Review of the 1.5 GHz band

Extended mobile satellite service (MSS) L‑band options paper

August 2023

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[Executive summary 1](#_Toc142412647)

[Issues for comment 3](#_Toc142412648)

[Introduction 4](#_Toc142412649)

[Legislative and policy environment 4](#_Toc142412650)

[Licensing arrangements 6](#_Toc142412651)

[Summary of submissions 9](#_Toc142412652)

[Responses to issues for comment 9](#_Toc142412653)

[The case for action 15](#_Toc142412654)

[Desirable planning outcomes 18](#_Toc142412655)

[Replanning options 20](#_Toc142412656)

[Option 1 20](#_Toc142412657)

[Option 2 20](#_Toc142412658)

[Option 3 24](#_Toc142412659)

[Assessment of options 25](#_Toc142412660)

[Assessment against the desirable planning outcomes 25](#_Toc142412661)

[Preliminary preferred option 27](#_Toc142412662)

[Next steps 29](#_Toc142412663)

[Invitation to comment 30](#_Toc142412664)

[Making a submission 30](#_Toc142412665)

[Glossary 31](#_Toc142412666)

[Appendix A: Summary of 1.5 GHz band arrangements 33](#_Toc142412667)

Executive summary

The 1427–1518 MHz, 1518-1525 MHz and 1668–1675 MHz frequency ranges (collectively referred to as the 1.5 GHz band) are currently used by a mixture of services and applications, including fixed services, aeronautical mobile services and various science services.

There has been growing interest in the 1.5 GHz band to provide support for new wireless broadband (WBB) and mobile satellite service (MSS) use-cases as well as the expansion of arrangements for incumbent services. In response to these developments, in May 2022, we released the *[Review of the 1.5 GHz band](https://www.acma.gov.au/consultations/2022-05/review-15-ghz-band-consultation-162022)* discussion paper (the May 2022 paper). The purpose of that paper was to start the discussion on possible changes to planning arrangements in the 1.5 GHz band. This included gathering information on the future spectrum needs of incumbent and possible new services in the band. Consultation closed in June 2022, and 13 submissions were received. This paper provides a summary of submissions received to the May 2022 paper.

Following consideration of these submissions, we have decided to progress the 1.5 GHz band to the preliminary re-planning stage of the ACMA’s spectrum planning process. Noting views raised in submissions and the different pace of international developments for different uses-cases in the band, it is proposed to first progress the review of arrangements for MSS in the 1518–1525 MHz and 1668–1675 MHz frequency ranges (the extended MSS L-band), with other services in the band to be progressed separately.

A review of terrestrial (that is, non-satellite) services in the broader 1427–1535 MHz frequency range is proposed for consideration in the 2024–25 financial year. This could result in the re-location of incumbent services, the requirement for incumbent services to cease or vary operation, expansion of arrangements for incumbent services and/or introduction of new services such as WBB.

This paper presents planning options for the extended MSS L-band and seeks comment on the options, which will help inform our decision making. The following 3 options have been identified:

* Option 1: No change.
* Option 2: Implement arrangements to allow MSS operation in the 1518–1525 MHz and 1668–1675 MHz frequency ranges on a no-interference-no-protection basis to incumbent in-band and adjacent band licences and services.
* Option 3: Implement arrangements for MSS in the extended MSS L-band (on the same basis as Option 2) and consider relocating some incumbent licences and services.

Option 2 has been identified as the ACMA’s preliminary preferred option. We consider that the overall utility of the extended MSS L-band and the long-term public interest derived from use of the spectrum is increased under this option, compared with Option 1. Option 2 also enables arrangements for MSS to be implemented in a shorter timeframe than Option 3 and will support more efficient use of the spectrum.

We are also proposing to expedite the implementation of Option 2 by seeking comment on the required variations to the [Radiocommunications (Communication with Space Object) Class Licence](https://www.legislation.gov.au/Series/F2015L01486) 2015 as part of this consultation process. A draft Radiocommunications (Communication with Space Object) Class Licence Variation 2023 (No. 1) is available alongside this paper for consideration.

If the updates to the class licence are made, then we propose to adopt the same allocation and licensing processes that are used for those portions of the MSS L-band spectrum that are already available for use. Licence applications would be considered within the existing Business Operating Plan, [*Procedures for space and space receive licensing*](https://www.acma.gov.au/node/1507)*.*[[1]](#footnote-1)Beyond ensuring the proposed operation is in accordance with ITU requirements, no further assessment of compatibility between satellite systems is proposed – the ITU satellite coordination process is sufficient to resolve any compatibility matters in this band. This is in line with the existing process to issue space and space-receive licences in the L‑band.

Feedback on the issues presented in this paper will help inform us whether we will implement Option 2, a variant of that option, or consider another option altogether.

It is important to note that the next stage of the 1.5 GHz band review will consider options for possible new and/or expansion of existing terrestrial services in the 1427–1535 MHz frequency range. This could result in the relocation of some incumbent licences and services out of the band. It could also require additional regulatory measures to be implemented on the MSS to facilitate coexistence with any new arrangements implemented. The exact nature of any measures will depend on the outcomes of that review. We anticipate that, at a minimum, it will include a requirement (or assumption for interference management purposes) that from a specified date onwards, MSS stations implement better performing receivers, including more stringent blocking levels. This is so the introduction of MSS, before options for other services are considered, does not unduly limit or constrain future replanning in the broader 1.5 GHz band.

# Issues for comment

We welcome comments – general or specific – on any of the issues raised in this paper. Specific questions also appear in relevant sections throughout the paper and are summarised here:

1. Comment is sought on the proposed desirable planning outcomes for the review of the extended MSS L-band.
2. Comment is sought on the options identified. Do you have any alternative options to propose?
3. Comment is sought on the ACMA’s assessment of options.

Comment is sought on the ACMA’s preliminary preferred approach, including the proposed draft amendments to the [Radiocommunications (Communication with Space Object) Class Licence](https://www.legislation.gov.au/Series/F2015L01486) 2015 and associated licence application and allocation process.

# Introduction

The 1427–1518 MHz, 1518-1525 MHz and 1668–1675 MHz frequency ranges (collectively referred to as the 1.5 GHz band) are currently used by a mixture of services and applications, including fixed services, aeronautical mobile services and various science services.

This paper presents possible planning options for the extended MSS L-band and a proposal to expedite the implementation of arrangements as an outcome of the May 2022 consultation on the [*Review of the 1.5 GHz band*](https://www.acma.gov.au/consultations/2022-05/review-15-ghz-band-consultation-162022)discussion paper. Feedback received on the planning options outlined in this paper will help inform our decision making.

## Legislative and policy environment

Planning and allocating communications infrastructure resources, including spectrum, is a key priority for the ACMA. We aim to plan and allocate spectrum transparently, efficiently and consistently with our legal obligations, and to address changing demand to support innovative communications services.[[2]](#footnote-2)

### Guiding legislation and policy

The ACMA’s decisions are guided by the object of the [*Radiocommunications Act 1992*](https://www.legislation.gov.au/Details/C2019C00262) to promote the long‑term public interest derived from the use of the spectrum by providing for the management of the spectrum in a manner that:

1. facilitates the efficient planning, allocation and use of the spectrum
2. facilitates the use of the spectrum for:
   1. commercial purposes
   2. defence purposes, national security purposes and other non‑commercial purposes (including public safety and community purposes)
3. supports the communications policy objectives of the Australian Government.

Communications policy initiatives relevant to the replanning considerations in this band have been identified.

Our work plan aims to support government communications and media objectives, and the following priorities outlined in the December 2022 [Ministerial Statement of Expectations](https://www.infrastructure.gov.au/department/media/publications/australian-communications-and-media-authority-statement-expectations):

promoting the long-term public interest derived from spectrum, including the benefits of technological developments that improve spectrum utilisation and efficiency

supporting government policies related to regional, rural and remote Australia including by having regard to relevant ministerial policy statements in the planning and allocation of spectrum to support innovation and competition in these areas

promoting investment, innovation and the adoption of new and emerging technologies, while continuing to safeguard the interests of consumers and small businesses.

We are committed to meeting our objectives in the context of the government’s broader media and communications policy framework. In our [Statement of Intent](https://www.acma.gov.au/publications/2023-03/plan/acma-statement-intent), we responded to the government’s Statement of Expectations for the ACMA.

#### Universal service obligation

Part 2 of the [*Telecommunications (Consumer Protection and Service Standards) Act 1999*](https://www.legislation.gov.au/Details/C2021C00551) establishes the universal service obligation (USO) to provide people in Australia with access to standard telephone services (STS) on reasonable request, as well as reasonable access to payphone services. The USO is delivered by Telstra. The statutory obligation is reinforced with a contract between the Commonwealth and Telstra that runs to 30 June 2032. The USO is a well-established and long-standing part of Australian telecommunications.

Within the NBN fixed-line footprint, Telstra generally uses the NBN to provide voice services. Outside this footprint (generally in rural and remote Australia), Telstra continues to use its own existing infrastructure to meet its statutory and contractual USO obligations. Telstra provides most voice services in these areas over its copper network; however, it also delivers just over 10,000 USO services[[3]](#footnote-3), including some payphones, through fixed wireless over its High-Capacity Radio Concentrator (HCRC) system, including use of spectrum in the 1.5 GHz band.

### Regional connectivity and satellite communications

The government is committed to improving regional connectivity through targeted investment intended to expand mobile coverage in under-served regional and remote communities. Its [Better Connectivity Plan for Regional and Rural Australia](https://www.infrastructure.gov.au/media-communications-arts/better-connectivity-plan-regional-and-rural-australia) will provide $656 million to improve mobile and broadband connectivity and resilience in rural and regional Australia. In addition to improving communications through the [Regional Connectivity Program](https://www.infrastructure.gov.au/media-communications-arts/internet/regional-connectivity-program-including-mobile-black-spot-opportunities), this investment will increase the resilience of communications services and public safety communications facilities and also accelerate Australia’s agricultural sector through the [On Farm Connectivity Program](https://www.infrastructure.gov.au/have-your-say/farm-connectivity-program). The government has also committed $1.1 billion for full-fibre NBN upgrades in regional Australia, and $480 million for upgrades to the NBN fixed wireless network.

The government has also established the Low Earth Orbit Satellite Working Group to examine the future role of satellite technology in delivering telecommunications services. We are a participant of the Working Group alongside the Department and other communications industry participants. The group met for the first time in February 2023 and identified 4 key issues for future consideration:

how satellites can help close the digital inclusion gap, particularly in relation to First Nations peoples (consistent with Closing the Gap Target 17)

how satellites can support greater resilience and redundancy in emergency circumstances

using satellites to deliver universal telecommunications services

the economic benefit that could come from greater low earth orbit (LEO) satellite use, including by facilitating the Internet of Things (IoT).[[4]](#footnote-4)

The group will continue to meet to provide advice and feedback to the government on possible regulatory reforms to support the industry.

## Licensing arrangements

There are currently 3 licence types available to authorise access to spectrum: spectrum, apparatus and class. Each of these has differing characteristics, including for the allocation method commonly used, approach to pricing, associated level of exclusivity and interference environment. These approaches influence how options can be developed and implemented.

A spectrum licence authorises the operation of devices within a defined frequency range and geographic area, with a high degree of exclusivity. The geographic area can vary in size and can comprise the entire country. Spectrum licences are usually allocated by an auction and have historically been utilised for most bands used to deploy commercial mobile broadband networks. Spectrum licences may be allocated for up to 20 years.

An inherent feature of spectrum licensing is technological flexibility – that is, the licence conditions and associated technical framework, while usually optimised for an expected technology, specify generic technical conditions[[5]](#footnote-5) and do not usually expressly mandate or limit specific technologies or services. This allows a licensee to deploy any technology that complies with the conditions of the licence. It is up to the licensee to manage interference between their devices (note that the adoption of international standards within the technical framework mitigates the potential for interference between devices). Spectrum licences are more conducive to secondary trading than apparatus licences, due to their ability to be sub-divided.

An apparatus licence authorises the use of a radiocommunications device (or group of devices) operating under a specific radiocommunications service type, in a specific frequency range, and traditionally at one or more specific geographic locations for a period of up to 20 years. They are typically issued ‘over-the-counter’ in accordance with our coordination policies. The ACMA [imposes cost recovery](https://www.acma.gov.au/fees-apparatus-licences) charges, and separate legislation imposes taxes for apparatus licences. These amounts cover our costs and give people incentive to use spectrum efficiently.

The ACMA has also created the [area-wide apparatus licence](https://www.acma.gov.au/area-wide-apparatus-licence). This authorises the operation of one or more radiocommunications devices within a defined geographic area in frequencies specified in the licence, subject to the conditions included in the issued licence. The licence type is scalable, enabling its use for authorising different-sized geographic areas and bandwidths. Unlike other apparatus licence types – which typically align with specific uses and purposes – the area-wide apparatus licence is capable of authorising a variety of services, uses, applications and technologies.

Class licences are a standing authorisation to access spectrum without the need to apply to the ACMA for an individual licence (hence no taxes or charges are paid), subject to the conditions of the relevant class licence. These conditions include technical and geographic matters and/or pertain to the type of use or class of user.

### Licensing of space-based communication systems

A space-based radiocommunications system may not be operated in Australia without a licence. In general, there are 2 broad options for licensing space systems in Australia.

The first option requires operators to obtain apparatus licences for each of their earth stations individually: an *earth licence* for the uplink and an *earth-receive licence* for the downlink. Under this approach, a licence is not required for the space stations or space-receive stations onboard a satellite.

The second option involves a combination of apparatus and class licences. In certain bands specified in the [Radiocommunications (Communication with Space Object) Class Licence 2015](https://www.legislation.gov.au/Series/F2015L01486) (CSO class licence), operators are required to obtain an apparatus licence for the space stations onboard a satellite with a *space licence* for the downlink and a *space-receive licence* for the uplink. Earth stations in the system are then automatically authorised collectively under the CSO class licence. This approach is typically used for satellite systems with numerous or ubiquitous FSS earth stations. It provides an efficient means of licensing a large number of earth stations and avoids the need to obtain a licence for every earth station in a satellite system.

A key requirement, irrespective of which approach to licensing is used, is that the satellite system must be filed with the International Telecommunication Union (ITU) by the ACMA or the equivalent national administration of another ITU member state.

If an operator wishes to licence a satellite system under the second option, the controlling business entity must first be included in either the [Radiocommunications (Australian Space Objects) Determination 2014](https://www.legislation.gov.au/Details/F2021C00361) or the [Radiocommunications (Foreign Space Objects) Determination 2014](https://www.legislation.gov.au/Details/F2021C00363/).

Information on how licence applications for space-based radiocommunications systems are assessed for compliance with ITU and other satellite regulatory matters is outlined in our [business operating procedures](https://www.acma.gov.au/business-operating-procedures-spectrum).[[6]](#footnote-6)

#### CSO class licence

The [Radiocommunications (Communication with Space Object) Class Licence 2015](https://www.legislation.gov.au/Details/F2021C00630) is a legislative instrument made by the ACMA under section 132 of the Radiocommunications Act. It provides a standing authorisation for the operation of earth stations in specified frequency bands if the operator of an associated satellite system has obtained space and space-receive licences authorising operation of the space-based segment of their system.

The CSO class licence also sets out equipment rules that earth stations authorised by this licence must comply with, as well as technical conditions that must be met for transmissions in certain bands to minimise interference with other radiocommunications services.

#### International obligations

The ACMA’s current practice is that a satellite filing with the ITU for the associated space object will be required, in accordance with Australia’s obligations as a member of the ITU.

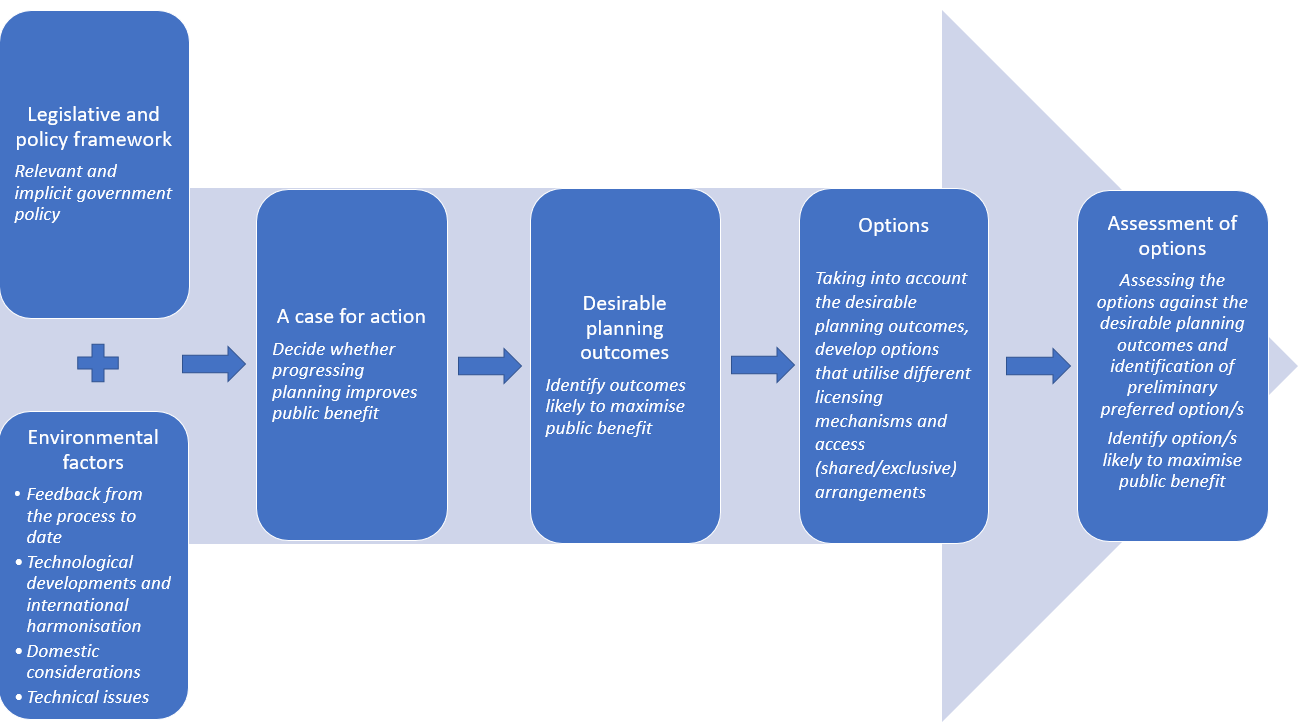
It should be noted that while the ACMA can develop a framework to support the licensing of a satellite service, the viability of a satellite service is largely dependent on the status of the satellite system in the ITU satellite coordination process. This is the responsibility of prospective licensees to assess, and the ACMA can make no assurances in this regard.

### Spectrum planning options development

We are guided in our spectrum management functions by the object of the Radiocommunications Act, set out in the ‘*Guiding legislation and policy*’ section of this paper. A balanced application of regulatory and market mechanisms is often necessary to achieve key elements of the object of the Radiocommunications Act, in particular, maximising the overall public benefit from the efficient allocation and use of the radiofrequency spectrum and meeting the government’s policy objectives.

Figure 1 shows the approach we propose to use in reviewing the 1.5 GHz extended MSS L-band in this paper and possible future papers. We will continue to apply this general approach as it considers the responses to this paper.

Spectrum planning options framework



# Summary of submissions

Thirteen [submissions](https://www.acma.gov.au/consultations/2022-03/proposed-spectrum-re-allocation-declaration-34-ghz-and-37-ghz-bands-ifc-102022) were received to the May 2022 paper and were published on our website. Submissions were received from:

Aqura

Australian Mobile Telecommunications Association (AMTA)

Australian Radio Communications Industry Association (ARCIA)

Communications Alliance – Satellite Services Working Group (CA-SSWG)

Ericsson

Inmarsat

Nokia

Optus

Pivotel

Powercor Australia Ltd (PAL)

* Noise FM

Telstra

University of New South Wales (UNSW) Canberra.

## Responses to issues for comment

### International arrangements and technology trends

Are there any international arrangements or technology trends that the ACMA should be aware of?

Submissions generally acknowledged the international trends and developments identified in the May 2022 paper. This included acknowledgement from mobile operators of growing interest in the 1427–1518 MHz band for WBB use internationally, particularly in Europe. One submitter indicated this will help drive equipment ecosystem development with good economies of scale that Australia could leverage. Another submitter noted that at present there was a limited ecosystem for WBB equipment and that use in most countries is below 1492 MHz.

Satellite operator and mobile operator interests highlighted the work currently underway within working parties 4C and 5D of the International Telecommunication Union Radiocommunication (ITU-R) sector on coexistence between WBB and MSS in the 1.5 GHz band. The outcomes of this work are expected to assist national administrations wishing to re-plan the 1.5 GHz band for WBB and MSS use. Due to the complexity of issues being considered, there is no clear timeframe for when the ITU-R will finish its work.

Several satellite and mobile operator submissions recommended delaying further consideration of the 1427–1518 MHz band. Satellite operator interests suggested waiting until ITU-R studies are finalised, or at the very least, limiting WBB to frequencies below 1492 MHz in the interim period. Mobile operator submitters believe the review should be delayed until 2024 as this would allow for the completion of ITU-R studies, as well as further development of international deployments and device ecosystems.

Another submitter noted that a number of countries are trialling Digital Audio Broadcasting (DAB) in the 1.5 GHz bands. They argued that, given the spectrum constraints within the current VHF Band III DAB allocation, it would make sense to have at least some allocation for DAB within the 1.5 GHz band.

### Domestic considerations

What is the demand for access to the 1.5 GHz band by WBB, MSS and broadcasting services? Are there any other new services that should be considered?

What are the ongoing requirements for incumbent services in the 1.5 GHz band? Are there any viable alternative options?

### New services

Two submissions representing satellite operator interest indicated that MSS has made use of the 1525–1559 MHz and 1626.5–1660.5 MHz bands in Australia for land, maritime and aeronautical operations for some time. They also indicated that demand for MSS is increasing. Given this demand, one submitter urged the ACMA to address use of MSS in the extended MSS L-band as soon as possible, noting recent satellite deployments that will enable use of the extended L-band in Australia and other Asia-Pacific countries. Other satellite sector submissions stressed that it is important to protect MSS from WBB in both the existing and extended MSS L-band as there are no viable alternatives for such use.

One submitter proposed that options for DAB in the 1.5 GHz band should be considered for both narrowcasting and wideband broadcasting services. They also suggested options to support point-to-point (PTP) studio transmitter links should be considered due to the band’s favourable propagation characteristics and the availability of equipment.

One submitter noted the limited WBB product available in the band and didn’t see this changing in the foreseeable future. They believe that this, coupled with the competing demands of incumbent licences and services, may make it difficult to accommodate local area WBB (LA WBB) use. Given the limited spectrum for narrowband PTP below 1 GHz, their view is that the 1.5 GHz band should be reviewed to support such use. They also noted the benefits of the broader MSS L-band in supporting services for public safety in remote areas.

Submissions representing mobile and wireless broadband interests supported making the 1427–1518 MHz band available for WBB use. Two submitters noted that 1.5 GHz spectrum could complement existing 1800 MHz and 2.1 GHz band spectrum and provide more options for LA WBB use. They noted that the lower frequency would support larger cell sizes and, therefore, more cost-effective solutions.

Mobile operator submissions stated additional mid-band spectrum is vital in meeting forecasted WBB traffic demand by the end of the decade. They identified numerous bands to meet this demand, and while 1.5 GHz was among them, it was not considered an immediate priority. Instead, it was suggested that further replanning be delayed until early 2024. One submitter recommended the review of the extended MSS L-band be similarly delayed. They argued that this would allow ITU-R studies on WBB/MSS coexistence to be finalised and used in the development of interference management frameworks. Three submitters considered that any arrangements developed for MSS should enable the use of 3GPP compliant equipment below 1518 MHz.

#### Incumbent licences and services

One submitter indicated they hold multiple PTP licences in the 1.5 GHz band in regional areas. These licences are deployed in areas where fibre is not a commercially viable option or where network diversity is required. They indicated they would prefer to continue operating these links and have no plans to increase their use in the band as alternative options would be cost intensive and could require additional radio sites to be established.

Another submitter indicated they hold multiple PTP and point-to-multipoint (PMP) licences in the 1.5 GHz band. These are used for stratospheric scientific balloon operations associated with astrophysical research which require bi-directional communications with ground stations at Alice Springs, Longreach and Newman. Their operation is restricted to remote areas by the Civil Aviation Safety Authority (CASA) to avoid areas that are densely populated. They indicated they would like to continue operations in the 1427–1535 MHz band. They would also like access to an additional 15–30 MHz to support newer wideband systems.

Telstra noted an ongoing requirement to support high-capacity radio concentrator (HCRC) systems in the 1.5 GHz band. These are used to support 10,000 USO services. Telstra noted that, while there are advancements in new technologies to replace HCRC, such as LEO satellites, these are still some time away. Telstra stated that mechanisms are needed to protect HCRC in regional and remote locations until a proven alternate technology solution is identified and deployed for USO customers. Telstra indicated plans to upgrade and relocate most of their roughly 870 PTP licences to other bands within the next 3 to 5 years. They also do not foresee any need for an increase in HCRC systems in the future.

Another submitter urged the government to review the USO and consider whether regional and remote communities may be better served by alternative services, such as next generation satellite services and other voice over data services trialled under the government’s Alternative Voice Services Trials (AVST) program.

Two submitters indicated further information was required to assess and comment on the Department of Defence’s (Defence) desire to access more spectrum in the 1.5 GHz band to support aeronautical mobile telemetry (AMT) applications. Regarding Defence’s desire to access part of the band to support mobile high-capacity networking, it was suggested they could acquire such spectrum through the normal market mechanisms.

### Band planning scenarios

What planning scenarios should be considered in the 1.5 GHz band?

#### WBB planning scenarios

There were a mix of views regarding possible WBB planning scenarios in the 1.5 GHz band.

One submitter stated a preference for supplemental downlink (SDL) or frequency division duplex (FDD) arrangements for WBB. They argued this would remove the risk of interference from WBB user terminals into MSS.

Mobile and wireless broadband interests all supported making the 1427–1518 Hz band available for WBB Australia-wide.

Two operators wanted arrangements to support both LA WBB and wide-area WBB (WA WBB) use-cases. Their preference is for time division duplex (TDD) WBB arrangements, though FDD could also be considered. Ultimately, the choice would depend on the developing device ecosystem and availability of equipment.

One submitter proposed use of area-wide apparatus licences (AWLs) in regional and remote areas. In metro areas, they proposed a mixture of AWLs and spectrum licensing. They considered it may be possible to share with incumbent licences and services in regional and remote areas but access to metro areas should be exclusive to WBB use-cases.

Mobile operators stated that any planning outcomes and technical arrangements implemented in the 1427–1518 MHz band need to be compliant with 3GPP standards. It was noted that while most international development is focused on SDL WBB, there is growing interest in TDD technologies. Their submissions acknowledged FDD equipment is available but considered it to be a less efficient choice.

One mobile operator stated a preference for spectrum licensing and arrangements optimised for TDD WBB use. They noted that TDD does not lend itself to small licence areas due to the risk of co-channel interference. Consequently, they proposed identification of large licence areas to enable interference to be effectively managed between licensees.

Another mobile operator recommended implementing spectrum licence arrangements using SDL configuration in metro and regional areas, and AWL arrangements in remote areas. They consider that, at this time, TDD is a less attractive option as there is currently no equipment ecosystem. They also argued that sub-2 GHz spectrum is not ideal for TDD use due to the greater risk of inter-network or adjacent area interference. They acknowledged there are some technological developments in TDD occurring that could make it an attractive option in the future. While FDD is considered a less efficient option than SDL and TDD technologies, the mobile operator suggested this could be the best solution to support a large number of operators in remote areas.

#### MSS planning scenarios

One satellite industry representative noted they are not in a position to support a particular planning scenario at this point. However, they believe there will be a need for a guard band between any WBB and MSS use. Furthermore, depending on the size of the guard band, other measures to manage interference may be required.

A satellite operator indicated support for a mixture of MSS planning scenarios 4 and 5 as described in the May 2022 paper. Mobile operators commented that any arrangements developed for MSS should enable the use of 3GPP compliant equipment below 1518 MHz.

#### Other planning scenarios

Two submissions proposed developing arrangements in the 1.5 GHz band to support narrowband PTP services. Noise FM also proposed making 7–10 MHz of the 1.5 GHz band available to support DAB narrowcasters and community radio. They suggested the rest of the band could then be shared between wideband FM analog audio broadcasting, PTP and PMP.

### Preliminary coexistence considerations

Comment is sought on the coexistence scenarios identified, including the ACMA’s preliminary thinking on these scenarios. Are there any other coexistence scenarios the ACMA should consider?

Submitters generally agreed with the ACMA’s views and initial proposals on coexistence in the May 2022 paper, with a few exceptions and/or additional comments.

One submitter stated that shared access between WBB and incumbent licences in the 1427–1518 MHz band could be considered in remote areas (including stratospheric balloon operations), while options to clear PTP licences should be considered in regional and metro areas. Their preliminary position is that no new PTP licences should be issued Australia-wide. For MSS, their view is that it should operate on a ‘no protection’ basis above 1518 MHz, as a small guard band could provide an inherent level of protection for such use.

One mobile operator’s position was that coexistence requirements should not be placed solely on WBB services. In particular, MSS receivers should meet minimum receiver-blocking performance requirements so not all mitigations are placed on WBB licensees. Furthermore, they consider that the use of guard bands is inefficient and should only be used as a last resort. They were also of the view that stratospheric balloons should be relocated from the band.

Another mobile operator supported a 3 MHz guard band from 1517–1520 MHz between WBB and MSS. They noted this would not remove the risk of interference, and coordination mechanisms would still need to be developed as part of a technical liaison group (TLG) process. The mobile operator also identified ECC Report 299[[7]](#footnote-7), which considers the timing and steps to introduce WBB into 1427–1518 MHz without harming MSS at seaports and airports.

One satellite operator stated that existing MSS receivers were not designed with the expectation of WBB operating below 1518 MHz. They highlighted a risk of interference to both legacy and future MSS terminals from such use. Representatives of the satellite industry suggested delaying the review of the 1427–1518 MHz band for WBB use until ITU-R studies are finalised; however, if the ACMA wishes to progress consideration before the ITU-R work is finalised, they recommended limiting any WBB use to below 1492 MHz.

The same satellite operator stated that if WBB is introduced into the 1492–1518 MHz frequency range, then appropriate technical rules would be required to manage interference. These could include guard bands and power-flux density (PFD) limits at ports/waterways and airports. They also noted that better performing MSS receiver-blocking requirements have been adopted in applicable equipment standards and will have a gradual rollout in Australia.

The satellite operator acknowledged that the likelihood of interference into MSS receivers from most incumbent licences in1518–1535 MHz is low. However, given the impact of any interference could be significant, their preference is to relocate these services to below 1518 MHz. Inmarsat noted Defence interest in using the 1518–1535 MHz frequency range for AMT and suggested such systems should operate on a ‘no protection’ basis from MSS downlinks.

The satellite operator noted the need to manage interference with radioastronomy in the 1668–1670 MHz frequency range; however, they questioned whether meteorological satellite (Metsat) use at Yarragadee, Western Australia, is still required as internationally these services have largely transitioned to the 1675–1710 MHz band.

# The case for action

In Australia, there are a range of spectrum uses supported in the 1.5 GHz band. This includes Aeronautical Mobile Telemetry (AMT), radio astronomy, Metsat, fixed PTP and PMP services. Since 1996, arrangements have been in place (now reflected in the [Radiocommunications 1.5 GHz Frequency Band Plan 2015](https://www.legislation.gov.au/Details/F2015L01271) (1.5 GHz band plan)) to preserve options[[8]](#footnote-8) for possible terrestrial and satellite audio broadcasting services in the 1452–1492 MHz band.

A detailed description of existing incumbent licences and services in the 1.5 GHz band is in the [May 2022 paper](https://www.acma.gov.au/consultations/2022-05/review-15-ghz-band-consultation-162022). A summary of these arrangements is at Appendix A.

There has been growing interest in the 1.5 GHz band to provide support for new services and expand operation of existing services, as follows:

Domestically and internationally, there is increasing demand for spectrum to support WBB services. Considerations at the 2015 World Radiocommunication Conference (WRC-15) resulted in the identification of the 1427–1518 MHz frequency range for International Mobile Telecommunications (IMT). Japan and numerous European countries have allocated spectrum for WBB use in all or part of the 1427–1518 MHz frequency range. Consequently, the associated equipment ecosystem is expanding.

Domestically, there is demand for making more spectrum available for WBB use by a variety of interests. These include mobile network operators (MNOs), wireless internet service providers, mining companies, utility companies and enterprise users. Submissions to the draft five-year spectrum outlook (FYSO) 2023–28 and the May 2022 paper reflected this growing demand; however, views were split on when spectrum in the 1.5 GHz band should be made available for WBB use. WA WBB operators want to delay further consideration until 2024, while LA WBB operators want spectrum to be made available as soon as possible.

WRC-03 and WRC-07 allocated additional spectrum in the 1518–1525 MHz and 1668–1675 MHz frequency ranges for MSS use (in addition to existing service allocations). This complemented existing L-band allocations. In response to the May 2022 paper, the satellite industry indicated the demand for MSS is increasing and, that in Australia, they are currently limited to operating in the 1525–1559 MHz (space-to-earth) and 1626.6–1660.5 MHz (earth-to-space) frequency ranges by the [Radiocommunications (Communication with Space Object) Class Licence 2015](https://www.legislation.gov.au/Series/F2015L01486).

Allocations to the broadcasting and broadcasting-satellite (both intended for DAB) services were made in the 1452–1492 MHz frequency range at the 1992 ITU World Administrative Radio Conference (WARC-92). Since 1996, arrangements have been in place to preserve options for possible terrestrial and satellite DAB use. While trials were carried out in Australia during the 1990s and 2000s, the DAB allocation in the 1.5 GHz band has remained unused for broadcasting services.[[9]](#footnote-9) We are not aware of widespread demand domestically for access to this spectrum to support DAB use.

Defence currently operates a range of services in different segments of the 1427–1535 MHz frequency range. In its submission to the [draft FYSO 2023–28](https://www.acma.gov.au/consultations/2023-03/draft-five-year-spectrum-outlook-2023-28) and the [proposed update to the Australian Radiofrequency Spectrum Plan](https://www.acma.gov.au/consultations/2020-08/proposed-update-australian-radiofrequency-spectrum-plan-consultation-272020) in 2020, Defence indicated an ongoing need for access to the band to support AMT with a desire to expand operations at some locations. They also have interest in mobile high-capacity WBB networking for domestic operations.

Submissions to the May 2022 paper also identified interest in the following new and expanded arrangements in the 1.5 GHz band:

2 submitters proposed developing arrangements to support narrowband PTP services

one submitter indicated they would like to continue stratospheric scientific balloon operations in the 1427–1535 MHz band. They also requested access to an additional 15–30 MHz to support newer wideband systems.

Given the range of these developments, we consider that the mix of services and applications currently supported in the band may no longer be optimal and is unlikely to promote the long-term public interest from use of the spectrum. We consider there is a good case to progress our review of the 1.5 GHz band to the *preliminary replanning* stage.

Noting the different pace of international developments for different uses in the band, it is proposed to progress the review of arrangements for MSS in the extended MSS L‑band first. A review of terrestrial (non-satellite) services in the broader 1427–1535 MHz frequency range will be progressed separately and is proposed for consideration in the 2024–25 financial year.

Several submissions to the May 2022 paper supported this approach as it will allow for the completion and adoption of ITU-R WBB/MSS coexistence studies later this year, as well as further development of international deployments and device ecosystems for WBB.[[10]](#footnote-10)

To the extent practical, the review of the extended MSS L-band will therefore consider:

Options for ongoing use of the extended MSS L-band by incumbent services.

Options for MSS use of the extended MSS L-band as well as coexistence measures with other in-band and adjacent band services. This will include coexistence measures between possible new services (including WBB) operating in the 1427–1518 MHz band. We acknowledge that there is ongoing work on this issue within the ITU-R and the outcomes are intended to provide guidance to countries wishing to deploy WBB and MSS in the 1.5 GHz band. This work may not be finalised within the intended timeframes for the extended MSS L-band review and implementation of associated arrangements; however, we will consider possible coexistence issues and measures to the extent possible.

It is intended that the next stage of the 1.5 GHz band review will consider arrangements for terrestrial (non-satellite) services in the broader 1427–1535 MHz band. This will facilitate a holistic consideration of the band by incumbent and proposed new services. We will review the timing of this stage of the consultation process as part of the development of the FYSO 2024–29.

The following issues will be considered as part of the next stage of the 1.5 GHz band review:

Options for ongoing use of the broader 1427–1535 MHz band by incumbent terrestrial (non-satellite) services and consideration of alternative spectrum solutions.

Options for new terrestrial services in the broader 1427–1535 MHz band including WBB and broadcasting services. These include coexistence measures with incumbent uses and users (including satellite services).

Options for expanded stratospheric scientific balloon operations, Defence use and narrowband fixed services in the broader 1427–1535 MHz band.

A review of the ongoing relevance of the 1.5 GHz band plan as it relates to use of the 1452–1492 MHz and 1525–1530 MHz bands.

We note that the next stage of the review of the 1.5 GHz band may or may not result in changes to arrangements for incumbent or proposed new users and uses.

# Desirable planning outcomes

The ACMA has identified relevant desirable planning outcomes for the review of the extended MSS L-band. These desirable outcomes take into account the legislative and policy environment, technological developments, international harmonisation issues, relevant domestic considerations and feedback from submissions to the May 2022 paper.

Existing and new uses identified for the extended MSS L-band present potentially competing demands for access to the same spectrum. This is particularly so in areas of high demand such as capital cities and other large population centres. While coexistence scenarios are generally contemplated in the ACMA’s band replanning activities, these need to be weighed against the potential reduction in utility and access to spectrum they could cause to both existing and new services. In some cases, exclusive access and licensing arrangements may be the most appropriate approach, while non-exclusive, shared access may be appropriate in others.

Optimisation of spectrum to promote the long-term public interest may result in replanning bands, which could affect incumbent services, including the need to relocate services to other parts of the spectrum or otherwise vary or cease operation. We acknowledge that any change to spectrum management arrangements may impact existing licensees operating in and adjacent to the extended MSS L-band. For this reason, when assessing options, we have identified the impacts on existing users and uses and, where possible, considered options for sharing or alternative arrangements that could enable the continued provision of these services. If an option involves loss of spectrum access for incumbent licensees, we typically allow an appropriate transition period for affected licensees to adjust to the new arrangements.

The proposed desirable planning outcomes for the review of the extended MSS L‑band are outlined below:

1. Support the introduction of MSS in all or part of the extended MSS L-band in a reasonable timeframe.
2. Support on-going use of the extended MSS L-band (and where relevant, adjacent bands) by incumbent licences and services as summarised at Appendix A. This includes:
3. Licences used for stratospheric balloon communications and licences held by Defence across the 1427–1535 MHz frequency range.
4. Fixed licences and services (PTP and PMP). This includes enabling the ongoing use of those licences used for the delivery of USO services in the 1427–1535 MHz band until such time as a proven alternate technology solution is identified and deployed (refer to the ‘Guiding legislation and policy’ section for further details).
5. Radio astronomy and meteorological services in and adjacent to the 1668–1675 MHz frequency range.
6. Devices authorised to operate in accordance with the [Radiocommunications (Low Interference Potential Devices) Class Licence 2015](https://www.legislation.gov.au/Details/F2022C00281) (the LIPD class licence), such as ground/wall penetrating radars.
7. Consider necessary regulatory measures for new MSS use in the extended MSS L‑band to enable coexistence with incumbent and possible future in-band and adjacent band services (such as WBB). This is so the introduction of MSS before options for other services are considered does not unduly limit or constrain future replanning of the broader 1.5 GHz band.

The desirable planning outcomes identified above recognise that consideration of arrangements for terrestrial services in the broader 1427–1535 MHz band will occur in the next stage of the 1.5 GHz band review. They are also consistent with the legislative and policy framework outlined in the first part of this paper. This includes the object of the Radiocommunications Act to promote the long‑term public interest derived from the use of the spectrum by:

facilitating the efficient planning, allocation and use of the spectrum,

facilitating use of the spectrum for commercial purposes,

facilitating use of the spectrum for defence purposes, national security purposes and other non-commercial purposes (including public safety and community purposes)

supporting the communications policy objectives of the government, as detailed in the ‘Guiding legislation and policy’ section.

### Question 1

Comment is sought on the proposed desirable planning outcomes for the review of the extended MSS L-band.

# Replanning options

The ACMA has identified 3 options for replanning the extended L‑band:

Option 1: No change, maintain the existing arrangements.

Option 2: Implement arrangements to enable MSS use of the extended MSS L‑band. All incumbent services and licences can continue operating in the band.

Option 3: Implement arrangements to enable MSS use of the extended MSS L‑band. Re-locate some or most incumbent services and licences to alternative bands or delivery techniques.

Further detail on each of these options is provided in this section.

When reading this section, note that our preliminary view for incumbent services is to:

provide protection to and support for the ongoing operation of radio astronomy and meteorological services operating both within and adjacent to the extended MSS L‑band

recognise the current delivery of USO services provided by Telstra’s DRCS/HCRC network using 1.5 GHz band spectrum

preserve existing arrangements for radiodetermination transmitters detailed in the LIPD class licence.

### Question 2

Comment is sought on the options identified. Do you have any alternative options to propose?

## Option 1

Under Option 1, there are no changes to the existing planning arrangements for the extended MSS L-band. This means MSS would not be introduced into the band and there would be no impact on incumbent services or licences.

## Option 2

Under Option 2, arrangements would be implemented to enable MSS use of the entire extended MSS L-band. Licences would be issued to applicants that could demonstrate that there is a relevant ITU satellite filing (refer to the business operating procedure for the submission and processing of applications for [space and space receive](https://www.acma.gov.au/publications/2020-08/guide/submission-and-processing-applications-space-and-space-receive-apparatus-licences) apparatus licences). Beyond ensuring the proposed operation is in accordance with ITU requirements[[11]](#footnote-11), no further assessment of compatibility between satellite systems is intended. Our view is that in this band, the ITU satellite coordination process is sufficient to resolve any compatibility matters.

As the extend MSS L-band is intended to complement and expand on existing MSS arrangements in the 1525–1559 MHz (space-to-earth) and 1626.6–1660.5 MHz (earth-to-space) frequency ranges, it is proposed to provide access using the same licensing mechanism. This would involve an amendment to the CSO class licence to include the extended MSS L-band.

Option 2 also allows the ongoing use of the extended MSS L-band by incumbent services and licences. To enable this, suitable coexistence measures need to be implemented. The May 2022 paper identified the relevant coexistence scenarios and the ACMA’s preliminary thinking on these. These are grouped into issues related to the 1518–1525 MHz (and adjacent) band/s and the 1668–1675 MHz (and adjacent) band/s.

A summary of arrangements currently in place, and adjacent to, the extended MSS L‑band that need to be considered follows, refer to Appendix A for further details:

* In and adjacent to the 1518–1525 MHz band:

PTP and PMP services in the 1427–1535 MHz band

aeronautical mobile applications in the 1427–1535 MHz band

radio astronomy services:

operating in the Australian Radio Quiet Zone Western Australia (ARQZWA), which covers the 70 MHz to 25.25 GHz band

operating at sites specified in Australian footnote AUS87 of the Australian Radiofrequency Spectrum Plan 2021 (the Spectrum Plan) in the 1.2–1.8 GHz band (among others)

communication with stratospheric balloons used for scientific research in the 1427–1535 MHz band

MSS in the 1525–1559 MHz frequency range

licensed ground/wall penetrating radars operating in the 30–12400 MHz band in accordance with the LIPD class licence.

* In and adjacent to the 1668–1675 MHz band:

apparatus-licensed radioastronomy services in the 1660–1670 MHz frequency range

radio astronomy services:

operating at the ARQZWA, which covers the 70 MHz to 25.25 GHz band[[12]](#footnote-12)

operating at sites specified in Australian footnote AUS87 of the Spectrum Plan in the 1.2–1.8 GHz band (among others)

Metsat earth-receive station in the 1670–1710 MHz band

metrological aids (MetAids) in the 1675–1700 MHz frequency range

licensed ground/wall penetrating radars operating in the 30–12400 MHz band in accordance with the LIPD class licence.

### 1518–1525 MHz and adjacent bands

The 1518–1525 MHz band is intended to be used for space-to-earth communications by the MSS. This means MSS user terminals will only receive signals in this band and do not pose an interference risk to incumbent licences and services. Of course, there is potential for incumbent services and licences to cause interference to MSS user terminals.

To manage this, MSS user terminals would not be afforded protection from such interference. This mirrors the existing situation for MSS use of the adjacent 1525–1535 MHz band and involves the same incumbent services. Furthermore, in their submission to the May 2022 paper, Telstra announced plans to upgrade and relocate most of their roughly 870 PTP licences in the 1427–1535 MHz frequency range to other bands within the next 3 to 5 years. This accounts for nearly 82% of PTP licences in the 1.5 GHz band and will further reduce any risk of interference.

There is also potential for a future change of arrangements in the 1427–1535 MHz band to affect MSS user terminals. As the MSS terminals in the extended MSS L-band would operate under a class licence, they are not afforded protection from interference. However, we will, as part of the next stage of the 1.5 GHz band review, take into account the potential effect on MSS receivers in the 1518–1525 MHz and adjacent bands when considering any change in arrangements. This could include the application of planning arrangements to reduce the risk of interference (such as the use of guard bands and additional restrictions on service deployments around ports and airports).

To better enable coexistence with other adjacent-band services, including possible WBB services, it is likely additional regulatory measures will also need to be applied to any MSS use in the L-band. At a minimum, the ACMA will seek to include a requirement (or assumption for interference management purposes) that from a specified date onwards, MSS stations implement better performing receivers, including more stringent blocking levels. This is so the introduction of MSS, before options for other services are considered, does not unduly limit or constrain future replanning in the broader 1.5 GHz band.

The actual regulatory measures required to enable coexistence will depend on the outcomes of the next stage of the 1.5 GHz band review and the subsequent changes to planning arrangements. As an example of measures that could be considered, the ITU-R has been studying options for coexistence between WBB and MSS in the 1.5 GHz band. A draft new Report ITU-R M.[REP.MSS & IMT L‑BAND COMPATIBILITY] (Doc. [4/77](https://www.itu.int/md/R19-SG04-C-0077/en)) and draft new Recommendation ITU-R M.[REC.MSS & IMT L-band COMPATIBILITY] (Doc. [4/78](https://www.itu.int/md/R19-SG04-C-0078/en)) will be considered by ITU-R Study Group 5 at its 25–26 September 2023 meeting for formal action on adoption and approval. In particular, Recommendation ITU-R M.[REC.MSS & IMT L-band COMPATIBILITY] provides examples of a number of different measures that could be applied to both WBB and MSS to reduce the risk of interference.

### 1668–1675 MHz and adjacent bands

The 1668–1675 MHz band is intended to be used for earth-to-space communications by the MSS. This means MSS user terminals will only transmit in this band and there is no interference risk to them; however, MSS user terminals pose an interference risk to incumbent services and licences.

To manage this risk, restrictions on the frequencies and areas where MSS user terminals can operate in are required to ensure the following licences and services are protected:

* The ARQZWA, established by the [Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023](https://www.legislation.gov.au/Series/F2023L00286) (the ARQZWA band plan) and encompassing the 70 MHz to 25.25 GHz frequency range.
* Apparatus-licenced radio astronomy services in the 1668–1670 MHz band operated by the CSIRO, located at Parkes and Narrabri in New South Wales.
* Radioastronomy facilities operating in the 1.2–1.8 GHz frequency range under footnote AUS87 of the Spectrum Plan.
* Metsat earth station receivers in the 1673.38–1678.62 MHz frequency range operated by Universal Space Network Inc, located at Yarragadee in Western Australia (this is consistent with footnote 380A of the Spectrum Plan, which requires MSS to protect earth stations of the Metsat service).

It is noted the CSO class licence already provides guidance on measures to manage interference for the ARQZWA. This is detailed in Note 3 at the end of section 8 and subsection 8(3) of the CSO class licence.

To manage interference in the identified radioastronomy and Metsat services and licences if Option 2 was adopted, we propose updating the CSO class licence as follows:

* Update subsection 8(2) authorising (if certain conditions are met) the operation of a station within 20 km of a radio astronomy observatory listed in footnote AUS87 of the Spectrum Plan to include frequency range 1670–1675 MHz.

Studies conducted under agenda item 1.31 in the [WRC-03 study cycle](https://www.itu.int/md/R03-WRC03-C-0003/en) identified that separation distances as large as 20–58 km may be required to protect radioastronomy services operating in the 1660–1670 MHz frequency range from MSS operating in adjacent bands. The 1660–1670 MHz frequency range is important for radioastronomy as it contains the spectral lines of the hydroxyl radical (OH). We propose that a 20 km separation distance is sufficient in this case, due to the general remote location of radioastronomy services and/or local terrain shielding that applies. It is noted that a 20 km separation distance currently applies to MSS with radioastronomy observatories listed in footnote AUS87 operating in the 1610–1626.5 MHz frequency range.

* Update subsection 8(3), which prohibits operation of a land station within 500 km of a radio astronomy observatory listed in footnote AUS87 of the Spectrum Plan as well as prohibiting stations onboard aircraft, to include the frequency range 1668–1670 MHz.

These restrictions were developed as an outcome of studies conducted under agenda item 1.31 in the [WRC-03 study cycle](https://www.itu.int/md/R03-WRC03-C-0003/en) that allocated the 1668–1675 MHz band for MSS. They are intended to provide co-channel protection to radioastronomy services from MSS operating in the 1660–1670 MHz frequency range. These requirements currently apply to MSS operation in the 1660–1660.5 MHz frequency range.

* Include a new subsection 8(3A) that requires MSS to not exceed a level of ‑128.1 dBm/MHz for more than 20% of the time at the output of the antenna of any earth-receive apparatus licence operating in the 1673.38–1675 MHz frequency range. This is the long-term level of protection detailed for Metsat services in [Recommendation ITU-R SA.1161](https://www.itu.int/rec/R-REC-SA/recommendation.asp?lang=en&parent=R-REC-SA.1161): ‘Sharing and coordination criteria for data transmission systems in the Earth exploration-satellite and meteorological-satellite services using satellites in geostationary orbit’. We are open to views on whether short-term protection criteria should also be applied for the protection of Metsat services.

The Bureau of Meteorology operates MetAids and Metsat services in the 1675–1710 MHz frequency range. As these operate in the band adjacent to the MSS, specific measures to manage interference may not be required. This is supported by [an analysis by Ofcom](https://www.ofcom.org.uk/consultations-and-statements/category-2/wireless-telegraphy-devices-2) in 2012[[13]](#footnote-13), which concluded there should be no sharing issues between MSS and adjacent band meteorological services.

## Option 3

Option 3 would be implemented like Option 2, except some or most existing apparatus-licensed services in and adjacent to the extended MSS L-band would be relocated to different frequencies or delivery techniques or be required to cease operation altogether. This means some of the interference and coexistence measures detailed under Option 2 would not apply under this option.

Possible incumbents that may be considered for relocation include incumbent PTP and PMP licences, aeronautical mobile applications and scientific research applications communicating with stratospheric balloons.

Importantly, under any variant of this option, the ACMA would continue to support the ongoing operation and protection of:

licences used for the delivery of USO services in the 1427–1535 MHz band until a proven alternate technology solution is identified and deployed

radio astronomy and meteorological services in and adjacent to the extended MSS L-band.

# Assessment of options

We have undertaken a preliminary assessment of the replanning options against the desirable planning outcomes for the extended MSS L-band. This section provides the outcomes of that assessment, along with our preliminary preferred option.

Feedback is sought on the discussion and assessment of options, including any evidence for the value of the band for MSS or other uses. This will inform our further consideration of the options for implementation.

## Assessment against the desirable planning outcomes

### Question 3

Comment is sought on the ACMA’s assessment of options.

### Option 1: No change to current arrangements in the extended MSS L-band

Option 1 maintains the current arrangements in the extended MSS L-band. As arrangements for MSS use in the extend L-band are not introduced, it does not meet the objective of desirable planning outcome 1.

Option 1 meets desirable planning outcomes 2 and 3. This is because no MSS means there would be no impact on incumbent in-band and adjacent band licences, and services for this stage of the review (of course, the next stage of the 1.5 GHz band review would still consider planning options for the broader 1427–1535 MHz band that may affect services in that frequency range). Furthermore, there is no need to consider the implementation of measures on the MSS to enable coexistence with possible future services.

While this option meets 2 of the 3 desirable planning outcomes, it does not support the introduction of MSS. We consider that the overall utility and public benefit derived from use of the spectrum is not increased under this option.

### Option 2: Enable MSS in the extended MSS L-band

The main elements of Option 2 are:

In line with desirable planning outcome 1, this option supports the introduction of arrangements for MSS use of the 1518–1525 MHz (space-to-earth) and 1668–1675 MHz (earth-to-space) frequency ranges. This provides access to more spectrum and complements existing arrangements for MSS in the 1525–1559 MHz and 1626.5–1660.5 MHz. Under this option, MSS stations operating in the 1518–1525 MHz band will not be afforded protection from incumbent in-band and adjacent band services. This is similar to the arrangements in place for MSS operating in the 1525–1535 MHz band. To manage the risk of interference from MSS stations in the 1668–1675 MHz band, various operational restrictions are proposed on their operation (refer to the ‘Replanning options’ section for details).

There is no change in arrangements for incumbent licences and services. Therefore, in line with desirable planning outcome 2, this option supports ongoing use of the extend L-band by incumbent licences and services. The next stage of the 1.5 GHz band review would still consider planning options for the broader 1427–1535 MHz band that may affect services in that frequency range.

If arrangements for MSS are implemented in the extended L-band before the review of arrangements for terrestrial (non-satellite related) services in the broader 1427–1535 MHz band, then there is a risk that this could lead to coexistence issues in the future.

We anticipate that any subsequent regulatory measures applied to MSS use in the L‑band will, at a minimum, include a requirement (or assumption for interference management purposes) that from a specified date onwards, MSS stations implement better performing receivers including more stringent blocking levels. Recommendation ITU-R M.[REC.MSS & IMT L-band COMPATIBILITY] (Doc. [4/78](https://www.itu.int/md/R19-SG04-C-0078/en)) provides examples of a number of different measures that could be applied to both WBB and MSS to reduce the risk of interference.

We consider that this option best meets the desirable planning outcomes and that the overall utility of the extended MSS L-band and the long-term public interest derived from use of the spectrum is increased under this option.

### Option 3: Enable MSS in the extended MSS L-band and relocate some incumbent services

Option 3 is the same as Option 2, except that defined incumbent licence and services in, and adjacent to, the extended MSS L-band would be re-located to different frequencies or delivery techniques, or be required to cease operation altogether. The ACMA intends to support the continued operation of radio astronomy and meteorological services in, and adjacent to, the extended MSS L-band. This only leaves incumbent licences and services operating in the 1427–1535 MHz band to consider.

While individual incumbent licences and services could be investigated for re-location at this time, such a process would take time and further delay consideration of arrangements for MSS in the extended MSS L-band. We are not aware of a pressing need to perform such an investigation before arrangements for MSS are introduced. This is demonstrated by existing MSS operation in the adjacent 1525–1535 MHz band, which shares the spectrum with the same incumbent licences and services. Furthermore, it would be more efficient to perform a holistic review of arrangements for terrestrial services in the broader 1427–1535 MHz in one process. This is what is currently proposed for the next stage of the of the 1.5 GHz band review.

We consider that this option meets desirable planning outcomes 1 and 3. We also consider the overall utility of the extended MSS L-band and the long-term public interest derived from use of the spectrum is increased under this option. However, the realisation of these benefits would be delayed compared to Option 2.

Table 1 provides a summary of our assessment of each of the replanning options against the desirable planning outcomes.

Summary of assessment of option against the desirable planning outcomes

Red: Does not meet the desirable planning outcome

Orange: Somewhat or partially meets the desirable planning outcome

Green: Either meets or best meets desirable planning outcome

|  |  |  |  |
| --- | --- | --- | --- |
| Option | Support introduction of MSS | Support on-going use by all incumbent services | Measures to enable MSS coexistence with existing and future services |
| 1 | No | Yes, no impact on incumbent licences and services (Note 1) | Not required as MSS use is not supported |
| 2 | Yes | Yes, no impact on incumbent licences and services (Note 1) | Measures identified for incumbent licences and services (Note 2)  Measures for future services will need to be considered and assessed as part of next stage of 1.5 GHz review (Note 3) |
| 3 | Yes, but delayed introduction compared to Option 2 | Varies depending on the number of licences and services that would be identified for re‑location | Same as Option 2 |

Note 1: The next stage of the 1.5 GHz band review would still consider planning options for the broader 1427–1535 MHz band that may affect services in that frequency range.

Note 2: Refer to the ‘Replanning options’ section for details on the proposed measures.

Note 3: While various measure to enable coexistence may be considered, at a minimum, we anticipate these will include a requirement (or assumption for interference management purposes) that from a defined date onwards, MSS stations implement a higher defined blocking performance.

## Preliminary preferred option

The ACMA’s preliminary preferred approach is to implement Option 2 as it best aligns with our desirable planning outcomes. This option also allows arrangements for MSS to be implemented in a shorter timeframe than Option 3.

The next stage of the 1.5 GHz band review will consider options for new terrestrial (non-satellite) services as well as options for expanding arrangements for incumbent services across the broader 1427–1535 MHz band. This will provide more time for Telstra (the major licensee in the 1.5 GHz band) to implement its planned relocation of 870 1.5 GHz PTP licences to different bands. It will also provide more time for alternative delivery mechanisms for the USO to be investigated and implemented. The future review will not consider changes to arrangements for radio astronomy or meteorological services operating in, and adjacent to, the 1.5 GHz band. We intend to maintain existing arrangements for these services and continue providing protection to them.

As Option 2 will have no impact on incumbent licences and services and is relatively simple to implement, we are also seeking comment on the required variations to the CSO class licence as part of this consultation to expedite the process (if we decide to adopt this option). A draft Radiocommunications (Communication with Space Object) Class Licence Variation 2023 (No. 1) is available alongside the consultation paper for consideration. This draft instrument includes the regulatory restrictions detailed for Option 2 in the ‘Replanning options’ section.

If the updates to the class licences are made, then we propose to adopt the same allocation and licensing processes for those portions of the MSS L-band spectrum that are already available for use. Licence applications would be considered within the existing Business Operating Plan, [*Procedures for space and space receive licensing*](https://www.acma.gov.au/node/1507).[[14]](#footnote-14)Beyond ensuring the proposed operation is in accordance with ITU requirements[[15]](#footnote-15), no further assessment of compatibility between satellite systems is intended. Our view is that in this band, the ITU satellite coordination process is sufficient to resolve any compatibility matters.

It is important to note that it is likely the next stage of the 1.5 GHz review will identify additional regulatory measures on MSS L-band use to facilitate coexistence with possible new services or to support the expansion of existing services in the band. The exact nature of any measures will depend on the outcomes of that review. We anticipate that any subsequent regulatory measures applied to MSS use in the L-band will, at a minimum, include a requirement (or assumption for interference management purposes) that from a specified date onwards, MSS stations implement better performing receivers, including more stringent blocking levels.

To ensure prospective MSS licensees are aware of the next stage of the 1.5 GHz band review and any implications it will have, we intend to:

attach an advisory note to any space-receive licences issued flagging the future review, including our intention to define a date for the implementation of (or assumption for interference management purposes) better performing MSS receivers, including more stringent blocking levels

include a note in the business operating procedures for the submission and processing of applications for [space and space receive](https://www.acma.gov.au/publications/2020-08/guide/submission-and-processing-applications-space-and-space-receive-apparatus-licences) apparatus licences, flagging the future review of arrangement and possible application of regulatory measures on MSS operating in L-band. This will include a statement of our intention to define a date for the implementation of (or assumption for interference management purposes) better performing MSS receivers, including more stringent blocking levels.

Until the next stage of the 1.5 GHz band review is completed, the ACMA will continue to enforce [Embargo 70](https://www.acma.gov.au/publications/2019-10/rules/embargo-70) for new assignments in the 1427–1518 MHz band. This will not prevent case-by-case consideration of new licences being issued. Maintaining the embargo is intended to ensure any new licensees are aware arrangements in the band may change, preserve future planning options and reduce the impact any change may have on incumbent services.

### Question 4

Comment is sought on the ACMA’s preliminary preferred approach, including the proposed draft amendments to the [Radiocommunications (Communication with Space Object) Class Licence](https://www.legislation.gov.au/Series/F2015L01486) 2015 and associated licence application and allocation process.

# Next steps

An indicative timeline for the next steps in the review of the 1.5 GHz band is provided in Table 2. The dates are subject to change, pending consideration of feedback provided by stakeholders to this paper and other ACMA priorities.

We have decided to adopt a ‘reply to comment’ period for this consultation. Following the first consultation period where initial submissions are received, a second period of 30 days will be provided – the reply to comment period. This will allow stakeholders to review what other entities have said in their initial submissions and make a further submission that supports or disagrees with them. This approach enhances transparency and allows stakeholders to test or challenge the issues raised in submissions and provide any additional, relevant information to the ACMA.

We will review the timing on the next stage of the 1.5 GHz band review process as part of the development of the FYSO 2024–29.

Indicative timeline for the 1.5 GHz band review process

| Action | Timeframe |
| --- | --- |
| Review of the 1.5 GHz band: Extended MSS L-band options paper consultation period | 16 August 2023 to 20 September 2023 |
| Reply to comment period | 29 September 2023 to 28 October 2023 |
| Release outcomes paper for the 1.5 GHz extended MSS L‑band consultation  Amend the CSO class licence (if implemented) | Q1 2024 |
| Review the 1.5 GHz band: 1427–1535 MHz band consultation | Q3 2024 |
| Release outcomes paper for the 1427–1518 MHz band consultation | Q4 2024 |

# Invitation to comment

## Making a submission

We invite comments on the issues set out in this options paper.

[Online submissions](https://www.acma.gov.au/have-your-say) can be made by uploading a document. Submissions in PDF, Microsoft Word or Rich Text Format are preferred.

Submissions by post can be sent to:

The Manager

Wireless Broadband

Australian Communications and Media Authority

PO Box 78

Belconnen ACT 2616

The closing date for submissions is COB, **Wednesday 20 September 2023**.

Consultation enquiries can be emailed to [freqplan@acma.gov.au](mailto:xxx@acma.gov.au).

#### Publication of submissions

We publish 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.

#### Reply to comment period

Following the end of the consultation period, we will publish submissions and then open a 30-day ‘reply to comment’ window to allow stakeholders to comment on other parties’ submissions. In the reply to comment period, submitters can review what others have said in their initial submissions and make a further submission that supports, opposes, or offers comment on their views. This approach promotes transparency and allows stakeholders to test the issues raised in submissions and provide any additional, relevant information to the ACMA.

#### Privacy

View information about our policy on the [publication of submissions](https://www.acma.gov.au/publication-submissions), including collection of personal information during consultation and how we handle that information.

Information on the *Privacy Act 1988,* how to access or correct personal information, how to make a privacy complaint and how we will deal with any complaints, is available in our [privacy policy](https://www.acma.gov.au/privacy-policy).

# Glossary

|  |  |  |
| --- | --- | --- |
| 1.5 GHz band |  | the 1427–1518 MHz, 1518–1525 MHz and 1668–1675 MHz frequency ranges |
| 1.5 GHz band plan |  | [Radiocommunications 1.5 GHz Frequency Band Plan 2015](https://www.legislation.gov.au/Details/F2015L01271) |
| 3GPP |  | 3rd Generation Partnership Project |
| ACMA |  | Australian Communications and Media Authority |
| AMT |  | aeronautical mobile telemetry |
| AMTA |  | Australian Mobile Telecommunications Association |
| ARCIA |  | Australian Radio Communications Industry Association |
| ARQZWA |  | Australian Radio Quiet Zone Western Australia |
| AVST |  | Alternative Voice Services Trials program |
| AWL |  | area-wide apparatus licence |
| CA SSWG |  | Communications Alliance – Satellite Services Working Group |
| CSIRO |  | Commonwealth Scientific and Industrial Research Organisation |
| CSO class licence |  | [Radiocommunications (Communication with Space Object) Class Licence](https://www.legislation.gov.au/Series/F2015L01486) 2015 |
| DAB |  | Digital Audio Broadcasting |
| ECC |  | Electronic Communications Committee |
| extended MSS L-band |  | the 1518–1525 MHz and 1668–1675 MHz frequency ranges |
| FDD |  | Frequency Division Duplex |
| FYSO |  | Five-year spectrum outlook |
| HCRC |  | High-Capacity Radio Concentrator |
| IMT |  | International Mobile Telecommunications |
| ITU |  | International Telecommunication Union |
| ITU-R |  | ITU Radiocommunication Sector |
| LA WBB |  | Local-area wireless broadband |
| LEO |  | Low Earth Orbit |
| LIPD class licence |  | [Radiocommunications (Low Interference Potential Devices) Class Licence](https://www.legislation.gov.au/Details/F2022C00281) 2015 |
| LTE |  | Long Term Evolution (4G) |
| May 2022 paper |  | [*Review of the 1.5 GHz band*](https://www.acma.gov.au/consultations/2022-05/review-15-ghz-band-consultation-162022)discussion paper |
| MetAids |  | Meteorological Aid Service |
| Metsat |  | Meteorological Satellite |
| MNO |  | mobile network operator |
| MSS |  | mobile-satellite service |
| PFD |  | power-flux density |
| PMP |  | point-to-multipoint |
| PTP |  | point-to-point |
| SDL |  | supplemental downlink |
| Spectrum Plan |  | Australian Radiofrequency Spectrum Plan 2021 |
| TDD |  | time division duplex |
| TLG |  | technical liaison group |
| USO |  | universal service obligation |
| WA WBB |  | wide-area wireless broadband |
| WBB |  | wireless broadband |
| WRC |  | World Radiocommunication Conference |

# Appendix A: Summary of 1.5 GHz band arrangements

A summary of existing arrangements in the 1.5 GHz band is provided in Figure 2 below. A more detailed description is provided in the [May 2022 paper](https://www.acma.gov.au/consultations/2022-05/review-15-ghz-band-consultation-162022). Tables 3–5 also provide a breakdown of licences and licensees in the 1.5 GHz band.

1.5 GHz and adjacent band arrangements

Timeline

Description automatically generated

A picture containing timeline

Description automatically generated

Top 10 PTP licensees in 1427–1535 MHz, at 1 July 2023

| **Licensee** | **Number of licences** |
| --- | --- |
| Telstra Corporation Limited | 866 |
| University of New South Wales | 26 |
| Department of Police & Emergency Management (Tas) | 26 |
| Powercor Australia Ltd | 25 |
| Essential Energy | 19 |
| Queensland Rail Limited | 12 |
| Electricity Networks Corporation | 12 |
| Power and Water Corporation | 11 |
| Western Australia Police | 10 |
| Airservices Australia | 5 |

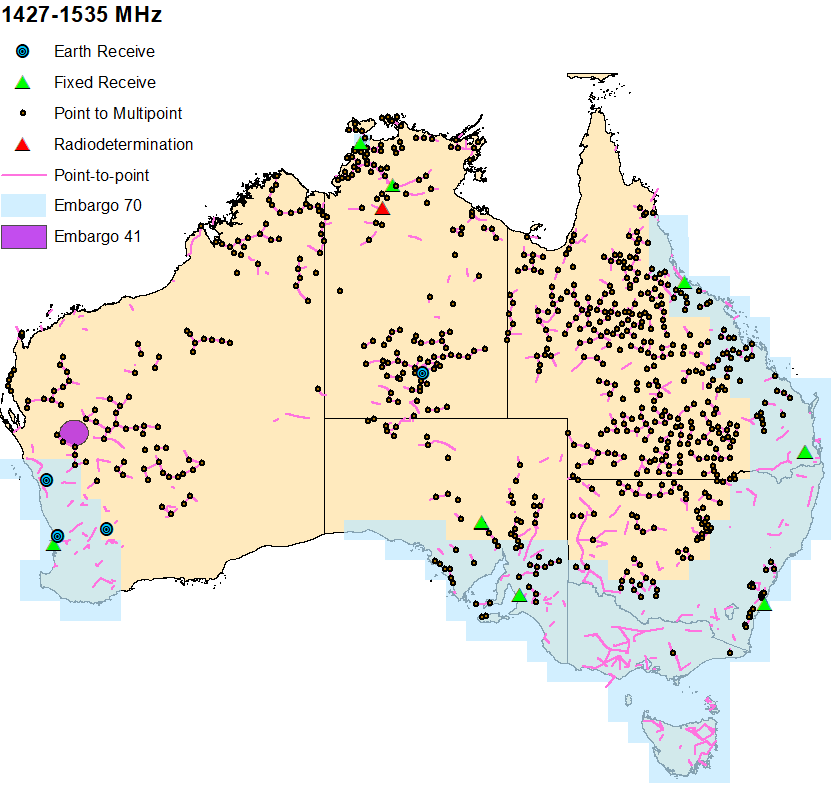
Licensees and licence types (other than PTP) in 1427–1535 MHz, at 1 July 2023

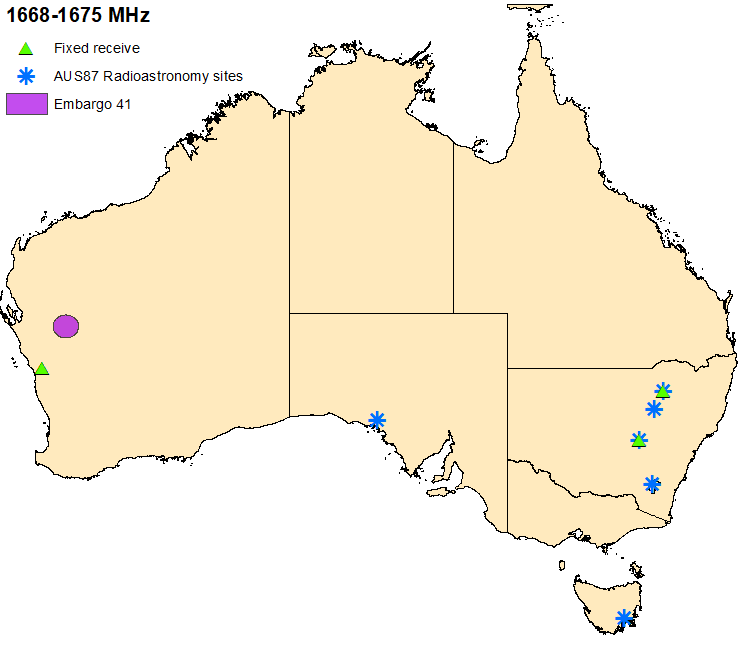
| **Licensee and licence types** | **Number of licences** |
| --- | --- |
| **Telstra Corporation Limited** | **721** |
| Point-to-multipoint | 721 |
| **Inmarsat** | **27** |
| Earth receive | 5 |
| Space | 22 |
| **Department of Defence** | **20** |
| Aeronautical assigned system | 2 |
| Aircraft assigned | 5 |
| Fixed receive | 12 |
| Radiodetermination | 1 |
| **University of New South Wales** | **10** |
| Earth receive | 1 |
| Point-to-multipoint | 9 |
| **Thuraya** | **3** |
| Space | 3 |
| **Astrocat SA** | **2** |
| Space | 2 |
| **EOS Defence Systems Pty Ltd** | **2** |
| Scientific assigned | 2 |
| **Mungalalu Truscott Airbase** | **1** |
| Earth receive | 1 |

Licensees and licence types in 1668–1675 MHz, at 1 July 2023

| **Licensee and licence types** | **Number of licences** |
| --- | --- |
| **Commonwealth Scientific and Industrial Research Organisation (CSIRO)** | **2** |
| Earth receive | 2 |
| **Universal Space Network Inc** | **2** |
| Earth receive | 2 |

Location of apparatus licences in the 1.5 GHz band, at July 2023





1. There may be a small change to the existing BoP if changes to the CSO class licence are made. [↑](#footnote-ref-1)
2. Australian Communications and Media Authority (ACMA), [*Corporate plan 2023–24*](https://www.acma.gov.au/publications/2021-08/plan/acmas-corporate-plan-2021-22)*,* ACMA website, 2023, accessed 27 July 2023. [↑](#footnote-ref-2)
3. Telstra, [Submission to the 2021 Regional Telecommunications Review](https://www.infrastructure.gov.au/sites/default/files/documents/rtr2021-submission-no-613-telstra-public.pdf), 2021, accessed 26 April 2022, p. 23. [↑](#footnote-ref-3)
4. Department of Infrastructure, Transport, Regional Development, Communications and the Arts, [*New satellite working group charts way forward for telco industry*](https://minister.infrastructure.gov.au/rowland/media-release/new-satellite-working-group-charts-way-forward-telco-industry) [media release], Australian Government, Wednesday 15 February 2023, accessed 23 March 2023. [↑](#footnote-ref-4)
5. Technical conditions include maximum power, frequency range, out-of-band emissions limits, geographical licence area, and out-of-area emission limits. [↑](#footnote-ref-5)
6. Specifically, procedures for submission and processing of applications for [space and space receive apparatus licences](https://www.acma.gov.au/procedures-space-and-space-receive-licensing) and [earth, earth receive apparatus licences and device registrations under area-wide apparatus licences for fixed earth stations](file:///C:/Users/NTomask/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/0PJ5DHPT/earth,%20earth%20receive%20apparatus%20licences%20and%20device%20registrations%20under%20area-wide%20apparatus%20licences%20for%20fixed%20earth%20stations). [↑](#footnote-ref-6)
7. European Communications Office (ECO), [ECC Report 299: *Measures to address potential blocking of MES operating in bands adjacent to 1518 MHz (including 1525-1559 MHz) at sea ports and airports*](https://docdb.cept.org/document/9066), ECO website, 2019, accessed 8 August 2023. [↑](#footnote-ref-7)
8. While the 1.5 GHz band plan also restricts use of the band by terrestrial and satellite broadcasting services, the intention was to preserve options for potential future use by these services. [↑](#footnote-ref-8)
9. Australian Communications and Media Authority (ACMA), [*The future delivery of radio*](https://www.acma.gov.au/publications/2020-03/report/future-delivery-radio), ACMA website, 2020, accessed 8 August 2023. [↑](#footnote-ref-9)
10. Work on this issue has progressed within the ITU-R. The draft new Report ITU-R M.[REP.MSS & IMT L‑BAND COMPATIBILITY] (Doc. [4/77](https://www.itu.int/md/R19-SG04-C-0077/en)) and draft new Recommendation ITU-R M.[REC.MSS & IMT L-band COMPATIBILITY] (Doc. [4/78](https://www.itu.int/md/R19-SG04-C-0078/en)) will be considered by Study Group 5 at its 25-26 September 2023 meeting for formal action on adoption and approval. [↑](#footnote-ref-10)
11. In this regard ITU Radio Regulations APPENDIX 5 (REV.WRC-19), Identification of administrations with which coordination is to be affected or agreement sought under the provisions of Article 9 specifies coordination requirements that are relevant to Australia. [↑](#footnote-ref-11)
12. See also section 3.5.6 Protection for the Mid-West Radio Quiet Zone in our business operating procedure for submission and processing of applications for [space and space receive](https://www.acma.gov.au/publications/2020-08/guide/submission-and-processing-applications-space-and-space-receive-apparatus-licences) apparatus licences information on space receive. [↑](#footnote-ref-12)
13. Ofcom, [*Licence Exemption of Wireless Telegraphy Devices*](https://www.ofcom.org.uk/consultations-and-statements/category-2/wireless-telegraphy-devices-2), Ofcom, United Kingdom Government, 2012, accessed 9 August 2023. [↑](#footnote-ref-13)
14. This paper notes the intention to make a small change to the existing business operating procedure if changes to the CSO class licence are made. [↑](#footnote-ref-14)
15. In this regard, ITU Radio Regulations APPENDIX 5 (REV.WRC-19), Identification of administrations with which coordination is to be affected or agreement sought under the provisions of Article 9 specifies coordination requirements that are relevant to Australia. [↑](#footnote-ref-15)