Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 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 to Spectrum Licensed Receivers — 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 to Receivers — 2.3 GHz Band) 2009* [F2009L00277] are revoked.

4 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 2.3 GHz band; and

(b) provide protection to radiocommunications receivers operating under spectrum licences issued for the 2.3 GHz band from interference caused by radiocommunications transmitters operating under a class licence, and from fixed transmitters operating under:

(i) an apparatus licence issued on or after the date on which these guidelines commence; or

(ii) a spectrum licence where the transmitter is registered under Part 3.5 of the Act on or after the date on which these guidelines commence.

(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.

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*.

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:
(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.

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

spurious response immunity means a measure of the ability of a radiocommunications receiver to discriminate between the wanted signal and an unwanted signal at any frequency, outside the frequency band of the licence, to which the receiver responds.

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

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 1 Background

A spectrum licence consists of 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.

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.

The following guidelines have been made to provide guidance on the management and settlement of interference to radiocommunications receivers operating under spectrum licences in the 2.3 GHz band and caused by radiocommunications transmitters operating under any other licence issued under the Act.

Part 2 Managing interference from other services

2.1 In-band interference

(1) In-band interference caused in a radiocommunications receiver operating under a spectrum licence in the 2.3 GHz band by a radiocommunications transmitter operating under an adjacent spectrum licence is managed by the core conditions imposed on the spectrum licences under section 66 of the Act, and the device boundary criterion and deployment constraints prescribed in the subsection 145 (4) Determination.

(2) In-band interference caused in a radiocommunications receiver operating under a spectrum licence in the 2.3 GHz band by a radiocommunications transmitter operating under an apparatus licence that is issued on or after the date on which these guidelines commence, is managed as if the transmitter is operated under a spectrum licence. The same device boundary criteria, as applied to spectrum licensed radiocommunications transmitters 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.

Note These guidelines do not cover interference caused by radiocommunications transmitters operating under apparatus licences that were issued before the date on which these guidelines commence.

(3) 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.

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

2.2 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.

2.3 Recording radiocommunications receiver details in the Register

For a radiocommunications receiver operated under a spectrum licence to be afforded protection in accordance with these guidelines, the details of the receiver must be recorded in the Register.

2.4 Mobile and nomadic devices

The compatibility requirement (specified in Part 4) does not apply to mobile or nomadic radiocommunications receivers operated under a spectrum licence in the 2.3 GHz band because the transient nature of these devices prevents the use of this requirement as an interference management procedure. Mobile and nomadic receivers have, by their nature, unlike a fixed receiver, the ability to avoid an interference source.

Part 3 Minimum level of receiver performance

3.1 Notional receiver performance

(1) The level of interference caused by out-of-band 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. A receiver must meet the notional level of performance to gain protection from interference from radiocommunications transmitters under these guidelines.

Part 4 Compatibility requirement

4.1 Compatibility

(1) The performance of a fixed receiver operated under a spectrum licence in the 2.3 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 before the date that the radiocommunications transmitter with which compatibility is sought has its details recorded in the Register.

(2) A radiocommunications transmitter operating under a class licence must comply with the conditions of the class licence.

Schedule 1 Notional receiver performance level

(subsection 3.1 (2) and 4.1 (1))

(1) Performance parameters

The notional level of performance for a radiocommunications receiver operating under a spectrum licence in the 2.3 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 the 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

The adjacent channel selectivity shall be greater than or equal to 43.5 dB with a frequency offset of less than 5 MHz from the frequency limit 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

The receiver blocking requirement is 89 dB at frequency offsets greater than 5 MHz from the upper and lower frequency limit of the licence under which the radiocommunications receiver operates.

(6) Receiver antenna and feeder losses

The antenna gain and feeder loss recorded for the 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

(subsection 4.1 (1))

(1) The compatibility requirement for a fixed receiver, operating under a spectrum licence is a minimum wanted signal level of –95.5 dBm per 5 MHz for more than 95% of the time in any 1 hour period.

(2) Logarithmic scaling should be used to find the appropriate level in alternative bandwidths.