

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

*Radiocommunications Act 1992*

made under section 262 of the

*Radiocommunications Act 1992*.

Prepared by the Australian Communications and Media Authority, Melbourne.

**Part 1 Introduction**

**1.1 Name of Advisory Guidelines**

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

**1.3 Purpose**

(1)The purpose of these guidelines 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) These guidelines 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 these guidelines into account in determining whether interference has occurred to a radiocommunications receiver operating under a 26 GHz band spectrum licence from a transmitter operating under another licence, in the absence of separate criteria agreed between affected licensees.

(4) These guidelines do not prevent a licensee negotiating other protection requirements with another licensee.

**1.4 Interpretation**

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

***26 GHz band*** means the 25.1 to 27.5 GHz frequency band.

***Act*** means the *Radiocommunications Act 1992.*

***active antenna system (AAS)*** refers to a base station antenna system where the amplitude and/or phase between antenna elements is continually adjusted, resulting in an antenna pattern that varies in response to short term changes in the radio environment.

***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.

***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:

1. 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
2. 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:

1. 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
2. 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.

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

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

***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 these guidelines.

***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 these guidelines.

*Note* A number of terms used in these guidelines are defined in the Act and unless the contrary intention appears, have the meanings given to them by the Act including:

* ACMA
* apparatus licence
* class licence
* core condition
* frequency band
* interference
* radiocommunications device
* 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:

* centre frequency
* device boundary
* device boundary criterion
* fixed receiver
* fixed transmitter
* geographic area

**Part 2 Background**

2.1 A spectrum licence refers to a frequency band and a geographic area. Interference occurring between adjacent spectrum licences consists of:

* in-band interference, across the geographic boundaries; and
* out-of-band interference, across the frequency boundaries.

2.2 This interference is managed by creating emission buffer zones along the geographic and frequency boundaries of the licence, using a number of provisions of the Act. These include:

* the core licence conditions that all spectrum licences are subject to (see section 66 of the Act), about:
* emission limits outside the geographic area; and
* emission limits outside the frequency band;
* the applicable determination under subsection 145 (4) of the Act about what constitutes unacceptable levels of interference; and
* advisory guidelines made under section 262 of the Act, about managing interference in specific circumstances.

**Part 3 Managing interference from other services**

**3.1 In-band interference**

(1) In-band interference caused in 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:

* + - 1. the core conditions imposed on the spectrum licences under section 66 of the Act;
      2. the device boundary criteria and deployment constraints prescribed in the subsection 145(4) Determination; and
      3. any condition set out in the spectrum licence relating to synchronisation (a ***synchronisation requirement***), unless other arrangements are agreed to by the affected licensees.

(2) In-band interference caused in a radiocommunications receiver operating under a spectrum licence by a radiocommunications transmitter operating under an apparatus licence that is issued after the commencement of the *Radiocomunications 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 registration 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.

This subsection does not apply to area-wide apparatus licences.

(3)In-band interference caused in a radiocommunications receiver operating under a spectrum licence by a radiocommunications transmitter operating under an area-wide apparatus licence is to be managed as if the transmitter is operated under a spectrum licence. The same device boundary criteria and synchronisation requirement (unless other arrangements are agreed to by the affected licensees) as that applied to spectrum licensed radiocommunications transmitters at the time of registration are also to be applied to new apparatus licensed radiocommunications transmitters. Therefore, spectrum licensed receivers are afforded the same level of in-band protection from area-wide apparatus licensed radiocommunications transmitters as they are afforded from radiocommunications transmitters operated under other spectrum licences.

(4) 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.

(5) 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 *Radiocomunications Spectrum Marketing Plan (26 GHz Band) 2020*.

This subsection does not apply to area-wide apparatus licences.

(6) 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*, as in force from time to time.

**3.2 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 that are close in terms of both frequency and distance. In addition, out-of-band interference:

(a) can extend for many Megahertz either side of the frequency boundary of a spectrum licence;

(b) is dependent on the quality of the radiocommunications receiver as well as the levels of the radiocommunications transmitter emission; and

(c) 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:

(a) affects the level of interference; and

(b) can vary for receivers operating under spectrum licences.

*Note:* The compatibility requirement is set out in Part 4.

**3.3 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 these guidelines.

**3.4 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**

**4.1 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 these Guidelines. A receiver must meet the notional level of performance to gain protection from interference from radiocommunications transmitters under these guidelines.

**Part 5 Compatibility requirement**

**5.1 Compatibility**

1. Subject to subsection 2, 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;

(b) meets the compatibility requirement set out in Schedule 2; and

(c) has its details included in the Register prior to the radiocommunications transmitter with which compatibility is sought has its details included in the Register.

*Note:* Application of the compatibility requirement is related solely to management of out-of-band interference and does not apply to in-band interference.

1. 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 requirement as stated in subsection (1).
2. Unless alternative arrangements are negotiated and agreed to, in the event a 26 GHz band spectrum licensee claims interference from one or more radiocommunications transmitters operating under another 26 GHz band spectrum licence into a radiocommunications receiver operated under their 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.
3. The interference management framework for radiocommunications devices operated under a class licence are contained in the relevant class licence.

*Note:* For a device with an active antenna system, the radiated power in the direction of a receiver operated under another licence, is defined as the sum of the gain of the antenna in the direction of the receiver (accounting for azimuth and elevation) and the total radiated power (dBm). This allowance is based on the assumption that beam pointing angles and/or power can be controlled dynamically to ensure a defined level of radiated power in a specific direction is not exceeded.

**Schedule 1 Notional receiver performance level**

(subsection 4.1 (2) and paragraph 5.1 (1) (a))

(1) **Performance parameters**

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 blocking; and

(c) receiver intermodulation rejection.

(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.

(3) **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 selectivy 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 -66.3 dBm/50 MHz in the adacent 50 MHz, measured at the input of the receiver.*

(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 limit of the spectrum licence under which the radiocommunications receiver operates and
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 a root mean square field strength at the input of the receive antenna of:
   * 1. 0.36 V/m in the 0.03-12.75 GHz frequency range; and
     2. 0.1 V/m in the frequency ranges 12.75-55 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 a interference power level of -61 dBm/50 MHz within the frequency offset of 50-1500 MHz, measured at the input of the receiver.*

(5) **Receiver** **intermodulation rejection**

The receiver intermodulation 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.

**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 5.1 (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:
   1. a minimum wanted signal level of –88 dBm per 50 MHz for more than 95% of the time in any 1 hour period; and
   2. a wanted to unwanted ratio of 5 dB.
2. Logarithmic scaling should be used to find the appropriate level in alternative bandwidths.

Endnotes

**Endnote 1 – About the endnotes**

The endnotes provide information about this compilation and the compiled law.

Endnote 2 (Abbreviation key) sets out abbreviations that may be used in the endnotes.

Endnote 3 (Legislation history) provides information about each law that has amended (or will amend) the compiled law. The information includes commencement details for amending laws and details of any application, saving or transitional provisions that are not included in this compilation.

Endnote 4 (Amendment history) provides information about the amendments at the provision (generally section or equivalent) level and includes information about any provision of the compiled law that has been repealed in accordance with a provision of the law.

It also includes information about any misdescribed amendment (that is, an amendment that does not accurately describe the amendment to be made). If, despite the misdescription, the amendment can be given effect as intended, the amendment is incorporated into the compiled law and the abbreviation “(md)” added to the details of the amendment included in the amendment history. If a misdescribed amendment cannot be given effect as intended, the abbreviation “(md not incorp)” is added to the details of the amendment included in the amendment history.

**Endnote 2—Abbreviation key**

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| ad = added or inserted | (md not incorp) = misdescribed amendment |
| am = amended | cannot be given effect |
| amdt = amendment | mod = modified/modification |
| c = clause(s) | No. = Number(s) |
| Ch = Chapter(s) | par = paragraph(s)/subparagraph(s) |
| Dict = Dictionary | Pt = Part(s) |
| Div = Division(s) | rep = repealed |
| exp = expires/expired or ceases/ceased to have effect | rs = repealed and substituted |
| F = Federal Register of Legislation | s = section(s)/subsection(s) |
| gaz = gazette | Sch = Schedule(s) |
| LA = *Legislation Act 2003* | Sdiv = Subdivision(s) |