 3GPP, and more specifically, should mirror the technical parameters for the 2 GHz (spectrum licensed) IMT band (1920-1980/2110-2170 MHz). We strongly support the mirroring of the 2 GHz IMT band technical attributes into the 2 GHz MSS band.

Thus, for user terminals transmitting in 1980-2005 MHz and receiving in 2170-2195 MHz, we support:

- In-band power Total Radiated Power (**TRP**) of less than or equal to 25 dBm per occupied bandwidth;



- Unwanted emissions limits for user terminal transmitters matching the 2 GHz spectrum licence technical framework (**SLTF**) of the 2 GHz IMT band; with the additional provision that unwanted emission limits above 2010 MHz must be below -60 dBW/MHz EIRP to protect Television Outside Broadcast (**TOB**) receivers; and
- Unwanted emissions limits for user terminal receivers matching the 2 GHz SLTF for receivers operating in 2110-2170 MHz (i.e., 2 GHz IMT band user terminal receivers).

We note there are no in-band power or unwanted emission limits specified for base stations on space objects transmitting in 2170-2195 MHz and receiving in 1980-2005 MHz. We support this approach.

We have no objection to the introduction of the following technical parameters for base stations (transmit and receive) for CGC or DA2G/CGC, although we strongly recommend both CGC and DA2G/CGC should only be permitted into the band if it does not prevent Satellite DTM. If terrestrial base stations are introduced (permitted) in the 2 GHz MSS band, then we support the ACMA's proposed technical parameters, namely:

- Limiting in-band TRP of less than or equal to 53.5 dBm/5 MHz;
- Unwanted emissions limits for transmitters to match the 2 GHz SLTF of the 2 GHz IMT band (2110-2170 MHz), with the exception that unwanted emission limit above 2204 MHz must be below -45 dBm/MHz EIRP to protect TOB receivers; and
- Unwanted emissions limits for receivers to match the 2 GHz SLTF for receivers in 1920–1980 MHz (base station receivers).

We also have no objection to DA2G terminals on aircraft operating at the proposed higher power limit of 40 dBm/occupied channel for aeronautical transmitters, provided their higher power levels do not cause interference to a mobile terminal communicating with a CGC base station. If higher-powered DA2G user terminals on aircraft would interfere with mobile terminals communicating with a (terrestrial) CGC base station, we consider this band should not be used for DA2G/CGC.

Finally, we support the ACMA's proposal to reduce the current the emission limit at the 2010 MHz boundary from of -66 to -60 dBW/MHz EIRP. The Australian Radiofrequency Spectrum Plan (**ARSP**)² specifies the use immediately above 2010 MHz (i.e., 2010-2025 MHz) is co-primary Fixed and Mobile, although footnote 388A also permits the use of High-Altitude Platform Stations (HAPS) in this band. We see no impediment to the operation of Fixed, Mobile or HAPS if the emission limit at the 2010 MHz boundary is relaxed to -60 dBW / MHz EIRP.

2.2. Coordination requirements: 2 GHz MSS with 2 GHz MSS (including narrowband MSS)

The ACMA proposes no additional coordination requirements are required between MSS operators in the 2 GHz MSS band. We consider satellite operators are better qualified to advise on this aspect of the arrangements.

3 Proposed coordination with incumbent use cases

The ACMA observes there are several other incumbent services operating in, or adjacent to, the 2 GHz MSS band. Telstra has a total of 90 PTP links in the 2 GHz PTP band (1920-2300 MHz), however, we

² Australian Radiofrequency Spectrum Plan, available at: <https://www.acma.gov.au/australian-radiofrequency-spectrum-plan>



have only four PTP links in 2170-2195 MHz (the upper channel of the 2 GHz MSS band) and none in 1980-2005 MHz (the lower channel of the 2 GHz MSS band). We also hold 1,857 PMTS Class B apparatus licences in regional and remote locations.³

3.1. Point-to-point (PTP) links

Noting that Embargo 23⁴ prevents new PTP links in the 2 GHz PTP band, we support the ACMA's proposed approach that existing (grandfathered) 2 GHz PTP links shall be protected from interference and claims of interference from services operating in the 2 GHz MSS band. We agree with the ACMA that the existing procedures in RALI FX3⁵ are appropriate for protecting PTP services across the entire 2 GHz PTP band (i.e., 2025–2285 MHz), which necessarily includes 2 GHz MSS band base stations operating in 2170-2200 MHz.

While we see no rationale for the CGC or DA2G/CGC use cases for this band, in the event CGC or DA2G/CGC are introduced into the 2 GHz MSS band, we consider it will be necessary to add coordination procedures into RALI FX3 for new terrestrial base stations to coordinate with existing (grandfathered) PTP links.

3.2. PTS apparatus licensed IMT base stations

We consider the alignment of the technical characteristics for 2 GHz MSS band user terminals and base stations with the technical characteristics of the 2 GHz IMT band (see previous section of our submission) will ensure that PTS Class B apparatus licensed services will be protected from interference from 2 GHz MSS band services (including protection from CGC or DA2G/CGC, in the event either of these use cases is introduced for this band).

3.3. Television Outside Broadcast

TOB services in 1980–2010/2170–2200 MHz are required to cease operations to support the introduction of MSS by 28 February 2026 in metropolitan area and designated (sporting) areas and 29 February 2024 elsewhere (regional areas). We acknowledge the ACMA's proposed approach that 2 GHz band MSS base station transmitters (2170-2200 MHz) must not cause interference to TOB services operating in this band prior to cessation of operation dates, and note that the likely introduction of Satellite DTM services in the 2 GHz MSS band will occur in regional and remote areas, which will be long after the 29 February 2024 date (a little over one week from now).

3.4. Earth Station Protection Zones (ESPZs)

We observe the ACMA proposes to introduce procedures to protect ESPZs from CGC base station transmitters. While we see no rationale for the introduction of either the CGC or DA2G/CGC use cases for this band, in the event either use case is introduced into the 2 GHz MSS band, we agree with the ACMA that it will need to introduce the proposed coordination procedures.

³ Optus also hold 5,894 PTS Class B and TPG hold 598. Source, RRL, 1 Feb, 2024.

⁴ <https://www.acma.gov.au/sites/default/files/2022-11/Embargo%2023.pdf>

⁵ RALI FX3, available at: <https://www.acma.gov.au/sites/default/files/2023-06/RALI%20FX03.pdf>



3.5. Australian Radio Quiet Zone Western Australia (ARQZWA)

We agree with the ACMA that RALI MS-32 does not afford protection to the ARQZWA from space objects under RALI MS32.⁶ We note with interest the ACMA's comment that "...space and space receive licensees are considered responsible for ensuring that their end-user earth station terminals do not cause harmful interference to radioastronomy services in the RQZ."⁷ While this may be a reasonable statement in terms of intent for user terminals, and indeed, user devices should all be turned off before entering the RQZ anyway, we add that claims for protection for the ARQZWA from interference under Radio Regulation 4.4 (RR4.4) are not possible in bands where there is no allocation for Radio Astronomy in the ARSP.⁸

Telstra acknowledges that Satellite DTM services will need to co-exist with radio astronomy in any of the bands those services operate in. Each of these technologies have great potential to benefit Australians in different ways. It will be necessary for operators of radio astronomy facilities and operators of both satellite and terrestrial services to co-ordinate closely so that each of these benefits can be realised, and we look forward to continued engagement with the radio astronomy community as we develop workable solutions for the future. Our submission earlier this year to the ACMA's consultation on Satellite Direct to Mobile contains further detail on the radio astronomy community and operators of Satellite DTM networks working together to maximise the benefits of each technology for Australia.

4 Demand, licensing and allocation considerations

In this section, we provide our views on the anticipated use cases and demand for the 2 GHz MSS band, along with our thoughts on the licensing approach and allocation and configuration considerations. In summary, our view is that the terrestrial spectrum (i.e., below the stratosphere) is best assigned through spectrum licensing and a market price allocation process. We also consider satellites (operating above the stratosphere) communicating with mobile devices should be licensed, and that the ACMA should only issue Space and Space Receive apparatus licences once an Inter-Operator agreement has been established between the terrestrial spectrum licensee and the satellite operator.

4.1. Demand

We consider the optimal use case for this band is Satellite DTM. We are excited to see the 3GPP developing standards in Release 17 (R17), Release 18 and beyond for regular mobile handsets and devices to communicate in MSS bands such as the 2 GHz band, and we consider this band has great potential to provide satellite-based coverage to future mobile devices without the need to coordinate access to spectrum in IMT bands that is currently used for terrestrial mobile networks.

We do not see a rationale for either the CGC or DA2G/CGC use cases in this band – see section 5 for an explanation of why our position on this matter has changed over the past four years to reflect new developments.

⁶ Consultation paper, s.3.6, where it says "...space and space receive licensees are not subject to RALI MS32..."

⁷ Consultation paper, s.3.6, middle of p.23.

⁸ Contravention of Radio Regulation 4.4 could be used to claim protection from harmful interference in bands allocated for Radio Astronomy, but not in bands that do not carry a Radio Astronomy allocation.



We also consider there is very likely to be excess demand for spectrum in the 2 GHz band, and the ACMA should proceed with a price-based allocation rather than an administrative allocation of licences.

Devices supporting 3GPP R17 non-terrestrial networks (NTN) technology and this 2 GHz band (n256) are already commercially available, for example the Motorola “Defy” for the UK and USA markets.⁹ We are seeing support for R17 NTN emerging in device chipsets and anticipate regular mobile devices will start offering support for R17 NTN using band n256 within the next year or so.

4.2. Licensing approach

Terrestrial spectrum (i.e., below the stratosphere) used for ubiquitous mobile services and where demand exceeds supply is best assigned through spectrum licensing and a market price allocation process (i.e., an auction) under section 60 of the Radiocommunications Act.

However, in its January 2021 Outcomes Paper on the 2 GHz MSS band, the ACMA expressed the following preliminary view:¹⁰

Our preliminary view, given demand is likely to exceed supply (as expressed in responses to the options paper), is that the most appropriate mechanism to resolve competing demand is a price-based allocation mechanism via auction. With price-based allocations under section 106 of the Radiocommunications Act 1992 limited to the allocation of transmitter licences (in this case space apparatus licences in 2170–2195 MHz), the ACMA would only issue the associated space receive apparatus licences in the paired band 1980–2005 MHz to those successful in the priced-based allocation process.

We consider the ACMA’s proposed preliminary view of a price-based allocation of the Space apparatus licence(s) under section 106 is not the appropriate mechanism for licensing operation in the 2 GHz MSS band, for several reasons:

- Firstly, the ubiquitous mobile terminals that will be used in this band will be commonplace consumer mobile phones, albeit future versions that support 3GPP Band n256 and/or Band n65 (the latter for CGC). Licensing should align with the service being provided, which is to terrestrial consumer mobile devices, and therefore, an auction for terrestrial spectrum licensing is more appropriate as the starting point than a price-based allocation of Space and Space Receive apparatus licences.
- Secondly, as the ACMA notes, there is no apparatus licence type for CGC,¹¹ and spectrum licensing is technology agnostic (while still specifying a technical framework), meaning CGC could be deployed at the licensee’s discretion without the ACMA having to develop a new apparatus licence type (a so-called “PMTS Class D”) for CGC.
- Thirdly, assigning Space and Space Receive apparatus licences in this band necessarily requires an amendment to the CSO class licence and for the ACMA to consider whether any revisions are required to our procedures for submission and processing of applications for space and space receive apparatus licences. As the ACMA notes, amendments to the CSO

⁹ <https://motorolarugged.com/en-gb/motorola-defy-satellite-link/> and <https://bullitt.com/en-us/>

¹⁰ ACMA, Replanning the 2 GHz MSS Band – Outcomes Paper, January 2021, bottom of p.2. https://www.acma.gov.au/sites/default/files/2022-09/3_Replanning-the-2-GHz-band-Outcomes-paper.docx

¹¹ Consultation paper, s.5.1.1, p.25, “... new apparatus licensing arrangements will need to be developed to support CGC systems, as CGC systems are not supported under licensing arrangements for space-based communication systems.”



class licence require consultation,¹² and it is likely any revisions to the procedures for submission and processing of applications for space and space receive apparatus licences would also require consultation. Alternatively, if the terrestrial spectrum were assigned using spectrum licences, the spectrum licensee could issue an authorisation (via a bulk process for all terminals) under section 68 of the Radiocommunications Act.

In summary, we consider there are several drawbacks associated with a price-based allocation of the space apparatus licences for this band, and we recommend the 2 GHz MSS band is best assigned through spectrum licensing of the earth segment and a market price allocation process. Once this is done, Space and Space Receive apparatus licences can be acquired by a satellite operator for the licensing of the space object. The assignment of the Space and Space Receive apparatus licences should only be to a satellite operator nominated in an **inter-operator agreement** between the terrestrial spectrum licensee and the satellite operator.

4.3. Band configuration

The ACMA proposes two configuration options:¹³ 1) a 2x15 MHz lot along with a 2x10 MHz lot; and 2) five “generic” 2x5 MHz lots.

We consider the minimum viable quantity of spectrum for a reasonable quality future Satellite DTM service capable of voice and data (not just text messages) is 10 MHz in each direction. The challenging link budget associated with satellite to ground communications features lower spectral efficiency than terrestrial networks, meaning that a greater minimum allocation of spectrum is needed to achieve adequate system capacity. Thus, the minimum lot-size for this band should be 2x10 MHz. We consider a configuration of only 2x5 MHz will not provide a reasonable quality voice and data experience, and our preference is for a configuration that is flexible in the use cases it is able to support.

As such, we consider the only two technically viable configurations are either: 1) a 2x15 MHz lot and a 2x10 MHz lot; or 2) a single 2x25 MHz lot. Of these two configurations, only one of them (the first) is proposed by the ACMA, and we support the ACMA’s Option 1) as the appropriate configuration for the 2 GHz MSS band.

5 Telstra supports Satellite DTM as the optimal use of this band

In response to the ACMA’s August 2019 discussion paper on the 2 GHz band, our submission advocated for DA2G services using IMT band (which was the ACMA’s Option 2). However, domestic airlines are well served today by satellite-to-aircraft communications operating in Ka-band and Ku-band for the provision of on-board Wi-Fi services.¹⁴ As a result, customer expectations have changed based on access to good quality Wi-Fi services, and a small incremental amount of S-band spectrum will not significantly augment in-flight Wi-Fi capabilities compared to the service currently supplied by Ka-band satellites.

¹² “... in accordance with the requirements of the Legislation Act 2003.” See consultation paper, s.5.1, p.25.

¹³ Consultation paper, s.5.2.1, p.27.

¹⁴ For example, SkyMuster supplied Ka-band satellite services to QANTAS. See <https://www.qantasnewsroom.com.au/media-releases/qantas-switches-on-fast-free-inflight-wifi/>



With the evolution at 3GPP in relation to Non-Terrestrial Networks (NTN), we now consider the 2 GHz MSS band is better used to support Satellite DTM services which are expected to be more attractive commercially and deliver much greater benefit to consumers in the long term.

We are aware that DA2G/CGC can coexist on the same frequency as satellite-to-aircraft.¹⁵ On the assumption that DA2G/CGC can operate on the same frequency and at the same location as MSS directly communicating with mobile handsets (i.e., DA2G/CGC can coexist with Satellite DTM/CGC), then we have no objection to the concurrent operation of DA2G/CGC with Satellite DTM, based on the technical parameters the ACMA proposes in this consultation paper.

However, if DA2G/CGC were to cause harmful interference to Satellite DTM (including CGC DTM) in this band, then we strongly prefer the use of this band for Satellite DTM.

We also consider the ACMA should not set aside (reserve) any of the spectrum in the 2 GHz MSS band for exclusive use for the DA2G/CGC use case.

¹⁵ See Ofcom consultation: **Authorisation of terrestrial mobile networks complementary to 2 GHz Mobile Satellite Service (MSS)**, section 4.5 ii), p.8. https://www.ofcom.org.uk/_data/assets/pdf_file/0021/77115/2ghz_consultation.pdf
Section 4.5 ii) states: “a terminal (or terminals) on the underside of the aircraft communicates with base stations on the ground that are under the aircraft’s flight path. This direct air to ground (DA2G) or CGC service link uses **the same 2 GHz spectrum** as the satellite component spectrum (**exploiting the attenuation provided by the aircraft’s fuselage** in the separation of the terminals on the top and underside of the aircraft and their different directions of communication).” (emphasis added).



Appendix 1: Response to consultation questions

This appendix contains our response to the fifteen consultation questions.

A1.1: 2 GHz MSS parameters

Question 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?

We support the ACMA's proposed technical parameters for the introduction of mobile earth stations (user terminal) and proposal for no technical limitations for base stations on space objects. We are not opposed to the introduction of technical parameters for the use of the 2 GHz MSS band for DA2G/CGC, although we do not see a rationale for the introduction of either the CGC or DA2G/CGC use cases for this band at this time. If either the CGC or DA2G/CGC use cases are introduced into the band, we consider it important that they do not cause interference to the Satellite DTM use case. See section 2.1 for further details.

Question 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.

We support the inclusion of active antenna systems in the technical framework for the 2 GHz MSS band.

Question 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?

We are not opposed to the introduction of the CGC or DA2G/CGC use cases for this band, although, we do not see a rationale for the introduction of this use case in Australia at this time, especially the DA2G/CGC use case. We consider, however, that introduction of either CGC or DA2G/CGC should not be at the expense of introducing Satellite DTM in this band, and we consider CGC or DA2G/CGC should only be permitted if it can operate concurrently with Satellite DTM without causing interference. See also section 5 for an explanation of Telstra's change in position on DA2G/CGC.

Question 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?

We support the relaxation of the emission limit at the 2010 MHz boundary to -60 dBW/MHz EIRP. See section 2.1 for further details.



Question 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.

We do not have a view on this question.

Question 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.

While we do not have a view on the appropriate emission limits to protect TOB usage, we observe that consistent limits are easier to apply and enforce than different limits in different locations. We propose the ACMA should determine one set of limits to be applied uniformly across Australia at the 2010 MHz and 2200 MHz frequency boundaries.

A1.2: Coordination requirements: 2 GHz MSS with other services

Question 7

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

See section 3 of our submission.

Question 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?

We are not opposed to the introduction of either the CGC or DA2G/CGC use cases for this band, although we do not see a rationale for the introduction of them at this time. However, if the ACMA introduces either the CGC or DA2G/CGC into the 2 GHz MSS band, we agree with the ACMA that coordination are likely required between CGC transmitters and earth station receivers.

Question 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.

We are not opposed to the introduction of either the CGC or DA2G/CGC use case for this band, although we do not see a rationale for them at this time. We do not have a view on the protection requirements for the ARQZWA from aeronautical transmitters.

For future mobile handsets communicating with satellites for Satellite DTM services using 1980–2005 MHz, the ARQZWA already has policies and procedures to ensure user terminals are switched off when they are within the ARQZWA, and we consider these procedures will suffice for the protection of



the ARQZWA from interference in the 1980-2005 MHz band. There should be no reason to apply additional restrictions.

A1.3: Coordination requirements: 2 GHz MSS with 2 GHz MSS

Question 10

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.

We do not have any views on the in-band or adjacent-band coordination between MSS satellites operating in the 2 GHz MSS band.

A1.4: Reconsideration of 2 GHz narrowband requirements

Question 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?

We are not opposed to the in-band EIRP limit being lifted.

Question 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?

If, in the future, the ACMA decides to review the arrangements for the 2 GHz narrowband spectrum, we consider it would be appropriate to look at propagation models that match the use case for the band and that are available at that time, rather than ask this question now.

A1.5: Licence allocation design

Question 13

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

See section 4.1 of our submission for details.

Question 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?

The minimum viable quantity of spectrum is 10 MHz. Thus, the minimum lot-size for this band should be 2x10 MHz. See section 4.3



Question 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.

We support configuration 1. We do not support Configuration 2, as 5 MHz is too narrow to make this band useful for the use cases to which it is best suited. See also our answer to Question 14 above, and section 4.3.