



Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters — 2.3 GHz Band) 2013

Radiocommunications Act 1992

The AUSTRALIAN COMMUNICATIONS AND MEDIA AUTHORITY makes these Advisory Guidelines under section 262 of the *Radiocommunications Act 1992*.

Dated 12 December 2013

Chris Chapman
[signed]
Member

Richard Bean
[signed]
Member/~~General Manager~~

Australian Communications and Media Authority

1 Name of Advisory Guidelines

These guidelines are the *Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters — 2.3 GHz Band) 2013*.

2 Commencement

These guidelines commence on 25 July 2015.

Note All legislative instruments and compilations are registered on the Federal Register of Legislative Instruments kept under the *Legislative Instruments Act 2003*. See <http://www.comlaw.gov.au>.

3 Revocation

The *Radiocommunications Advisory Guidelines (Managing Interference from Transmitters — 2.3 GHz Band) 2009* [F2009L00275] are revoked.

4 Purpose of these guidelines

- (1) The purpose of these guidelines is to manage interference to apparatus licensed or class licensed radiocommunications receivers operating adjacent to the 2.3 GHz band:
 - (a) outside the spectrum licensed bands; or
 - (b) outside the spectrum licensed areas.
- (2) These guidelines also provide guidance on managing interference across the geographical boundaries of 2.3 GHz spectrum licences.
- (3) The ACMA will take these guidelines into account in determining whether a spectrum licensed radiocommunications transmitter is causing interference to an apparatus licensed or class licensed radiocommunications receiver operating in any of the circumstances set out in these guidelines. These guidelines do not prevent a licensee negotiating other protection requirements with another licensee.

5 Interpretation

- (1) In these guidelines, unless the contrary intention appears:

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

Act means the *Radiocommunications Act 1992*.

harmful interference has the same meaning as in the Spectrum Plan.

in-band means:

- (a) for a radiocommunications transmitter or radiocommunications receiver operated under a spectrum licence, the frequencies within the frequency band in which operation of those radiocommunications devices is authorised under the licence; and
- (b) for a radiocommunications transmitter or radiocommunications receiver operating under an apparatus licence, the frequencies within the lower frequency limit and the upper frequency limit specified in the licence.

ITU means the International Telecommunication Union.

ITU-R means the International Telecommunication Union Radiocommunication Sector.

ITU-R Recommendation means a Recommendation made by the ITU-R as in force from time to time.

Note ITU-R Recommendations are available on the ITU website at <http://www.itu.int>.

LIPD class licence means the *Radiocommunications (Low Interference Potential Devices) Class Licence 2000* as in force from time to time.

Note The LIPD class licence is available on the ComLaw website at <http://www.comlaw.gov.au>.

out-of-band means:

- (a) for a radiocommunications transmitter or radiocommunications receiver operated under a spectrum licence, the frequencies outside the frequency band in which operation of those radiocommunications devices is authorised under the licence; and
- (b) for a radiocommunications transmitter or radiocommunications receiver operating under an apparatus licence, the frequencies outside the lower frequency limit and upper frequency limit specified in the licence.

RALI FX 3 means the Radiocommunications Assignment and Licensing Instruction No. FX 3, *Microwave Fixed Services Frequency Coordination*, published by the ACMA, as existing from time to time.

Note RALI FX 3 is available on the ACMA website at <http://www.acma.gov.au>.

RALI FX 21 means the Radiocommunications Assignment and Licensing Instruction No. FX 21, *Television Outside Broadcasting Services in the bands 1980-2110 MHz and 2170-2300 MHz*, published by the ACMA, as existing from time to time.

Note RALI FX 21 is available on the ACMA website at <http://www.acma.gov.au>.

RALI MS 31 means the Radiocommunications Assignment and Licensing Instruction No. MS 31, *Notification Zones for Apparatus Licensed Services Around Radio Astronomy Facilities*, published by the ACMA, as existing from time to time.

Note RALI MS 31 is available on the ACMA website at <http://www.acma.gov.au>.

RALI MS 37 means the Radiocommunications Assignment and Licensing Instruction No. 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, as existing from time to time.

Note RALI MS 37 is available on the ACMA website at <http://www.acma.gov.au>.

Spectrum Plan means the *Australian Radiofrequency Spectrum Plan* prepared under subsection 30(1) of the Act, as in force from time to time.

subsection 145 (4) Determination means the *Radiocommunications (Unacceptable Levels of Interference – 2.3 GHz Band) Determination 2013*.

Note A number of terms used in these guidelines are defined in the Act and, unless the contrary intention appears, have the meaning given to them by the Act. These include:

- ACMA
- apparatus licence
- class licence
- core condition
- frequency band
- interference
- radiocommunications receiver
- radiocommunications transmitter
- Register
- spectrum licence.

- (2) Unless the contrary intention appears, terms used in these guidelines that are defined in the subsection 145 (4) Determination have the same meaning as in that determination.

Note The following terms that are used in these guidelines are defined in the subsection 145 (4) Determination:

- fixed transmitter
- Radio Regulations.

- (3) Unless the contrary intention appears, terms used in these guidelines that are defined in the *Radiocommunications (Interpretation) Determination 2000* have the same meaning as in that determination.

Part 1 Background

The 2.3 GHz band has been designated for spectrum licensing Australia-wide. Radiocommunications receivers of apparatus licensed and class licensed services may operate in and adjacent to this frequency band. These receivers may suffer interference from unwanted emissions and blocking, caused by a radiocommunications transmitter operating under a spectrum licence in the 2.3 GHz band.

Unwanted emissions are by-products of a radiocommunications transmitter's emissions and include broadband noise, harmonics, intermodulation products, transient signals and other spurious signals. Blocking occurs when a high level off-tune signal overloads a radiocommunications receiver's front-end and causes a degradation in the quality of the wanted output signal. Intermodulation products can be generated in-band in the input stages of receivers in the presence of two or more high level signals at the receiver input.

These guidelines have been made for the management of these types of interference to licensed radiocommunications receivers operating in the following circumstances:

- Point-to-point fixed services operating in the frequency band below the 2.3 GHz band (Part 2 of these guidelines);
- Space research, space operations and earth exploration-satellite service receivers operating in the 2200–2300 MHz band (Part 3 of these guidelines);
- Mobile services operating in the band below the 2.3 GHz band (Part 4 of these guidelines);
- Television outside broadcast services authorised by the *Television Outside Broadcast Service (1980–2110 MHz and 2170–2300 MHz) Frequency Band Plan 2012* (Part 5 of these guidelines); and
- Class licensed services operating under the LIPD class licence in the 2400–2483.5 MHz band (Part 6 of these guidelines).

These guidelines also provide advice regarding:

- Protection of radio-astronomy services operating on an opportunistic basis (Part 7 of these guidelines); and
- Managing interference across the geographical boundaries of 2.3 GHz spectrum licences (Part 8 of these guidelines).

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. ITU-R Recommendation P.1144 “*Guide to the application of the propagation methods of Radiocommunications Study Group 3*” provides a guide on the application of various propagation methods developed internationally by the ITU-R. It advises users on the most appropriate methods for particular applications as well as the limits, required input information, and output for each of these methods. It is recommended that the most recent version of propagation models defined by the ITU-R should be considered when modelling propagation in the 2.3 GHz band.

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

Part 2 Point-to-point fixed service receivers

2.1 Background

- (1) Point-to-point fixed service receivers operating below the 2.3 GHz band are licensed in accordance with the frequency assignment criteria detailed 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.
- (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 undue detriment to current licensees, users of RALI FX 3 are urged to consult the current version when planning systems, to increase spectrum productivity.

2.2 Protection requirements

- (1) The protection requirements for point-to-point fixed service receivers operating below the 2.3 GHz band are specified in RALI FX 3 and apply to radiocommunications transmitters operated under a spectrum licence that were registered in the Register after the date of issue of the apparatus licence under which the receiver operates.
- (2) In planning for the operation of radiocommunications transmitters under a spectrum licence in the 2.3 GHz band, spectrum licensees are to provide a level of out-of-band and in-band protection from those transmitters as would be provided from apparatus licensed fixed service transmitters whose frequencies are assigned in accordance with RALI FX 3.

Part 3 Space research, space operations and earth exploration-satellite service receivers

3.1 Background

- (1) Spectrum licensees operating radiocommunications transmitters in the 2.3 GHz band are required to provide in-band protection to Earth stations in accordance with ITU-R Recommendation SF.1006 “*Determination of the interference potential between earth stations of the fixed-satellite service and stations in the fixed service*”. This is a condition of the spectrum licence under which the transmitter operates.
- (2) There is a primary allocation in the Spectrum Plan for the following services in the 2200–2290 MHz band:
 - (a) space research (space-to-Earth and space-to-space);
 - (b) space operation (space-to-Earth and space-to-space); and
 - (c) earth exploration-satellite (space-to-Earth and space-to-space).
- (3) There is a primary allocation in the Spectrum Plan for the space research (deep space, space-to-Earth) service in the 2290–2300 MHz band.
- (4) The Register should be consulted for the most up-to-date information on the location of existing Earth stations operating in these services.

3.2 Protection requirements

- (1) Spectrum licensees operating radiocommunications transmitters in the 2.3 GHz band are required to protect Earth stations in accordance with the protection requirements specified in Annex 7 to Appendix 7 of the Radio Regulations.
- (2) In addition, RALI MS 37 provides out-of-band protection and coordination requirements with space research service radiocommunications receivers operating in the 2290–2300 MHz band. RALI MS 37 provides protection from blocking to these receivers which is not specifically considered in Annex 7 to Appendix 7 of the Radio Regulations. It is a condition of a 2.3 GHz spectrum licence that the licensee must comply with the requirements specified in RALI MS 37 relating to the protection to be afforded to deep space Earth station receivers, if the receiver:
 - (a) is licensed under the Act; and
 - (b) was registered in the Register prior to the date on which the radiocommunications transmitter operated under a 2.3 GHz spectrum licence is registered.

Further, the protection and coordination requirements of RALI MS 37 apply to radiocommunications transmitters operated under spectrum licences in the 2.3 GHz band if their transmission parameters are modified after the date on which an Earth station receiver was registered in the Register.

- (3) In planning for the operation of radiocommunications transmitters under a spectrum licence in the 2.3 GHz band, spectrum licensees should consult the procedures specified in RALI MS 37.
- (4) The ACMA encourages direct liaison between spectrum licensees and Earth station operators during the system planning phase.

- (5) Additional information on the protection and coordination requirements for space service radiocommunications receivers are set out in the following ITU-R Recommendations:
- (a) Recommendation ITU-R SA.1154 “*Provisions to protect the space research (SR), space operations (SO) and Earth exploration-satellite services (EESS) and to facilitate sharing with the mobile service in the 2 025–2 110 MHz and 2 200–2 290 MHz bands*”;
 - (b) Recommendation ITU-R SA.363 “*Space operation systems*”;
 - (c) Recommendation ITU-R SA.609 “*Protection criteria for radiocommunication links for manned and unmanned near-Earth research satellites*”;
 - (d) Recommendation ITU-R SA.1157 “*Protection criteria for deep-space research*”;
 - (e) Recommendation ITU-R SA.509 “*Space research earth station and radio astronomy reference antenna radiation pattern for use in interference calculations, including coordination procedures*”;
 - (f) Recommendation ITU-R SA.1014 “*Telecommunications requirements for manned and unmanned deep-space research*”;
 - (g) Recommendation ITU-R SA.1016 “*Sharing considerations relating to Deep-Space Research*”;
 - (h) Recommendation ITU-R 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*”.

Part 4 Mobile service

4.1 Background

- (1) There is a primary allocation in the Spectrum Plan for mobile services in the 2200–2300 MHz band, which is adjacent to the spectrum licensed 2.3 GHz band.
- (2) The 2200–2290 MHz band is primarily used for aeronautical mobile telemetry (AMT) services at specific locations as provided in the Spectrum Planning Paper 10/01 *Coordination Information for Defence Aeronautical Mobile Telemetry Systems Operating in the 2200 to 2300 MHz Frequency Range*. Apparatus licensed fixed receive stations of this service require protection from spectrum licensed services in the 2.3 GHz band.

Note Spectrum Planning Paper 10/01 is available on the ACMA website at <http://www.acma.gov.au>.

4.2 Protection requirements

- (1) Radiocommunications transmitters operated under a spectrum licence in the 2.3 GHz band in accordance with the conditions of the licence, are not taken to cause unacceptable interference to AMT receivers operating in the 2200–2290 MHz band.
- (2) Spectrum licensees of radiocommunications transmitters operated in accordance with the conditions of the licence are not required to afford additional protection to AMT receivers operating in the 2200–2290 MHz band.

Note At the time of developing these guidelines there were no mobile services operating in the 2290–2300 MHz band. These guidelines will be updated in the event this changes to include protection requirements in relation to services in this band.

Part 5 Television outside broadcast (TVOB) service

5.1 Background

The *Television Outside Broadcast Service (1980–2110 MHz and 2170–2300 MHz) Frequency Band Plan 2012* makes provision for television outside broadcast (**TVOB**) services in the 1980–2110 MHz and 2170–2300 MHz frequency bands.

Note The *Television Outside Broadcast Service (1980–2110 MHz and 2170–2300 MHz) Frequency Band Plan 2012* is available on the ComLaw website at <http://www.comlaw.gov.au>.

5.2 Protection requirements

- (1) The protection requirements for TVOB services operating in the 2170–2300 MHz band are specified in RALI FX 21. These requirements apply to radiocommunications transmitters operated under a spectrum licence in the 2.3 GHz band that were registered in the Register after the date of issue of the TVOB apparatus licence. Only TVOB receivers with site details recorded in the Register may be afforded protection.
- (2) In planning for the operation of radiocommunications transmitters under a spectrum licence in the 2.3 GHz band, spectrum licensees should consult the procedures specified in RALI FX 21.

Part 6 Class licensed services

6.1 Background

- (1) In the 2400–2483.5 MHz band, the LIPD class licence permits the operation of a number of different types of radiocommunications transmitters.
- (2) The operation of radiocommunications transmitters under the LIPD class licence is typically on a no-interference, no-protection basis.

6.2 Protection requirements

- (1) Radiocommunications transmitters operated under a spectrum licence in the 2.3 GHz band in accordance with the conditions of the licence, are not taken to cause unacceptable interference to services operating under the LIPD class licence.
- (2) Spectrum licensees of radiocommunications transmitters operated in accordance with the conditions of the licence are not required to afford additional protection to services operating under the LIPD class licence.

Part 7 Radio Astronomy Service receivers

7.1 Background

Radio Astronomy Service (*RAS*) radiocommunications receivers conduct passive observations in the frequency bands specified in Australian Footnote AUS87 in the Spectrum Plan.

7.2 Protection Requirements

- (1) Spectrum licensees operating radiocommunications transmitters in the 2.3 GHz band are requested to have regard to RAS radiocommunications receivers operating on frequencies in and adjacent to the spectrum licensed 2.3 GHz band covered by Australian Footnote AUS87 in the Spectrum Plan. Specifically, this includes RAS receivers operating in the frequency range 2200–2700 MHz.
- (2) In planning for the operation of fixed transmitters under a spectrum licence in the 2.3 GHz band, spectrum licensees should follow the notification arrangements specified in RALI MS 31 before operating the transmitters.

Note 1 While RAS facilities operate on a fortuitous reception basis, the ACMA encourages direct liaison by spectrum licensees with RAS station operators particularly during the system planning phase of new systems to minimise the potential interference impact on these stations.

Note 2 RALI MS 31 is subject to continuous review in consultation with industry. As a result, users of RALI MS 31 are urged to consult the current version when planning systems. The current version of RALI MS 31 is available on the ACMA website at <http://www.acma.gov.au>.

Part 8 Adjacent area spectrum licensed receivers

8.1 Background

The device boundary criterion, as defined in the subsection 145 (4) Determination, is the primary mechanism for managing interference across geographical boundaries. However, at times it may be necessary for licensees operating radiocommunications transmitters in the 2.3 GHz band to negotiate with other spectrum licensees when deploying services in order to avoid harmful interference.

8.2 Recommended preliminary coordination procedures

- (1) Spectrum licensees planning to deploy radiocommunications transmitters in the 2.3 GHz band should have regard to radiocommunications receivers registered in the Register operating under other 2.3 GHz band spectrum licences.
- (2) In planning for the operation of fixed transmitters under a spectrum licence in the 2.3 GHz band, spectrum licensees should coordinate with any radiocommunications receivers registered in the Register. The coordination performed should:
 - (a) use the parameters of the radiocommunications receivers as recorded in the Register;
 - (b) use the level of protection set out in the subsection 145 (4) Determination;
 - (c) make use of a suitable propagation model to model path loss between the fixed transmitters and radiocommunications receivers; and
 - (d) take into account terrain and any other relevant factors.

Note An example of a suitable propagation model is that set out in section 4.5.2 of ITU-R Recommendation P.526-12 *Propagation by diffraction*.
- (3) In the event that coordination performed under subsection (2) indicates harmful interference may occur, spectrum licensees should consider:
 - (a) replanning the deployment of the fixed transmitters to avoid causing harmful interference; or
 - (b) negotiating with the affected spectrum licensee to find a resolution.