



ARA Submission

Replanning of the 1880-1920
MHz band

Options Paper

17 March 2023

ABN 64 217 302 489

The rail industry

The Australasian Railway Association (ARA) is a not-for-profit member-based association that represents rail throughout Australia and New Zealand. Our members include rail operators, track owners and managers, manufacturers, construction companies and other firms contributing to the rail sector. We contribute to the development of industry and government policies in an effort to ensure Australia's passenger and freight transport systems are well represented and will continue to provide improved services for Australia's growing population.

This submission has been developed in consultation with ARA member organisations.

Any questions regarding this submission should be directed to Simon Bourke, General Manager – Policy and Government Relations via sbourke@ara.net.au.

Australia's rail industry

Rail is a significant industry in Australia, creating economic activity through its operations and capital investments. It is an industry with activities across every major metropolitan and regional area and is supported by the full spectrum of skills in the Australian workforce.

In 2019, the rail industry contributed around \$30 billion to the Australian economy and employed more than 165,000 workers (directly and indirectly in full-time equivalent terms, FTE). The industry is made up of around 900 businesses that are located in approximately 20 major hubs.

Issues for comment

The following information is provided by the ARA to address the issues for comment provided in the Discussion Paper.

Comments on the proposed desirable planning outcomes.

The proposed desirable planning outcomes for the review of the 1.9 GHz band were identified as:

1. Maintain arrangements for existing services.

The ARA agrees in principle, noting that:

- Half of the 1880-1920 MHz spectrum is used for mainly DECT purposes. Domestic DECT use will likely decrease as use of fixed phone services (PSTN, NBN, or VoIP) decline in favour of

mobile phone services. The ACMA's report on 'Communications and media in Australia: Trends and developments in telecommunications 2020–21'¹ found:

"Our use of fixed-line home phones has sharply declined – down from 54% in 2017 to 24% in 2021."

This suggests DECT use in domestic settings will continue to decline with falling fixed-line home phone use.

- Most PTP and PMP services are in regional and low-density areas, away from major populated areas serviced by metropolitan rail.

2. Expand arrangements for short range wireless broadband (SR WBB) services.

In Railway Mobile Radio (RMR) areas, the ARA does not support expansion of SR WBB where this would lead to unquantifiable and uncoordinated interference.

Based on current trends in domestic SR WBB use, the ARA does not see a need for SR WBB expansion in 1900 – 1910 MHz. However, the ARA is not opposed to SR WBB expansion into 1910 – 1920 MHz.

The ARA considers expansion of SR WBB into 1900 – 1910 MHz to be detrimental to the introduction of RMR. This is due to the addition of unquantifiable interference from class-licenced sources to future RMR services. In metropolitan areas where RMR density will be highest, SR WBB would be impacted by RMR BS if 1900-1910 MHz spectrum is shared. Further information on the implications of uncontrolled interference sources is provided in our response to Option 4 and discussions on coexistence later in this submission.

3. Introduce arrangements for new railway mobile radio (RMR) services.

The ARA strongly agrees with this desirable planning outcome to introduce arrangements for RMR services. The EU made 1900-1910 MHz available for RMR on 28 September 2021² for several reasons:

- Global System for Mobile Communications – Railway (GSM-R) is unlikely to be supported beyond 2030;
- Compared to GSM-R, Future Railway Mobile Communication System (FRMCS) offers a higher quality of service and is more cost effective. The system is also planned to deliver more in terms of applications such as Automatic Train Operation (ATO) or the Connected Driver Advisory System (C-DAS); and

¹ [https://www.acma.gov.au/sites/default/files/2021-](https://www.acma.gov.au/sites/default/files/2021-12/Trends%20and%20developments%20in%20telecommunications%202020-21_0.pdf)

[12/Trends%20and%20developments%20in%20telecommunications%202020-21_0.pdf](https://www.acma.gov.au/sites/default/files/2021-12/Trends%20and%20developments%20in%20telecommunications%202020-21_0.pdf)

² COMMISSION IMPLEMENTING DECISION (EU) 2021/1730 of 28 September 2021 on the harmonised use of the paired frequency bands 874,4-880,0 MHz and 919,4-925,0 MHz and of the unpaired frequency band 1 900-1 910 MHz for Railway Mobile Radio

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021D1730&from=EN>

- To enable the parallel operation of GSM-R and FRMCS during an approximately 10-year migration phase, and to benefit from new railway critical applications during and beyond migration, access to a sufficient harmonised spectrum for RMR is essential.

In addition to 1800 MHz band spectrum, rail operators in Australia will benefit from acquiring 1900 MHz spectrum for RMR for the following reasons:

- Equipment procurement and support:
 - availability - equipment vendors will develop RMR equipment designed for 1900 MHz spectrum due to EU decision;
 - suitability - no need to modify for use with a different spectrum band; and
 - supportability - leverage global support arrangements driven by the large European customer base;
- Additional bandwidth to support future high-bandwidth RMR applications including video surveillance streaming;
- Opportunity to deploy RMR services for rail corridors and infrastructure located outside the license boundary of the existing 1800 MHz license used for RMR:
 - **NSW:** Bomaderry and Singleton – to cover towns rather than end coverage just before township.
 - **Queensland:** The section between Beerwah and Gympie North, extending eastwards to the coast. This will provide coverage for the northern part of the suburban passenger rail network and the future Sunshine Coast railway. Potential future extension of RMR into regional parts of the Qld Rail network.
 - **Victoria:** Future extension of RMR coverage to all regional rail corridors and infrastructure including the following:
 - North-west (Woodend, Kyneton, Malmsbury, Castlemaine, Kangaroo Flat, Bendigo, Epsom, Huntly, Goornong, Elmore, Rochester, Echuca, Eaglehawk, Raywood, Dingee, Pyramid, Kerang, Swan Hill)
 - West (Ballarat, Wendouree, Beaufort, Ararat, Creswick, Clunes, Talbot, Maryborough)
 - South-west (Winchelsea, Birregurra, Colac, Camperdown, Terang, Sherwood Park, Warrnambool)
 - South-east (Longwarry, Drouin, Warragul, Yarragon, Trafalgar, Moe, Morwell, Traralgon, Rosedale, Sale, Stratford, Bairnsdale)
 - North (Kilmore East, Broadford, Tallarook, Seymour, Nagambie, Murchison East, Mooroopna, Shepparton, Avenel, Euroa, Violet Town, Benalla, Wangaratta, Springhurst, Chiltern, Wodonga, Albury)
 - **SA:** Four main rail lines
 - Adelaide to Seaford - to be extended further south in the distant future
 - Adelaide to Gawler - possible extension north
 - Adelaide to Belair - possible extension in the future to Mt Barker
 - Adelaide to Outer Harbour - no further extensions
 - **WA:** Potential future extension of RMR coverage to all regional passenger rail corridors and infrastructure including the following:
 - Perth to Bunbury (current shared corridor potential dedicated route in planning)
 - Perth to Kalgoorlie

The ARA therefore agrees with this planning outcome on the basis that 1800 MHz band spectrum will still be available for RMR services. This is similar to the approach taken in Europe which uses 900 MHz in addition to their 1900 MHz spectrum³.

4. Maintain coexistence with 1.9 GHz band services

The ARA agrees that the introduction of RMR into 1900-1910 MHz should have minimal impact on other 1.9 GHz band services.

The ARA considers that coexistence issues between DECT and adjacent bands and services have been adequately studied to demonstrate the impact on DECT would be negligible. The ECC Report 314 confirmed this view, finding interference to FRMCS from mobile handsets or user equipment (UE) would be negligible. The report found that the desensitisation of the FRMCS from DECT is generally negligible, apart from exceptional cases where it can reach up to 10 dB for a few seconds, noting that in these situations the wanted signal remains 30 dB above the interference level. Most cases showed DECT systems would only require a separation distance from FRMCS cab radios of up to 50m depending on the deployment of DECT. This distance increases to up to 165m for FRMCS base stations. In cases where DECT was deployed outdoors, the required separation distance could be as high as 900m.⁴

5. Maintain coexistence with adjacent band services.

The ARA agrees that the allocation of 1880 - 1920 MHz spectrum should have minimal impact on adjacent band services, noting that:

- Changes to spectrum licence technical frameworks of adjacent band services are likely to impact 1880 - 1920 MHz band services due to high power sites and Adaptive Antenna Systems (AAS);
- Adjacent band services are likely to be re-farmed using 5G technologies; and
- Any potential interference has been mitigated by limiting the allocation of RMR to 1900 - 1910 MHz providing a large separation to 1800 MHz and 1920 - 1980 MHz band services⁵.

Views on any other applications we have not identified that could be accommodated under SR WBB.

The ARA has no comment on other applications that could be accommodated, however the ARA has a strong preference that any other proposed applications have no impact on RMR.

³ ECC/DEC/(20)02 20/11/2020 <https://docdb.cept.org/download/4039>

⁴ ACMA Replanning of the 1880–1920 MHz band Options paper

⁵ ACMA Replanning of the 1880–1920 MHz band Options paper

Comments on the replanning options, especially the preliminary preferred option presented in this paper, and any alternative options.

Option 1

Option 1: Maintaining existing arrangements. Regulatory arrangements in the 1880–1900 MHz frequency range may require minor amendments to ensure some new SR WBB technologies can be accommodated in this segment.

The ARA does not support this option.

The ARA supports the introduction of RMR in 1900 – 1910 MHz. Option 1 does not permit RMR and therefore this option fails to achieve the ACMA's desirable planning outcomes.

Option 2

Option 2: Expanding SR WBB arrangements from exclusive use in 1880–1900 MHz to include shared use in the 1900–1920 MHz frequency range Australia-wide, with no other changes to current arrangements.

The ARA does not support this option.

The ARA supports the introduction of RMR in 1900 – 1910 MHz. Option 2 does not permit RMR and therefore this option fails to achieve the ACMA's desirable planning outcomes.

Option 3

Option 3: Introducing arrangements to allow for RMR in the 1900–1910 MHz frequency range on an Australia-wide basis, with no change to current arrangements in the other segments. The ACMA is seeking stakeholder feedback on coexistence of DECT and future DECT services by introducing FRMCS in the 1900–1910 MHz band.

The ARA supports the introduction of RMR in 1900 – 1910 MHz Australia-wide.

The EU made 1900-1910 MHz a RMR/FRMCS band⁶ on 28 September 2021⁷ for several reasons:

- GSM-R is unlikely to be supported beyond 2030;
- Compared to GSM-R, FRMCS offers a higher quality of service and is more cost effective. The system is also planned to deliver more in terms of applications such as Automatic Train Operation (ATO) or the Connected Driver Advisory System (C-DAS); and
- To enable the parallel operation of GSM-R and FRMCS during an approximately 10-year migration phase, and to benefit from new railway critical applications during and beyond migration, access to a sufficient harmonised spectrum for RMR is essential.

⁶ <https://op.europa.eu/en/publication-detail/-/publication/aa8ab02f-2187-11ec-bd8e-01aa75ed71a1/language-en>

⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021D1730&from=EN>

In addition to 1800 MHz band spectrum, rail operators in Australia will benefit from acquiring 1900 MHz spectrum for RMR for the following reasons:

- Equipment procurement and support:
 - EU spec availability - equipment vendors will develop RMR equipment designed for 1900 MHz spectrum due to EU decision;
 - suitability - no need to modify for use with a different spectrum band; and
 - supportability - leverage global support arrangements driven by the large European customer base;
- Additional bandwidth supports future high-bandwidth RMR applications including video surveillance streaming;
- Opportunity to deploy RMR services for rail corridors and infrastructure located outside the license boundary of the existing 1800 MHz license used for RMR:
 - **NSW:** Bomaderry and Singleton – to cover towns rather than end coverage just before township.
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 - **Victoria:** Future extension of RMR coverage to all regional rail corridors and infrastructure including the following:
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 - **WA:** Potential future extension of RMR coverage to all regional passenger rail corridors and infrastructure including the following:
 - Perth to Bunbury (current shared corridor potential dedicated route in planning)
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The ARA supports the introduction of RMR in 1900 – 1910 MHz Australia-wide on the basis that 1800 MHz band spectrum remains available whilst it is needed for RMR services. This is similar to the approach taken in Europe which will use existing 900 MHz in addition to 1900 MHz spectrum⁸.

The ARA supports 1900 - 1910 MHz being dedicated to rail in metropolitan areas and regional areas associated with rail corridors and related infrastructure. Adoption of similar technical framework to that of EU will facilitate use of EU equipment, experience, and designs for Australian RMR deployments.

Increased utilisation of 1900 – 1910 MHz may be considered by making it more broadly available for state government transport agencies to use, mirroring carrier license exemptions for transport authorities as per Telecommunication Act 1997. For example, NSW has aggregated transport modes under Transport for NSW, while the Victorian Department of Transport and Planning has endorsed a strategy to consolidate broader transport radio systems for trams, buses and roads. Similar arrangements are in play or being explored in WA and Queensland.

The ARA agrees with the ACMA's assessment that, coexistence with adjacent band services is supported by having frequency separation between RMR and adjacent band services.

The ARA considers that Option 3 permits engineering of rail telecommunication networks without needing to account for wide-spread uncontrolled interference from ad-hoc sources. This would establish a near identical operating environment to that in Europe for Australian rail jurisdictions. This is discussed in more detail in ARA's response to Option 4 below.

Option 4

Option 4: Extending arrangements for SR WBB to the 1880–1920 MHz frequency range to allow shared use of the 1900–1920 MHz frequency range Australia-wide. Introducing arrangements to allow for RMR in the 1900–1910 MHz 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 are seeking stakeholder feedback on the feasibility of future DECT to co-exist with LA WBB / PTP services in regional and remote areas if DECT services extend to the entire 40 MHz band.

The ARA supports the introduction of RMR in 1900 – 1910 MHz Australia-wide. However, jurisdictions cannot accept sharing spectrum with SR WBB.

Interference

Sharing spectrum with SR WBB increases the risk of interference. This presents the following challenges:

⁸ ECC/DEC/(20)02 20/11/2020 <https://docdb.cept.org/download/4039>

- Interference is unquantifiable, requiring assumptions to be made that may not survive system design-life. This has happened in the UK and Europe, where GSM-R initially worked alongside Mobile Network Operator's (MNO) 2G systems until 3G & 4G technology was deployed. To address interference, the UK & European rail industries developed bespoke onboard radio equipment with improved receiver parameters (ETSI TS 102 933-1) and introduced mobile Radio Frequency filters (UIC O-8760) to reduce out-of-band emissions.
- Interference is co-channel. In designing a network with dedicated spectrum, an assumption can be made that co-channel interference is primarily self-interference generated by a site under a designer's control. With shared-use spectrum, additional assumptions need to be made to estimate co-channel interference that would cause lower C/I ratios and therefore lower cell bandwidths. To mitigate an increase in C/I, cell sizes would need to be reduced.

Therefore, from an interference perspective, shared spectrum would materially impact network cost due to smaller cells and risk of interference from uncontrolled class-licensed sources would remain.

This susceptibility to interference introduces a risk to the delivery of safe, reliable and efficient train operations required under the national and state legislation such as the Victorian Transport Integration Act 2010. In managing risk, rail designers apply a technique known as the Hierarchy of Controls, whereby the preferred approach is to eliminate a risk rather than implement engineering controls. The ARA considered that risks associated with sharing spectrum can be eliminated by adopting option 3 which reserves 1900 - 1910 MHz band for rail in metropolitan areas.

If risk of external interference from SR WBB services is not eliminated, an additional administrative mitigation and associated cost burden would be required as follows:

- The need to detect and triangulate interference sources;
- The need to negotiate with those using the spectrum; and
- The need to develop and deploy alternative agreed solutions or re-design affected area to reduce impact of interference on RMR and associated rail safety and control communications.

The ARA considers that this administrative burden on rail jurisdictions with limited resources can be eliminated by Option 3.

Coordination

Option 4 proposes coordinating spectrum access with SR WBB which are primarily DECT services deployed under a class license⁹. Future services may include DECT 2020 and Multefire that presumably would be deployed under same or similar class license.

⁹ Radiocommunications (Cordless Communications Devices) Class Licence 2014
<https://www.legislation.gov.au/Series/F2014L01800>

The ARA considers coordinating with class-licensed users to be 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.

Harmonising with the EU would also enable industry to use EU equipment and resources to design and deploy RMR networks in Australia. It is the ARA's understanding that rail operators in the EU will not be sharing 1900 – 1910 MHz spectrum with SR WBB. Should this option be progressed, Australia will have different design limitations to be addressed that are not present in EU designs and equipment standards.

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

The ARA has no view on need for PHS.

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?

Should the 1900 – 1920 MHz band plan¹⁰ be allowed to sunset and RMR is permitted in the 1900 – 1910 MHz, a new band plan would be required to ensure RMR in the 1900 – 1910 MHz is considered a primary service.

Comments on coexistence considerations, and analysis on coexistence issues for the proposed options in this band.

SLTF have recently been revised to permit introduction of high power 5G systems with AAS. This change to 1800 MHz and 2 GHz bands will result in higher out-of-band interference into adjacent bands.

As discussed in the options paper, limiting transmitter power of an FRMCS (RMR) base station may result in a higher density of base stations, increasing cost and complexity.

RMR operating in 1900 - 1910 MHz would provide a significant guard band (10 MHz) to MNO base receivers operating in 3GPP Band n1 (1920 - 1980 MHz). It is worth noting that RMR would only be required along railway corridors. Interference would be likely limited to MNO base stations on or near the rail corridor and in close proximity to an RMR base station.

As suggested in the options paper, the ARA agrees that further analysis should be carried out to determine interference risk, mitigating measures and overall, least restrictive technical conditions for RMR operating in 1900 - 1910 MHz.

¹⁰ 1900 –1920 MHz band plan <https://www.legislation.gov.au/Details/F2012L00733>