

Planning of the 2 GHz band

Discussion paper

AUGUST 2019

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Executive summary

The 1980–2010 MHz and 2170–2200 MHz bands (referred to collectively in this paper as the 2 GHz band) are currently included in the ‘initial investigation stage’ of the ACMA’s work program for major band replanning activities, as outlined in the [Draft five-year spectrum outlook 2019–23](#).

The 2 GHz band is currently used for television outside broadcast (TOB) services on a shared and non-exclusive basis for short-term applications such as covering special events.

TOB was introduced in the 2 GHz band in 2012 on an interim basis while the future use of the band is under review. In recent times, there has been increasing interest in the use of the 2 GHz band for a range of services and applications, including:

- > Long-term usage by TOB services
- > Mobile-satellite services (with or without Ancillary Terrestrial Component/Complementary Ground Component)
- > Mobile broadband services
- > Passenger aircraft Direct-Air-to-Ground Communications (DA2GC) links.

This paper commences discussion of the existing and possible future uses for the 2 GHz band and associated spectrum needs. The paper does not contain any detailed replanning options, Authority ‘preliminary views’ or propose any regulatory changes. However, to aid discussion, a number of possible planning scenarios for the band are presented.

Submissions in response to this discussion paper will help inform the ACMA’s assessment of planning arrangements in the 2 GHz band, including whether to progress the band to the ‘preliminary replanning’ stage of the ACMA’s replanning processes. If that occurs, additional consultation with interested parties will occur before any regulatory decisions are made on planning and licensing arrangements in the band.

Issues for comment

Based on the current domestic and international considerations, and taking into account the planning scenarios and the questions the different scenarios raise, the ACMA invites comment on the scenarios and on the following questions:

1. What TOB services use the 2 GHz band under current arrangements? Is demand for TOB in this band growing or decreasing?
2. What interest do you have in making further use of the 2 GHz band?
3. Given the points raised in this discussion paper:
 - a. How much spectrum is required to provide the service?
 - b. Is there a clear geographical delineation—for example, metropolitan or regional—for the service?
 - c. Is there, or will there be, readily available equipment for the service?

Introduction

Purpose

In the [Draft five-year spectrum outlook 2019–23](#), the ACMA identified the 2 GHz band for initial investigation in its work program.

This paper identifies the current uses of, and interest in the band domestically, and emerging international trends. The aim is to start the conversation on what, if any, changes to arrangements in the band are necessary to ensure maximum public benefit is derived from its use.

Scope

The scope of this paper is limited to the 1980–2010 MHz and 2170–2200 MHz bands. Adjacent band arrangements are outside the scope of this review, though band edge coexistence may be considered in the future.

The paper canvasses a range of issues for the future use of the 2 GHz band. No specific planning options are offered or proposed. Depending on the feedback received on this paper, the ACMA may consider that arrangements in the band warrant further consideration. If so, the ACMA will engage in further public consultation to consult on replanning options before any changes are made to planning and access arrangements in the band.

History of the 2 GHz band in Australia

The 2 GHz band (1980–2010 MHz and 2170–2200 MHz) was originally planned to support fixed point-to-point links as part of the 2.1 GHz (1900–2300 MHz) band¹. In the early 2000s, fixed links were cleared from the band to support the introduction of mobile satellite services and 2.1 GHz spectrum licences. While the majority of fixed point-to-point links were cleared, the envisaged mobile satellite services did not eventuate.

In October 2010, as an outcome of the review of the 2.5 GHz band and long-term arrangements for electronic news gathering, the 2 GHz band was made available for electronic news gathering on an interim basis². Implementation of that outcome saw:

- > the making of the [Television Outside Broadcast Service \(1980–2110 MHz and 2170–2300 MHz\) Frequency Band Plan 2012](#) (the TOB Band Plan)
- > development of Radiocommunications Assignment and Licensing Instruction (RALI) [FX21 Television Outside Broadcasting Services in the Bands 1980–2110 MHz and 2170–2300 MHz](#)
- > an ACMA policy (as stated in [spectrum embargo 23](#)) to restrict all services except TOB in the 2 GHz band to support the introduction of TOB services and to preserve planning options for 1980–2010 MHz and 2170–2200 MHz while the future use of the band is under review.

¹ Refer Radiocommunications Assignment and Licensing Instruction [FX 3](#), Microwave fixed services frequency coordination.

² Refer [IFC 01/2010](#), Review of the 2.5 GHz band and long-term arrangements for ENG.

Current national arrangements

The [Australian Radiofrequency Spectrum Plan 2017](#) (the ARSP) includes allocations in the 2 GHz band to the fixed, mobile and mobile-satellite services on a primary basis as shown in Appendix A. Australian allocations are consistent with global allocations in the 2 GHz band. The adjacent bands support a range of fixed, mobile, space research, space operations and earth exploration services.

In Australia, policy arrangements are currently in place to support the following uses in various parts of the 2 GHz band:

- > Television outside broadcast services—as detailed in [RALI FX21](#)
- > Fixed point-to-point services that were licensed prior to the TOB band plan coming into effect
- > Short-term technology demonstrations or other short-term applications.

In addition, there are requirements to protect the Australian Radio Quiet Zone Western Australia (near Boolardy Station). These requirements are specified in the [Radiocommunications \(Mid-West Radio Quiet Zone\) Frequency Band Plan 2011](#), RALI MS 32 on the coordination of apparatus licensed services within the Australian Radio Quiet Zone Western Australia, and spectrum [embargo 41](#), which covers the 70 MHz–25.25 GHz band, and therefore applies to the 2 GHz band.

The ACMA considers on a case-by-case basis requests for short-term technology demonstrations or other short-term applications. As outlined in the [Draft Five-year spectrum outlook 2019–23](#), the ACMA is open to supporting such requests in the frequency ranges 1980–1985 MHz and 2170–2175 MHz on a short-term basis, subject to appropriate interference management and resolution conditions, where these applications will not impact on existing services.

An illustration of arrangements in the 2 GHz band (and spectrum immediately adjacent) is provided in Figure 1. A breakdown of apparatus-licensed services in the 2 GHz band is provided in Table 1 and Table 2.

Table 1: Number of apparatus-licensed services in the 2 GHz band

Service	1980–2010 MHz	2170–2200 MHz	Total of each service
Television outside broadcast	10 ³	12 ⁴	22
Fixed point-to-point ⁵	7	7	14
Total in each band	17	19	36

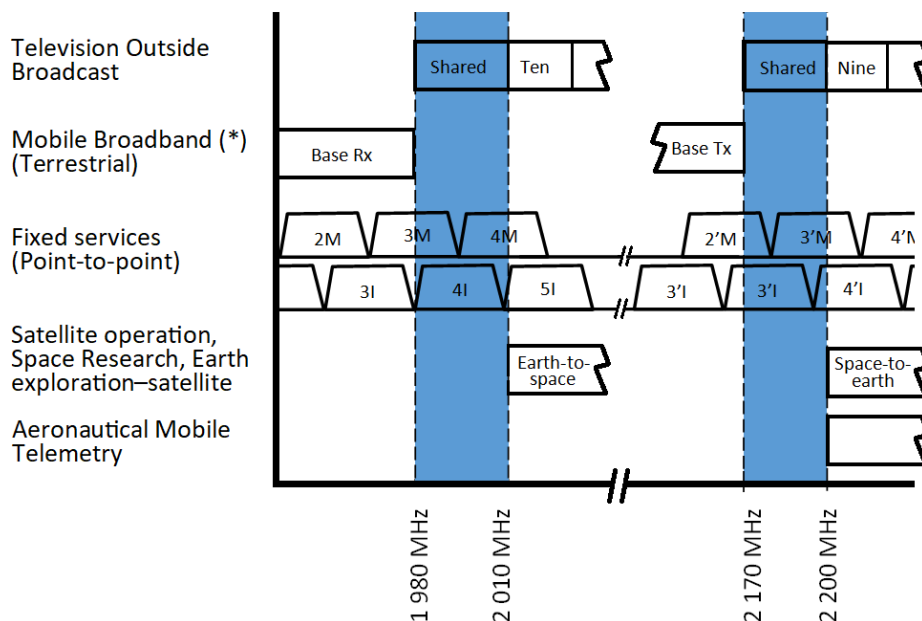
Data taken from [Register of Radiocommunications Licences \(RRL\)](#) as at 1 July 2019.

³ Consisting of six area-wide licences (three NSW, two Victoria, one low/remote density area) and four site-specific.

⁴ Consisting of 10 area-wide licences (two NSW, four Victoria, three Queensland, one low/remote density area) and two site-specific.

⁵ One fixed link comprises of one transmitting station and one receiving station, each at a fixed location.

Figure 1: Illustration of current licensed services in the 2 GHz band



(*) Mobile broadband services utilise a mixture of spectrum licences and apparatus licences, depending on the geographical area.

Television outside broadcast (TOB)

Television outside broadcast refers to wireless applications used as part of news gathering, special events or media production. The 2 GHz band is used predominately for transmitting video using either a wireless camera over a short distance or point-to-point link from an outside broadcast van to a central capture point, typically permanently located in a high point.

RALI [FX 21](#) provides information on frequency coordination and licensing arrangements for TOB services in the bands 1980–2110 MHz and 2170–2300 MHz. It includes advice on coordination with adjacent band 2 GHz spectrum licenced services and public telecommunications service (PTS) apparatus licenced services.

The ACMA does not coordinate TOB services operating in the 2 GHz band. TOB licensees are required to coordinate usage with other TOB licensees.

There are currently 22 TOB services in the 2 GHz band used by various video production organisations that have a mixture of area-wide and site-specific licences. The site-specific TOB apparatus licences are located in Melbourne, Adelaide and Perth.

The 2 GHz band was extensively used during the 2018 Gold Coast Commonwealth Games special event to support the high number of wireless cameras used.

Fixed (point-to-point) services

Arrangements for fixed point-to-point services in the 2 GHz band are detailed in RALI FX3. The channelling arrangements, detailed in RALI FX3 and shown in Figure 1, partially encroach into the 2 GHz band.

Under the TOB Band Plan,⁶ no new fixed point-to-point links may be operated in the 2 GHz band. There are currently 14 legacy point-to-point links⁷, all of which are licensed to Telstra in remote areas of Australia, as shown in Figure 2.

Figure 2: Point-to-point links in the 2 GHz band



Mobile satellite services

While the mobile satellite service (MSS) is contemplated in the TOB Band Plan in the 2 GHz band, ACMA policy (as stated in spectrum embargo 23) is to limit use of the band to TOB services pending review of arrangements in the band.

⁶ Refer to section 8 of the TOB Band Plan.

⁷ Referring to Figure 1, in the 2 GHz band there are seven point-to-point links on channel 5I and seven on channel 2'M.

Short-term technology demonstrations including short-term satellite applications

The ACMA has supported the use of the 2 GHz band for experimental and demonstration purposes for satellite and other uses on a short-term basis.

Table 2 lists the short-term applications currently licenced in Australia. There are four scientific assigned licences in the 2 GHz band, with two held by Fleet Space in Pinkerton Plains, South Australia, and two held by Omnispace Australia in Ararat, Victoria. Sirion Global holds a short-term earth receive licence and a fixed earth licence in Dubbo, New South Wales.

Table 2: Number of short-term apparatus-licensed or scientific-licensed services in the 2 GHz band

Service	1980–2010 MHz	2170–2200 MHz	Total of each service
Fixed earth	1	-	1
Earth receive	-	1	1
Scientific assigned	2	2	4
Total in each band	3	3	6

Data taken from [RRL](#) as at 1 July 2019.

International developments

To provide a snapshot of global activity and trends in this band, this section outlines the activities of international and regional organisations and individual country regulatory bodies in the 2 GHz band.

International organisations

International Telecommunication Union (ITU)

The international and domestic table of frequency allocations for the 2 GHz band (1980–2010 MHz and 2170–2200 MHz) is shown in Appendix A. The band is allocated to fixed, mobile and mobile satellite services on a primary basis in all three ITU regions. Australia has aligned its domestic service allocations to the international allocations.

Activity within this band in the ITU in recent years has focused on the use of the band for International Mobile Telecommunications (IMT) as well as sharing between IMT and the mobile-satellite service, including under World Radiocommunication Conference 2019 (WRC-19) agenda item 9.1 (issue 9.1.1). The frequency bands 1980–2010 MHz and 2170–2200 MHz are subject to a global IMT identification via footnote 388⁸. In Resolution **212 (Rev. WRC-15)**, it is noted that these frequency bands are available for use for both the terrestrial and satellite components of IMT.

Asia-Pacific Telecommunity (APT)

In April 2018, the APT Wireless Group (AWG) completed a revision of [APT Report 46](#) on the frequency usage of the bands 1980–2010 MHz and 2170–2200 MHz. The majority of administrations have planned the 2 GHz band for a combination of mobile broadband, fixed and/or mobile-satellite services. However, the APT Report indicates that the 2 GHz band is under-utilised. A number of Asia-Pacific countries indicated their intention to re-plan the 2 GHz band for terrestrial mobile broadband services. China has indicated that the 2 GHz band will continue to be used for MSS.

European Union (EU)

The 2 GHz band was designated for MSS use across the EU in 2006 in ECC Decision ECC/DEC/(06)09⁹. In 2009 Inmarsat and Solaris (now EchoStar) were awarded MSS spectrum access rights across the EU under an EU-led pan-European harmonised selection and award process.¹⁰ The 2 GHz band continues to be prioritised for MSS with Complementary Ground Component (CGC) use in the EU.

The European Aviation Network (EAN) became operational in March 2019¹¹ and provides an integrated satellite and complementary LTE-based terrestrial network across Europe using the 2 GHz band. It utilises some 300 base stations across the European Union.

⁸ ITU, Radio Regulation 5.388, Articles, 2016.

⁹ [ECC Decision ECC/DEC/\(06\)09](#): ECC Decision of 1 December 2006 on the designation of the bands 1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile-Satellite Service, including those supplemented by a Complementary Ground Component (CGC).

¹⁰ https://www.ofcom.org.uk/_data/assets/pdf_file/0022/107464/Authorisation-terrestrial-mobile-networks-2-GHz-MSS.pdf.

¹¹ <https://paxex.aero/2019/03/inmarsat-british-airways-launch-ean-connectivity-in-europe/>.

3rd Generation Partnership Project (3GPP)

The 3rd Generation Partnership Project is a standards organisation which develops protocols for mobile telephony, including specifications for specific frequency bands. 3GPP band 65 encompasses the 2 GHz band (1920–2010 MHz (uplink) and 2110–2200 MHz (downlink)). Australia has adopted arrangements in 3GPP band 1 (1920–1980 MHz (uplink) and 2110–2170 MHz (downlink)) for terrestrial mobile broadband services, which is a subset of 3GPP band 65, excluding the 2 GHz band.

Other national regulators

Ofcom, United Kingdom

The United Kingdom was part of the harmonised selection and award process for the 2 GHz band 2009, which saw MSS spectrum access rights awarded to Inmarsat and Solaris (now EchoStar) across the EU.

In 2009, Ofcom developed arrangements for terrestrial base stations (known as the Complementary Ground Components, or CGCs) to be used as part of the MSS system by both MSS operators.

As the system evolved, Inmarsat developed plans to use its radio spectrum assignment to deliver broadband services to aircraft, through a system comprised of a satellite and terrestrial component. As such, Inmarsat requested that Ofcom consider the authorisation regime for the CGC base stations that form part of their proposed system. Following this request, in 2016 Ofcom developed arrangements which facilitated the use of the aeronautical service in the 2 GHz band.¹⁰

Federal Communications Commission (FCC), United States

In the United States, the 2 GHz bands are planned for a mix of advanced wireless services (AWS) and broadband personal communications services (PCS) for cellular mobile-type services, and MSS. These arrangements are largely unique to North America and incompatible with arrangements in Australia and many other parts of the world for mobile broadband services in the 1800 MHz and 2.1 GHz spectrum licensed frequency bands. This is due to differences in the actual frequency bands allocated as well as the frequency separation and site-sense of these allocations.

The AWS-4 spectrum (2000–2020 MHz and 2180–2200 MHz) is allocated on a co-primary basis for MSS and for terrestrial fixed and mobile services. This spectrum was initially allocated on the condition that terrestrial mobile services in the band were tied to the provision of MSS in the band (a concept known as ancillary terrestrial component (ATC)). However, in December 2012, the FCC rescinded the ATC rules in the 2 GHz band and authorised terrestrial mobile services on a co-primary basis with MSS. The FCC now allows the deployment of stand-alone mobile terrestrial service, independent of the MSS, with the condition that AWS-4 operations not cause harmful interference to 2 GHz MSS operations and accept any interference received from duly authorised 2 GHz MSS operations.

Innovation, Science and Economic Development (ISED), Canada

In December, 2014, ISED Canada (formerly known as Industry Canada) released its decision on arrangements for MSS and AWS-4 in the bands 2000–2020 MHz and 2180–2200 MHz. It concluded that MSS offerings are beneficial in areas of Canada that are not easily covered by other technologies. Therefore, ISED Canada maintained the ATC rules which required the deployment of terrestrial mobile services in the 2 GHz band to be tied to the provision of MSS.

Ministry of Internal Affairs and Communications (MIC), Japan

The 2 GHz band is allocated to both the mobile service and MSS in Japan, with disaster relief the main application of the MSS. As at April 2018, details of the use of the 2 GHz band for future services was under consideration in Japan.¹²

China

In China the 2 GHz band is assigned for MSS. The first Chinese MSS satellite using these bands, named TianTong-1, was successfully launched in August 2016. The MSS system is now under commercial operation, with China Telecom the main commercial operator.¹²

Summary

An understanding of the services and applications being contemplated in the 2 GHz band worldwide gives an indication of potential applications that could be supported in Australia. Importantly, international spectrum harmonisation and technology standardisation have the potential to offer benefits from economies of scale and possibly, depending on the application, global roaming. However, these international factors need to be considered in the local Australian context.

¹² APT report, 'Frequency Usage of the Bands 1 980-2 010 MHz AND 2 170 - 2 200 MHz in Asia Pacific Region', No. APT/AWG/REP-46(Rev2), April 2018.

Domestic considerations

A number of new or evolving domestic interests have arisen in the 2 GHz band in recent years. This section provides an overview of these interests.

Television outside broadcast (TOB)

As discussed above, the 2 GHz band is currently used on a shared basis for TOB services. This band has been predominantly used for special events or ad hoc short-term assignments by a range of users. The continued interest in use of the 2 GHz band for TOB services will be considered in this review.

- | |
|---|
| <p>1. What TOB services use the 2 GHz band under current arrangements? Is demand for TOB in this band growing or decreasing?</p> |
|---|

Mobile-satellite services (MSS)

Submissions to the [Draft five-year spectrum outlook 2019–23](#) from a number of organisations expressed an interest in the future use of the 2 GHz band for MSS¹³. This included interest in deployment models with and without complementary ground component (CGC).

CGC is ground-based infrastructure in a mobile satellite system that enhances the coverage of the satellite network. Ancillary Terrestrial Component (ATC) is the equivalent term used in the United States. However, the frequency arrangements used in the US are incompatible with existing Australian arrangements. Therefore, the European CGC model is more applicable to Australia.

While the Europasat satellite network currently providing services across Europe does not provide coverage of Australia, services similar to those provided by Europasat or other MSS services could be deployed in Australia as part of an international footprint in the future.

Satellite IoT applications

There is also interest from emerging satellite operators to provide satellite IoT applications in the 2 GHz band. Due to the low duty cycle and data rate needs of IoT applications, they would be well suited to operating in a shared frequency band supported by various operators¹⁴.

Mobile service (MS)

Mobile broadband

The adjacent band (1920–1980 MHz and 2110–2170 MHz) is already used in Australia by mobile broadband services (3GPP Band 1). Standards exist that would enable this band to be extended to cover the whole of the 2 GHz band, as detailed by 3GPP Band 65 (1920–2010 MHz and 2110–2200 MHz).

¹³ See submissions from the Communications Alliance Satellite Services Working Group, Inmarsat, Omnispace Australia, Kepler Communications and Optus to [IFC 10/2019- Draft five-year spectrum outlook 2019-23](#).

¹⁴ See, for example, Omnispace Australia and Kepler Communications submissions to [IFC 10/2019- Draft five-year spectrum outlook 2019-23](#).

Direct Air-to-Ground

Direct Air-to-Ground Communications (DA2GC) systems refer to broadband wireless links to passenger aircraft, facilitating improved and seamless broadband access for use by both the travelling public and aircraft operators (including crews). Unlike CGC in the MSS, DA2GC systems are not integrated with a satellite component and are alternative deployment model for the 2 GHz band.

The technical characteristics and operational features of the systems for public communications with aircraft are included in [Report ITU-R M.2282-0](#). However, the bands listed in this report do not include the 2 GHz band. There are several variants in approaches and technologies described in this report. The general approach is to have a localised radiofrequency communications system on board the plane providing connectivity between the passengers' existing mobile devices and a microcell. The DA2GC system then provides the link for the microcell to existing terrestrial mobile networks.

Countries including the US, Canada and Japan have implemented DA2GC systems using different technologies and different frequency bands. Studies of DA2GC systems have been conducted in Europe¹⁵, and some trials conducted, but permanent arrangements have not been finalised.

Within the Asia-Pacific Telecommunity (APT) Wireless Group there have been several reports prepared looking at DA2GC and the applications it could facilitate.^{16,17}

¹⁵ [ECC Report 214](#) Broadband Direct-Air-to-Ground Communications (DA2GC), June 2014.

¹⁶ APT Report on 'Possible Radio Services and Applications onboard Aircraft and Vessels' ([APT/AWG/REP-56](#)), September 2014

¹⁷ APT Survey Report on "Application of Direct Broadband Radio Communication System between Air and Ground" ([APT/AWG/REP-63](#)), March 2015

Band considerations

There is interest in access to 2 GHz spectrum for a number of different, and potentially competing, uses. The ACMA is seeking evidence and views to inform its consideration of whether arrangements in the band should be reviewed and relevant factors to consider in any review.

The ACMA notes that some form of planning will be necessary, even if it is simply to provide ongoing certainty to the current interim TOB arrangements.

Reflecting on international and domestic trends in the 2 GHz band, it appears one or a combination of the following four services could potentially make use of this spectrum in the future:

- > Television outside broadcast
- > Mobile-satellite services (with or without Ancillary Terrestrial Component/Complementary Ground Component rules), including satellite IoT
- > Mobile broadband services
- > Direct air-to-ground communications.

Four general scenarios are outlined below to enable consideration of the broad options for future arrangements in this band.

A number of questions have been identified:

- > What services/applications should be accommodated in the band?
- > Which frequencies ranges should be made available for these services/applications?
- > Which geographic areas should be made available for these services/applications?
- > On what basis should access be provided? Should access be granted on an exclusive or shared basis, coordinated or uncoordinated, et cetera?
- > What licensing mechanisms are appropriate?

The ACMA is at the initial investigation phase of consideration of this band. It is seeking to understand which arrangements would maximise the overall public benefit derived from use of the band. We anticipate that industry responses to the above questions will inform a more structured analysis of the band's highest value use, which would be the subject of a later consultation.

The scenarios below have been developed to help stimulate thinking. They range from what are essentially 'bookend' approaches (such as allocation to a single service/application) to more nuanced hybrids of these approaches.

Supporting test and demonstration of possible applications

As previously outlined in the [Five-year spectrum outlook](#), current ACMA policy is to support case-by-case consideration of licence applications for test and demonstration purposes in the frequency ranges 1980–1985 MHz and 2170–2175 MHz (the guard band between TOB and frequency adjacent spectrum licensing and apparatus-licensed public mobile telecommunications services) on a short-term basis, subject to appropriate interference management and resolution conditions where these applications will not impact on existing services.

With TOB usage typically limited to capital city areas and regional areas for major events, the ACMA considers it is also possible to support licence applications for test

and demonstration purposes in the wider 1980–2010 MHz and 2170–2200 MHz bands in remote-density and some low-density areas on a short-term basis, subject to appropriate interference management and resolution conditions.

In the meantime, while options are developed for further consideration in partnership with industry, the ACMA seeks stakeholder views on such a proposal.

Scenario 1: Single majority service/application use of entire band

One approach may be to establish optimised arrangements across the majority of the band for a single type of service or application.

Questions raised by these scenarios include:

- > Will the demand for a single service be sufficient to justify the exclusion of other service types?
- > What is the impact on services excluded from the band? Can they be accommodated in other bands?
- > Are there related spectrum considerations? How should spectrum be divided between different users? What are the adjacent band considerations?

Scenario 2: All services/applications with dedicated, exclusive spectrum

Another approach might be to provide for use of the band for several different services/applications with dedicated Australia-wide allocations. Providing several services/applications with dedicated spectrum (given there is only finite spectrum available in the band) would result in each service/allocation only having access to a modest subset for the band.

Noting the potential amount of spectrum available, there is a limited opportunity to support all services that have expressed an interest in using the 2 GHz band in a particular area. For example, if mobile broadband, MSS and TOB services were each provided with 2 x 10 MHz of spectrum, DA2GC would not be facilitated in the 2 GHz band.

Questions raised by this scenario include:

- > Is there demand for each service/application in the band?
- > Does this allow enough spectrum for all the services/applications?
- > What part of the band should be made available for each service? What are the adjacent band considerations?
- > How should spectrum be divided between different users?

Scenario 3: Geographic separation of services

There is a strong likelihood that at least some services/applications may be localised to certain geographic areas. For example, the mobile broadband and TOB services could be limited to major population areas and MSS supported in regional areas, thus increasing the potential spectrum for the individual services.

Questions raised by this scenario include:

- > What is the impact of constraining a service geographically?
- > How do trends/demand for allocations vary geographically?

Scenario 4: Combination or hybrid approach of other scenarios

In considering scenarios 1 to 3, different possibilities may present themselves. Some services may be able to coexist in the same geographic area in the same spectrum, while other services may be able to share the same frequency range if separated by geographic area. Some services/applications may require dedicated Australia-wide spectrum. Scenario 4 is a combination of scenarios 1 to 3.

Further, technical conditions to facilitate sharing between services, including guard bands, provide opportunities for services such as satellite IoT, which has low data rate and low bandwidth requirements.

One potential approach under this scenario is allowing DA2GC systems Australia-wide on a shared basis with TOB services in major population areas. MSS could also be supported Australia-wide but be secondary to DA2GC systems Australia-wide and to TOB services in major population areas. Any guard bands required to facilitate sharing with adjacent band services could be considered for satellite IoT.

All questions raised in the previous scenarios would be relevant to this scenario.

Issue for comment

Based on the current domestic and international considerations, and taking into account the planning scenarios and the questions the different scenarios raise, the ACMA invites comment on the scenarios and on the following questions:

2. What interest do you have in making further use of the 2 GHz band?
3. Given the points raised in this discussion paper:
 - a. How much spectrum is required to provide the service?
 - b. Is there a clear geographical delineation—for example, metropolitan or regional for the service?
 - c. Is there or will there be readily available equipment for the service?

Invitation to comment

Making a submission

The ACMA invites comments on the issues set out in this discussion paper or any other issues relevant to the 1980–2010 and 2170–2200 MHz bands.

> [Online submissions](#) can be made via the comment function or by uploading a document. Submissions in Microsoft Word or Rich Text Format are preferred.

> Submissions by post can be sent to:

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

The closing date for submissions is COB, Friday 13 September 2019.

Consultation enquiries can be emailed to freqplan@acma.gov.au.

Publication of submissions

The ACMA publishes submissions on our website, including personal information (such as names and contact details), except for information that you have claimed (and we have accepted) is confidential.

Confidential information will not be published or otherwise released unless required or authorised by law.

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[Privacy and consultation](#) provides information about the ACMA's collection of personal information during consultation and how we handle that information.

Information on the *Privacy Act 1988* and the ACMA's privacy policy (including how to access or correct personal information, how to make a privacy complaint and how we will deal with the complaint) is available at acma.gov.au/privacypolicy.

Appendix A—ARSP extracts covering the 2 GHz Band

Table 3 shows an extract from the Australian Radiofrequency Spectrum Plan (ARSP) for the 1980–2010 MHz and 2170–2200 MHz bands. Also included is text of relevant footnotes in Table 4.

Table 3: Extract from the Australian Radiofrequency Spectrum Plan 2017 for the 1980–2010 MHz and 2170–2200 MHz bands

Column 1: ITU Radio Regulations Table of Allocations			Column 2:
Region 1	Region 2	Region 3	Australian Table of Allocations
1 980 – 2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-Space) 351A 388 389A 389B 389F		1 980 – 2 010 FIXED MOBILE MOBILE-SATELLITE (Earth-to-Space) 351A 388 389A
....			
2 170 – 2 200	FIXED MOBILE MOBILE-SATELLITE (Earth-to-Space) 351A 388 389A 389F		2 170 – 2 200 FIXED MOBILE MOBILE-SATELLITE (Earth-to-Space) 351A 388 389A

Table 4: Extract from the Australian Radiofrequency Spectrum Plan—footnotes

Footnote	Text
351A	For the use of the bands 1 518–1 544 MHz, 1 545–1 559 MHz, 1 610–1 645.5 MHz, 1 646.5–1 660.5 MHz, 1 668–1675 MHz, 1 980–2 010 MHz, 2 170–2 200 MHz, 2 483.5–2 520 MHz and 2 670–2 690 MHz by the mobile–satellite service, see Resolutions 212 (Rev.WRC-07) and 225 (Rev.WRC-07) . (WRC-07)
388	The frequency bands 1 885–2 025 MHz and 2 110–2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications (IMT). Such use does not preclude the use of these frequency bands by other services to which they are allocated. The frequency bands should be made available for IMT in accordance with Resolution 212 (Rev.WRC-15) (see also Resolution 223 (Rev.WRC-15)). (WRC-15)
389A	The use of the bands 1 980–2 010 MHz and 2 170–2 200 MHz by the mobile–satellite service is subject to coordination under No. 9.11A and to the provisions of Resolution 716 (Rev.WRC-2000) . (WRC-07)
389B	The use of the band 1 980–1 990 MHz by the mobile–satellite service shall not cause harmful interference to or constrain the development of the fixed and mobile services in Argentina, Brazil, Canada, Chile, Ecuador, the United States, Honduras, Jamaica, Mexico, Peru, Suriname, Trinidad and Tobago, Uruguay and Venezuela.
389F	In Algeria, Benin, Cape Verde, Egypt, Iran (Islamic Republic of), Mali, the Syrian Arab Republic and Tunisia, the use of the bands 1 980–2 010 MHz and 2 170–2 200 MHz by the mobile–satellite service shall neither cause harmful interference to the fixed and mobile services, nor hamper the development of those services prior to 1 January 2005, nor shall the former service request protection from the latter services.