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Frequency coordination and licensing procedures for Railway Mobile Radio (RMR) in the 1900–1910 MHz band

Radiocommunications Assignment and Licensing Instruction

RALI: MS 51

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Amendment history

Date	Comments
02 July 2026	Initial release.

Suggestions for improvements to Radiocommunications Assignment and Licensing Instruction MS 51 may be addressed to:

The Manager, Spectrum Planning Section
Australian Communications and Media Authority
PO Box 78
Belconnen ACT 2616

or by email to: freqplan@acma.gov.au.

Please notify the ACMA of any inaccuracy or ambiguity found in this RALI, so that it can be investigated and appropriate action taken.

Contents

1 Introduction

1.1 Purpose

The purpose of this Radiocommunications Assignment and Licensing Instruction (RALI) is to provide information about, and describe the necessary steps for, the frequency coordination and licensing of Railway Mobile Radio (RMR) services in the 1900-1910 MHz band.

The information in this document reflects the ACMA's statement of current policy in relation to frequency coordination and apparatus licensing of RMR services in the 1900-1910 MHz band. In making decisions, accredited frequency assigners and the ACMA's officers should take all relevant factors into account and decide each case on its merits. Issues relating to this document that appear to fall outside the stated policy should be referred to:

The Manager, Spectrum Planning Section
Australian Communications and Media Authority
PO Box 78
Belconnen ACT 2616

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1.2 Scope

This RALI details the steps necessary for frequency coordination and licensing of proposed RMR services in the 1900-1910 MHz band. It covers coexistence arrangements between proposed RMR services and other previously licensed RMR services; and between RMR services and other radiocommunications services identified in Table 1 that share the same or adjacent frequency bands.

The RALI provides instructions that may be used by ACMA assigners and Accredited Persons when assessing whether proposed RMR services will cause (or receive) unacceptable interference to (or from):

- point-to-point fixed links (fixed links),
- point-to-multipoint (BWA) systems,
- spectrum licensed services in adjacent frequency bands, and
- Public telecommunications services (PTS) in adjacent frequency bands.

This RALI also identifies other services for which no specific coordination criteria have been developed, due to the nature of the service and the potential for interference being low.

Coordination calculations should be performed to assess potential interference to and from RMR base stations, as required. Coordination of RMR cab radios[1] and low powered remote stations is not required as they operate on a 'no

[1] RMR cab radios refers to the transmitter/receiver equipment installed on the train

interference no protection' (NINP) basis. Interference protection and requirements to protect other services are based upon the assumption that mobile and base station deployments conform to the deployment model described at Appendix E.

This RALI does not cover all matters relevant to the coordination of RMR transmitters and receivers with other services and it should be read in conjunction with other applicable RALIs and BOPs.

1.2.1 Basic principles

The basic principles for coordination and operation of RMR services in the 1900-1910 MHz band are that:

- A RMR system comprises of one base station and any number of remote or mobile stations communicating with those base stations and is used to provide safety and control communications for railway services.
- RMR base stations are authorised under a PTS apparatus licence and RMR mobile/remote stations are authorised by the Radiocommunications (Cellular Mobile Telecommunications Devices) Class Licence 2024 (the cellular mobile class licence).
- PTS apparatus licences may only be issued in the frequency range 1900-1910 MHz for RMR base stations that are located within 100m of a railway line defined in Appendix A.
- RMR base station transmitters must comply with the emission limits set out in Appendix E of this RALI.
- RMR licences will only be issued with the support of the Australian Rail Association (ARA) to ensure that they are limited to use by the rail-sector, and to facilitate management of coexistence within the rail-sector.
- an ACMA frequency assigner or Accredited Person will conduct the frequency coordination of RMR services in accordance with this RALI. To assess the feasibility of the proposed RMR services, applicants may undertake coordination studies in accordance with the procedures in this RALI prior to submitting the application. The results of such studies may be included with the licence application.
- The coordination arrangements in this RALI give effect to a 'reservation' for RMR services in the 1900-1910 MHz frequency range along the railway lines described in Appendix A.
- While the operational criteria for RMR services have been based on Future Railway Mobile Communication Systems (FRMCS) standards, any RMR technology can be used to provide a service for purposes described in this RALI if it adheres to the criteria set out in this RALI.

1.3 Overview of coordination procedures

Information on RMR equipment characteristics and an assumed deployment model are provided in Appendix E. The deployment model provides assumed characteristics for the base station and for related mobile stations. This RALI requires that coordination calculations be performed to assess potential interference to and from the RMR base station.

Section 2 of this RALI describes a range of potential co-channel and adjacent channel interference scenarios that must be considered when making assessments of potential interference.

Section 3 provides a procedure for making assessments of potential interference. Appendices B, C, D and E provide the applicable protection criteria to be used in performing the assessments.

A summary of potential interference scenarios and the applicable coordination procedure is given in Table 1. Not all interference scenarios are relevant for all deployments.

Table 1: Summary of potential interference scenarios.

Interference scenarios	Coordination procedure
RMR into RMR (see section 2.1)	No procedure required
RMR Tx into BWA Rx (see section 2.2.1)	For BWA Rx licensed before 2 July 2026]: RALI FX19 For BWA Rx licensed on or after 2 July 2026: No procedure required (coexistence addressed via BWA Tx to RMR Rx coordination in section 3.2.1)
BWA Tx into RMR Rx (see section 2.2.2)	For BWA Tx licensed before 2 July 2026: section 3.2.2. For BWA Tx licensed on or after 2 July 2026: section 3.2.1.
RMR Tx into fixed link Rx (see section 2.3.1)	For fixed link Rx licensed before 2 July 2026: section 3.3.1 of this RALI For fixed link Rx licensed on or after 2 July 2026section 3.3.2
Fixed link Tx into RMR Rx (see section 2.3.2)	For fixed link Tx licensed before 2 July 2026: section 3.4.2 of this RALI For fixed link Rx licensed on or after 2 July 2026: section 3.4.1.
RMR Tx into 2 GHz band spectrum licensed and PTS Rx (see section 2.4)	Section 3.5 of this RALI
Spectrum licensed and PTS Tx into RMR Rx (see section 2.5)	No procedure required
RMR and class licensed DECT services (see section 2.6)	No procedure required
RMR and apparatus licensed short-range wireless broadband (SR WBB) services (see section 2.7)	See RALI FX19

1.4 Overview of licensing

PTS apparatus licences are used to authorise the operation of PTS systems that comprises two or more land stations (i.e. RMR base stations). The cellular mobile class licence authorises mobile stations to communicate with the land stations authorised under the PTS apparatus licence, under a NINP basis.

PTS licences will only be issued for RMR services in the 1900–1910 MHz band to applicants that have been approved by the ARA (see section 4).

In the 1900–1910 MHz band channel widths of 5 and 10 MHz apply.

Additional information about the licensing arrangements is provided in section 4 of this RALI.

2 Potential interference scenarios

2.1 Potential RMR network interference into other RMR networks

RMR services will operate within Australia in the 1900-1910 MHz band using Time Division Duplex (TDD) technologies.

RMR stations operating in the 1900-1910 MHz band have the potential to cause interference to other RMR stations. In most situations it is believed that this potential interference scenario will be adequately addressed through the nature of the deployment of RMR networks (i.e. along rail corridors) and the restriction of issuing licences to rail operators by the ARA. Therefore, no coordination details have been provided in Section 3 of this RALI. We encourage operators to consider and liaise with other rail operators when deploying their network.

Operators should consider potential interference between disparate RMR networks prior to applying for a licence. Mitigation measures should be considered including, power, antenna discrimination, filtering, shielding and synchronisation[2].

In the event that interference does occur, the ACMA encourages licensees to cooperate and, where necessary, compromise to find a resolution.

If the matter cannot be resolved between affected parties, we note that RMR base stations operate on a NINP basis with respect to other RMR base stations (see special conditions in section 4.8). RMR mobile stations, which are authorised under the cellular mobile class licence, also operate on a NINP basis. RMR licensees will therefore be required to rectify any interference issues into other RMR base station receivers.

2.2 Coexistence between RMR network and BWA systems

Broadband wireless access (BWA) services that use time division duplexing (TDD) operate in defined regional and remote areas in the 1900-1920 MHz band. Arrangements for BWA services are detailed in RALI FX19.

2.2.1 Potential RMR transmitter interference into BWA receivers

An RMR base station transmitter operating in the 1900-1910 MHz band has the potential to cause interference to a BWA base station receiver. For BWA receivers licensed before 2 July 2026, protection criteria are provided in Appendix B.2 of RALI FX 19. For BWA receivers licensed on or after 2 July 2026, in most situations it is believed that this scenario will be adequately addressed through the coordination of BWA base station transmitters against

[2] Synchronisation options are outlined in Table 11.1.1-1 of ETSI TS 138 213, *Rail Telecommunications (RT); Future Railway Mobile Communication System (FRMCS); Radio performance aspects* for

RMR base station receivers. Therefore, no coordination procedures have been prescribed in Section 3 of this RALI.

However, if interference does occur, the ACMA encourages licensees to cooperate and, where necessary, compromise to find a resolution. If the matter cannot be resolved between affected parties, we note that BWA services (licensed on or after 2 July 2026) within 160 km for co-channel and 15 km for adjacent channel of a railway line operate on a NINP basis with regards to RMR base stations – see section 4.8. In these scenarios, the BWA licensee will therefore be required to rectify any interference issues into their BWA base station receivers caused by a RMR transmitters.

2.2.2 BWA transmitter interference into RMR receivers

BWA base station transmitters operating in the 1900-1920 MHz band have the potential to cause interference to RMR base station receivers operating in the 1900-1910 MHz band. Frequency coordination procedures outlined in Section 3.2 are to be used for assessing whether:

- a proposed BWA transmitter will cause unacceptable interference to a RMR receiver, and
- a proposed RMR receiver will receive unacceptable interference from an existing BWA transmitter licensed before 2 July 2026.

2.3 Coexistence between RMR network and fixed links

Fixed links operate in and adjacent to the 1900-1910 MHz band in accordance with the arrangements in RALI FX3.

2.3.1 Potential RMR transmitter interference into fixed link receivers

A consequence of the RMR network deployment model is that RMR base station transmitters are the station type that is most likely to interfere with incumbent fixed link receivers.

For the 1900–1910 MHz band, potential interference between RMR base transmitters and 1.8 GHz and the 2.1 GHz band fixed link receivers must be assessed.

For fixed link receivers licensed before 2 July 2026, frequency coordination procedures for assessing whether a proposed new RMR base station transmitter will cause unacceptable interference to existing fixed link receivers must be performed according to the frequency coordination process outlined in section 3.3.1.

For fixed link receivers licensed on or after 2 July 2026, in most situations interference from an RMR transmitter into a proposed fixed link receiver will be adequately addressed through the coordination of the proposed fixed link transmitter and RMR base station receiver. Therefore, a proposed RMR base station transmitter is not required to be coordinated with existing fixed link receivers licensed on or after 2 July 2026. While we expect coordination to not be necessary, section 3.3.2 provides a procedure for assessing the risk of interference into a proposed fixed link receiver occurring.

In the event that interference does occur, the ACMA encourages licensees to cooperate and, where necessary, compromise to find a resolution. If the matter

cannot be resolved between affected parties, we note that fixed links within 160 km for co-channel and 60 km for adjacent channel of a railway line operate on a NINP basis with regards to RMR base stations – see section 4.8. In these scenarios, the fixed link licensee will therefore be required to rectify any interference issues into fixed link receivers caused by a RMR transmitter.

2.3.2 Fixed link transmitter into RMR receiver

Potential interference from fixed link transmitters into RMR base station receivers must be assessed. The frequency coordination procedures outlined in Section 3.4 should be used for assessing whether:

- a proposed fixed transmitter will cause unacceptable interference to a RMR receiver; and
- a proposed RMR receiver will receive unacceptable interference from an existing fixed link transmitter that was licensed before 2 July 2026.

2.4 Coexistence between RMR network and devices operated under a spectrum licence or PTS apparatus licence in the 2 GHz band

Interference consideration between RMR networks and 2 GHz band spectrum licensed or PTS apparatus licensed services is limited to adjacent channel cases in the same area only, where RMR network has the potential to cause interference to, and receive interference from, 2 GHz services. These 2 GHz band services employ frequency division duplexing (FDD), with 1920–1980 MHz being the base receive segment.

There are four possible interference scenarios:

> RMR base station transmitter interference into upper-adjacent spectrum licensed or PTS base station receivers.

> RMR mobile/remote station transmitter interference into upper adjacent-spectrum licensed or PTS base station receivers.

> Spectrum licensed or PTS mobile station transmitter interference into lower-adjacent RMR base station receivers.

> Spectrum licensed or PTS mobile station transmitter interference into lower-adjacent RMR remote station receivers.

The first of these, involving RMR base station transmitters, is the dominant interference scenarios and will need to be assessed when assigning new RMR services. Due to the difference in transmitter power between RMR base stations and remote stations, assessment of the first scenario alone is normally considered sufficient to manage interference. However, in some cases where remote stations are geographically near a 2 GHz band spectrum licensed or PTS base station receiver, interference may need to be managed. If there is doubt, the procedure in section 3.5 of this RALI, modified to account for the actual operating characteristics and likely locations of the RMR remote station/s, should be used to assess interference potential when then RMR transmitter is within 70 km of a spectrum licensed or PTS base station receiver.

Devices that operate under the cellular mobile class licence (i.e. mobile and remote stations) and devices exempt from registration under 2 GHz band spectrum licences (i.e. spectrum licensed mobile stations) operate on NINP basis. This means that in the event interference is caused by a remote or mobile station transmitter (authorised by either the cellular mobile class licences or the spectrum licence), it is the responsibility of the licensee authorised to operate the mobile/remote station to resolve the issue.

2.5 Coexistence between RMR network and devices operated under a spectrum licence or PTS licence in the 1800 MHz band

Interference consideration between RMR networks and 1800 MHz band spectrum licensed or PTS apparatus licensed services is limited to adjacent channel cases in the same area only, where RMR network has the potential to cause interference to, and receive interference from, 1800 MHz band services. These 1800 MHz band services employ frequency division duplexing (FDD), with 1805 – 1880 MHz being the base transmit segment.

There are four possible interference scenarios:

- RMR base station transmitter interference into lower-adjacent spectrum licensed or PTS mobile station receiver.
- RMR mobile/remote station transmitter interference into lower-adjacent spectrum licensed or PTS mobile station receiver.
- Spectrum licensed or PTS base station transmitter interference into upper-adjacent RMR base station receiver.
- Spectrum licensed or PTS base station transmitter interference into upper-adjacent RMR mobile/remote station receiver.

The third of these, involving interference from 1800 MHz band spectrum licenced or PTS base station transmitters into RMR base station receivers, is the dominant interference scenario. Due to the difference in transmitter power between base stations and mobile stations, assessment of the third scenario alone is normally considered sufficient to manage interference.

Spectrum licensed or PTS apparatus licensed base station transmitters operating in the 1805–1880 MHz band are outside the 2nd adjacent channel of RMR stations. The frequency separation is considered sufficient to mitigate this potential interference, so no coordination procedures have been specified in Section 3 of this RALI.

The RMR receiver characteristics outlined in Appendix B provide guidance to RMR operators that should assist in mitigating any potential interference from spectrum licensed or PTS apparatus licensed base station transmitters operating in the 1805–1880 MHz band.

If interference does occur, the ACMA encourages licensees to cooperate to find a resolution. Devices that operate under the cellular mobile class licence (i.e. mobile and remote stations) and devices exempt from registration under 1800 MHz band spectrum licences (i.e. spectrum licensed mobile stations) operate on an NINP basis. This means that in the event interference is caused by a remote or mobile station transmitter (authorised by either the cellular

mobile class licences or the spectrum licence), it is the responsibility of the licensee authorised to operate the mobile/remote station to resolve the issue.

2.6 Underground RMR network

RMR stations in underground locations such as tunnels will likely be a part of the RMR network. Due to the service being located underground, the potential for interference to/from above ground services is low. Thus, no formal coordination with these services is considered necessary provided **Special Condition C23** is attached to any licence issued. There is no limit on how much of the 1.9 GHz band can be used in an underground environment under these conditions.

Coordination among multiple underground licensees in the same location is a site management issue and should be resolved by relevant licensees and/or the underground site manager. **Special Condition C23** limits the above ground emissions and requires that underground stations operate on a 'no interference and no protection (NINP) basis'.

When applying for a licence or including underground RMR services on an existing PTS licence, an above ground RMR transmitter position indicating the nominal location of the underground facility, must be ascribed. Multiple underground devices may be operated under any licence issued, without the requirement for registration, provided the requirements of **Special Condition C23** are not exceeded.

Other parameters that should be used on any licence applications are:

- EIRP: 10 µW
- Antenna ID: 80219
- Antenna height: 1.5 m
- Antenna azimuth: omni directional

For an existing PTS licence that does not support underground communications (i.e. no Special Condition C23), the licensee may apply to vary their existing licence to support underground transmitters using the procedure as above.

2.7 DECT services in the 1880–1900 MHz band

Spectrum in the 1880–1900 MHz band is used by Australia-wide class licensed digital enhanced cordless telecommunications (DECT) services. These services are lower-adjacent to the 1900–1910 MHz band.

Interference to and from adjacent band class licensed DECT services could potentially occur in situations where DECT equipment is operated near to 1900–1910 MHz band RMR equipment. However, in practice, it is expected that this will generally be mitigated by technology features inherent in the DECT standard. Specifically, DECT technology incorporates a Dynamic Channel Assignment (DCA) algorithm, whereby when a DECT receiver senses interference above a threshold level on a given channel, it will select an alternative channel.

In addition, sharing studies, including ECC Report 314[3], concluded that the risk of interference between FRMCS and uncoordinated DECT services is low. Accordingly, there is no need for any prescribed coordination procedures between RMR networks and class licensed DECT services.

2.8 SR WBB services in the 1900–1920 MHz band

Spectrum in the 1900–1920 MHz band is used by apparatus licensed indoor short-range WBB (SR WBB) services in metropolitan areas. It is expected that DECT would be the primary technology used for SR WBB services. Arrangements for assigning these services are detailed in RALI FX19.

Interference to and from co-channel and adjacent-band apparatus licensed SR WBB services could potentially occur in situations where SR WBB equipment is operated near 1900–1910 MHz band RMR equipment. Although the combination of DCA mentioned in section 2.7 and the indoors-only restriction on SR WBB operation in this band reduces the risk of potential interference, coordination is still required.

Apparatus-licensed SR WBB services operate on a NINP basis with regards to RMR services and RALI FX19 prescribes the coordination procedure for proposed apparatus licensed DECT services in the vicinity of defined railway lines.

[3] 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*, May 2020

3 RMR network coordination procedures

This part provides an overview of the coordination procedure to be followed.

To perform the coordination, access to licence data for existing assignments is required. This data is available on the ACMA's *Register of Radiocommunications Licences* (RRL). Unless otherwise stated in this RALI, notional parameters for proposed and existing stations should only be used for coordination purposes when actual parameters are not available.

3.1 Further options if coordination is unsuccessful

If the prescribed protection requirement is not met, then spectrum access is not possible unless further steps are taken by the applicant, however the applicant may consider the following options:

- Modifying the configuration of the proposed service to meet the protection criteria (this may include modifying the equipment to limit operation to a smaller portion of the band, or changing the locations, antenna height, proposed EIRP, etc.).
- Negotiating an agreement with the affected or affecting service(s) regarding changes to the service(s) and/or the RMR network.
- Applying for a licence to conduct test transmissions to assess the actual, vs theoretical, propagation loss, which can then be used to recalculate the interference potential.

3.2 Assessing BWA interference into RMR network

Interference from a BWA transmitter into a RMR receiver is to be assessed using the criteria in this section. The two interference scenarios considered in this section are:

- Interference from a proposed BWA into a RMR receiver.
- Interference from BWA transmitter licensed before 2 July 2026 into a proposed RMR receiver.

3.2.1 Interference from a proposed BWA transmitter into an RMR receiver

New BWA services may be licensed on or after 2 July 2026, within the coordination distance and frequency range specified in Table 2 on a NINP basis with regards to RMR base stations (special condition C26 is to be attached to the licence for these BWA services – see section 4.8). In addition, every point along a railway line that is within these areas is to be afforded protection from a proposed BWA transmitter in accordance with the protection criteria detailed in Appendix B. In doing so, a notional RMR base station (as defined in Appendix E) should be assumed to be operating at all points on a rail line.

No coordination is required for proposed BWA transmitters outside the distances and frequency ranges in Table 2.

Table 2: Distance and frequency range where BWA transmitter coordination is required.

Distance from railway line[4]	BWA Frequency Range
160 km (co-channel) 15 km (adjacent channel)	1900–1920 MHz

3.2.2 Interference from a BWA transmitter licensed before 2 July 2026 into a proposed RMR receiver

For a proposed RMR receiver, assessment of the interference risk should be based on the criteria detailed in Appendix B for BWA transmitters licensed before 2 July 2026 that are within the coordination distance and frequency range in Table 3. BWA transmitters licensed on or after 2 July 2026 are not expected to cause interference based on the coordination requirements in section 3.2.1.

Table 3: Distance and frequency range where BWA transmitter coordination is required.

Distance from the existing BWA receiver[4]	BWA Frequency Range
160 km (co-channel) 15 km (adjacent channel)	1900–1920 MHz

3.3 Assessing RMR transmitter interference into fixed links

Interference from a RMR base station transmitter into a fixed link receiver is assessed using the procedures set out in this section. Two scenarios are considered together in this section:

- Interference from a proposed RMR transmitter into a licensed fixed link receiver licensed before 2 July 2026.
- Interference from a licensed RMR transmitter into a proposed fixed link receiver licensed on or after 2 July 2026.

3.3.1 Interference from a proposed RMR transmitter into a fixed link receiver licensed before 2 July 2026

Fixed link receivers licensed before 2 July 2026 that are within the distance and frequency range described in Table 4 are to be afforded protection (to the protection ratios detailed in Appendix C) from any proposed RMR base station.

Table 4: Distance and frequency range where fixed link coordination is required.

[4] Any overlap of the occupied bandwidth of the transmitter and receiver is considered co-channel

Distance from the fixed link receiver[5]	Fixed Link Receiver Frequency Range[6]
160 km (co-channel) 60 km (adjacent channel)	1867.5–1980 MHz

If an RMR base station occupies spectrum at or within the second adjacent channel of the fixed link receiver channel, and if that RMR base station is located within 10 km of the fixed link receiver, coordination will be deemed to have failed coordination, and a licence will not be granted.[7]

3.3.2 Interference from an existing RMR transmitter into a proposed fixed link receiver licensed on or after 2 July 2026

Fixed links may be licensed on or after 2 July 2026, within the distance and frequency range described in Table 5 on a NINP basis with regards to RMR base stations (special condition C26 is to be attached to the licence for these fixed links – see section 4.8).

Accordingly, RMR transmitters do not need to be coordinated against these fixed links. However, for proposed fixed link receivers, an assessment of the interference risk can be undertaking based on the ratios detailed in Appendix C and assuming a notional RMR base station transmitter (operating in accordance with the parameters set out in Appendix E) located anywhere along a railway line. No assessment is required for proposed fixed link receivers outside the distance and frequency range described in Table 5.

Table 5: Distance and frequency range where fixed link receiver coordination is required.

Distance from railway line[8]	Fixed Link Receiver Frequency Range[9]
160 km (co-channel) 60 km (adjacent channel)	1867.5–1980 MHz

[5] Any overlap of the occupied bandwidth of the transmitter and receiver is considered co-channel

[6] Include receivers with an occupied bandwidth fully or partially within this coordination range

[7] Prospective licensees are reminded that mobile/remote stations operate on a 'no interference' basis as defined in the cellular mobile class licence. The 10 km minimum separation distance requirement stated here is intended to reduce the potential for RMR stations to cause harmful interference into a fixed link receiver while also ensuring that RMR licensees have a reasonable chance to service the area surrounding the proposed RMR base station without causing interference to fixed link receivers.

[8] Any overlap of the occupied bandwidth of the transmitter and receiver is considered co-channel

[9] Include receivers with an occupied bandwidth fully or partially within this coordination range

3.4 Assessing interference from fixed links into RMR network

Interference from a fixed link transmitter into a RMR base station receiver is assessed using the criteria in this section, for the following two interference scenarios:

- Interference from a proposed fixed link into an RMR receiver.
- Interference from an existing fixed link transmitter (licensed before 2 July 2026) into a proposed RMR receiver.

3.4.1 Interference from a proposed fixed link transmitter into an RMR receiver

Fixed links may be licensed on or after 2 July 2026, within the distance and frequency range specified in Table 6 on a NINP basis with regards to RMR base stations (special condition C26 is to be attached to the licence for these fixed links – see section 4.8). In addition, every point along a railway line that is within the distance coordination range is to be afforded protection from a proposed fixed link transmitter in accordance with the protection criteria detailed in Appendix B. In doing so, a notional RMR base station receiver (as defined in Appendix E) should be assumed to be operating at all points on a rail line.

No coordination is required for proposed fixed link transmitters outside the distance and frequency range described in Table 6.

Table 6: Fixed link transmitter frequency coordination range

Distance from railway line[10]	Fixed link Frequency Coordination Range[11]
160 km (co-channel) 60 km (adjacent channel)	1874.5–1951 MHz

3.4.2 Interference from a fixed link transmitter licensed before 2 July 2026 into a proposed RMR receiver

For a proposed RMR receiver, assessment of the interference risk should be based on criteria detailed in Appendix B for fixed link transmitters licensed before 2 July 2026 that are within the distance and frequency range described in Table 7. Fixed link transmitters licensed on or after 2 July 2026 are not expected to cause interference based on the coordination requirements in section 3.4.1.

Table 7: Distance and frequency ranges where fixed link transmitter coordination is required

[10] Any overlap of the occupied bandwidth of the transmitter and receiver is considered co-channel

[11] Include receivers with an occupied bandwidth fully or partially within this cull range

Distance from existing fixed link receiver[12]	Fixed link Frequency Coordination Range[13]
160 km (co-channel) 60 km (adjacent channel)	1874.5–1951 MHz

3.5 Assessing adjacent channel interference from an RMR transmitter into a 2 GHz band spectrum licensed or PTS receiver

Existing 2 GHz band spectrum licensed and PTS apparatus licensed base station receivers operate in the frequency range 1920-1980 MHz. The *Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers—2 GHz Band) 2023* (the Rx RAG) contains the notional receiver performance levels for 2 GHz band spectrum licensed receivers. However, to aid coexistence between RMR and 2 GHz base station receivers in Europe, an enhanced selectivity specification has been developed as detailed in ETSI TS 103 807.

While not all existing 2 GHz base stations operated in Australia will meet this enhanced selectivity, the ACMA expects that new base station deployments will. This means that as operators deploy new base stations, either at a new site or to upgrade a base station at an existing site, the number of base stations that meet the enhanced selectivity will increase naturally over time. To account for this, there will be a need for collaboration between RMR and 2 GHz band operators to ascertain the operating parameters of deployed 2 GHz band base stations receivers and to establish a timeline for upgrading base stations that do not yet meet the enhanced selectivity.

The ACMA expects that licensees will work in a collaborative manner to find mutually beneficial solutions to achieve coexistence, however we have included a ‘fall-back notification’ option for when enhanced selectivity can be assumed for coordination purposes if a collaborative approach fails to reach agreement. We will also continue to monitor the effectiveness of these arrangements and may consider changes if necessary.

Coordination is required for proposed RMR transmitters within the distances and frequency separations from 2 GHz band receivers specified in Table 8. Collaboration with 2 GHz band licensees to ascertain which existing base stations receivers meet the enhanced selectivity performance (for receivers licensed/registered before 2 July 2026) will aid in reducing the number of receivers that will need to be coordinated with.

Table 8: Distance and frequency ranges where spectrum licence/PTS receiver coordination is required

[12] Any overlap of the occupied bandwidth of the transmitter and receiver is considered co-channel

[13] Include receivers with an occupied bandwidth fully or partially within this range

	Distance from an existing 2 GHz band spectrum or PTS licensed receiver	Spectrum licensed and PTS receiver frequency range[14]
2 GHz band receivers licensed/registered before 2 July 2026	70 km	1920–1980 MHz
2 GHz band receivers licensed/registered after 2 July 2026; or Receivers that the 2 GHz band licensee has confirmed meets the enhanced selectivity performance of -30 dBm/10 MHz; or Receivers that the RMR operator has provided written notification to the affected 2 GHz band licensee 2 years prior to the assignment of the RMR transmitter (*see note)	5 km	1920–1980 MHz

*Note: Notification needs to be provided to all licensees that have a 2 GHz band receiver licensed/registered within 70km of the proposed location of the RMR transmitter. Notification must identify which receivers would fail coordination (without enhanced selectivity), the calculations (assumptions and results) used to identify which base station receivers would fail coordination and the details of the planned RMR service that will help the 2 GHz band licensee to determine what action, if any, to take. These details must include the location and operating parameters of the proposed RMR transmitter and the date that the transmitter will commence operating. If the RMR station details change, a new notification must be provided to the 2 GHz band licensee (resetting the notification period).

Coordination is deemed to pass if the calculated signal from the proposed RMR transmitter:

a) does not exceed -30 dBm/10 MHz at the input connecter of the receiver for 2 GHz band receivers licensed/registered after 2 July 2026, or
b) does not exceed the protection criteria specified in the RAG Rx for 2 GHz band receivers licensed/registered before 2 July 2026, or

[14] Include receivers with an occupied bandwidth fully or partially within this frequency range

c) does not exceed -30 dBm/10 MHz at the input connecter of the receiver for 2 GHz band receivers licensed/registered before 2 July 2026 and the RMR operator has provided written notification to the affected 2 GHz band licensee 2 years prior to the assignment of the RMR transmitter, or
d) if the affected 2 GHz band spectrum/PTS licensee has provided written agreement that supports the proposed RMR transmitter assignment.

When making assessments against the protection criteria in the RAG Rx, the following receiver sensitivity values are to be used:

- For receivers with an occupied bandwidth ≤ 20 MHz: -96 dBm. This sensitivity value is based on the reference sensitivity value from 3GPP TS38.104 (-102 dBm) + 6 dB.
- For receivers with an occupied bandwidth > 20 MHz: -89 dBm. This sensitivity value is based on the reference sensitivity value from 3GPP TS38.104 (-95 dBm) + 6 dB.

3.6 Site engineering aspects

At shared sites, or sites in the same vicinity, several potential interference scenarios other than co-channel or adjacent channel interference may occur. These include intermodulation; transient and spurious emissions; receiver desensitisation; and, physical blocking. These scenarios are caused by non-linear and often complex processes that are, usually, not readily predicted using information contained in the ACMA's *RRL*. Nevertheless, several "site engineering" methods can be applied to address these potential interference scenarios. These include, but are not limited to, site shielding, frequency separation, site locations, aligning transmission and reception timing and power reduction. Most of these methods mentioned above require cooperation between licensees.

In the case of co-siting with spectrum licensed devices, if the interference from the spectrum licensed device is not the result of non-compliance with the conditions of the licence, then licensees must take reasonable steps to negotiate towards measures to reduce interference to acceptable levels.

The ACMA expects that licensees (or their site managers) will work cooperatively and apply good site engineering practice to resolve problems[15].

[15] Refer to *RALI FX3* section 3.3 for further discussion.

4 Licensing

4.1 Overview of licensing

A Public Mobile Telecommunications Service Class B (PMTS B) apparatus licence for a PTS system may be issued to authorise the operation of a service that consists of 2 or more land stations. Stations that communicate with a station authorised under a PTS licence (i.e. mobile and remote stations) would be authorised by the cellular mobile class licence.

Under the PTS licence type, the PMTS B licensing option is to be used for RMR base stations in the 1900-1910 MHz frequency range.

PTS licences for RMR operation may only be issued for base stations that are located within 100 m of a railway line, as defined in Appendix A, and, outside the areas defined in relevant *spectrum embargoes*.

4.2 Licence conditions

The operation of radiocommunications equipment authorised by a PTS licence is subject to:

- Conditions specified in the *Radiocommunications Act 1992* (the Act), including an obligation to comply with the Act.
- Conditions specified in the *Radiocommunications Licence Conditions (Transmitter Licence) Determination 2025*, *Radiocommunications Licence Conditions (PTS Licence) Determination 2024* and any other determinations made by the ACMA under section 107(1)(f) of the Act.
- Conditions specified in this RALI.
- Conditions specified in the licence.
- Any further conditions imposed by the ACMA under section 111 of the Act.

If interference occurs after a licence is issued and the matter cannot be resolved between the affected parties, licensees can expect the ACMA to have regard to this RALI and relevant legislative instruments in mediating on the matter.

4.3 Access to spectrum

Proposed licensees should initially seek access to 1900–1910 MHz band spectrum through the Australasian Railway Association (ARA). If the accredited person, via consultation with the ARA, determines that the request cannot be accommodated within 1900–1910 MHz spectrum, then alternative spectrum will need to be considered.

Table 9 shows the channel centre frequencies and band limits for the 1900–1910 MHz band. The two TDD channels with a bandwidth of 5 MHz may be aggregated to form a single 10 MHz channel with a centre frequency of 1905 MHz.

Table 9: Channel centre frequencies and band limits for RMR system in the range 1900-1910 MHz

Ch	Centre Frequency (MHz)	Lower limit (MHz)	Upper limit (MHz)
1	902.5	1900	1905
2	907.5	1905	1910

4.4 Maximum transmitter power

The maximum permitted level of radio emission for the operation of a RMR transmitter must not exceed a radiated power of 65 dBm/10 MHz EIRP.

4.5 Use of spectrum by rail services and non-rail services

This RALI prioritises the use of the 1900–1910 MHz band for rail use. The ARA is to be consulted in considering the use of this spectrum for rail services. The process for consultation is described in section 4.6.

The 1900–1910 MHz band can also be used by non-rail services in accordance with the coordination rules specified in this RALI (which includes a prioritisation for rail services), as well as provisions in any other applicable RALI. The ARA does not need to be consulted for using this band for non-rail services.

4.6 Assigning Spectrum

Before a licence application is submitted to the ACMA, the ARA is to be consulted in writing by the applicant or the applicant's agent. The full details of the proposed licensee and the proposed service should be provided. The ARA will subsequently advise the applicant in writing, normally within three weeks, of the following:

1. Whether or not the applicant is an Australian Rail Industry Entity[16],
2. Whether or not the proposed service is appropriate to be accommodated in 1900–1910 MHz band,
3. If a rail entity is not to be accommodated, the reason(s) why.

The ARA advice should accompany the relevant licence application. The ACMA will have regard to the advice from the ARA when deciding on licensing a service.

The contact details for the ARA are:

Australasian Railway Association

[16] An Australian Rail Industry Entity means a rail user that is accredited by the Office of the National Rail Safety Regulator (ONRSR). The Rail Safety National Law requires that rail operators must apply for and be granted accreditation, before they commence undertaking railway operations. A list of the Australian Rail Industry Entities in Australia is maintained by ONRSR.

PO Box 4608
Kingston ACT 2604

Phone +61 2 6270 4501
Fax +61 2 6273 5581
Email spectrum@ara.net.au

The role of the ARA in this process may be reviewed in the future.

4.7 Advisory notes

The following user selectable **advisory note FR** must be attached to all licences authorising RMR services in the 1900–1910 MHz band:

> *"The shared spectrum arrangements and uncoordinated nature of class licensed radiocommunications devices in the 1880–1900 MHz band:*
>
> *a. may result in interference from nearby class licensed radiocommunications devices that may reduce system performance; and*
>
> *b. the likelihood of such interference is very low due to the dynamic channel allocation techniques inherent in cordless technologies used in the band; and*
>
> *c. protection from such interference cannot be afforded."*

4.8 Special conditions

The following user selectable **special condition C25** is to be attached to all PTS licences in the 1900-1910 MHz frequency range:

> **Special Condition C25:** *'A person must only operate a radiocommunications transmitter for the purpose of the provision of rail safety and control communications.'*

The following user selectable **special condition C26** is to be attached to all PTS licences in the 1900-1910 MHz frequency range, and all new point-to-point and point-to-multipoint licences issued in the range 1900-1920 MHz for stations that are located within 150km (co-channel) or 30 km (adjacent-channel) from a railway line in Appendix A:

> **Special Condition C26:** *'No interference shall be caused to, and no protection from interference shall be afforded from, stations operated under a PTS licence in the 1900-1910 MHz frequency range.*

Special Condition C23 must be applied to all spectrum accesses associated with PTS licences in the frequency range 1900 - 1910 MHz that will deploy devices underground.

> **Special Condition C23**
>
> A person must not operate a:
>
> a) radiocommunications transmitter that is, or is part of, a station other than a registration exempt station otherwise than in accordance with section 8 of the Radiocommunications Licence Conditions (PTS Licence) Determination 2024 (PTS LCD); or

b) registration exempt station otherwise than in accordance with sections 9, 12 and 13 of the PTS LCD.

In this condition, registration exempt station has the same meaning as in the PTS LCD and also means a base station:

a) that is, or incorporates, one or more radiocommunications transmitters (a relevant transmitter); and
b) that is located in an underground space; and
c) for which each relevant transmitter:
    (i) is operated with a radiated true mean power not greater than 10 micro watts per occupied bandwidth, when measured at an opening above ground that connects to the underground space; and
    (ii) is operated on a frequency specified in this licence for the operation of a radiocommunications transmitter; and
    (iii) if this licence specifies an emission designator for emissions made by a radiocommunications transmitter – is operated in accordance with that emission designator; and
d) if a radiocommunications receiver is part of the station – the receiver is operated on a frequency specified in this licence.

4.9 Spectrum access records

Technical details relating to the RMR base station, including transmit power, antenna, location, antenna height, antenna type/orientation and transmit/receive frequencies must be recorded. Note that:

> Where sectored antennas are used, details of the antenna model, tilt, polarisation, and azimuth[17] must be recorded for each sector.

> Where steerable beam antennas are used, details of the highest possible gain must be recorded.

[17] Where the sectored antennas are combined to achieve an effectively omni-directional coverage (on a single channel) it is not necessary to specify the azimuth of each sector antenna.

5 Exceptions

Exceptions to the requirements of this RALI for prospective assignments require case-by-case consideration by the Manager, Spectrum Planning Section.

A request for exemption from the requirements of this RALI would need to be accompanied by evidence to support the request.

All requests for exemptions should be submitted to freqplan@acma.gov.au.

6 RALI Authorisation

Approved 02/07/2026

Manager
Spectrum Planning Section
Spectrum Planning and Engineering Branch

Communications Infrastructure Division
Australian Communications and Media Authority

Glossary of terms

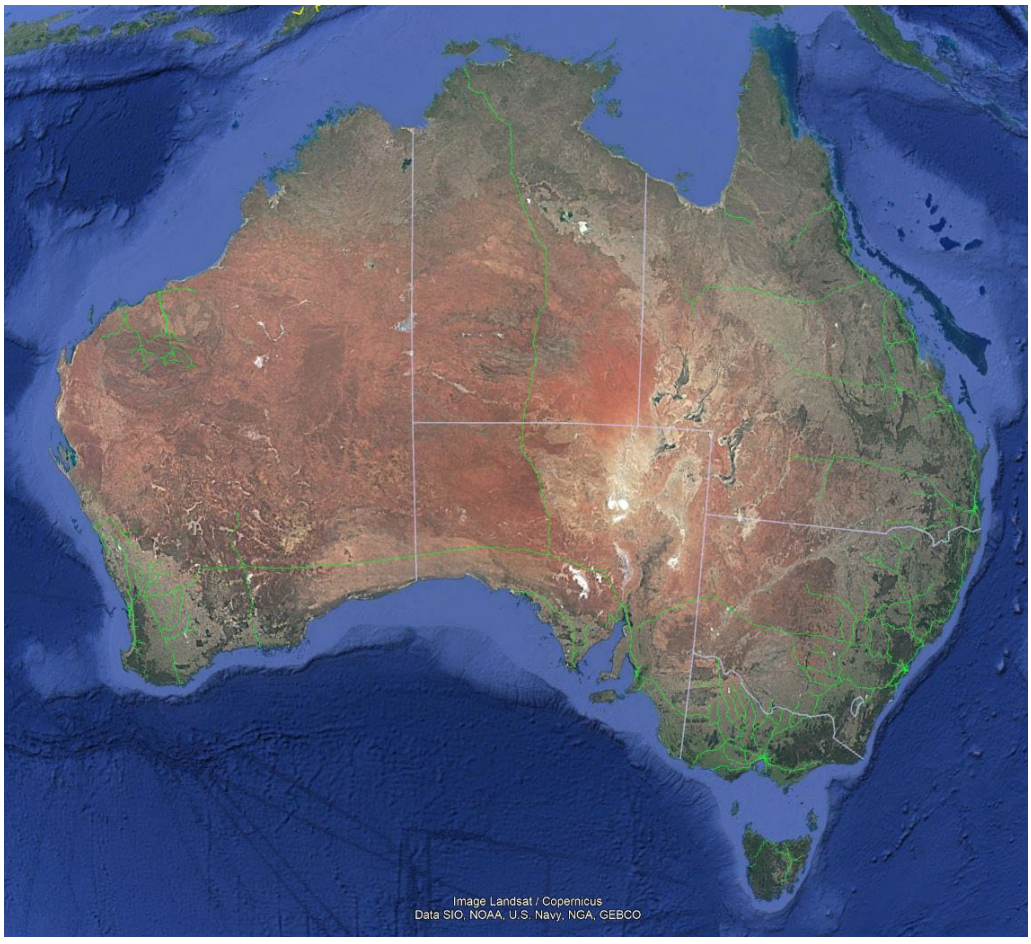
ACMA	Australian Communications and Media Authority
BWA	Broadband Wireless Access
DECT	Digital Enhanced Cordless Telecommunications (previously known as Digital European Cordless Telecommunications)
EIRP	Equivalent Isotropically Radiated Power
FDD	Frequency Division Duplex
FRMCS	Future Railway Mobile Communication Systems
ITU	International Telecommunications Union
PTS	Public Telecommunications Service
RALI	Radiocommunications Assignment and Licensing Instruction
RMR	Railway Mobile Radio
RRL	Register of Radiocommunication Licences
Rx	Receiver
TDD	Time Division Duplex
Tx	Transmitter

Appendix A: Railway lines for RMR network in the 1900–1910 MHz band

In this RALI, references to a railway line for coordination purposes means a railway line can be obtained from the Digital Atlas Australia website: https://digital.atlas.gov.au/datasets/digitalatlas::railway-lines/about, also see Figure A1.

The area available for apparatus licensed RMR services in the 1900–1910 MHz band is defined as being anywhere within 100 m of a railway line described in the above link.

Figure A1: Railway lines in Australia



The railway lines listed on the above database, illustrated in Figure A1, have different operational statuses. Table A1 provides guidance on the railway line operational status that requires protection.

Table A1: Railway lines to be protected based on operational status

Operational Status	To be Protected
Operational	Yes
Proposed	Yes
Under Construction	Yes
Disused	Yes
Closed	Yes
Unknown	Yes
Other	Yes
Abandoned	No
Dismantled	No

A.1 Additional railway lines

As new railway lines are designed and built, there may be occasions where the railway lines provided by the Digital Atlas Australia map do not include these railway lines. To address this issue, additional railway lines (in a KML format) are included on the ACMA website. These railways lines will need to be used for the purposes of this RALI.

Railway authorities should provide details of new or proposed railway lines to the ACMA as soon as possible, for consideration for inclusions in this RALI.

Appendix B: Protection criteria for RMR receivers in the 1900–1910 MHz band

For the purposes of this appendix, adjacent channels are defined with respect to the device subject to interference ("victim") receiver's channel bandwidth. For example, in the case of an interference assessment for a fixed link transmitter using a 14 MHz channel into a RMR receiver using a 5 MHz channel, the first adjacent channel refers to the 5 MHz channels either side of the victim receiver's occupied channel. The same logic is used to determine the 2nd adjacent channel. For cases where the occupied bandwidth of the transmitter and receiver fully or partially overlap, then co-channel protection requirements are to be adhered to.

B.1 Protection of RMR receivers from a non-RMR transmitter

Table B1 defines protection criteria for RMR receivers from interfering non-RMR transmitter. The requirements in Table B1 are to be met at the input of the RMR receiver.

Table B1: RMR protection criteria from non-RMR transmitters.

Frequency offset	**PROTECTION CRITERIA** **Digital interferer Tx into digital victim Rx**
Co-channel	–100 (dBm per 5 MHz channel) –97 (dBm per 10 MHz channel)
1st adjacent channel	–42 (dBm per 5 MHz channel) –39 (dBm per 10 MHz channel)
2nd adjacent channel	—

Appendix C: Protection criteria for fixed point-to-point receivers in the 1.8 and 2.1 GHz bands

For the purposes of this appendix, adjacent channels are defined with respect to a victim receiver's channel size. For example, in the case of an interference assessment of a RMR transmitter using a 5 MHz channel into a fixed link receiver using a 14 MHz channel, the first adjacent channel refers to the 14 MHz channels either side of the victim receiver's occupied channel. The same logic is used to determine interference into the 2nd and 3rd adjacent channels. The following protection ratios are to be used when assessing interference to fixed link point receivers in the 1.8 and 2.1 GHz bands.

Table C1 contains protection ratios for 1.8 or 2.1 GHz fixed link receivers from interfering RMR transmitters. The requirements in Table C1 are to be met at the input of the fixed link receiver.

Table C1: Fixed link protection ratios from RMR transmitters.

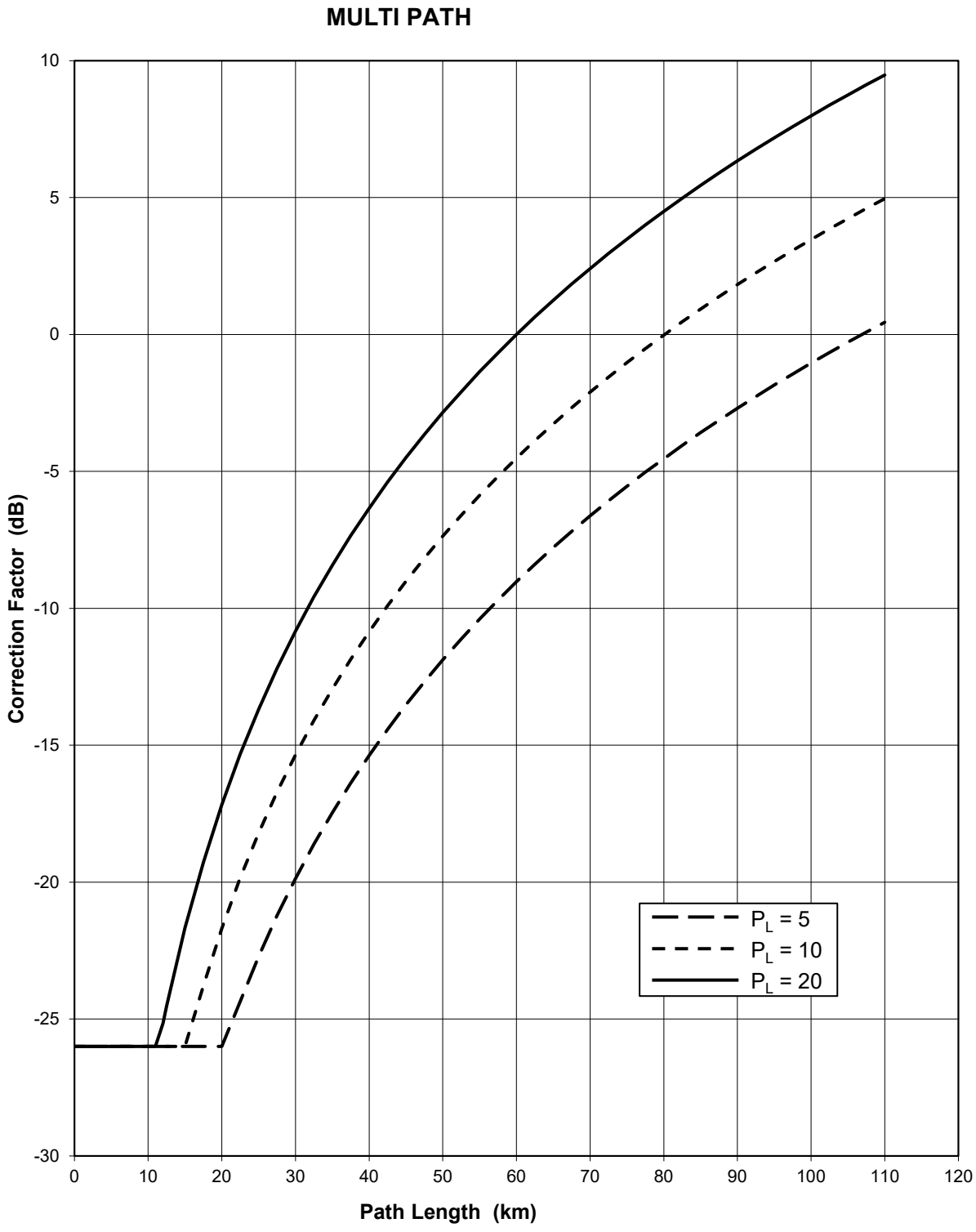
Frequency offset	REQUIRED PROTECTION RATIO (dB) Digital interferer Tx into digital victim Rx
Co-channel	60
1st adjacent channel	30
2nd adjacent channel	0
3rd adjacent channel	—

The protection ratios in Table C1 are based on a 60 km path length and P_L (Percentage of time that the average refractivity gradient in the lowest 100 m of the atmosphere is less than or equal to –100 N units/km) value of 20. For other path length and P_L values refer to the correction factor graph contained in Appendix B.

Separate protection ratios for analogue victim receivers have not been defined. The above-mentioned protection ratios for digital services should be applied in all cases.

Provisionally, protection ratio values quoted here are identical to those included in *RALI FX3* for comparable cases. However, assigners should be advised that in future these values (and the comparable values in *RALI FX3*) may be revised downward to increase the density of spectrum usage in these bands.

Appendix D: Protection ratio correction factors



P_L: Percentage of time that the average refractivity gradient in the lowest 100 m of the atmosphere is less than or equal to –100 N units/km.

For further details refer to Annex A to Appendix 1 of *RALI FX3*.

Appendix E: RMR service model

E.1 Equipment types

The equipment types and technologies considered in developing this RALI were based on the following standard:

> 3GPP TS 38.104, “Technical Specification Group Radio Access Network; NR; Base Station (BS) radio transmission and reception”

Additional studies considered in developing this RALI were:

> ETSI TR 103 865, “*Rail Telecommunications (RT); Future Railway Mobile Communication System (FRMCS); Radio performance aspects*”

> ECC Report 314, “*Co-existence between Future Railway Mobile Communication System (FRMCS) in the frequency range1900-1920 MHz and other applications in adjacent bands*”

> ECC Report 318, “*Compatibility between RMR and MFCN in the 900 MHz range, the 1900-1920 MHz band and the 2290-2300 MHz band*”

E.2 Deployment model and general equipment characteristics

Deployment model values were chosen after considering typical RMR transmitter parameter values. Tables E1 and E2 show deployment model parameter values for base stations and remote stations respectively.

Table E1: transmitter deployment parameters.

Base station Parameter	Deployment model value	Unit
Maximum in band EIRP	65	dBm/10 MHz
Antenna Gain	18	dBi
Feeder losses	4	dB
Tx Bandwidth	10	MHz
Antenna height	30	m
Adaptive transmit power control	enabled	—
Maximum out of band EIRP: 1920 – 1980 MHz	-40	dBm/10 MHz

Table E2: RMR mobile station deployment parameters.

Mobile station Parameter	Deployment model value	Unit
Cab radio		
Maximum in band total radiated power	31	dBm/10 MHz
Tx Bandwidth	10	MHz
Antenna height	5	m
Adaptive transmit power control	enabled	—
Maximum out of band EIRP: 1920 – 1925 MHz	-25	dBm/10 MHz
Maximum out of band EIRP: 1925 – 1980 MHz	-30	dBm/10 MHz
Maximum out of band EIRP: 1880 – 1920 MHz	-2	dBm/10 MHz
Railway Mobile Radio Terminal		
Maximum in band EIRP	23	dBm/10 MHz

E.3 Emission masks

In additional to the parameters shown in the above tables, emission characteristics must conform to the 3GPP TS 38.104 for base stations, or 3GPP TS 38.101 for user equipment, standards for the n101 band, paying particular attention to co-existence requirements.