



Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 2 GHz Band) 2023

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

Dated: 23 February 2023

Chris Jose
[signed]
Member

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[signed]
~~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 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.

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 GHz Band) 2016*

The *Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 2 GHz Band) 2016* [F2016L01712] are repealed.

5 Definitions

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

2 GHz band means the 2 GHz lower band and the 2 GHz upper band.

2 GHz lower band means the frequency band 1920 MHz to 1980 MHz.

2 GHz spectrum licence means a spectrum licence that authorises the operation of radiocommunications devices in the 2 GHz band.

2 GHz upper band means the frequency band 2110 MHz to 2170 MHz.

Act means the *Radiocommunications Act 1992*.

Category 1 receiver: see paragraph 9(a).

Category 2 receiver: see paragraph 9(b).

fixed service means a radiocommunication service between fixed points.

HAPS means a station located on an object:

- (a) at an altitude between 20 km and 50 km; and
- (b) at a specified, nominal, fixed point relative to the earth.

Note: HAPS stands for high altitude platform station.

in-band means:

- (a) for a radiocommunications device operated under a spectrum licence – the part of the spectrum within which the operation of radiocommunications devices is authorised under the licence; or
- (b) for a radiocommunications device operated under an apparatus licence that specifies a frequency band– the frequencies within the lower frequency limit and the upper frequency limit specified in the licence; or

- (c) for a radiocommunications device operated under an apparatus licence that specifies a specific frequency and bandwidth – the frequencies within that bandwidth, when centred on the specific frequency.

ITU-R Recommendation means a recommendation made by the Radiocommunication Sector of the International Telecommunication Union.

Note: ITU-R Recommendations are available, free of charge, from the website of the International Telecommunication Union at www.itu.int.

mobile service has the meaning given by the spectrum plan.

MSS means mobile-satellite service.

out-of-band, for a radiocommunications device, means a frequency other than an in-band frequency.

point to point fixed service means a radiocommunication service using point to point stations.

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.

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.

section 145 determination means the *Radiocommunications (Unacceptable Levels of Interference – 2 GHz Band) Determination 2023*.

Note: The section 145 determination is available, free of charge, from the Federal Register of Legislation at www.legislation.gov.au.

spectrum space means the 3 dimensional space consisting of a frequency band and a geographic area.

TOB service means radiocommunications made by the operation of a television outside broadcast station.

Note 1: TOB stands for television outside broadcast.

Note 2: 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) core conditions;
- (e) frequency band;
- (f) interference;
- (g) radiocommunication;
- (h) radiocommunications device;
- (i) radiocommunications receiver;
- (j) radiocommunications transmitter;
- (k) Register;
- (l) spectrum licence;
- (m) spectrum plan;
- (n) transmitter licence.

- (2) In this instrument, unless the contrary intention appears, a term that is defined in the section 145 determination has the same meaning as in that determination.
- (3) In this instrument, unless the contrary intention appears, each of the terms listed in subsection (4) 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.

Note: The *Radiocommunications (Interpretation) Determination 2015* is available, free of charge, from the Federal Register of Legislation at www.legislation.gov.au.

- (4) For the purposes of subsection (3), the terms are:
- (a) ***earth station***;
 - (b) ***mobile-satellite service***;
 - (c) ***point to point station***;
 - (d) ***PTS***;
 - (e) ***public mobile telecommunications service***;
 - (f) ***space station***;
 - (g) ***station***;
 - (h) ***television outside broadcast station***.
- (5) 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 GHz band has been allocated for spectrum licensing in capital cities, and parts of the 2 GHz band (1960 MHz to 1980 MHz, paired with 2150 MHz to 2170 MHz) have been allocated for spectrum licensing in regional areas. Apparatus licensed and class licensed radiocommunications transmitters communicate with radiocommunications receivers in and adjacent to the 2 GHz band. These receivers may suffer interference from unwanted emissions, blocking and intermodulation caused by a radiocommunications transmitter operated under a 2 GHz spectrum licence.
- (2) This instrument has been made to provide guidance on the management of interference from radiocommunications transmitters operated under a 2 GHz spectrum licence to the following:
 - (a) point to point fixed services operating in and adjacent to the 2 GHz band (Part 3);
 - (b) MSS operating above 1980 MHz or above 2170 MHz, adjacent to the 2 GHz band (Part 4);
 - (c) radiocommunications to or from a space object authorised by apparatus licences in the 2025 MHz to 2120 MHz and 2200 MHz to 2300 MHz frequency bands (Part 5);
 - (d) TOB services authorised by apparatus licences in the 1980 MHz to 2110 MHz and 2170 MHz to 2300 MHz frequency bands (Part 6);
 - (e) mobile services provided by radiocommunications transmitters authorised under PTS apparatus licences operating in the 2 GHz band in regional and remote areas, or on board aircraft (Part 7);
 - (f) radiocommunications devices operating under a class licence in and adjacent to the 2 GHz band (Part 8).
- (3) 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.1114 “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 GHz band.

Note 1: ITU-R Recommendation P.1114 is available, free of charge, from the International Telecommunication Union’s website at www.itu.int.

Note 2: The use of other published propagation models applicable to the 2 GHz band may also be suitable.
- (4) The ACMA may take this instrument into account in determining whether a radiocommunications transmitter operated under a 2 GHz spectrum licence is causing interference to an apparatus licensed or class licensed radiocommunications receiver operating in circumstances set out in this instrument.
- (5) 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 in and adjacent to the 2 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 categories

A radiocommunications receiver that is part of a fixed service operating in the 2 GHz band is:

- (a) if the operation of the receiver is authorised by an apparatus licence first issued under section 100 of the Act before 12 October 2017 – a **Category 1 receiver**; or
- (b) if the operation of the receiver is authorised by an apparatus licence first issued under section 100 of the Act on or after 12 October 2017, outside the spectrum space of a 2 GHz spectrum licence – a **Category 2 receiver**.

10 Point to point receiver protection requirements

- (1) The protection requirements for fixed services in and adjacent to the 2 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.
- (2) Category 1 receivers are to be provided with in-band and out-of-band protection from interference in accordance with RALI FX 3.
- (3) Category 2 receivers:
 - (a) are to be provided with out-of-band protection, in accordance with RALI FX 3, from interference caused by a radiocommunications transmitter operated under a frequency adjacent 2 GHz spectrum licence, which was included in the Register after the apparatus licence that authorises operation of the receiver was first issued under section 100 of the Act; and
 - (b) are to accept levels of in-band emissions from a radiocommunications transmitter operated under a 2 GHz spectrum licence, if the transmitter is operated in accordance with the conditions of the 2 GHz spectrum licence and does not cause an unacceptable level of interference as defined in the section 145 determination.

Part 4—MSS

11 Background

The spectrum plan allocates the 1980 MHz to 2010 MHz (Earth-to-space) and the 2170 MHz to 2200 MHz (space-to-Earth) frequency bands for MSS as a primary service.

12 Protection requirements

- (1) The ACMA generally will not regard interference, from a radiocommunications transmitter operated under a 2 GHz spectrum licence, to MSS receivers to be unacceptable if the spectrum licensee complies with all relevant condition of the licence.
- (2) For a HAPS radiocommunications transmitter operating as a base station, the requirements of *recommends* 4 of ITU-R Recommendation M.1456-0 “Minimum performance characteristics and operational conditions for high altitude platform stations providing IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2” apply.

Note: ITU-R Recommendation M.1456-0 is available, free of charge, from the International Telecommunication Union’s website at www.itu.int.

Part 5—Space services

13 Background

- (1) The spectrum plan allocates the 2025 MHz to 2110 MHz frequency band for the following services as primary services:
 - (a) space operation services (Earth-to-space, space-to-space);
 - (b) earth exploration-satellite services (Earth-to-space, space-to-space);
 - (c) space research services (Earth-to-space, space-to-space).
- (2) The spectrum plan allocates the 2110 MHz to 2120 MHz frequency band for the space research service (deep space, Earth-to-space) as a primary service.
- (3) The spectrum plan allocates the 2200 MHz to 2290 MHz frequency band for the following services as primary services:
 - (a) space operation services (space-to-Earth, space-to-space);
 - (b) earth exploration-satellite services (space-to-Earth, space-to-space);
 - (c) space research services (space-to-Earth, space-to-space).
- (4) 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.
- (5) Earth 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.
- (6) The ACMA encourages direct liaison between spectrum licensees and space 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.

14 Protection requirements

The protection requirements for earth station receivers operating in the 2200 MHz to 2300 MHz frequency band are set out in the following:

- (a) ITU-R Recommendation SA.363-5 “Space operation systems”;
- (b) 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”;
- (c) ITU-R Recommendation SA.1157-1 “Protection criteria for deep-space research”.

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

Part 6—TOB services

15 Background

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. 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.

16 Protection requirements

- (1) The protection requirements for TOB services operating in the 1980 MHz to 2110 MHz and 2170 MHz to 2300 MHz frequency bands are set out in RALI FX 21. These requirements apply to radiocommunications transmitters operated under 2 GHz band 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 GHz band spectrum licence, spectrum licensees should consult the procedures set out in RALI FX 21.

Part 7—Public mobile telecommunications services

17 Background

Public mobile telecommunications services operate under PTS transmitter licences in the 2 GHz band. These services are limited to regional and remote areas of Australia that are not covered by spectrum licences.

18 Protection requirements

Radiocommunications transmitters operated under a 2 GHz band spectrum licence, in accordance with the conditions of the licence, are generally taken not to cause unacceptable interference to public mobile telecommunications services operated under PTS transmitter licences.

Part 8—Class licensed services

19 Background

- (1) Various class licences permit the operation of a number of different kinds of radiocommunications transmitters in and adjacent to the 2 GHz band.
- (2) The operation of radiocommunications transmitters under class licences is generally on a ‘no-interference’ and ‘no-protection’ basis.

20 Protection requirements

Radiocommunications transmitters operated under a 2 GHz band spectrum licence, in accordance with the conditions of the licence, are generally taken not to cause unacceptable interference to radiocommunications transmitted under a class licence.