



Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 26 GHz Band) 2020

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

Dated: 20 November 2020

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Part 1 Preliminary

1 Name

These are the *Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 26 GHz Band) 2020*

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 *Radiocommunications Act 1992*.

4 Definitions

(1) In this instrument:

adjacent channel means a channel with a centre frequency offset on either side of the assigned channel frequency of the occupied channel by a specific frequency relation.

adjacent channel selectivity means a measure of the ability of the radiocommunications receiver to receive a wanted signal without exceeding a specified degradation in output quality due to the presence of an unwanted adjacent channel signal.

area-wide licence has the meaning given in Schedule 1 to the *Radiocommunications (Interpretation) Determination 2015*.

blocking means a measure of the ability of a radiocommunications receiver to receive a wanted signal in the presence of a high level unwanted interferer on frequencies other than those of the adjacent channels.

emission buffer zone means a zone along the frequency or geographic boundary of a spectrum licence where emission levels of radiocommunications transmitters are reduced to ensure that significant levels of emissions stay within the geographic area and frequency band of the licence.

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.

intermodulation response rejection means a measure of the ability of a radiocommunications receiver to receive a wanted signal in the presence of two or more unwanted signals with a specific amplitude and frequency relationship to the wanted signal frequency.

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 MS 46 means the Radiocommunications Assignment and Licensing Instruction MS 46, *Licensing and coordination procedures for area-wide apparatus licensed services in the 26/28 GHz bands*, published by the ACMA.

Note: RALI MS 46 is available free of charge on the ACMA website: www.acma.gov.au.

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

Subsection 145(4) Determination means the *Radiocommunications (Unacceptable Levels of Interference — 26 GHz Band) Determination 2020*.

Note: The Subsection 145(4) Determination is available free of charge from the Federal Register of Legislation: www.legislation.gov.au.

unwanted emissions means any emissions (both out-of-band and spurious emissions) outside the lower and upper frequency limits of a spectrum licence.

unwanted signal means all emissions from any radiocommunications transmitter which is not communicating with the radiocommunications receiver of a service protected by this instrument.

wanted signal means the radiofrequency emission from a radiocommunications transmitter designed for communication between the transmitter and the radiocommunications receiver of a service protected by this instrument.

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

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

- (2) Unless the contrary intention appears, terms used in this instrument 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 this instrument are defined in the Subsection 145(4) Determination:

- 26 GHz band;
- Act;
- centre frequency;
- device boundary;
- device boundary criterion;
- fixed receiver;
- fixed transmitter; and

- geographic area.

5 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

6 Background

- (1) A spectrum licence authorises operation of radiocommunications devices in a frequency band and a geographic area. Interference occurring between adjacent spectrum licences consists of:
 - (a) in-band interference, across the geographic boundaries; and
 - (b) out-of-band interference, across the frequency boundaries.
- (2) The interference is managed by creating emission buffer zones along the geographic and frequency boundaries of the spectrum licence, using a number of ACMA powers and functions under the Act. These include:
 - (a) the core licence conditions that all spectrum licences are subject to (see section 66 of the Act) about:
 - (i) emission limits outside the geographic area; and
 - (ii) emission limits outside the frequency band;
 - (b) the Subsection 145(4) Determination about what constitute unacceptable levels of interference for the purpose of registration of devices under a spectrum licence; and
 - (c) advisory guidelines made under section 262 of the Act, which guide decisions about managing interference in specific circumstances.

7 Purpose

- (1) The purpose of this instrument is to:
 - (a) manage in-band and out-of-band interference by providing compatibility requirements for registered fixed receivers operating under spectrum licences issued for the 26 GHz band; and
 - (b) provide protection to radiocommunications receivers operating under spectrum licences issued for the 26 GHz band from interference caused by radiocommunications transmitters operating under apparatus licences, class licences and spectrum licences.
- (2) This instrument should be used by operators of spectrum licensed services, class licensed services and apparatus licensed services in the planning of services or in the resolution of an interference case.
- (3) The ACMA will take this instrument into account in determining whether interference has occurred to a radiocommunications receiver operating under a 26 GHz band spectrum licence from a radiocommunications transmitter operating under another licence, in the absence of separate criteria agreed between affected licensees.
- (4) This instrument does not prevent a licensee negotiating other protection arrangements with another licensee.

Part 3 Managing interference from other services

8 In-band interference

- (1) In-band interference caused to a radiocommunications receiver operating under a spectrum licence in the 26 GHz band by a radiocommunications transmitter operating under an adjacent spectrum licence is managed by:
 - (a) the core conditions imposed on the spectrum licences under section 66 of the Act;
 - (b) the device boundary criteria and deployment constraints prescribed in the Subsection 145(4) Determination; and
 - (c) any condition set out in the spectrum licence relating to synchronisation (a **synchronisation requirement**), unless other arrangements are agreed to by the affected licensees.

Note: The synchronisation requirement is set out in clause 12 of Licence Schedule 4 of the sample licence in the *Radiocommunications Spectrum Marketing Plan (26 GHz Band) 2020*.

- (2) Subject to subsection (3), in-band interference caused to a radiocommunications receiver operating under a spectrum licence by a radiocommunications transmitter operating under an apparatus licence in the 26 GHz band issued after the commencement of the *Radiocommunications Spectrum Marketing Plan (26 GHz Band) 2020* is managed as if the transmitter is operated under a spectrum licence. The same device boundary criteria, as applied to spectrum licensed radiocommunications transmitters at the time of their registration on the Register, are also applied to new apparatus licensed radiocommunications transmitters. Therefore, spectrum licensed receivers are afforded the same level of in-band protection from new apparatus licensed radiocommunications transmitters as they are afforded from radiocommunications transmitters operated under adjacent spectrum licences.
- (3) Subsection (2) does not apply to area-wide apparatus licences.
- (4) In-band interference caused to a radiocommunications receiver operating under a spectrum licence by a radiocommunications transmitter operating under an area-wide apparatus licence in the 26 GHz band is to be managed as if the transmitter is operated under a spectrum licence. The same device boundary criteria and synchronisation requirement, as applied to spectrum licensed radiocommunications transmitters at the time of their registration on the Register, are also to be applied to new area-wide licensed radiocommunications transmitters in the 26 GHz band (unless other arrangements are agreed to by the affected licensees and noting that the synchronisation requirement does not apply to earth stations authorised under an area-wide licence).

Note: Licence conditions for area-wide licences are contained in the *Radiocommunications Licence Conditions (Area-Wide Licence) Determination 2020*. Arrangements relating to registering a device under an area-wide licence in the frequency range 24.7 GHz–30 GHz are contained in the *Radiocommunications (Register of Radiocommunications Licences) Determination 2017*, the *Radiocommunications Licence Conditions (Area-Wide Licence) Determination 2020* and RALI MS 46.

- (5) Application of the device boundary criteria manages in-band interference, and these criteria incorporate emission limits that provide reasonable protection inside the geographic area of a licence. Emission limits are also used to manage out-of-band interference, but these do not provide protection along the frequency boundaries of a spectrum licence throughout the entire geographic area. Because of the nature of out-of-band interference, emission limits cannot be used to provide protection from out-of-band interference for devices that are located near each other, for example, at multi-operator sites.

- (6) Subject to subsection (7), spectrum licensees must accept any in-band interference to radiocommunications receivers caused by radiocommunications transmitters operating under an apparatus licence issued before the commencement of the *Radiocommunications Spectrum Marketing Plan (26 GHz Band) 2020*.

Note: The *Radiocommunications Spectrum Marketing Plan (26 GHz Band) 2020* is available free of charge from the Federal Register of Legislation: www.legislation.gov.au.

- (7) Subsection (6) does not apply to area-wide apparatus licences, except when in-band interference is caused by an earth station that was previously operated under an apparatus licence other than an area-wide apparatus licence.

- (8) A radiocommunications receiver operated under a spectrum licence in the 26 GHz band is not afforded protection from interference by a device operated under the *Radiocommunications (Body Scanning – Aviation Security) Class Licence 2018*.

Note: The *Radiocommunications (Body Scanning – Aviation Security) Class Licence 2018* is available free of charge from the Federal Register of Legislation: www.legislation.gov.au.

9 Out-of-band interference

- (1) Out-of-band interference is difficult to predict because the levels and frequencies of unwanted emissions depend on both the nearness of, and the operating frequencies of, radiocommunications transmitters and radiocommunications receivers. In addition, out-of-band interference:
- can extend for many megahertz either side of the frequency boundary of a spectrum licence;
 - is dependent on the quality of the radiocommunications receiver as well as the levels of the radiocommunications transmitter emission; and
 - is difficult to model accurately.
- (2) If emission limits were used to manage out-of-band interference for devices in close proximity, the interference modelling inaccuracy would require large probability margins to be added to those limits. These margins would place severe constraints on use of the spectrum because the frequency boundaries of a licence extend throughout the entire geographic area of a licence. Therefore, emission limits that manage out-of-band interference throughout the geographic area of a spectrum licence cannot be used because they would lead to a severe loss of utility of the spectrum on both sides of the frequency boundary.
- (3) Instead of making large tracts of spectrum space unusable through the imposition of emission limits, out-of-band interference is managed through interference management procedures based on a compatibility requirement for radiocommunications receivers. A minimum level of receiver performance is specified in conjunction with the compatibility requirement because the performance level of receivers:
- affects the level of interference; and
 - can vary for receivers operating under spectrum licences.

Note: The minimum level of receiver performance is specified in Part 4. The compatibility requirement is set out in Part 5.

10 Recording radiocommunications receiver details in the Register

A radiocommunications receiver operated under a spectrum licence must be recorded in the Register to be afforded protection in accordance with this instrument.

11 Mobile and nomadic devices

The compatibility requirement specified in Part 5 does not apply to mobile or nomadic radiocommunications receivers operated under a spectrum licence in the 26 GHz band because the transient nature of these devices prevents the use of this requirement as an interference management procedure.

Part 4 Minimum level of receiver performance

12 Notional receiver performance

- (1) The level of interference caused by unwanted emissions depends on the interference susceptibility of a radiocommunications receiver and the level of the unwanted signal. Emission levels from radiocommunications transmitters should not have to be reduced below a point where the performance of the radiocommunications receiver is the main cause of the problem.
- (2) Therefore, it is necessary to establish a benchmark notional receiver performance level when setting a compatibility requirement for radiocommunications receivers. The recommended notional receiver performance level is set out in Schedule 1 to this instrument. A receiver must meet the notional level of performance to gain protection from interference from radiocommunications transmitters under this instrument.

Part 5 Compatibility requirement

13 Compatibility

- (1) The performance of a fixed receiver operated under a spectrum licence in the 26 GHz band meets the compatibility requirement if the receiver:
 - (a) has at least the notional level of receiver performance set out in Schedule 1 to this instrument;
 - (b) meets the compatibility requirement set out in Schedule 2 to this instrument; and
 - (c) was registered in the Register before the relevant radiocommunications transmitter was registered in the Register, whether or not the transmitter is authorised by the same apparatus licence as it was at the time it was registered in the Register.
- (2) The licensee of a radiocommunications transmitter operating under an apparatus or spectrum licence must ensure compatibility with a fixed receiver operating under a 26 GHz band spectrum licence that meets the compatibility requirements as stated in subsection (1).
- (3) Unless alternative arrangements are negotiated and agreed to between licensees, if a 26 GHz band spectrum licensee claims there is interference from one or more radiocommunications transmitters operating under another 26 GHz band spectrum licence to a radiocommunications receiver operated under its 26 GHz band spectrum licence, all relevant 26 GHz band spectrum licensees are required to synchronise their services as specified in any synchronisation requirement condition included in their spectrum licence.

Note: The synchronisation requirement is set out in clause 12 of Licence Schedule 4 of the sample licence in the *Radiocommunications Spectrum Marketing Plan (26 GHz Band) 2020*.

- (4) The interference management framework for radiocommunications devices operated under a class licence, except devices operated under the *Radiocommunications (Body Scanning – Aviation Security) Class Licence 2018*, are contained in the relevant class licence.

Note: For devices operated under the *Radiocommunications (Body Scanning – Aviation Security) Class Licence 2018*, see subsection 8(8).

Schedule 1 Notional receiver performance level

(subsection 12(2) and paragraph 13(1)(a))

1 Performance parameters

- (1) The notional level of performance for a radiocommunications receiver operating under a spectrum licence in the 26 GHz band in relation to interfering signals from a radiocommunications transmitter operated under an apparatus licence relates to:
 - (a) adjacent channel selectivity;
 - (b) receiver intermodulation response rejection; and
 - (c) receiver blocking.
- (2) The performance parameters of a radiocommunications receiver are defined at the antenna connector port of the receiver unit, except for receiver blocking requirements at frequency offsets of greater than 1500 MHz. All frequency offsets are specified with reference to the upper and lower limits of the frequency bands of the spectrum licence under which the receiver operates.

2 Adjacent channel selectivity

The adjacent channel selectivity requirement is 21.7 dB above the minimum wanted signal level and applies in the adjacent 50 MHz of the licence under which the radiocommunications receiver operates.

Note: When using the adjacent channel selectivity requirement to calculate the maximum tolerable interference level, the calculated level is the maximum power within the adjacent 50 MHz. For example, a receiver complying with the notional receiver performance level will be able to tolerate an interference power level of -63.3 dBm/50 MHz in the adjacent 50 MHz, measured at the input of the receiver.

3 Receiver intermodulation response rejection

The receiver intermodulation response rejection level is 19 dB for each out-of-band signal at frequency offsets greater than or equal to 5 MHz from the upper and lower frequency limit of the licence under which the radiocommunications receiver operates.

4 Receiver blocking

- (1) The receiver blocking requirement is 27 dB above the minimum wanted signal level, and applies at frequency offsets greater than 50 MHz and less than or equal to 1500 MHz from the upper and lower frequency limits of the spectrum licence under which the radiocommunications receiver operates.
- (2) The receiver blocking requirement for unwanted signals within the -3 dB beamwidth of the receiver antenna and at frequency offsets of greater than 1500 MHz, is expressed as a root mean square field strength at the input of the receiver antenna of:
 - (a) 0.36 V/m in the frequency range 0.03 GHz–12.75 GHz; and
 - (b) 0.1 V/m in the frequency range 12.75 GHz–55 GHz, excluding frequency offsets of less than or equal to 1500 MHz from the upper and lower frequency limit of the spectrum licence under which the radiocommunications receiver operates.

Note: When using the receiver blocking requirement of 27 dB to calculate the maximum tolerable interference level at offsets greater than 50 MHz and less than or equal to 1500 MHz, a reference bandwidth of 50 MHz is to be used. For example, a receiver complying with the notional receiver performance level will be able to tolerate an interference power level of -58 dBm/50 MHz within the frequency offset of 50 MHz–1500 MHz, measured at the input of the receiver.

5 Receiver antenna and feeder losses

The antenna gain and feeder loss recorded for a radiocommunications receiver in the Register should be used for coordination. If an antenna gain or feeder loss is not available in the Register, then an antenna gain (including losses) of 23 dBi in all directions applies.

Schedule 2 Compatibility requirement

(paragraph 13(1)(b))

1. For the purpose of assessing compatibility with other radiocommunications services, the performance of a fixed radiocommunications receiver operated under a 26 GHz band spectrum licence is:
 - (a) a minimum wanted signal level of -85 dBm per 50 MHz for more than 95% of the time in any 1 hour period; and
 - (b) a wanted to unwanted ratio of 8 dB.
2. Logarithmic scaling should be used to find the appropriate level in alternative bandwidths.