Replanning of the 1880–1920 MHz band

Outcomes paper

NOVEMBER 2023

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Executive summary

The ACMA released the [*Exploring future use of the 1.9 GHz band*](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) discussion paper in November 2021. This paper identified domestic and international considerations for the future use of the 1880–1920 MHz band (the 1.9 GHz band) and explored views on possible changes in planning arrangements for the band. Following the discussion paper, the ACMA released the [*Replanning of the 1880–1920 MHz band*](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) options paper in November 2022.

Current regulatory arrangements in the 1.9 GHz band are optimised to support the existing mixture of uses in Australia:

* Class-licensed cordless communications devices in the frequency range 1880‑1900 MHz Australia-wide.
* Apparatus-licensed point-to-point (PTP) and point-to-multipoint (PMP) systems in the frequency range 1900–1920 MHz in regional and remote areas. PMP is typically used to provide local area wireless broadband (LA WBB) services.

Various low interference potential class-licensed devices (LIPD) in the entire band, Australia-wide.

The options paper set out 4 possible options for future use of the 1.9 GHz band:

* **Option 1:** maintaining existing arrangements.
* **Option 2:** expanding short range wireless broadband (SR WBB) arrangements for exclusive use in 1880–1900 MHz band to include shared use in the 1900–1920 MHz frequency range, Australia-wide.
* **Option 3:** introducing arrangements to allow for rail mobile radio (RMR) in the 1900–1910 MHz frequency range on an Australia-wide basis, both exclusively and shared with existing services on an Australia-wide basis, with no change to current arrangements in the rest of the band.

**Option 4:** maintaining exclusive SR WBB access to 1880–1900 MHz, extending arrangements for SR WBB to allow shared use in the 1900–1920 MHz frequency range, Australia-wide; introducing arrangements to allow for RMR in the 1900–1910 MHz frequency range, Australia-wide, on a shared and coordinated basis with other services, while maintaining arrangements for LA WBB and PTP in regional and remote areas.

We received 11 responses to the options paper from the rail, communications and audio wireless sectors. Respondents favoured either Option 3 or Option 4 (the ACMA’s preliminary preferred option).

Of the responses that addressed sunsetting of the 1900–1920 MHz Frequency Band Plan 201*2*, all either supported or did not oppose sunsetting, and the instrument was allowed to sunset on 1 April 2023. As a result, PTP services are now a primary service in regional and remote areas of the band.

A ‘reply to comment’ period opened on 27 March 2023 and closed on 21 April 2023, to allow replies to the responses received for the options paper. We received 5 replies from the rail and communications sectors.

Following consideration of responses and replies, we have identified planning outcomes for the 1.9 GHz band.

The ACMA will move to implement the planning decisions, which will include the development of technical planning frameworks (including further consultation where necessary) and, where appropriate, detailed licensing, allocation and pricing considerations. Planning outcomes identified at this stage include both ACMA planning decisions as well as preliminary views on these future activities, some of which may be subject to further legislative or consultative processes.

## Industry feedback and ACMA considerations

Strong support was provided for the ACMA’s preliminary preferred option (Option 4); however, respondents supporting Option 4 were generally concerned about how the various technologies could coexist, recommending coexistence studies or interference mitigation strategies to manage the issue. Option 3 gained strong support from the railway industry and state government organisations concerned with potential interference issues affecting rail safety systems and critical railway operations.

Seven submissions received addressed the ACMA’s 5 desirable planning outcomes for the review of the 1.9 GHz band:

1. Maintain regulatory arrangements for existing services within the 1.9 GHz band.
2. Expand arrangements for SR WBB services.
3. Introduce arrangements for new RMR services.
4. Maintain coexistence with 1.9 GHz band services.

Maintain coexistence with adjacent band services.

Of these submissions, 6 supported all planning outcomes. One submission supported only 4 of the 5 planning outcomes – Outcome 2 was not supported - arguing that interference from class-licensed sources (SR WBB) would be detrimental to RMR.

## Planning decisions and preliminary views

The ACMA has concluded that arrangements consistent with a modified Option 3 is likely to best achieve the desirable planning outcomes identified for the band.

Key planning decisions identified for the 1880–1920 MHz band are consistent with a variation of arrangements proposed under Option 3 of the options paper. This involves:

* Maintaining SR WBB use under Australia-wide class-licensing arrangements across the 1880–1900 MHz frequency range. Also updating these arrangements to ensure support for ‘future DECT’ (indoor and outdoor applications).
* Introducing Australia-wide apparatus-licensed arrangements for SR WBB (‘future DECT’) indoor only applications in the 1900–1920 MHz frequency range.
* Maintaining LA WBB and PTP access arrangements across the 1900–1920 MHz frequency range in regional and remote areas. The ACMA will consider the need for restrictions on new licences near defined rail corridors. We will also assess whether existing licences will be affected by arrangements developed to support the introduction of RMR.
* Preserving options for RMR services in the 1900–1910 MHz segment of the band for new uses and applications. The ACMA intends to work with industry to develop technical arrangements for RMR. This will include consideration of existing rail safety and communications spectrum licences in the 1800 MHz band as well as any timeframes to deploy services in the 1.9 GHz band. We note that the outcomes of the 1.9 GHz review process, including the identification of a dedicated 10 MHz of spectrum for RMR operation Australia-wide, may be a relevant consideration in the expiring spectrum licence process for 1800 MHz band spectrum licences.

The ACMA has formed the view that this combination of measures will best promote the long-term public interest from use of the band.

Based on the outcomes identified in this paper, a summary of the overall proposed configuration for the 1.9 GHz band is shown in Figure 3 of the ‘Planning outcomes’ section.

## Next steps

A high-level implementation plan has been developed and is outlined in Table 1 in the ‘Next steps’ section.

# Introduction

The 1.9 GHz band is allocated in the [*Australian Radiofrequency Spectrum Plan 2021*](https://www.legislation.gov.au/Details/F2021L00617) (the Spectrum Plan) to fixed and mobile services on a primary basis. Under the Spectrum Plan, the 1900–1920 MHz frequency range is currently allocated for PMP services on a primary basis and, following the sunsetting of the 1900–1920 MHz frequency band plan on 1 April 2023, PTP services on a primary basis in regional and remote areas. Coordination and licensing arrangements are described in the Radiocommunications Assignment and Licensing Instruction (RALI) FX19 and RALI FX03.

In the 1880–1900 MHz frequency range, the use of cordless telecommunications systems (CTS) including Digital Enhanced Cordless Telecommunications (DECT) and the personal handy-phone system (PHS) is authorised under the [Radiocommunications (Cordless Communications Devices) Class Licence 2014](https://www.legislation.gov.au/Details/F2021C00645) (cordless communications devices class licence).

Before October 2017, access to the 1900–1920 MHz frequency range in metropolitan areas was authorised by spectrum licences. At licence expiry, spectrum licence holders did not seek renewal of their licences. Consequently, the frequency range was no longer made available for spectrum licensing, with [Embargo 76](https://www.acma.gov.au/publications/2019-11/rules/embargo-76) put in place to preserve future planning options in metropolitan areas while making the band available elsewhere.

The 1900–1920 MHz frequency range is identified for International Mobile Telecommunications (IMT) in the International Telecommunication Union (ITU) Radio Regulations. Current domestic use for wireless broadband (WBB) services has been low, although there has been some recent increase in activity in the band. There is, however, substantial WBB use of spectrum licences in the adjacent bands below 1880 MHz and above 1920 MHz.

In response to these developments, the ACMA moved the band into the ‘initial investigation’ phase of replanning in its work program in the 2020–24 five-year spectrum outlook ([FYSO](https://www.acma.gov.au/five-year-spectrum-outlook)).

The ACMA released the [*Exploring future use of the 1.9 GHz band*](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) discussion paper in November 2021. The consultation closed in February 2022, with 22 responses received. This paper identified domestic and international considerations for the future use of the 1.9 GHz band and explored views on possible changes in planning arrangements for the band.

Following the discussion paper, the ACMA released the [Replanning of the 1880–1920 MHz band](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) options paper in November 2022. The consultation closed in March 2023, with 11 responses received from industry and interested parties.

A ‘reply to comment’ period was then held, to allow replies to the responses to the submissions we received for the options paper. We received 5 replies.

This paper presents the ACMA’s replanning outcomes for the 1.9 GHz band and informs stakeholders about the future use of the band.

## Legislative and policy environment

Managing spectrum efficiently and effectively for the benefit of all Australians is a key priority for the ACMA.[[1]](#footnote-2)

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 managing 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, national security and other non‑commercial purposes (including public safety and community purposes)
3. supports the communications policy objectives of the Australian Government.

## Licensing arrangements

There are 3 licensing approaches available to the ACMA for authorising access to spectrum: spectrum, apparatus and class licences. These approaches influence how spectrum replanning 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 typically been utilised in 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[[2]](#footnote-3) and generally do not 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 design features such as their ability to be sub-divided.

An apparatus licence generally 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. Apparatus licences are typically issued by the ACMA ‘over the counter’, consistent with administrative policy published by the ACMA (for example, RALIs). [Taxes and cost recovery charges apply](https://www.acma.gov.au/fees-apparatus-licences) in relation to apparatus licences, which cover our costs and incentivise licensees to use spectrum efficiently.

The ACMA has also created the [area-wide licence](https://www.acma.gov.au/area-wide-apparatus-licence).[[3]](#footnote-4) This authorises the operation of one or more radiocommunications transmitters in a defined geographic area within frequencies specified in the licence, subject to the conditions included on the issued licence and in any applicable licence condition determination. The licence type is scalable, enabling its use for authorising different sized geographic areas and bandwidths. Unlike other transmitter licence types – which typically align with specific uses and purposes – the area-wide licence can authorise 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 class licence. These conditions may include technical and geographic matters and may pertain to the type of use or class of user.

## Spectrum planning outcomes development

We are guided in our spectrum management functions by [the object of the Radiocommunications Act](https://www.acma.gov.au/object-and-scope-radiocommunications-act-1992), set out in section 3. A balanced application of regulatory and market mechanisms is often necessary to achieve key elements of the object of the Radiocommunications Act, in particular promoting the long-term public interest derived from the use of the radiofrequency spectrum and meeting the government’s policy objectives.

The [*Exploring future use of the 1.9 GHz band*](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) discussion paper noted that due to evolving technologies and use cases in the band, the current regulatory arrangements in the band are unlikely to now align with the spectrum uses and users that best promote the long-term public interest.

The ACMA invited responses from stakeholders on a range of questions in the discussion paper, with 22 responses received. Two common themes were present in the paper:

* The ACMA should maintain the existing 20 MHz (1880–1900 MHz) band for DECT and ‘future DECT’ (the new generations of DECT; DECT evolution and DECT-2020 new radio (NR)) use, including cordless telephony, wireless microphone systems and new applications such as the Internet of Things (IoT).
* The ACMA should maintain the existing 20 MHz (1900–1920 MHz) band for WBB, LA WBB and PTP services in regional or remote areas.

As an outcome of that consultation process, we formed the preliminary view that a mix of uses is most likely to promote the long‑term public interest derived from the use of the 1.9 GHz band. Four replanning options were presented in the [Replanning of the 1880–1920 MHz band](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) options paper, of which Option 4 was the ACMA’s preliminary preferred option.

In determining the planning outcomes presented in this paper, we considered responses to the discussion and options papers, as well as the replies to responses on the options paper. We also considered other relevant developments, both domestic and international, that may impact the potential future use of the band.

We will consult further on proposed licensing and technical planning arrangements as outlined in the ‘Next steps’ section.

## Issues not within the scope of this paper

### Apparatus licence tax arrangements

A review of the apparatus licence tax arrangements that apply to different services is not within the scope of this paper. In general, there are opportunities for interested parties to provide their views about pricing matters as part of the consultation on the annual work program in the [five-year spectrum outlook](https://www.acma.gov.au/publications/2023-10/five-year-spectrum-outlook-2023-28) (FYSO). It is also noted in the FYSO 2023–28 that the ACMA is considering a review of apparatus licence taxes in the frequency ranges 520 MHz to 2690 MHz in the 2025–26 financial year, where there would be further opportunities to comment. In addition, if the proposed planning arrangements outlined in this paper extend to consultation on proposed licensing arrangements, there would be opportunities to comment on the relevant pricing matters at that time.

### Engagement in international activities

The scope of this paper does not extend to Australian strategies or positions on matters under consideration in international spectrum management forums, such as the ITU or Asia-Pacific Telecommunity (APT). These matters are dealt with separately through relevant preparatory processes led by the ACMA and/or the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (the Department). Stakeholders interested in these processes can find more information on the [ACMA website](https://www.acma.gov.au/international-radiocommunications-activities) or by contacting either the ACMA’s International Radiocommunications Section ([irs@acma.gov.au](mailto:irs@acma.gov.au)) or the Department’s International Radiocommunications Section ([wrc@communications.gov.au](mailto:wrc@communications.gov.au)).

# The process to date

This chapter recaps the scenarios outlined in the discussion paper and options proposed in the options paper, identifies issues and themes raised in submissions to these papers and outlines the ACMA’s view on them.

## Overall approach to replanning the band

### Discussion paper

The ACMA released the [*Exploring future use of the 1.9 GHz band*](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021)discussion paper in November 2021. The paper examined the current use of the band, domestic demand for new services and international trends. It also sought views on potential future uses of the band.

The discussion paper identified the following existing and potential new use cases and trends in the 1.9 GHz band:

* **DECT/ DECT Evolution/DECT- 2020-NR applications.** DECT is a local area wireless technology used predominantly in the 1.9 GHz band and widely adopted for cordless phones, as well as wireless microphones and headset use. ‘Future DECT’ will bring new applications to the entire 1.9 GHz band. These come with a very high level of coexistence.
* **FRMCS/MCX services.** Future Railway Mobile Communication System (FRMCS) is an evolving technology that is being developed by the Conference of European Postal and Telecommunications (CEPT) for the specialised requirements of rail services. FRMCS is being developed to operate in the 1900–1910 MHz band and is based on the 3GPP Rel. 17 standard. Mission-critical services, known as MCX, have been identified as a transitional technology between existing rail deployments and FRMCS.
* **Fixed or mobile WBB services.** These are PMP licences predominantly used by regional operators to provide LA WBB services[[4]](#footnote-5). There are also PTP licences in remote areas.

**MulteFire.** A technology designed to create new wireless long-term evolution (LTE)-based technology networks that operate in class-licensed[[5]](#footnote-6) spectrum. MulteFire release 1.0 supports the applications of 3GPP 4G/LTE and 5G wireless broadband systems, and the MulteFire Alliance released a [white paper](https://www.mfa-tech.org/wp-content/uploads/MulteFire_Release-1.1_WhitePaper_03JAN.pdf) in 2019 identifying plans for expansion of MulteFire into the 1.9 GHz band.

The discussion paper sought feedback to help inform the ACMA whether there is support for current or alternative uses of the band, inviting comments on the following:

1. What is the relevance of the personal handy-phone system (PHS) and should this use be retained?
2. What is the interest in the use of new technologies to provide a service?
3. How much spectrum is required to provide the service?
4. What interservice considerations need to be undertaken for the service to be deployed?
5. What are the deployment scenarios for the service?
6. Are services still using DECT or are they transitioning to DECT-2020 NR?
7. Are there any applicable coexistence scenarios not identified? Are there any scenarios that are unlikely to be practically achievable (and hence the associated planning scenario should be discounted), or are there any that are readily achieved?
8. What are possible planning scenarios and industry views on the overall future use of the 1.9 GHz band and its services:
9. How much spectrum is required (distinguishing between the minimum viable and desirable) to provide the service?
10. Is there a clear geographical delineation – for example, metropolitan or regional – for the service?
11. Is there or will there be equipment readily available for the service?

The ACMA presented 5 scenarios in the discussion paper, including a consideration of potential coexistence issues:

Scenario 1: Use of the whole band by a single technology, such as DECT or wireless broadband.

Scenario 2: Dedicated frequency segments for multiple technologies, such as DECT or wireless broadband.

Scenario 3: Dedicated frequency segments for multiple technologies but with some geographical restriction for some, such as remote only for PTP services.

Scenario 4: Sharing of frequency segments by multiple technologies.

Scenario 5: Hybrid approaches of the other scenarios involving geographic restriction but some sharing.

### Options paper

The ACMA subsequently progressed the band to the preliminary replanning stage, which included release of the [*Replanning of the 1880–1920 MHz band*](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021)options paper in November 2022.

In conducting its planning activities, the ACMA is informed by the object of the Radiocommunications Act. Consistent with that object and after reviewing submissions to the discussion paper, the options paper proposed the following 5 desirable planning outcomes for the review of the 1.9 GHz band:

1. Maintain regulatory arrangements for existing services within the 1.9 GHz band.
2. Expand arrangements for SR WBB services.
3. Introduce arrangements for new RMR services.
4. Maintain coexistence with 1.9 GHz band services.
5. Maintain coexistence with adjacent band services.

The paper identified and assessed 4 replanning options for the 1.9 GHz band.

* Option 1: Maintain existing arrangements.
* Option 2: Maintain exclusive SR WBB access to 1880–1900 MHz and allow SR WBB access to 1900–1920 MHz on a shared basis Australia-wide, with no other change to current arrangements.
* Option 3: Introduce arrangements for RMR in the 1900–1910 MHz frequency range, both exclusively and shared with existing services on an Australia-wide basis, with no change to current arrangements in the rest of the band.

Option 4: Maintain exclusive SR WBB access to 1880–1900 MHz and allow   
SR WBB access to 1900–1920 MHz on a shared basis Australia-wide. Introduce arrangements to allow for RMR in the 1900–1910 MHz frequency range on a shared basis with other services on an Australia-wide basis.

Option 4 was identified as most likely to maximise the public benefit from use of the 1.9 GHz band and was therefore presented as the ACMA’s preliminary preferred option. Option 4 would maintain all current incumbent SR WBB, LA WBB and PTP services, expand the SR WBB allocation across the entire 1.9 GHz band, and introduce the RMR allocation for rail communications in the 1900–1910 MHz frequency range.

## Discussion of responses

Consultation on the options paper closed on 17 March 2023. We received 11 responses to the options paper. A ‘reply to comment’ period opened on 27 March 2023 and closed on 21 April 2023, with 5 replies received. All submissions are available [on the ACMA website](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021).

# Summary and response to options paper issues

This section summarises responses provided to the options paper, any additional issues raised, and the ‘reply to comment’ responses we received. A list of all respondents is in Appendix A.

## Issues for comment

**Question 1**

The ACMA invites comments on the proposed desirable planning outcomes.

Seven responses were received addressing this question. Six submissions supported the 5 desirable planning outcomes. Some of the comments made included:

* one communications product service provider agreed with the Electronic Communications Committee (ECC) Report 318[[6]](#footnote-7) that there is potential for interference from high power FRMCS base stations into mobile network base stations in the 1920–1980 MHz band
* one telecommunications service provider supported recognition that any changes should ensure coexistence with adjacent band services
* another telecommunications service provider was concerned with the order of the planning outcomes, noting that it could be inferred that the order they are listed in is based on priority. As such, they consider that outcome number 5 (maintain coexistence with adjacent band services) should be second in the list to ‘ensure the interference management requirements for incumbent adjacent band services remains unchanged’

an audio product manufacturer noted they have some concerns regarding compatibility with technologies or systems not compatible with DECT.

One rail industry responder supported 4 out of the 5 planning outcomes, noting that for outcome number 2 (expand arrangements for SR WBB services) they did not support expansion of SR WBB into the 1900–1910 MHz range, arguing that interference from class-licensed sources would be detrimental to RMR.

#### ACMA response

The ACMA is satisfied that most responses were in support of, or did not object to, the 5 desirable planning outcomes. The ACMA confirms that the order of the 5 planning outcomes is not ranked by priority.

Option 3 and Option 4 both provide arrangements for RMR in the 1900–1910 MHz range on an Australia-wide basis in metropolitan, regional and remote areas through apparatus licences; however, Option 4 is the only option to propose SR WBB in these same areas in the 1900–1920 MHz range. Potential interference to RMR is addressed in the ‘Consultation outcomes’ section of this document.

**Question 2**

The ACMA seeks stakeholders’ views on any other applications we have not identified that could be accommodated under SR WBB.

Of the 11 responses, none addressed this question directly. However, one responder suggested that ‘the spectrum segment proposed for RMR be made available for LA-WBB services under apparatus licensing outside the railway corridors in regional and remote areas’.

#### ACMA response

The ACMA will continue to monitor technology developments and international trends to identify other applications that could be accommodated under SR WBB. Provision for LA WBB services outside the railway corridor in regional and remote areas is considered in the ‘Consultation outcomes’ section of this document.

**Question 3**

The ACMA invites comments on the replanning options, especially the preliminary preferred option presented in this paper, and any alternative options.

Of the 11 responses, 8 preferred Option 4 (with provisional support from one responder), one preferred either Option 3 or Option 4, and 2 responses preferred Option 3.

#### Preference for Option 3

One rail services provider stated they fully support the rail industry responder’s submission, as Option 3 would provide benefits to all rail operators in Australia. The rail industry responder provided a detailed analysis of Option 3 and Option 4 (which allow for RMR). In support of Option 3, they noted that:

* Global System for Mobile Communications - Railway (GSM-R) is unlikely to be supported beyond 2030
* FRMCS offers higher quality of service compared to GSM-R
* rail operators will benefit as equipment vendors develop RMR equipment for the 1.9 GHz band due to the European Union’s decision [Commission Implementing Decision (EU) 2001/1730](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021D1730&from=EN) to make 1900–1910 MHz available for RMR in 2021, additional bandwidth to support high-bandwidth RMR applications, and opportunity to deploy services outside spectrum licence boundaries in NSW, Qld, Vic, SA and WA

the 1710–1785 MHz/1805–1880 MHz band (1800 MHz band) should remain available while needed for RMR services and support the 1900–1910 MHz band being dedicated to rail in metropolitan and regional areas, with a similar framework to that of the European Union (EU).

The rail industry responder and rail services provider did not support Option 4. They considered this option would increase the risk of interference that could affect network costs and introduce a risk to delivering safe, reliable and efficient train operations as required under state legislation. The rail industry responder preferred the elimination of risk by reserving the 1900–1910 MHz frequency range in metropolitan areas for rail, rather than implementation of engineering controls that they considered would cause additional administrative mitigation and associated cost burden.

The rail industry responder advocated harmonising with the EU to enable industry to use EU equipment and resources in Australia and argued that coordinating with class-licensed users is ‘an onerous responsibility and not practical for deployment of RMR, which will be used to support rail safety and control communications where train movement authorities may need to be revoked in an emergency’.

#### Preference for Option 4

A mobile telecommunications industry body responder supported Option 4 to maximise the number of applications in the band, on the provisio that apparatus-licensed receivers in the 1900–1920 MHz band are protected. They noted that they did not oppose class-licensed DECT in the 1900–1920 MHz band; however, they considered that SR WBB in this band will be a challenge from the perspective of sharing with outdoor fixed links or WBB, and from the lack of obligation on or incentive for class-licensed service providers to coordinate. The responder noted the importance of protecting adjacent 1800 MHz and 1920–1980 MHz/2110–2170 MHz (2 GHz) bands and PTP links. Without what they consider to be ‘an appropriate interference management framework’, they preferred Option 3.

One communications product services provider was concerned by potential interference into adjacent band IMT services.

A communication service industry body stated their level of support for each option, with limited support for Option 1, no support for Option 2 and Option 3, and support for Option 4 with the opinion that it would provide the best outcome, but the RMR segment would need ‘further consideration’. They also suggested that LA WBB should be allowed under apparatus licensing as a secondary utilisation in the 1900–1910 MHz band for areas outside railway corridors to allow higher utilisation of WBB spectrum in regional and remote areas.

One telecommunications service provider supported Option 4, noting that RMR should coexist with adjacent band spectrum-licensed 1800 MHz and 2 GHz bands, which may be challenging and would require ‘thorough consideration and planning’. They stated that high-power base stations and services in the 1.9 GHz band may potentially result in interference or restrictions in the adjacent bands, which would significantly impact existing mobile networks and services. The responder proposed that any new licences in the 1.9 GHz band should not cause interference to services in the 2 GHz band or restrictions to any new deployments in the 1800 MHz and 2 GHz bands, and no filtering or additional mitigation measures should be placed on existing licences. They considered that RMR could be accommodated in the 1900–1910 MHz band if, in addition to the above, the railway industry vacated all or part of their 1800 MHz holdings.

Another telecommunications service provider supported Option 4 as it would provide the highest value use for the 1.9 GHz band, while noting the importance of maintaining existing interference mitigation arrangements for adjacent-band IMT services. They requested the continued ability to implement PTP links outside of metropolitan areas in the 1900–1920 MHz band to provide services to regional communities and mining sites.

A DECT industry responder supported Option 4, which would allow operation of DECT and DECT NR+ applications. They considered sharing of the spectrum should only be with technologies with advanced sharing mechanisms, to not interfere with DECT/DECT NR+ applications. They proposed that interference studies be conducted with MulteFire.

An audio product manufacturer supported Option 4 as they considered it provides the most flexibility and shall support DECT, as long as any new technology in the 1.9 GHz band does not interfere with DECT users. They noted that technologies such as 3GPP-based NR and MulteFire would likely cause interference to DECT-2020 NR.

Although not specifically stating their support for a specific option presented in the paper, a wireless service provider’s response promoted DECT-2020 NR/DECT NR+ and provided a discussion on the benefits of the technology in detail. The ACMA therefore assigned their support to Option 4.

#### Preference for Option 3 or Option 4

One responder supported either Option 3 or Option 4, as both options allow rail operators to introduce FRMCS. For Option 3, they recommended that the ACMA consider keeping 1800 MHz for GSM-R and/or 1800 MHz for GSM-R/LTE, and to allow rail operators to introduce 5G/FRMCS at 1.9 GHz with 1800 MHz spectrum released over time. Regarding their support for Option 4, the responder assumed that DECT and MulteFire would be limited to indoor use, particularly near the rail corridor.

#### ACMA response

The ACMA notes that most responses supported Option 4, as this would provide the most flexibility. The ACMA agrees that Option 4 would maximise use of the 1.9 GHz band and that any new services in the band must coexist with incumbent services, including those services in adjacent bands. However, there are coexistence considerations between RMR and DECT devices, particularly when used outdoors. The ACMA acknowledges that RMR is considered a safety-critical service by the rail industry and implementing Option 3 would reduce potential interference to rail services. Potential interference to and from RMR (specifically FRMCS) is addressed in the ‘Consultation outcomes’ section of this document.

**Question 4**

Is personal handy phone system (PHS) technology still required to be included in the cordless communication devices class licence?

Five responses noted that PHS may be removed from the cordless communication devices class licence. No objections were received.

#### ACMA response

The ACMA will propose removal of the PHS from the cordless communication devices class licence when the class licence is next reviewed. The cordless communication devices class licence will sunset on 1 April 2025, and any review will likely take place before then.

**Question 5**

The 1900–1920 MHz frequency band plan will sunset on 1 April 2023. Is the band plan still required, or can the band plan be allowed to sunset?

Five responders supported or agreed to the 1900–1920 MHz Frequency Band Plan 2012 being allowed to sunset, with one stating that it would ensure continued protection of PTP links and allow further rollout where required.

The rail industry responder was not against the band plan sunsetting; however, they suggested that a new band plan would be required ‘to ensure RMR in the 1900–1910 MHz is considered a primary service’.

#### ACMA response

As there were no objections received, the ACMA allowed the 1900–1920 MHz Frequency Band Plan 2012 to sunset on 1 April 2023. The ACMA has no plan to create a new band plan for all or part of the 1.9 GHz band.

**Question 6**

The ACMA invites comments on coexistence considerations, and analysis on coexistence issues for the proposed options in this band.

Of the 11 responses, 9 highlighted the need for interference mitigation and/or recommended coexistence studies and analysis be conducted. One had no specific comment on this question, while one rail service provider did not suggest interference mitigation or studies; however, they stated their support for the rail industry responder’s submission.

A rail industry responder stated that high power 5G systems with adaptive antenna systems in the 1800 MHz and 2 GHz bands will result in higher out-of-band interference into adjacent bands but argued that limiting FRMCS base station transmission power ‘may result in a higher density of base stations, increasing cost and complexity’. They noted that RMR operating in the 1900–1910 MHz band would provide a 10 MHz guard band to mobile network operator base station receivers operating in 3GPP Band n1 (1920–1980 MHz), and RMR would be limited to the rail corridor. They agreed that further analysis should be carried out to determine interference risk, mitigation, and the least restrictive technical conditions for RMR.

In supporting Option 4, one responder noted that ‘careful coordination to minimise interference concerns and proposed RMR Services, especially given that RMR services operating in 1900–1910 MHz band are time division duplex (TDD) based and susceptible to interference’, and that the rail corridor needed to be protected by minimising interference to RMR as rail is a mission critical service.

A communications service provider noted their concern of interference from the 1900–1920 MHz band into the 2 GHz uplink as per ECC Report 318 and suggested that ‘[f]urther investigations into potential interference, mitigations and licence conditions should be done’, with the onus on FRMCS operators to limit harmful interference.

A mobile telecommunications industry body responder quoted ECC Report 318 regarding potential for interference from FRMCS may be caused to mobile network base station receivers and as a result ‘some form of mitigation will be required’. They interpreted the ACMA’s intent as being that it does not anticipate any additional requirements on IMT operators in adjacent bands because the onus to mitigate interference will be on FRMCS operators. The responder considered that there was insufficient assurance for spectrum licences, and that the ACMA would need to clearly articulate that the onus is on FRMCS operators to mitigate interference between FRMCS and IMT. They suggested that RMR services should be treated as a secondary service to ensure this outcome. The responder opposed any additional requirements on 2 GHz base station receivers and stressed the importance of:

* protection of adjacent-band 2 GHz base station receivers
* no harmful interference/undue constraint to 1800 MHz or 2 GHz networks

protection of, and continued support for, PTP links.

Another telecommunications service provider did not oppose the development of arrangements to accommodate for RMR; however, they remained strongly of the view that any coexistence measures should remain the responsibility of any new entrant. They noted that although FRMCS is based on 3GPP 4G LTE and 5G NR, this ‘does not necessarily result in a successful coexistence of 3GPP Band 1 and Band 39’. Referencing ECC Report 318, the responder noted that the report indicated more than 20 dB isolation is required to protect 2 GHz WBB uplink from FRMCS in the 1900–1910 MHz band. The responder’s view was that there should be no new requirements to services in the 1800 MHz and 2 GHz bands, with all requirements imposed on RMR transmitters. They also stated that allowing RMR beyond 1900–1910 MHz will ‘likely add additional technical complexity for consideration’ leading to increased resourcing and costs for managing interference.

Another telecommunications service provider had some concern that additional filtering, and/or guard bands would be required to protect existing IMT services, particularly in the 2 GHz band. They noted their concern for adjacent band interference into the 2 GHz band where they operate 3GPP compliant equipment. They requested greater certainty that there would be no additional requirements for IMT base stations in the 1800 MHz and 2 GHz bands, and that the ACMA make it clear that the obligation to mitigate interference should be on FRMCS operators.

A DECT industry responder proposed coexistence studies between DECT, DECT NR+ and MulteFire be carried out to investigate the possibility of harmful interference between the technologies.

An audio product manufacturer also requested additional investigation into whether MulteFire systems can coexist with DECT systems in the 1.9 GHz band.

Although not specifically addressing the question, a wireless service provider noted that draft ECC Report 332 concluded ‘DECT-2020 NR operation causes less interference in the 1880–1920 MHz to the adjacent services due to lower operating bandwidths and efficient power control which is limiting the transmitted power level’.

#### ACMA response

The ACMA notes that coexistence within the 1.9 GHz band is a common concern in the responses. Interference management and coexistence studies are addressed in the ‘Consultation outcomes’ section of this document.

## Reply to comment

Five replies to submissions were received, as listed in Appendix A. Of those who provided replies, 3 had not submitted initial responses to the options paper.

A rail industry replier requested ‘some degree of protection from interference within and around the rail corridor’ as the principal use of FRMCS/RMR in the 1900–1910 MHz band would be utilised for rail safety systems and critical railway operations, and did not consider that sharing spectrum with class-licensed SR WBB was possible. In reply to responses from a mobile telecommunications industry body, a communications product services provider and 2 telecommunications service providers, they noted that operation in the 1900–1910 MHz band would provide a 10 MHz and over 20 MHz guard band for 2 GHz and 1800 MHz band services, respectively. The replier considered that secondary allocation and second-in-time installations of adjacent band systems near the rail corridor would impact RMR.

The rail industry replier supported a responder’s concern regarding class-licensed SR WBB devices and their preference for Option 3 if an appropriate interference management framework cannot be developed, and another responder’s support for either Option 3 or Option 4, agreeing that sharing and coordinating with SR WBB services would be a challenge. They agreed with a telecommunications service provider’s view that licensing should provide ‘protection, coordination and rights to enable efficient utilisation of spectrum’ and, noting the respondent considered Option 4 to be a starting point, suggested that Option 3 should be considered if coordination issues with SR WBB cannot be resolved.

A rail industry replier highlighted a wireless service provider’s view that all technologies sharing spectrum should have the capability to ‘automatically comply and mitigate their interference to adjacent users’, and noted again sharing difficulties between RMR base stations and SR WBB. In response to a responder’s comment that ‘…3GPP technology developed for trains, have not been economically viable in the longer term’, they noted that in Europe ‘3GPP-based railway radiocommunications systems have been implemented for over 100,000 km of track’, and noted that next generation RMR will be based on 5G (FRMCS), with the EU reserving spectrum in the 1900 MHz band.

Another rail industry replier supported the above replier’s original response and concerns regarding Option 4, which would share the spectrum with class-licensed SR WBB services. They noted that under rail safety laws, duty holders are required ‘to eliminate risks to safety so far as reasonably practicable’ or where not possible ‘to minimise risks so far as reasonably practicable’. They argued that it is unclear how rail operators will be able to share spectrum with SR WBB services, and their introduction would potentially risk safe train operations. As such, the replier supported ARA’s preference for Option 3 to eliminate the risk of interference, particularly in metropolitan areas.

A replier, that did not make an original submission, supported the rail industry’s preference for Option 3. They noted the responses from the telecommunications service providers in support of Option 4 and argued that it would increase the risk of interference to RMR, which they described as a safety critical public service. They supported the positions provided by a rail industry responder to all issues for comment in the options paper, emphasising that RMR would need to be a primary service in the 1900–1910 MHz band to reduce the risk of interference from other services.

A communication industry body remained in support of their original preference for Option 4, but suggested that RMR requires further consideration, with apparatus licensed LA WBB as a secondary utilisation for areas outside the railway corridors to allow for higher use of the spectrum in regional and remote areas. They also reiterated their comments that use of the 1880–1900 MHz band should not be limited to DECT.

Another replier that did not make an original submission commented on the response of a rail industry responder, which stated that RMR services in the 1900–1910 MHz band will allow transition from GSM-R to FRMCS. Their reply noted that currently there is 5 + 5 MHz of spectrum available for public safety use, below the 10 + 10 MHz international benchmark for Public Safety Mobile Broadband (PSMB). In 2022, NSW tested PSMB and identified a ‘significantly worse user experience when working only with 5 MHz and that this allocation may not meet all Emergency Service Organisation requirements’. As a result, the replier considered spectrum in both the 1800 MHz and 1900 MHz bands was required to support Australian emergency services organisations.

#### ACMA response

The suggestion concerning PSMB may be considered once rail is established in the 1900–1910 MHz band. LA WBB or PTP arrangements in the 1.9 GHz band could be used to provide PSMB services in remote and regional areas where available.

# Consultation discussion

Following consultation the ACMA decided to further investigate Option 3 and Option 4 as presented in the [options](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) paper due to these options being preferred by responders (and noting the ACMA preliminary preferred option was Option 4). These arrangements are illustrated in Figure 1 and Figure 2, respectively.

1. Arrangements for Option 3

A chart of a license

Description automatically generated with medium confidence

Option 3 provides for:

* maintaining SR WBB uses under class-licensing arrangements across   
  1880–1900 MHz
* enabling access to new uses including ‘future DECT’ licensing arrangements across 1880–1900 MHz
* maintaining LA WBB and PTP access arrangements across 1900–1920 MHz in regional and remote areas

introducing RMR services in the 1900–1910 MHz segment of the band for new uses and applications such as rail applications.

The option meets desirable planning outcomes 1 and 3 (as detailed in the ‘Overall approach to replanning the band’ section) by:

* maintaining arrangements for incumbent services in the 1.9 GHz band
* identifying the 1900–1910 MHz band for exclusive RMR use, Australia-wide.

As detailed later in this section, we also consider this option can meet desirable planning outcomes 4 and 5, coexistence with in-band (within the 1880–1920 MHz band) and adjacent band services (services below 1880 MHz and above 1920 MHz) via the implementation of suitable technical frameworks.

1. Arrangements for Option 4

A screenshot of a chart

Description automatically generated

In addition to the benefits provided by Option 3, Option 4 also:

* promotes the long‑term public interest derived from the use of the spectrum
* provides a responsive and flexible approach to meeting the needs of spectrum users by providing a mix of service types and allocation methods
* encourages the use of efficient radiocommunication technologies and a wide range of services of an adequate quality by introducing new service types.

In addition to meeting the same desirable planning outcomes as Option 3, Option 4 meets desirable planning outcome 4 by expanding arrangements for SR WBB services into the 1900–1920 MHz band.

## Coexistence considerations

Options 3 and 4 propose the introduction of new services into the 1900–1920 MHz band. Both options propose introducing arrangements for RMR into the 1900–1910 MHz band and maintaining SR WBB in the 1880–1900 MHz band. The main difference between options 3 and 4 is that Option 4 includes class-licensing arrangements for SR WBB in the 1900–1920 MHz band.

A number of submissions to the consultation process identified possible coexistence concerns with existing services and new services. We have considered comments made and, where available, reviewed existing international studies to help inform our decision making.

### Summary of existing and proposed new services

Currently, bands adjacent to the 1.9 GHz band are used by:

* spectrum licences in the 1800 MHz band in city and regional areas. Public Telecommunications Services (PTS) licences have been issued to authorise access to the band in remote areas. Both spectrum and apparatus licences are typically used to provide WBB services using frequency division duplex (FDD) technologies, with base station transmitters operating in the 1805–1880 MHz frequency range

spectrum licences in the 2 GHz band in major cities and upper part of the 2 GHz band in regional areas. There are also arrangements for PTS in regional and remote areas. These licences are typically used to provide WBB services using FDD technologies, with base station receivers operating in the 1920–1980 MHz frequency range.

Currently, the 1.9 GHz band is used by:

* class-licensed cordless telecommunications systems (CTS) operating in the 1880–1900 MHz band, including DECT

LA WBB operating under PMP licences in the 1900–1920 MHz band in regional and remote areas

PTP services in the 1900–1920 MHz band in regional and remote areas.

Under the proposed Option 3 and Option 4, the 1.9 GHz band would be used by:

* SR WBB services (DECT and ‘future DECT’, MulteFire) operating under a class licence in the 1880–1900 MHz band, Australia-wide, and using TDD technlogies
* SR WBB services (‘future DECT’, MulteFire) operating under a class licence in the 1900–1920 MHz band, Australia-wide, and using TDD technlogies (Option 4 only)

RMR operating under apparatus-licensing arrangemensts in the 1900–1910 MHz band, Australia-wide, and using TDD technologies.

### ACMA observations

We have identified several interference scenarios resulting from replanning the 1.9 GHz band under Options 3 and 4. As an outcome of the consideration of coexistence issues, the ACMA makes the following observations:

* RMR (FRMCS): ECC Report 318 and ECC Report 314[[7]](#footnote-8) indicate that interference to and from adjacent band PTS/spectrum licences above 1920 MHz and adjacent and co-channel PTP services is possible but is considered to be manageable. ECC Report 314 also indicates that adjacent channel interference from DECT into FRMCS is not significant. Also, while co-channel interference from outdoor DECT is possible, the level depends on the proximity of the DECT network.

DECT: Interference to DECT operation was found by ECC Report 314 to be possible from RMR (FRMCS) in close proximity, and more likely to outdoor DECT applications.

Overall, the ACMA agrees with the ECC studies and considers that interference between RMR services in the 1900–1910 MHz band and incumbent in-band/adjacent band services can be managed under an appropriately defined technical framework. We also consider there is potential to expand class licence arrangements in the 1880–1900 MHz band to support more SR WBB technologies while still managing interference with incumbent services and new RMR services.

We consider outdoor SR WBB services operating under a class licence in the 1900–1920 MHz band, such as DECT, are likely to result in the largest interference risk to incumbent services and RMR. This is largely due to the unknown location and uncoordinated nature of devices operating under a class licence. The risk of interference increases further in metropolitan areas where DECT and RMR services would likely be deployed in large numbers. However, there may be an opportunity to support the operation of indoor SR WBB devices on a coordinated basis. This would require such SR WBB use to be apparatus licensed and have appropriate technical conditions applied.

### Update on international activities: Ofcom consultation

On 23 March 2023, Ofcom, the United Kingdom’s radio spectrum regulator, released for consultation their [*Exploring future use of the unpaired 2100 MHz (1900-1920 MHz) spectrum*](https://www.ofcom.org.uk/consultations-and-statements/category-1/future-use-of-the-unpaired-2100-MHz-spectrum) paper. Ofcom’s view was that:

… it should be feasible to deploy high power use in 1900–1915 MHz and lower power use in the 1915–1920 MHz band, assuming the mobile base station receivers above 1920 MHz have sufficient selectivity or geographical separation to prevent it being blocked by future high and low power services in 1900–1920 MHz.[[8]](#footnote-9)

Fourteen submissions were received from interested parties.

The UK have similar adjacent band arrangements to Australia regarding arrangements for FDD WBB in the 1800 MHz and 2 GHz bands. Some submissions supported using the 1900–1920 MHz band (or portions thereof) for TDD WBB use, including FRMCS. Submissions from mobile network operators highlighted potential interference risks into adjacent band FDD WBB services from such use.

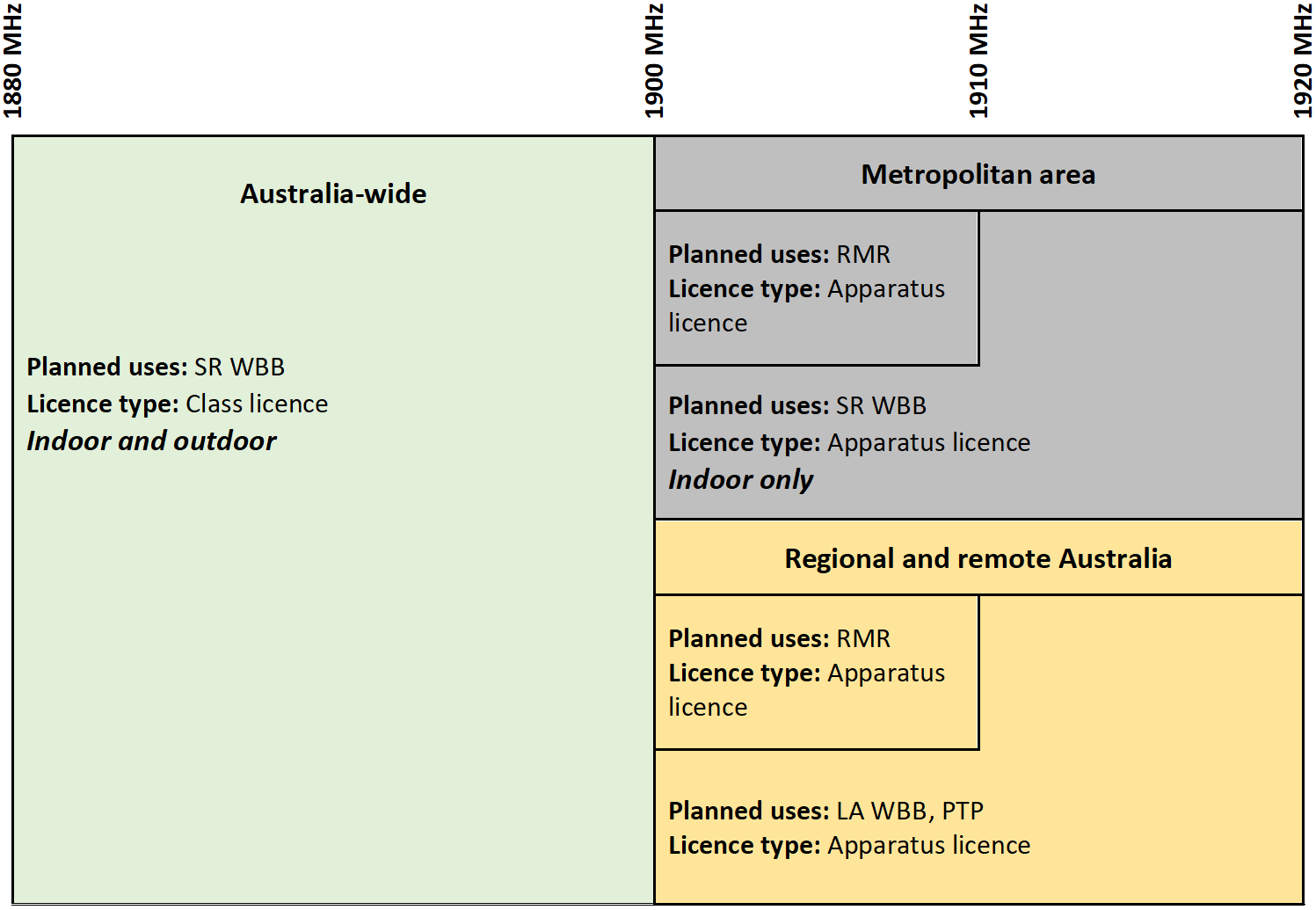
Ofcom has not yet finalised the outcomes of their consultation process. The ACMA will continue to monitor developments within the UK and other international organisations regarding the 1.9 GHz band. Where appropriate, we will consider any arrangements developed, including measures developed to manage coexistence, as part of the implementation or future updates to arrangements in Australia.

# Planning outcomes

## Planning decisions

Considering responses and replies to the options paper and the coexistence considerations detailed in the previous section, the ACMA has decided to proceed with a modified Option 3 for the 1880–1920 MHz band. Modified Option 3 is detailed in Figure 3. Appendix B provides the geographical area descriptions.

1. Arrangements for 1.9 GHz spectrum



This option differs from Option 3 with the inclusion of arrangements for apparatus-licensed indoor SR WBB use in metropolitan areas. We anticipate that the arrangements for indoor SR WBB will allow devices to be used in venues such as theatres, conference centres, warehouses, airports, ports, hospitals, schools, universities and smart buildings. Our preliminary studies show indoor SR WBB use should be able to coexist with RMR and other incumbent services on a coordinated basis. Implementing indoor SR WBB arrangements via apparatus licensing (rather than class licensing) enables this coordinated approach. We note that similar use could also be supported in regional and remote areas under the existing apparatus-licensed arrangements for LA WBB.

Class-licensing arrangements for SR WBB systems will be retained and updated in the 1880–1900 MHz band.

It is intended that RMR will be the primary service within defined areas around rail corridors in the 1900–1910 MHz band. This will allow rail operators to plan for and deploy RMR to support their operations. Arrangements for LA WBB and PTP use will be in place outside of the defined rail corridors.

We note that further work is required to define the rail corridors that will be reserved for RMR use. We will also need to work with industry to define areas where coordination between RMR and other services will be required, including possible restrictions on the issue of new LA WBB and PTP licences to preserve options for future RMR use. It is possible that this work will result in some existing LA WBB or PTP licensees near rail corridors having to either modify or cease operation to facilitate the deployment of future RMR services.

## Preliminary views

The ACMA has formed the following preliminary views related to technical and licensing arrangements in the 1.9 GHz band. These arrangements will be further developed and finalised as part of the ACMA’s standard consultation processes on proposed regulatory arrangements, including legislative instruments.

An indicative timeline for the implementation of the 1.9 GHz planning arrangements is provided at the ‘Next steps’ section.

### Licensing arrangements for SR WBB

As submissions to the options paper were focused on DECT (including ‘future DECT’) uses, this will be the initial focus for the development of SR WBB arrangements in the 1.9 GHz band. Class-licensing arrangements in the 1880–1900 MHz band will support both DECT and ‘future DECT’, while apparatus-licensed arrangements will be developed to support ‘future DECT’ in the 1900–1920 MHz band. These arrangements may be updated in future if viable alternative SR WBB technologies are developed and there is interest from industry to do so.

Due to the low power and short-range nature of SR WBB, in particular for indoor applications, the ACMA considers that PMP apparatus licences may be appropriate for such use in metropolitan areas. This will provide visibility of the location of services to facilitate coordination and identification of potential interference sources (if required).

Outside of metropolitan areas, we consider that SR WBB use could be supported under existing apparatus-licensing arrangements used for LA WBB (that is, allowing both indoor and outdoor use).

### Licensing arrangements for LA WBB

LA WBB services using the 1900–1920 MHz band are authorised currently by PMP licences. The ACMA has considered whether to use area wide licence (AWL) arrangements for LA WBB. However, given SR WBB systems will also be supported, which can operate in areas much smaller than can be defined by HCIS, we have formed the preliminary view that the existing PMP arrangements to be the most appropriate.

We will also update [RALI FX19](https://www.acma.gov.au/publications/2019-09/instruction/rali-fx19-frequency-coordination-and-licensing-procedures-point-multipoint-apparatus-licensed-services-1900-1920-mhz-band) Frequency coordination and licensing procedures for point to multipoint apparatus licensed services in the 1900−1920 MHz band(RALI FX19) to reflect the outcomes of the 1.9 GHz band review.

### Licensing arrangements for PTP

We do not intend to substantively change licensing arrangements for PTP services in the 1.9 GHz band. However, we will update [RALI FX3](https://www.acma.gov.au/publications/2019-09/instruction/rali-fx3-microwave-fixed-services) to reflect the outcomes of the 1.9 GHz band review.

### LA WBB and PTP coexistence with RMR

We will work with industry to identify what restrictions may need to apply on the issue of new LA WBB and PTP licences around rail corridors. To limit the impact on future LA WBB and PTP licences, the ACMA has expanded Embargo 76 to apply Australia-wide. This will help prospective new LA WBB and PTP licensees to be aware that we are in the process of implementing new planning arrangements that may impact them. As mentioned previously, it is possible that this work will result in some existing LA WBB and PTP licensees near rail corridors having to either modify or cease operation to facilitate the deployment of future RMR services.

### Licensing arrangements for RMR

A definition of rail corridors that will be reserved for RMR use is still required. While we intend to work with industry to identify relevant rail corridors, we anticipate this will encompass the cities of Adelaide, Brisbane, Melbourne, Perth and Sydney as well as various regional areas. Due to the large area that could be covered, we will consider whether AWLs should be used to support RMR services. AWLs can encompass large or small areas, as well as irregular areas that could occur along rail corridors.

### Transition arrangements for RMR and 1800 MHz band spectrum licences

Most rail licensees have deployed GSM-R and LTE technologies under their existing 1800 MHz band spectrum licences. A transition to FRMCS is expected to occur over different timeframes in different jurisdictions. It could occur relatively fast for licensees that have not yet deployed services under their 1800 MHz licences; however, it could take several years (possibly more than a decade) for other jurisdictions. We understand the rail industry will require time to design and deploy new networks as well as transition relevant services into the 1.9 GHz band. In parallel to this, the ACMA will develop and implement technical arrangements that define how interference will be managed with PMP, PTP, PTS and spectrum licences.

As of 1 September 2023, there are 8,121 assignments in the 1800 MHz spectrum licence band associated with delivery of public rail services held by the following licensees: Queensland Rail, Public Transport Authority of Western Australia, Sydney Trains and Victorian Rail Track. Although the South Australian Department of Planning Transport and Infrastructure hold an 1800 MHz band spectrum licence, there are no assignments under this licence in the [Register of Radiocommunications Licences](https://web.acma.gov.au/rrl/browse_licences.licence_list?pSV_ID=85&pSS_ID=850) (RRL). The licences are all due to expire in June 2028.

We are currently considering submissions received to our consultation on our proposed approach to [expiring spectrum licences](https://www.acma.gov.au/expiring-spectrum-licences#:~:text=you%20must%20apply%20to%20us,process%20it%20is%206%20months)) (ESLs). The 1800 MHz band spectrum licences, including those associated with delivery of public rail services, will be among the first to expire, with licensees able to apply to the ACMA for renewal of their licences. The outcomes of the 1.9 GHz review process, including the identification of a dedicated 10 MHz of spectrum for RMR operation Australia-wide, may be a relevant consideration in the ESL process.

We intend to work with rail licensees regarding the development of arrangements for RMR in the 1.9 GHz band. This will include consideration of existing arrangements for rail safety and communications in the 1800 MHz band as well as any timeframes for deployments in the 1.9 GHz band.

### RMR coexistence with adjacent band services

Submissions from mobile network operators were particularly concerned with how the introduction of RMR into the 1900−1910 MHz band would affect their services in the adjacent 1800 MHz and 2 GHz bands. While there are guard bands in place to facilitate coexistence, we recognise that this alone may not be sufficient to manage interference.

We intend to work with industry to investigate this issue and, if necessary, develop appropriate additional arrangements to enable coexistence. Our preliminary view is that new RMR services will need to consider and work around existing deployments in adjacent bands when designing and implementing networks. We also consider, once RMR services are deployed, that new adjacent band services will need to implement measures to facilitate coexistence.

# Next steps

To give effect to the planning decisions and preliminary views outlined in this paper, we have developed an indicative high-level implementation plan. Table 1 sets out the activities and estimated timing that will follow the release of this paper.

Completion of these activities is contingent on a variety of factors, including feedback received from stakeholders. Timeframes are indicative and intended to provide a guide to the sequencing and commencement of particular streams of work. A more detailed implementation program will be developed and consulted on through the ACMA’s annual [FYSO](https://www.acma.gov.au/five-year-spectrum-outlook) process.

Indicative timeline for implementation of planning arrangements in the 1.9 GHz band

| Action | Timeframe |
| --- | --- |
| Consult on updates to [RALI FX3](https://www.acma.gov.au/publications/2019-09/instruction/rali-fx3-microwave-fixed-services) to reflect planning decisions | Q2 2024 |
| Consult on a remake of the [Radiocommunications (Cordless Communications Devices) Class Licence 2014](https://www.legislation.gov.au/Details/F2021C00645) to reflect planning decisions and account for sunsetting of the instrument | Q2 2024 |
| Commence development of draft technical framework for:  RMR in the 1900−1910 MHz band  indoor SR WBB in the 1900−1920 MHz band  Update [RALI FX](https://www.acma.gov.au/publications/2019-09/instruction/rali-fx19-frequency-coordination-and-licensing-procedures-point-multipoint-apparatus-licensed-services-1900-1920-mhz-band)19 to reflect planning decisions | Q4 2024 |
| Consult on licensing and allocation arrangements for RMR and SR WBB use in the 1900−1920 MHz band | TBD |

# Acronyms used in this paper

3GPP 3rd Generation Partnership Project

AMTA Australian Mobile Telecommunications Association

APT Asia-Pacific Telecommunity

ARA Australasian Railway Association

ARCIA Australian Radio Communications Industry Association

ASMG Australian Spectrum Map Grid

CEPT Conference of European Postal and Telecommunications

CTS Cordless telecommunications services

DECT Digital Enhanced Cordless Telecommunications

ECC Electronic Communications Committee

ESL Expiring Spectrum Licence

FDD Frequency Division Duplex

FRMCS Future Railway Mobile Communication Systems

FYSO Five-year spectrum outlook

GSM-R Global System for Mobile Communications – Railway

HCIS Hierarchical Cell Identification Scheme

IMT International mobile telecommunications

IoT Internet of Things

ITU International Telecommunication Union

LA Local area

LTE Long term evolution

MCX Mission-critical services

MFCN Mobile and Fixed Communications Networks

NR New radio

ONRSR Office of the National Rail Safety Regulator

PHS Personal handy phone system

PMP Point-to-multipoint

PSMB Public Safety Mobile Broadband

PTP Point-to-point

PTS Public Telecommunications Service

RALI Radiocommunications Assignment and Licensing Instruction

RMR Railway mobile radio

RRL Register of Radiocommunications Licences

SR Short range

TDD Time Division Duplex

TLG Technical Liaison Group

UE User equipment

WBB Wireless broadband

WISP Wireless Internet Service Provider

# Appendix A: List of respondents

We opened the consultation for our options paper,[*Replanning of the 1880−1920 MHz band*](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) on 30 November 2022. The consultation period formally closed on 17 March 2023, with the last submissions received on 23 March 2022. We received 11 responses from the following stakeholders.

1. Aqura Technologies
2. Australasian Railway Association (ARA)
3. Australian Radio Communications Industry Association (ARCIA)
4. Australian Mobile Telecommunications Association (AMTA)
5. DECT Forum
6. Nokia
7. Optus
8. Shure Incorporated
9. Sydney Trains
10. Symb-iot-ech
11. Telstra Group Limited

We opened a ‘reply to comment’ period on the responses received to the options paper on 27 March 2023. The reply period closed on 21 April 2023. We received [5 replies](https://www.acma.gov.au/consultations/2021-11/exploring-future-use-19-ghz-band-consultation-402021) from the following stakeholders.

1. Australasian Railway Association (ARA)
2. Australian Radio Communications Industry Association (ARCIA)
3. NSW Telco Authority
4. Office of the National Rail Safety Regulator (ONRSR)
5. Victorian Government Department of Transport and Planning (Victorian Government)

# Appendix B: Geographical area descriptions

We have defined geographical areas to assist in the analysis of use of, and potential future use scenarios for, the 1880–1920 MHz band (see Table 2). A brief description of each follows:

* metropolitan: covers all capital cities (except Darwin and Hobart)
* regional: as defined in HCIS description of areas
* remote: includes those areas of Australia not covered by metropolitan and regional areas

Australia-wide: covers metropolitan, regional and remote areas.

The Australian Spectrum Map Grid (ASMG) is used to define geographical areas over which spectrum licences are issued. The Hierarchical Cell Identification Scheme (HCIS) is a naming convention developed by the ACMA that applies unique ‘names’ to each of the cells that make up the ASMG. The ASMG and HCIS are described in detail in the document [*The Australian spectrum map grid 2012*](https://www.acma.gov.au/australian-spectrum-map-grid).

The HCIS coordinates can be converted into a Placemark file (viewable in Google Earth) through a facility on the [*Convert HCIS area description to Placemark*](https://www.acma.gov.au/convert-hcis-area-description-placemark-0) facility on the ACMA website.

HCIS description of areas

| Area | Sub-area name | HCIS |
| --- | --- | --- |
| Metropolitan | Adelaide | IW3J,IW3K,IW3L,IW3N,IW3O,IW3P,IW6B,IW6C,IW6D,IW6F,IW6G,IW6H,  IW3E5,IW3E6,IW3E8,IW3E9,IW3F4,IW3F5,IW3F6,IW3F7,IW3F8,IW3F9,  IW3G4,IW3G5,IW3G6,IW3G7,IW3G8,IW3G9,IW3H4,IW3H5,IW3H6,IW3H7,  IW3H8,IW3H9,IW3I2,IW3I3,IW3I5,IW3I6,IW3I8,IW3I9,IW3M2,IW3M3,IW3M5,  IW3M6,IW3M8,IW3M9,IW6A2,IW6A3,IW6A5,IW6A6,IW6A8,IW6A9,IW6E2,  IW6E3,IW6E5,IW6E6,IW6E8,IW6E9,JW1E4,JW1E7,JW1I1,JW1I4,JW1I7,  JW1M1,JW1M4 |
| Brisbane | NT9,NT8C,NT8D,NT8G,NT8H,NT8K,NT8L,NT8O,NT8P,NU3A,NU3B,NU3C,  NU3D,NU3F,NU3G,NU3H,NT5O4,NT5O5,NT5O6,NT5O7,NT5O8,NT5O9,  NT5P4,NT5P5,NT5P6,NT5P7,NT5P8,NT5P9,NT6M4,NT6M5,NT6M6,NT6M7,  NT6M8,NT6M9,NT6N4,NT6N5,NT6N6,NT6N7,NT6N8,NT6N9,NT6O4,NT6O5,NT6O6,NT6O7,NT6O8,NT6O9,NT6P4,NT6P5,NT6P6,NT6P7,NT6P8,NT6P9,  NU2C1,NU2C2,NU2C3,NU2D1,NU2D2,NU2D3,NU2D5,NU2D6,NU2D8,  NU2D9,NU2H2,NU2H3,NU3E1,NU3E2,NU3E3,NU3E5,NU3E6,NU3E8,NU3E9,NU3I2,NU3I3,NU3J1,NU3J2,NU3J3,NU3K1,NU3K2,NU3K3,NU3L1,NU3L2,  NU3L3 |
| Canberra | MW4D,MW4H,MW4L,MW5A,MW5B,MW5E,MW5F,MW5I,MW5J,MW1P4,  MW1P5,MW1P6,MW1P7,MW1P8,MW1P9,MW2M4,MW2M5,MW2M6,MW2M7,MW2M8,MW2M9,MW2N4,MW2N5,MW2N6,MW2N7,MW2N8,MW2N9,MW4P1,MW4P2,MW4P3,MW5M1,MW5M2,MW5M3,MW5N1,MW5N2,MW5N3 |
| Melbourne | KX3J,KX3K,KX3L,KX3N,KX3O,KX3P,KX6A,KX6B,KX6C,KX6D,KX6E,KX6F,  KX6G,KX6H,KX6I,KX6J,KX6K,KX6L,LX1I,LX1M,LX1N,LX1O,LX4A,LX4B,  LX4C,LX4E,LX4I,KX3E9,KX3F5,KX3F6,KX3F7,KX3F8,KX3F9,KX3G1,KX3G2,KX3G4,KX3G5,KX3G6,KX3G7,KX3G8,KX3G9,KX3H4,KX3H5,KX3H6,KX3H7,KX3H8,KX3H9,KX3I3,KX3I6,KX3I8,KX3I9,KX3M2,KX3M3,KX3M4,KX3M5,  KX3M6,KX3M7,KX3M8,KX3M9,LX1E4,LX1E7,LX1E8,LX1E9,LX1J1,LX1J4,  LX1J5,LX1J6,LX1J7,LX1J8,LX1J9,LX1K4,LX1K7,LX4F1,LX4F2,LX4F4,LX4F5,LX4F7,LX4F8,LX4J1,LX4J2,LX4J4,LX4J5,LX4J7,LX4J8 |
| Perth | BV1I,BV1J,BV1K,BV1L,BV1M,BV1N,BV1O,BV1P,BV2I,BV2J,BV2M,BV2N,  BV4A,BV4B,BV4C,BV4D,BV4E,BV4F,BV4G,BV4H,BV4I,BV4J,BV4K,BV4L,  BV5A,BV5B,BV5E,BV5F,BV5I,BV5J,BV1E7,BV1E8,BV1E9,BV1F7,BV1F8,  BV1F9,BV1G7,BV1G8,BV1G9,BV1H7,BV1H8,BV1H9,BV2E7,BV2E8,BV2E9,  BV2F7,BV2F8,BV2F9,BV4M1,BV4M2,BV4M3,BV4N1,BV4N2,BV4N3,BV4O1,  BV4O2,BV4O3,BV4P1,BV4P2,BV4P3,BV5M1,BV5M2,BV5M3,BV5N1,BV5N2,BV5N3 |
| Sydney | MV9I,MV9J,MV9K,MV9L,MV9M,MV9N,MV9O,MV9P,MW3C,MW3D,MW3G,  MW3H,MW3K,MW3L,NV4N,NV4O,NV4P,NV5M,NV5N,NV5O,NV5P,NV7B,  NV7C,NV7D,NV7E,NV7F,NV7G,NV7H,NV7I,NV7J,NV7K,NV7L,NV7M,NV7N,  NV7O,NV7P,NW1A,NW1B,NW1C,NW1D,NW1E,NW1F,NW1G,NW1H,NW1I,  NW1J,NW1K,NW1L,MV9D6,MV9D9,MV9E4,MV9E5,MV9E6,MV9E7,MV9E8,  MV9E9,MV9F4,MV9F5,MV9F6,MV9F7,MV9F8,MV9F9,MV9G4,MV9G5,  MV9G6,MV9G7,MV9G8,MV9G9,MV9H3,MV9H4,MV9H5,MV9H6,MV9H7,  MV9H8,MV9H9,MW3B2,MW3B3,MW3B5,MW3B6,MW3B8,MW3B9,MW3F2,  MW3F3,MW3F5,MW3F6,MW3F8,MW3F9,MW3J2,MW3J3,MW3O1,MW3O2,  MW3O3,MW3P1,MW3P2,MW3P3,NV4I5,NV4I6,NV4I8,NV4I9,NV4J4,NV4J5,  NV4J6,NV4J7,NV4J8,NV4J9,NV4K4,NV4K5,NV4K6,NV4K7,NV4K8,NV4K9,  NV4L4,NV4L5,NV4L6,NV4L7,NV4L8,NV4L9,NV4M2,NV4M3,NV4M5,NV4M6,  NV4M8,NV4M9,NV5I4,NV5I5,NV5I6,NV5I7,NV5I8,NV5I9,NV5J4,NV5J5,  NV5J6,NV5J7,NV5J8,NV5J9,NV5K4,NV5K5,NV5K6,NV5K7,NV5K8,NV5K9, NV5L4,NV5L5,NV5L6,NV5L7,NV5L8,NV5L9,NV7A2,NV7A3,NV7A4,NV7A5,  NV7A6,NV7A7,NV7A8,NV7A9,NW1M1,NW1M2,NW1M3,NW1N1,NW1N2,  NW1N3,NW1O1,NW1O2,NW1O3,NW1P1,NW1P2,NW1P3 |
| Regional | - | CV,DV,IV,JV,KQ,KV,KW,LR,LV,LW,LY,MS,MT,MU,AU9,AV9,AW3,BU7,BU8,  BV3,BV6,BV7,BV8,BV9,BW1,BW2,BW3,BW5,BW6,CW1,CW2,CW3,CW4,  DW1,DW2,DW3,EV1,EV2,EV3,EV4,EV5,EV6,EV7,FV1,FV2,FV3,FV4,FV5,  GV1,GV2,GV3,GV6,HV1,HV2,HV3,HV4,HV5,HV6,HV8,HV9,HW3,HW6,IW1,  IW2,IW4,IW5,IW7,IW8,IW9,JW2,JW3,JW4,JW5,JW6,JW7,JW8,JW9,JX1,JX2,  JX3,JX5,JX6,KO1,KO4,KO5,KO7,KO8,KP1,KP2,KP4,KP5,KP6,KP7,KP8,KP9,KX1,KX2,KX4,KX5,KX8,KX9,KY2,KY3,KY6,LP4,LP7,LQ1,LQ2,LQ4,LQ5,LQ7,  LQ8,LX2,LX3,LX5,LX6,LX7,LX8,LX9,LZ1,LZ2,LZ3,MR1,MR4,MR5,MR7,MR8,  MR9,MV1,MV2,MV3,MV4,MV5,MV6,MV7,MV8,MW6,MW7,MW8,MW9,MX1,  MX2,MX3,MX4,MX7,MY1,MY4,MY7,MZ1,NS4,NS7,NS8,NS9,NT1,NT2,NT3,  NT4,NT7,NU1,NU4,NU5,NU6,NU7,NU8,NU9,NV1,NV2,NV3,AU6I,AU6J,AU6K,AU6L,AU6M,AU6N,AU6O,AU6P,BU4H,BU4I,BU4J,BU4K,BU4L,BU4M,BU4N,  BU4O,BU4P,BU5E,BU5F,BU5G,BU5H,BU5I,BU5J,BU5K,BU5L,BU5M,BU5N,  BU5O,BU5P,BU9A,BU9B,BU9E,BU9F,BU9I,BU9J,BU9M,BU9N,BV1A,BV1B,  BV1C,BV1D,BV2A,BV2B,BV2C,BV2D,BV2G,BV2H,BV2K,BV2L,BV2O,BV2P, BV5C,BV5D,BV5G,BV5H,BV5K,BV5L,BV5O,BV5P,IW3A,IW3B,IW3C,IW3D,  IW6I,IW6J,IW6K,IW6L,IW6M,IW6N,IW6O,IW6P,JW1A,JW1B,JW1C,JW1D,  JW1F,JW1G,JW1H,JW1J,JW1K,JW1L,JW1N,JW1O,JW1P,KX3A,KX3B,KX3C,KX3D,KX6M,KX6N,KX6O,KX6P,LX1A,LX1B,LX1C,LX1D,LX1F,LX1G,LX1H,  LX1L,LX1P,LX4D,LX4G,LX4H,LX4K,LX4L,LX4M,LX4N,LX4O,LX4P,MV9A,  MV9B,MV9C,MW1A,MW1B,MW1C,MW1D,MW1E,MW1F,MW1G,MW1H,  MW1I,MW1J,MW1K,MW1L,MW1M,MW1N,MW1O,MW2A,MW2B,MW2C,  MW2D,MW2E,MW2F,MW2G,MW2H,MW2I,MW2J,MW2K,MW2L,MW2O,  MW2P,MW3A,MW3E,MW3I,MW3M,MW3N,MW4A,MW4B,MW4C,MW4E,  MW4F,MW4G,MW4I,MW4J,MW4K,MW4M,MW4N,MW4O,MW5C,MW5D,  MW5G,MW5H,MW5K,MW5L,MW5O,MW5P,NT5A,NT5B,NT5C,NT5D,NT5E,  NT5F,NT5G,NT5H,NT5I,NT5J,NT5K,NT5L,NT5M,NT5N,NT6A,NT6B,NT6C,  NT6D,NT6E,NT6F,NT6G,NT6H,NT6I,NT6J,NT6K,NT6L,NT8A,NT8B,NT8E,  NT8F,NT8I,NT8J,NT8M,NT8N,NU2A,NU2B,NU2E,NU2F,NU2G,NU2I,NU2J,  NU2K,NU2L,NU2M,NU2N,NU2O,NU2P,NU3M,NU3N,NU3O,NU3P,NV4A,  NV4B,NV4C,NV4D,NV4E,NV4F,NV4G,NV4H,NV5A,NV5B,NV5C,NV5D,NV5E,NV5F,NV5G,NV5H,BV1E1,BV1E2,BV1E3,BV1E4,BV1E5,BV1E6,BV1F1,  BV1F2,BV1F3,BV1F4,BV1F5,BV1F6,BV1G1,BV1G2,BV1G3,BV1G4,BV1G5,  BV1G6,BV1H1,BV1H2,BV1H3,BV1H4,BV1H5,BV1H6,BV2E1,BV2E2,BV2E3,  BV2E4,BV2E5,BV2E6,BV2F1,BV2F2,BV2F3,BV2F4,BV2F5,BV2F6,BV4M4, BV4M5,BV4M6,BV4M7,BV4M8,BV4M9,BV4N4,BV4N5,BV4N6,BV4N7,BV4N8,BV4N9,BV4O4,BV4O5,BV4O6,BV4O7,BV4O8,BV4O9,BV4P4,BV4P5,BV4P6,  BV4P7,BV4P8,BV4P9,BV5M4,BV5M5,BV5M6,BV5M7,BV5M8,BV5M9,BV5N4,BV5N5,BV5N6,BV5N7,BV5N8,BV5N9,IW3E1,IW3E2,IW3E3,IW3E4,IW3E7,  IW3F1,IW3F2,IW3F3,IW3G1,IW3G2,IW3G3,IW3H1,IW3H2,IW3H3,IW3I1,  IW3I4,IW3I7,IW3M1,IW3M4,IW3M7,IW6A1,IW6A4,IW6A7,IW6E1,IW6E4,  IW6E7,JW1E1,JW1E2,JW1E3,JW1E5,JW1E6,JW1E8,JW1E9,JW1I2,JW1I3,  JW1I5,JW1I6,JW1I8,JW1I9,JW1M2,JW1M3,JW1M5,JW1M6,JW1M7,JW1M8,  JW1M9,KX3E1,KX3E2,KX3E3,KX3E4,KX3E5,KX3E6,KX3E7,KX3E8,KX3F1,  KX3F2,KX3F3,KX3F4,KX3G3,KX3H1,KX3H2,KX3H3,KX3I1,KX3I2,KX3I4,  KX3I5,KX3I7,KX3M1,LX1E1,LX1E2,LX1E3,LX1E5,LX1E6,LX1J2,LX1J3,  LX1K1,LX1K2,LX1K3,LX1K5,LX1K6,LX1K8,LX1K9,LX4F3,LX4F6,LX4F9,  LX4J3,LX4J6,LX4J9,MV9D1,MV9D2,MV9D3,MV9D4,MV9D5,MV9D7,MV9D8,MV9E1,MV9E2,MV9E3,MV9F1,MV9F2,MV9F3,MV9G1,MV9G2,MV9G3,  MV9H1,MV9H2,MW1P1,MW1P2,MW1P3,MW2M1,MW2M2,MW2M3,MW2N1,MW2N2,MW2N3,MW3B1,MW3B4,MW3B7,MW3F1,MW3F4,MW3F7,MW3J1, MW3J4,MW3J5,MW3J6,MW3J7,MW3J8,MW3J9,MW3O4,MW3O5,MW3O6,  MW3O7,MW3O8,MW3O9,MW3P4,MW3P5,MW3P6,MW3P7,MW3P8,MW3P9,MW4P4,MW4P5,MW4P6,MW4P7,MW4P8,MW4P9,MW5M4,MW5M5,MW5M6,MW5M7,MW5M8,MW5M9,MW5N4,MW5N5,MW5N6,MW5N7,MW5N8,MW5N9,NT5O1,NT5O2,NT5O3,NT5P1,NT5P2,NT5P3,NT6M1,NT6M2,NT6M3,NT6N1,NT6N2,NT6N3,NT6O1,NT6O2,NT6O3,NT6P1,NT6P2,NT6P3,NU2C4,NU2C5,NU2C6,NU2C7,NU2C8,NU2C9,NU2D4,NU2D7,NU2H1,NU2H4,NU2H5,  NU2H6,NU2H7,NU2H8,NU2H9,NU3E4,NU3E7,NU3I1,NU3I4,NU3I5,NU3I6,  NU3I7,NU3I8,NU3I9,NU3J4,NU3J5,NU3J6,NU3J7,NU3J8,NU3J9,NU3K4,  NU3K5,NU3K6,NU3K7,NU3K8,NU3K9,NU3L4,NU3L5,NU3L6,NU3L7,NU3L8,  NU3L9,NV4I1,NV4I2,NV4I3,NV4I4,NV4I7,NV4J1,NV4J2,NV4J3,NV4K1,  NV4K2,NV4K3,NV4L1,NV4L2,NV4L3,NV4M1,NV4M4,NV4M7,NV5I1,NV5I2, NV5I3,NV5J1,NV5J2,NV5J3,NV5K1,NV5K2,NV5K3,NV5L1,NV5L2,NV5L3,  NV7A1,NW1M4,NW1M5,NW1M6,NW1M7,NW1M8,NW1M9,NW1N4,NW1N5,  NW1N6,NW1N7,NW1N8,NW1N9,NW1O4,NW1O5,NW1O6,NW1O7,NW1O8,  NW1O9,NW1P4,NW1P5,NW1P6,NW1P7,NW1P8,NW1P9,MT4H,MT4K,MT4L,MU5G,MU5H,MU5L,MV3G,MV3H,MV3K,MV3L,MT4F9,MT4G2,MT4G3,  MT4G4,MT4G5,MT4G6,MT4G7,MT4G8,MT4G9,MT4J3,MT4J6,MT4O1,  MT4O2,MT4O3,MT4O6,MT4P1,MT4P2,MT4P3,MT4P4,MT4P5,MT5E4,MT5E7,MT5I1,MT5I2,MT5I4,MT5I5,MT5I7,MT5M1,MU5C8,MU5C9,MU5D7,MU5D8,  MU5D9,MU5K1,MU5K2,MU5K3,MU5K4,MU5K5,MU5K6,MU5K8,MU5K9,  MU6A7,MU6E1,MU6E2,MU6E4,MU6E5,MU6E7,MU6E8,MU6I1,MU6I2,MU6I4,MU6I5,MU6I7,MV3C8,MV3C9,MV3D7,MV3F3,MV3F5,MV3F6,MV3F8,MV3F9,MV3J2,MV3J3,MV3J5,MV3J6,MV3J9,MV3O1,MV3O2,MV3O3,MV3P1,NU7K4,CV,DV,IV,JV,KQ,KV,KW,LR,LV,LW,LY,MS,AU9,AV9,AW3,BU7,BU8,BV3,BV6,BV7,BV8,BV9,BW1,BW2,BW3,BW5,BW6,CW1,CW2,CW3,CW4,DW1,DW2, DW3,EV1,EV2,EV3,EV4,EV5,EV6,EV7,FV1,FV2,FV3,FV4,FV5,GV1,GV2,GV3,GV6,HV1,HV2,HV3,HV4,HV5,HV6,HV8,HV9,HW3,HW6,IW1,IW2,IW4,IW5,IW7,IW8,IW9,JW2,JW3,JW4,JW5,JW6,JW7,JW8,JW9,JX1,JX2,JX3,JX5,JX6,KO1,  KO4,KO5,KO7,KO8,KP1,KP2,KP4,KP5,KP6,KP7,KP8,KP9,KX1,KX2,KX4,KX5,KX8,KX9,KY2,KY3,KY6,LP4,LP7,LQ1,LQ2,LQ4,LQ5,LQ7,LQ8,LX2,LX3,LX5,  LX6,LX7,LX8,LX9,LZ1,LZ2,LZ3,MR1,MR4,MR5,MR7,MR8,MR9,MT1,MT2,  MT3,MT6,MT7,MT8,MT9,MU1,MU2,MU3,MU4,MU7,MU8,MU9,MV1,MV2,MV4,MV5,MV6,MV7,MV8,MW6,MW7,MW8,MW9,MX1,MX2,MX3,MX4,MX7,MY1,  MY4,MY7,MZ1,NS4,NS7,NS8,NS9,NT1,NT2,NT3,NT4,NT7,NU1,NU4,NU5,  NU6,NU8,NU9,NV1,NV2,NV3,AU6I,AU6J,AU6K,AU6L,AU6M,AU6N,AU6O,  AU6P,BU4H,BU4I,BU4J,BU4K,BU4L,BU4M,BU4N,BU4O,BU4P,BU5E,BU5F,  BU5G,BU5H,BU5I,BU5J,BU5K,BU5L,BU5M,BU5N,BU5O,BU5P,BU9A,BU9B,  BU9E,BU9F,BU9I,BU9J,BU9M,BU9N,BV1A,BV1B,BV1C,BV1D,BV2A,BV2B,  BV2C,BV2D,BV2G,BV2H,BV2K,BV2L,BV2O,BV2P,BV5C,BV5D,BV5G,BV5H,  BV5K,BV5L,BV5O,BV5P,IW3A,IW3B,IW3C,IW3D,IW6I,IW6J,IW6K,IW6L,  IW6M,IW6N,IW6O,IW6P,JW1A,JW1B,JW1C,JW1D,JW1F,JW1G,JW1H,JW1J,  JW1K,JW1L,JW1N,JW1O,JW1P,KX3A,KX3B,KX3C,KX3D,KX6M,KX6N,KX6O,KX6P,LX1A,LX1B,LX1C,LX1D,LX1F,LX1G,LX1H,LX1L,LX1P,LX4D,LX4G,  LX4H,LX4K,LX4L,LX4M,LX4N,LX4O,LX4P,MT4A,MT4B,MT4C,MT4D,MT4E,  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1. ACMA [*Corporate plan 2023–24*](https://www.acma.gov.au/publications/2023-07/plan/corporate-plan-2023-24). [↑](#footnote-ref-2)
2. Technical conditions include maximum power, frequency range, out-of-band emissions limits, and geographical licence area. [↑](#footnote-ref-3)
3. The ACMA has also created the area-wide receiver licence, which authorises the operation of radiocommunications receivers. [↑](#footnote-ref-4)
4. LA WBB services are deployments by operators servicing small geographic areas, including wireless internet service providers (WISPs), fixed wireless access providers, as well as campus-style and private network deployments by industry verticals and enterprise users. [↑](#footnote-ref-5)
5. Also referred to as unlicensed spectrum by some international regulators. This is spectrum where an individual licence for a radiocommunications device is not required. [↑](#footnote-ref-6)
6. ECC Report 318, Compatibility between RMR and MFCN in the 900 MHz range, the 1900–1920 MHz band and the 2290–2300 MHz band, 3 July 2022. [↑](#footnote-ref-7)
7. ECC Report 314, Co-existence between Future Railway Mobile Communication System (FRMCS) in the frequency range 1900–1920 MHz and other applications in adjacent bands, 21 May 2020. [↑](#footnote-ref-8)
8. Ofcom, ‘Exploring future use of the unpaired 2100 MHz (1900-1920 MHz) spectrum’, 23 March 2023, p. 13. [↑](#footnote-ref-9)