



Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 3.4 GHz Band) 2015

Radiocommunications Act 1992

made under section 262 of the
Radiocommunications Act 1992.

Compilation No. 2

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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 — 3.4 GHz Band) 2015*.

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 3.4 GHz band; and
 - (b) provide protection to radiocommunications receivers operating under spectrum licences issued for the 3.4 GHz band from interference caused by radiocommunications transmitters operating under a class licence, and from fixed transmitters operating under an apparatus licence or a spectrum licence.
- (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 3.4 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:

3.4 GHz band means the part of the spectrum from 3400 MHz to 3800 MHz.

Act means the *Radiocommunications Act 1992*.

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.

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 47 means the Radiocommunications Assignment and Licensing Instruction MS 47 *Frequency coordination and licensing procedures for Area-Wide Licences (AWL) in the 3400–4000 MHz band*, published by the ACMA.

Note: RALI MS 47 is available, free of charge, from the ACMA’s website at www.acma.gov.au.

receiver blocking means the measure of the ability of a radiocommunications receiver to receive a wanted signal in the presence of a high level unwanted interferer on frequencies beyond the first adjacent channel.

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 — 3.4 GHz Band) Determination 2015*.

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

- (3) In these guidelines, a reference to a part of the spectrum, a frequency band or a frequency range includes all frequencies that are greater than but not including the lower frequency, up to and including the higher frequency.

Note: This means the lower number in the reference to a part of the spectrum, a frequency band or a frequency range is not included in the part of the spectrum, the frequency band or the frequency range.

1.5 References to other instruments

In these guidelines, unless the contrary intention appears:

- (a) a reference to another 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 existing 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 and are accessible, free of charge, at www.legislation.gov.au.

Note 3: See section 314A of the Act.

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 3.4 GHz band by a radiocommunications transmitter operating under an adjacent spectrum licence issued on or after 14 December 2015 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.
- (2) In-band interference caused in a radiocommunications receiver operating under a spectrum licence in:
 - (a) the 3400-3575 MHz frequency band, by a radiocommunications transmitter operating under an apparatus licence issued on or after 16 July 2022; or
 - (b) the 3575-3700 MHz frequency band, by a radiocommunications transmitter operating under an apparatus licence issued on or after 9 March 2018; or
 - (c) the 3700-3800 MHz frequency band, by a radiocommunications transmitter operating under an apparatus licence issued on or after 16 July 2022;is managed by applying the device boundary criterion to those radiocommunications transmitters, as set out in RALI MS 47, as if the apparatus licence were an area wide licence.
- (4) Radiocommunications transmitters operating under a Radiodetermination apparatus licence are not required to adhere to the device boundary criterion, provided the licensee implements measures to minimise the impact on services operated under 3.4 GHz band spectrum licences. In-band interference from radiodetermination licences is expected to be transient in nature. In the event this is not the case, the radiodetermination licensee will be required to implement further mitigation measures to reduce the impact on services operated under 3.4 GHz band spectrum licences. To further assist with managing interference, when planning and operating fixed or mobile wireless networks, spectrum licensees should also have regard to subclause 3.2(4) of these guidelines.
- (5) Spectrum licensees must accept any in-band interference to radiocommunications receivers operating in:
 - (a) the 3400-3575 MHz frequency band, caused by radiocommunications transmitters operating under an apparatus licence issued before 16 July 2022; or
 - (b) the 3575-3700 MHz frequency band, caused by radiocommunications transmitters operating under an apparatus licence issued before 9 March 2018; or
 - (c) the 3700-3800 MHz frequency band, by a radiocommunications transmitter operating under an apparatus licence issued before 16 July 2022.

This subsection does not apply to radiodetermination apparatus licences.

- (6) The interference management framework, if any is required, for devices operated under a class licence is contained in the relevant class licence.

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.

- (4) High power radiolocation services in the 3100-3500 MHz band are operated by the Department of Defence on an itinerant basis. These radiolocation services have the potential to disrupt the throughput of 3.4 GHz receivers particularly on the uplink channel (base station receiver). The Department of Defence already employ techniques to minimise impacting other in-band and adjacent band services. However, there will be occasions when interference cannot be fully mitigated by these techniques. In such instances the interference may be due to receiver blocking, strong out of band emissions of the radar, or other susceptibilities within a 3.4 GHz fixed or mobile wireless network configuration. When planning service deployments, spectrum licensees are urged to consider different engineering techniques to reduce the likelihood of impact to their spectrum licensed service. Such engineering techniques by spectrum licensees may include additional RF filtering, network redundancy, or resilience of network configuration where vulnerabilities to radar signal interference are identified. The ACMA will work with the Department of Defence to provide what additional information it can to assist spectrum licensees on this matter. Such information will only be given directly to existing or likely prospective spectrum licensees.

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 3.4 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 3.4 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.

- (2) The licensee of a radiocommunications transmitter operating under an apparatus or spectrum licence must ensure compatibility with a fixed receiver operating under a 3.4 GHz band spectrum licence that meets the compatibility requirement as stated in subsection (1).
- (3) Unless alternative arrangements are negotiated and agreed to, in the event a 3.4 GHz band spectrum licensee claims interference from one or more radiocommunications transmitters operating under another 3.4 GHz band spectrum licence into a radiocommunications receiver operated under their 3.4 GHz band spectrum licence, all relevant 3.4 GHz band spectrum licensees are required to synchronise their services as specified in any synchronisation requirement condition included in their spectrum licence.
- (4) Subsections (1), (2) and (3) do not apply to a radiocommunications transmitter operated under a radiodetermination licence. The licensee of a radiodetermination service ensures compatibility by meeting the criteria defined in subsection 3.1 (4).
- (5) 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 3.4 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 rejection; and
- (c) receiver blocking.

(2) The performance parameters of a radiocommunications receiver are defined at the antenna connector port of the receiver unit. 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

- (a) For radiocommunications receivers operating in a bandwidth of 20 MHz or less, the adjacent channel selectivity shall be greater than or equal to 45 dB in the adjacent 5 MHz of the licence under which the radiocommunications receiver operates.
- (b) For radiocommunications receivers operating in a bandwidth greater than 20 MHz, the adjacent channel selectivity shall be greater than or equal to 45 dB in the adjacent 20 MHz of the licence under which the radiocommunications receiver operates.

(4) Receiver intermodulation rejection

The receiver intermodulation rejection level is -52 dBm per occupied bandwidth 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.

(5) Receiver blocking

- (a) The receiver blocking requirement for a radiocommunications receiver operating in the 3340-3860 MHz frequency range with a bandwidth of:
 - (i) 20 MHz or less is -43 dBm per 5 MHz at frequency offsets greater than 5 MHz from the upper and lower frequency limit of the spectrum licence under which the radiocommunications receiver operates; or
 - (ii) more than 20 MHz is -43 dBm per 20 MHz at frequency offsets greater than 20 MHz from the upper and lower frequency limit of the spectrum licence under which the radiocommunications receiver operates.
- (b) The receiver blocking requirement for a radiocommunications receiver operating at all other frequencies is a total mean power of -15 dBm.

(6) 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 17 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 3.4 GHz band spectrum licence is:
 - (a) a minimum wanted signal level of -95.5 dBm per 5 MHz for more than 95% of the time in any 1 hour period; and
 - (b) a wanted to unwanted ratio of 12.5 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.

The following endnotes are included in every compilation:

Endnote 1—About the endnotes

Endnote 2—Abbreviation key

Endnote 3—Legislation history

Endnote 4—Amendment history

Abbreviation key—Endnote 2

The abbreviation key sets out abbreviations that may be used in the endnotes.

Legislation history and amendment history—Endnotes 3 and 4

Amending laws are annotated in the legislation history and amendment history.

The legislation history in endnote 3 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.

The amendment history in endnote 4 provides information about amendments at the provision (generally section or equivalent) level. It also includes information about any provision of the compiled law that has been repealed in accordance with a provision of the law.

Misdescribed amendments

A misdescribed amendment is an amendment that does not accurately describe how an amendment is to be made. If, despite the misdescription, the amendment can be given effect as intended, then the misdescribed amendment can be incorporated through an editorial change made under section 15V of the *Legislation Act 2003*.

If a misdescribed amendment cannot be given effect as intended, the amendment is not incorporated and “(md not incorp)” is added to the amendment history.

Endnote 2—Abbreviation key

ad = added or inserted

am = amended

amdt = amendment

c = clause(s)

C[x] = Compilation No. x

Ch = Chapter(s)

def = definition(s)

Dict = Dictionary

disallowed = disallowed by Parliament

Div = Division(s)

exp = expires/expired or ceases/ceased to have effect

F = Federal Register of Legislation

gaz = gazette

LA = *Legislation Act 2003*

LIA = *Legislative Instruments Act 2003*

(md not incorp) = misdescribed amendment cannot be given effect

mod = modified/modification

No. = Number(s)

o = order(s)

Ord = Ordinance

orig = original

par = paragraph(s)/subparagraph(s)
/sub-subparagraph(s)

pres = present

prev = previous

(prev...) = previously

Pt = Part(s)

r = regulation(s)/rule(s)

reloc = relocated

renum = renumbered

rep = repealed

rs = repealed and substituted

s = section(s)/subsection(s)

Sch = Schedule(s)

Sdiv = Subdivision(s)

SLI = Select Legislative Instrument

SR = Statutory Rules

Sub-Ch = Sub-Chapter(s)

SubPt = Subpart(s)

underlining = whole or part not

commenced or to be commenced

Endnote 3 – Legislation history

Name	Registration	Commencement	Application, saving and transitional provisions
<i>Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers – 3.4 GHz Band) 2015</i>	25 May 2015 (see F2015L00729)	14 December 2015	
<i>Radiocommunications – 3.4 GHz Band Omnibus Variation 2018 (No. 1)</i>	27 July 2018 (see F2018L01063)	28 July 2018	
<i>Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers – 3.4 GHz Band) Variation 2023 (No. 1)</i>	26 June 2023 (see F2023L00856)	27 June 2023	

Endnote 4 – Amendment history

ad. = added or inserted am. = amended rep. = repealed rs. = repealed and substituted

Provision affected	How affected
s 1.2A	rep. LA s 48D;
s 1.2B	rep. LA s 48C;
s.1.3(1)	am. F2023L00856;
s 1.4(1)	am. 2018 No. 1; am. F2023L00856;
s.1.4(3)	ad. F2023L00856;
s.1.5	ad. F2023L00856;
Part 3	rs. 2018 No. 1;
s.3.1(2)	rs. F2023L00856;
s.3.1(3)	rep. F2023L00856;
s.3.1(4)	am. F2023L00856;
s.3.1(5)	am. F2023L00856;
s.3.2(4)	am. F2023L00856;
s 4.1	am. 2018 No. 1;
s 5.1(3)	rs. 2018 No. 1;
s 5.1(4)	rs. 2018 No. 1;
s 5.1(5)	rs. 2018 No. 1;
s 5.1(6)	rep. 2018 No. 1;
Sch 1	am. 2018 No. 1; am. F2023L00856;
Sch 3	rep. 2018 No. 1;