

Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 2.3 GHz Band) 2023

The Australian Communications and Media Authority makes the following guidelines under section 262 of the *Radiocommunications Act 1992*.

Dated:

Member

Member/General Manager

Australian Communications and Media Authority

**Part 1—Preliminary**

1 Name

 These are the *Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 2.3 GHz Band) 2023*.

2 Commencement

 This instrument commences at the start of the day after the day it is registered on the Federal Register of Legislation.

Note: The Federal Register of Legislation may be accessed free of charge at [www.legislation.gov.au](http://www.legislation.gov.au).

3 Authority

 This instrument is made under section 262 of the Act.

4 Repeal of the *Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 2.3 GHz Band) 2013*

 The *Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 2.3 GHz Band) 2013* [F2013L02143] are repealed.

5 Definitions

 (1) In this instrument, unless the contrary intention appears:

***2.3 GHz band*** means the frequency band 2300 MHz to 2400 MHz.

***2.3 GHz spectrum licence*** means a spectrum licence that authorises the operation of radiocommunications devices in the 2.3 GHz band.

***AMT*** means aeronautical mobile telemetry.

***RALI FX 3*** means the Radiocommunications Assignment and Licensing Instruction FX 3 *Microwave fixed services frequency coordination*, published by the ACMA.

Note: RALI FX 3 is available, free of charge, from the ACMA’s website at [www.acma.gov.au](http://www.acma.gov.au).

***RALI FX 21*** means the Radiocommunications Assignment and Licensing Instruction FX 21 *Television outside broadcasting services in the bands 1980-2110 MHz and 2170-2300 MHz*, published by the ACMA.

Note: RALI FX 21 is available, free of charge, from the ACMA’s website at [www.acma.gov.au](http://www.acma.gov.au).

***RALI MS 31*** means the Radiocommunications Assignment and Licensing Instruction MS 31 *Notification Zones for Apparatus Licensed Services Around Radio Astronomy Facilities*, published by the ACMA.

Note: RALI MS 31 is available, free of charge, from the ACMA’s website at [www.acma.gov.au](http://www.acma.gov.au).

***RALI MS 32*** means the Radiocommunications Assignment and Licensing Instruction MS 32 *Coordination of Apparatus Licensed Services Within the Australian Radio Quiet Zone Western Australia*, published by the ACMA.

Note: RALI MS 32 is available, free of charge, from the ACMA’s website at [www.acma.gov.au](http://www.acma.gov.au).

***RALI MS 37*** means the Radiocommunications Assignment and Licensing Instruction MS 37 *Coordination of spectrum-licensed devices operating in the 2.3 GHz band with SRS earth stations in the 2290-2300 MHz band*, published by the ACMA.

Note: RALI MS 37 is available, free of charge, from the ACMA’s website at [www.acma.gov.au](http://www.acma.gov.au).

***subsection 145(4) determination*** means the *Radiocommunications (Unacceptable Levels of Interference – 2.3 GHz Band) Determination 2023*.

Note: The *Radiocommunications (Unacceptable Levels of Interference – 2.3 GHz Band) Determination 2023* is available, free of charge, from the Federal Register of Legislation at [www.legislation.gov.au](http://www.legislation.gov.au).

***TOB service*** (short for television outside broadcast service) means radiocommunications made by the operation of a television outside broadcast station.

Note 1: A number of other expressions used in this instrument are defined in the Act, including the following:

(a) ACMA;

(b) apparatus licence;

(c) class licence;

(d) frequency band;

(e) interference;

(f) radiocommunication;

(g) radiocommunications device;

(h) radiocommunications receiver;

(i) radiocommunications transmitter;

(j) Register;

(k) spectrum licence;

(l) spectrum plan.

Note 2: A number of other expressions used in this instrument may be defined in an instrument made under subsection 64(1) of the *Australian Communications and Media Authority Act 2005*, including:

(a) Act;

(b) ARQZWA;

(c) fixed receiver;

(d) fixed transmitter;

(e) harmful interference;

(f) in-band;

(g) ITU-R Recommendation;

(h) LIPD class licence;

(i) out-of-band;

(j) Radio Regulations.

 (2) In this instrument, unless the contrary intention appears, each of the terms listed in subsection (3) has the meaning given by:

 (a) the *Radiocommunications (Interpretation) Determination 2015*; or

 (b) if another instrument replaces that determination and defines the term – the other instrument.

 (3) For the purposes of subsection (2), the terms are:

 (a) ***earth receive station***;

 (b) ***earth station***;

 (c) ***fixed receive station***;

 (d) ***television outside broadcast station***.

 (4) In this instrument, unless the contrary intention appears, each of the terms listed in subsection (5) has the meaning given by the spectrum plan.

 (5) For the purposes of subsection (4), the terms are:

 (a) ***earth exploration-satellite service***;

 (b) ***fixed service***;

 (c) ***mobile service***;

 (d) ***radio astronomy service***;

 (e) ***space operation service***;

 (f) ***space research service***;

 (g) ***space station***.

 (6) In this instrument, unless otherwise specified, a reference to a part of the spectrum or a frequency band includes all frequencies that are greater than but not including the lower frequency, up to and including the higher frequency.

Note: This subsection means the lower number in a part of the spectrum or a frequency band is not included in the part of the spectrum or the frequency band.

6 References to other instruments

 In this instrument, unless the contrary intention appears:

 (a) a reference to any other legislative instrument is a reference to that other legislative instrument as in force from time to time; and

 (b) a reference to any other kind of instrument or writing is a reference to that other instrument or writing as in force or existence from time to time.

Note 1: For references to Commonwealth Acts, see section 10 of the *Acts Interpretation Act 1901*; and see also subsection 13(1) of the *Legislation Act 2003* for the application of the *Acts Interpretation Act 1901* to legislative instruments.

Note 2: All Commonwealth Acts and legislative instruments are registered on the Federal Register of Legislation.

Note 3: See section 314A of the Act.

**Part 2—Overview**

7 Background

 (1) The 2.3 GHz band has been allocated for spectrum licensing. Spectrum licensed, apparatus licensed and class licensed radiocommunications transmitters communicate with radiocommunications receivers in and adjacent to the 2.3 GHz band. These receivers may suffer interference from unwanted emissions, blocking and intermodulation caused by a radiocommunications transmitter operated under a 2.3 GHz spectrum licence.

 (2) This instrument has been made to provide guidance on the management of interference from radiocommunications transmitters operated under a 2.3 GHz spectrum licence to radiocommunications receivers operating in the following circumstances:

 (a) point to point fixed services operating on frequencies below the 2.3 GHz band (Part 3);

 (b) space research service, space operations service and earth exploration-satellite service receivers operating in the 2200 MHz to 2300 MHz band (Part 4);

 (c) mobile services operating on frequencies below the 2.3 GHz band (Part 5);

 (d) television outside broadcast services operated in accordance with the *Radiocommunications (Television Outside Broadcasting) (2010-2110 MHz and 2200-2300 MHz) Frequency Band Plan 2022* and the *Radiocommunications (Mobile-Satellite Service) (1980–2010 MHz and 2170–2200 MHz) Frequency Band Plan 2022* (Part 6);

 (e) radiocommunications devices operating under the LIPD class licence in the 2300 MHz to 2483.5 MHz frequency band (Part 7).

 (3) This instrument also provides advice regarding:

 (a) protection of radio astronomy services operating on a fortuitous basis (Part 8); and

 (b) managing interference across the geographic boundaries of 2.3 GHz spectrum licences (Part 9).

 (4) As radio waves propagate in different ways because of factors such as frequency, terrain, atmospheric conditions and topography, there are a number of ways to predict path loss. The ITU-R Recommendation P.1144 “Guide to the application of the propagation methods of Radiocommunication Study Group 3” provides a guide on the application of various propagation methods developed by the Radiocommunication Sector of the International Telecommunication Union. It advises on the most appropriate methods for particular applications, as well as the limits, required input information and output for each of these methods. The most recent version of propagation models developed by the Radiocommunication Sector of the International Telecommunication Union should be considered when modelling propagation in the 2.3 GHz band.

Note 1: ITU-R Recommendation P.1144 is available, free of charge, from the International Telecommunication Union’s website at [www.itu.int](http://www.itu.int).

Note 2: The use of other published propagation models applicable to the 2.3 GHz band may also be suitable.

 (5) The ACMA may take this instrument into account in determining whether a radiocommunications transmitter operated under a 2.3 GHz spectrum licence is causing interference to an apparatus licensed or class licensed radiocommunications receiver operating in circumstances set out in this instrument.

 (6) This instrument does not prevent a person negotiating and implementing other protection requirements with other persons.

**Part 3—Point to point fixed service receivers**

8 Background

 (1) Point to point fixed services operating on frequencies below the 2.3 GHz band are generally licensed in accordance with the frequency assignment criteria set out in RALI FX 3. RALI FX 3 provides details about channel plans for individual microwave bands, and guidance on interference criteria and frequency coordination between microwave links to achieve certain performance objectives. It provides assignment criteria for each frequency band and specifies protection ratios. The criteria are usually based on accepted ITU-R Recommendations.

 (2) RALI FX 3 is subject to continuing review in consultation with industry, to incorporate improved assignment techniques and changing technology requirements. Particular account is taken of changes in ITU-R Recommendations, and standards made by other bodies. As revisions seek to improve spectrum access opportunities, without causing undue detriment to existing licences, users of RALI FX 3 should consult the current version when planning systems, to increase spectrum productivity.

9 Point to point receiver protection requirements

 The protection requirements for fixed services operating on frequencies below the 2.3 GHz band are specified in RALI FX 3. In planning for the operation of radiocommunications transmitters under a spectrum licence, spectrum licensees are to provide a level of in-band and out-of-band protection from those transmitters as would be provided for apparatus licensed radiocommunications transmitters used for fixed services, the frequencies of which are assigned in accordance with RALI FX 3.

**Part 4—Space services**

10 Background

 (1) The spectrum plan allocates the 2200 MHz to 2290 MHz frequency band for the following services as primary services:

(a) space research services (space-to-Earth, space-to-space);

(b) space operation services (space-to-Earth, space-to-space);

(c) earth exploration-satellite services (space-to-Earth, space-to-space).

 (2) The spectrum plan allocates the 2290 MHz to 2300 MHz frequency band for the space research service (deep space, space-to-Earth) as a primary service.

 (3) Earth stations and earth receive stations in the 2200 MHz to 2290 MHz and 2290 MHz to 2300 MHz frequency bands operate in various locations throughout Australia, as recorded in the Register.

 (4) The ACMA encourages direct liaison between spectrum licensees and both space station operators and earth station operators during the system planning phases of new services when they are nearby each other.

Note: For more about primary services, see sections 6, 7 and 12 of the spectrum plan.

11 Protection requirements

 (1) The protection requirements for an earth receive station are set out in Annex 7 to Appendix 7 of the Radio Regulations.

 (2) Additional in-band protection requirements for earth receive stations in the 2.3 GHz band are those set out in ITU-R Recommendation SF.1006 “Determination of the interference potential between earth stations of the fixed-satellite service and stations in the fixed service”.

Note 1: Some 2.3 GHz spectrum licences may have a licence condition requiring compliance with ITU-R Recommendation SF.1006.

Note 2: ITU-R Recommendation SF.1006 is available, free of charge, from the International Telecommunication Union’s website at [www.itu.int](http://www.itu.int).

 (3) In addition, protection requirements for radiocommunications receivers used for the purpose of the space research service in the 2290 MHz to 2300 MHz frequency band are set out in RALI MS 37.

Note 1: Some 2.3 GHz spectrum licences may have a licence condition requiring compliance with RALI MS 37 in certain circumstances.

Note 2: The protection requirements in RALI MS 37 apply in relation to blocking of receivers that is not specifically considered by Annex 7 to Appendix 7 of the Radio Regulations.

 (4) In planning for the operation of radiocommunications transmitters under a 2.3 GHz spectrum licence, licensees should consider RALI MS 37.

 (5) Additional information on the protection and coordination requirements for radiocommunications receivers used for the purpose of the space research service are set out in the following:

(a) ITU-R Recommendation SA.363 “Space operation systems”;

(b) ITU-R SA.509 “Space research earth station and radio astronomy reference antenna radiation pattern for use in interference calculations, including coordination procedures”;

(c) ITU-R Recommendation SA.609 “Protection Criteria for radiocommunications links for manned and unmanned near-Earth research satellites”;

(d) ITU-R Recommendation SA.1014 “Telecommunications requirements for manned and unmanned deep-space research”;

(e) ITU-R Recommendation SA.1016 “Sharing considerations relating to Deep-Space research”;

(f) ITU-R Recommendation SA.1154 “Provisions to protect the space research (SR), space operations (SO) and Earth exploration satellite services (EES) and to facilitate sharing with the mobile service in the 2 025-2 110 MHz and 2 200-2 290 MHz bands”;

(g) ITU-R Recommendation SA.1157 “Protection criteria for deep-space research”;

(h) ITU-R Recommendation SA.1743 “Maximum allowable degradation to radiocommunication links of the space research and space operation services arising from interference from emissions and radiations from other radio sources”.

Note: The ITU-R Recommendations are available, free of charge, from the International Telecommunication Union’s website at [www.itu.int](http://www.itu.int).

**Part 5—Mobile services**

12 Background

 (1) The spectrum plan allocates the 2200 MHz to 2300 MHz frequency band for mobile services as a primary service. This band is adjacent to the 2.3 GHz band.

 (2) The 2200 MHz to 2900 MHz frequency band is primarily used for AMT services at locations specified in the ACMA’s Spectrum Planning Paper 10/01 *Coordination Information for Defence Aeronautical Mobile Telemetry Systems Operating in the 2200 to 2300 MHz Frequency Range*.

Note: Spectrum Planning Paper 10/01 is available, free of charge, from the ACMA’s website at [www.acma.gov.au](http://www.acma.gov.au).

 (3) Apparatus licensed fixed receive stations used for AMT services are afforded protection from 2.3 GHz spectrum licensed radiocommunications transmitters.

13 Protection requirements

 If a radiocommunications transmitter is operated under a 2.3 GHz spectrum licence in accordance with the conditions of the licence:

(a) the transmitter is not taken to cause unacceptable interference to an apparatus licensed fixed receive station used for AMT services in the 2200 MHz to 2900 MHz frequency band; and

(b) the 2.3 GHz spectrum licensee does not need to afford additional protection to such a fixed receive station.

Note: At the time this instrument was made, there were no mobile services operating in the 2290 MHz to 2300 MHz frequency band.

**Part 6—TOB services**

14 Background

 (1) TOB services are generally licensed in accordance with the frequency assignment criteria set out in RALI FX 21. RALI FX 21 provides information on frequency coordination and licensing arrangements for TOB services in the 1980 MHz to 2110 MHz and 2170 MHz to 2300 MHz frequency bands.

 (2) Under the *Radiocommunications (Mobile-Satellite Service) (1980-2010 MHz and 2170-2200 MHz) Frequency Band Plan 2022*, existing TOB services in certain circumstances are required to cease operation in the 1980 MHz to 2010 MHz and 2170 MHz to 2200 MHz frequency bands by 1 March 2026 in metropolitan areas and other designated areas, and by 1 March 2024 elsewhere.

 (3) The *Radiocommunications (Television Outside Broadcasting) (2010–2110 MHz and 2200–2300 MHz) Frequency Band Plan 2022* provides that the 2010 MHz to 2110 MHz and 2200 MHz to 2300 MHz frequency bands may be used for the purposes of TOB services.

15 Protection requirements

 (1) The protection requirements for TOB services operating in the 2170 MHz to 2300 MHz frequency band are set out in RALI FX 21. These requirements apply to radiocommunications transmitters operated under 2.3 GHz spectrum licences that are included in the Register after the apparatus licence that authorises operation of a TOB radiocommunications device was first issued under section 100 of the Act. Only TOB radiocommunications receivers with site details included in the Register are afforded protection.

 (2) In planning for the operation of radiocommunications transmitters under a 2.3 GHz spectrum licence, spectrum licensees should consult the procedures set out in RALI FX 21.

**Part 7—Class licensed services**

16 Background

 (1) The LIPD class licence authorises the operation of a number of different kinds of radiocommunications transmitters in the 2400 MHz to 2483.5 MHz frequency band.

 (2) The operation of radiocommunications transmitters under a class licence is generally on a ‘no-interference’ and ‘no-protection’ basis.

17 Protection requirements

 Radiocommunications transmitters operated under a 2.3 GHz spectrum licence, in accordance with the conditions of the licence, are generally taken not to cause unacceptable interference to radiocommunications transmitted under the LIPD class licence.

**Part 8—Radio Astronomy Services**

18 Background

 (1) The spectrum plan recognises that certain radiocommunications receivers used for radio astronomy services operate in, and adjacent to, the 2.3 GHz band (see Australian footnote reference AUS87 in the spectrum plan).

 (2) The site located in remote central Western Australia, near Boolardy, identified for radio astronomy use has been protected by the establishment of the ARQZWA across the radiofrequency spectrum from 70 MHz through to 25.25 GHz. The location of the site, and the definition of the ARQZWA, can be found in the *Radiocommunications (Australian Radio Quiet Zone Western Australia) Frequency Band Plan 2023*. An area within 70 km of the site has been excluded from the geographic area of 2.3 GHz spectrum licences.

19 Protection requirements

 (1) Licensees of 2.3 GHz spectrum licences should have regard to radiocommunications receivers used for radio astronomy that are specified in Australian footnote reference AUS87 in the spectrum plan (***AUS87 receivers***).

 (2) Although AUS87 receivers operate on a fortuitous basis, the ACMA encourages direct liaison between licensees of 2.3 GHz spectrum licences with operators of AUS87 receivers, particularly during the system planning phase for new fixed transmitters to be registered under 2.3 GHz spectrum licences, to minimise potential interference to AUS87 receivers. Licensees of 2.3 GHz spectrum licences should follow the notification arrangements specified for apparatus licensed radiocommunications devices set out in RALI MS 31.

 (3) Licensees of 2.3 GHz spectrum licences in areas adjacent to the ARQZWA should coordinate proposed stations using the methods and limits set out for apparatus licensees in RALI MS 32.

**Part 9—Spectrum licensed receivers**

20 Background

 (1) Fixed receivers operate under various 2.3 GHz spectrum licences in adjacent geographic areas. The device boundary criterion in the subsection 145(4) determination is the primary method for managing interference between geographically-adjacent 2.3 GHz spectrum licences.

 (2) However, it may be necessary for licensees of 2.3 GHz spectrum licences to negotiate with each other to avoid harmful interference.

21 Recommended preliminary coordination procedures

 (1) Before a radiocommunications transmitter is included in the Register for a 2.3 GHz spectrum licence, the licensee should have regard to radiocommunications receivers included in the Register for other 2.3 GHz spectrum licences.

 (2) When planning to operate a fixed transmitter under a 2.3 GHz spectrum licence, the licensee should coordinate with any radiocommunications receivers included in the Register for other 2.3 GHz spectrum licences. The coordination should:

 (a) use the details of each receiver, as included in the Register; and

 (b) use the level of protection set out in the subsection 145(4) determination; and

 (c) use a suitable propagation model to model path loss between the fixed transmitter and each receiver; and

 (d) take into account the terrain and any other relevant factors.

Example for paragraph (c): The propagation model in section 4.5.2 of ITU-R Recommendation P.526-12 “Propagation by diffraction” is a suitable propagation model.

 (3) If such coordination indicates that harmful interference may occur to a radiocommunications receiver as a result of operating the fixed transmitter, the licensee should consider:

 (a) replanning the fixed transmitter to avoid the harmful interference; or

 (b) negotiating with the licensee of the affected 2.3 GHz spectrum licence to find a resolution.