EXPLANATORY STATEMENT

Issued by the Australian Communications and Media Authority

Radiocommunications (Unacceptable Levels of Interference – 2.3 GHz Band) Determination 2013

Radiocommunications Act 1992

Purpose

The purpose of the *Radiocommunications (Unacceptable Levels of Interference – 2.3 GHz Band) Determination 2013* (**the Determination**) is to set out what is an unacceptable level of interference caused by a radiocommunications transmitter operating under a spectrum licence issued in the 2.3 GHz band for the purposes of section 145 of the *Radiocommunications Act 1992* (**the Act**). The Determination aims to ensure that unacceptable levels of emission from radiocommunications transmitters operated under a spectrum licence are kept within the geographic area and frequency band of the licence.

Legislative Provisions

Section 69 of the Act requires each spectrum licence to include a condition that specifies that a radiocommunications transmitter must not be operated under the licence unless the requirements of the Australian Communications and Media Authority (**the ACMA**) under Part 3.5 of the Act for registration of transmitters have been met. Section 69 also provides that the condition may exempt radiocommunications transmitters of particular kinds from having to meet those registration requirements.

Part 3.5 of the Act provides for the registration of licences. The Register of Radiocommunications Licences (**the Register**) is established by section 143 of the Act. Section 144 of the Act stipulates the information which must be included on the Register for each spectrum licence, which includes such details as the ACMA determines, in writing, about radiocommunications devices that are operated under spectrum licences (paragraph 144(1)(e)). These details have been determined in the *Radiocommunications (Register of Radiocommunications Licences) Determination 1997*.

Under subsection 145(1) of the Act, the ACMA may refuse to include in the Register under paragraph 144(1)(e) details of a radiocommunications transmitter that is proposed to be operated under a spectrum licence, if it is satisfied that operation of the transmitter could cause an unacceptable level of interference to the operation of other radiocommunications devices under that or any other spectrum licence, or any other licence. The Determination is made under subsection 145(4) of the Act for this purpose and sets out what is an unacceptable level of interference caused by a radiocommunications transmitter operating under a spectrum licence issued in the 2.3 GHz band.

Pursuant to subsection 33(3) of the *Acts Interpretation Act 1901* and subsection 145(4) of the Act, the ACMA may revoke a legislative instrument made under subsection 145(4) of the Act.

The Determination is a legislative instrument under the *Legislative Instruments Act 2003* (**LI Act**).

Background

A spectrum licence permits a licensee, subject to specified conditions, to operate radiocommunications devices within a particular spectrum space, defined by 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. Interference can also occur between spectrum licensed devices and devices operating under apparatus and class licensing arrangements respectively.

The 2.3 GHz band was converted to spectrum licensing in the year 2000. Current spectrum licences in the 2.3 GHz band will expire on 24 July 2015. To prepare for the re-issue and/or re-allocation of spectrum licences in the 2.3 GHz band, the ACMA conducted a review of the 2.3 GHz spectrum licensing technical framework. The aim of the review was to:

- ensure flexibility so that a range of modern technologies can be used in the band, with a particular focus on International Mobile Telecommunications (IMT) technologies;

- provide conditions that enable continued usage of existing network technologies in the band;
- provide interference management within the 2.3 GHz band, and in adjacent bands; and
- address deficiencies that have come to light during the current licence period.

To ensure that the spectrum licensing technical framework remains appropriate for the next spectrum licence tenure period, the review recommended that the provisions in the *Radiocommunications (Unacceptable Levels of Interference — 2.3 GHz Band) Determination 2009* (**2009 Determination**) be amended to:

- revise the device boundary criterion (**DBC**) method by simplifying the calculation of effective antenna height and through greater resolution provided by use of 360 one-degree radials and line segments of 500 metres;
- revise the level of protection defined in the DBC;
- use a new digital elevation model (**DEM-9S**) based on the Geocentric Datum of Australia 1994 (**GDA94**) datum that is made available by Geoscience Australia[1]; and
- remove the method of registration of groups of transmitters and receivers through the Roads and Towns Mobile Listing.

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The ACMA has now revoked the 2009 Determination (with effect from 25 July 2015) and made the Determination under subsection 145(4) of the Act. The Determination takes effect on 25 July 2015. The Determination is one of a set of legal instruments being made by the ACMA to vary the spectrum licensing technical framework applicable to the 2.3 GHz band according to the review recommendations.

Operation

Under subsection 145(1) of the Act, the ACMA may, if it is satisfied that the operation of a radiocommunications transmitter could cause an unacceptable level of interference to other radiocommunications devices, refuse to register the transmitter. The Determination sets out what is meant by an 'unacceptable level of interference' in relation to a radiocommunications transmitter operated under a spectrum licence issued in the 2.3 GHz band.

Consultation

The ACMA has consulted extensively with stakeholders about the review of the spectrum licensing technical framework for the 2.3 GHz band. In October 2012, the ACMA established an advisory body known as a Technical Liaison Group (**TLG**) to support the review of the technical framework. Incumbent and prospective licensees for the 2.3 GHz band were invited to participate in the TLG process. The role of the TLG was to consider and provide advice to the ACMA on technical aspects of the development or review of the technical framework for the 2.3 GHz band.

The ACMA developed three discussion papers which outlined the proposed approach to the spectrum licensing framework for the 2.3 GHz band. These papers were provided for comment by the ACMA to TLG members and they are available on the ACMA website at http://www.acma.gov.au.

The ACMA took into account the views expressed by TLG members when preparing the Determination. The draft Determination was also available for public comment from 14 October 2013 to 13 November 2013 in order to give all interested parties a further opportunity to comment on the draft instrument.

There were two submissions received during public consultation regarding the revised technical framework. These submissions provided no comment on the draft Determination.

Regulatory Impact

The ACMA consulted with the Office of Best Practice Regulation (**the OBPR**) on the requirement for a Regulation Impact Statement (**RIS**) for this legislative instrument. The OBPR advised that the

[1] The Geocentric Datum of Australia 1994, is the geodetic datum designated as the "Geocentric Datum of Australia (GDA94)" gazetted in the Commonwealth of Australia Gazette No. GN 35 on 6 September 1995. More information can be obtained from Geoscience Australia's website at www.ga.gov.au.

Determination does not warrant the preparation of a RIS because it is only likely to have minor and machinery impacts. The reference for the OBPR's assessment is ID 16044.

Documents Incorporated by Reference

The Determination incorporates the following documents by reference:

> The *Australian Spectrum Map Grid 2012* published by the ACMA. Copies can be obtained from the ACMA website at www.acma.gov.au.

> The GEODATA 9 Second Digital Elevation Model (DEM-9S) Version 3 (Australia and New Zealand Land Information Council unique identifier ANZCW0703011541), published by Geoscience Australia. Copies of DEM-9S can be obtained from the Geoscience Australia website at www.ga.gov.au.

> The Geocentric Datum of Australia 1994 (GDA94) gazetted in the Commonwealth of Australia Gazette No. GN 35 on 6 September 1995.

> The Radio Regulations published by the International Telecommunication Union (ITU). Copies of the Radio Regulations can be obtained from the ITU at www.itu.int.

> Recommendation ITU-R P.526-12 *Propagation by diffraction* published by the ITU. Copies of Recommendation ITU-R P.526-12 can be obtained from the ITU at www.itu.int.

Statement of compatibility with human rights

Subsection 9(1) of the *Human Rights (Parliamentary Scrutiny) Act 2011* requires the rule maker in relation to a legislative instrument to which section 42 (disallowance) of the LI Act applies to cause a statement of compatibility to be prepared in respect of that legislative instrument. The Determination is a legislative instrument to which section 42 applies.

The ACMA is satisfied that the Determination is compatible with the human rights and freedoms recognised or declared in the international instruments listed in section 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011*. The Determination does not have any human rights implications as it does not engage any of the applicable rights or freedoms.

The Determination is compatible with human rights as it does not raise any human rights issues.

Detailed Description of the Instrument

Section 1 – Name of Determination
This section provides that the Determination is to be cited as the *Radiocommunications (Unacceptable Levels of Interference – 2.3 GHz Band) Determination 2013*.

Section 2 - Commencement
This section states that the Determination commences on 25 July 2015.

Section 3 – Revocation
This section revokes the *Radiocommunications (Unacceptable Levels of Interference — 2.3 GHz Band) Determination 2009*, with effect from 25 July 2015.

Section 4 – Purpose
This section states that the purpose of the Determination is to set out the technical rules defining what is considered to be an unacceptable level of interference caused by a radiocommunications transmitter operating under a spectrum licence in the 2.3 GHz band. The unacceptable level of interference is defined so as to ensure that high emission levels from spectrum licensed radiocommunications transmitters are contained within the geographic area and frequency bands of the licence under which the transmitter operates. There are three notes that clarify and provide further information about the purpose of the Determination.

Note 1 explains that the ACMA may refuse to register a device under a spectrum licence if it believes it will cause an unacceptable level of interference.

Note 2 refer to an information paper, titled "Registration of radiocommunications devices under spectrum licences", which is available from the ACMA's website. The information paper provides further guidance to licensees on the registration of transmitters under Part 3.5 of the Act.

Note 3 indicates how the ACMA will consider the two advisory guidelines made under section 262 of the Act (listed in the note) about managing interference to spectrum licensed receivers and from spectrum licensed transmitters in the 2.3 GHz band when managing interference disputes.

Section 5 – Interpretation
This section provides definitions for the terms used in the Determination and provides that unless otherwise specified, the range of numbers that identify a frequency band in the Determination includes the higher but not the lower number.

Section 6 – Emission designator
This section provides that the emission designator of a radiocommunications transmitter's emission is to be determined in accordance with Appendix 1 of the ITU Radio Regulations. However, when determining a transmitter's emission designator, references to necessary bandwidth for a given class of emission in the Radio Regulations are taken to be references to the occupied bandwidth of the transmitter.

Section 7 – Group of radiocommunications transmitters
This section provides that a group of radiocommunications transmitters consists of two or more fixed transmitters located at a common site, that have common features – such as the same centre frequency and emission designator. Individual radiocommunications transmitters in a group can be registered as if they were a single device. Under Schedule 2, the device boundary for a group of radiocommunications transmitters is calculated differently to the device boundary for a single radiocommunications transmitter.

Section 8 – Group of radiocommunications receivers
This section provides that a group of radiocommunications receivers consists of two or more fixed receivers, located at a common site that have common features. Individual radiocommunications receivers in a group can be registered as if they were a single device. The location of a group of radiocommunications receivers is calculated in accordance with Schedule 1 as if it were a group of radiocommunications transmitters.

Section 9 – Unacceptable level of interference
This section defines what is an unacceptable level of interference for the purposes of registration and interference management in the 2.3 GHz band. A radiocommunications transmitter producing emissions that do not meet the requirements of the Determination will, in most circumstances, be refused registration by the ACMA under subsection 145(1) of the Act. Licensees who operate such devices without registration will be in breach of the licence condition referred to in section 69 of the Act and may be subject to further compliance action under the Act.

Under paragraphs 9(1)(a)-(c) of the Determination, a spectrum licensed radiocommunications transmitter is considered to have caused an unacceptable level of interference if:

- the operation of the transmitter breaches the core conditions of the licence relating to the maximum permitted level of radio emissions from the radiocommunications transmitter outside of the geographic and frequency boundaries of the licence; or
- the device boundary of the transmitter lies outside the geographic area of the licence[2]; or
- the device boundary for the transmitter cannot be calculated in accordance with Part 1 of Schedule 2 of the Determination.

Under subsection 9(2) of the Determination, unacceptable interference is not deemed to be caused by those parts of the device boundary that fall outside the bounds of the *Australian Spectrum Map Grid 2012*. This does not apply along those radials of the device boundary that cross the geographical area of another spectrum licence.

[2] The device boundary is a theoretical boundary calculated around the device using the methodology set out in Schedule 2 of the Determination.

The note to section 9 clarifies that devices exempt from registration do not need to adhere to the device boundary criteria specified in the Determination.

Section 10 – Accuracy
This section specifies the level of accuracy required when calculating the values of the parameters that are in Schedules 2 and 3 of the Determination.

Schedule 1 – Location of a transmitter
This Schedule specifies how the location of a radiocommunications transmitter and a group of radiocommunications transmitters is to be determined. The provisions explain that the location of a radiocommunications transmitter is the location of the phase centre of the antenna, or for a group of radiocommunications transmitters, the centre point between the phase centre of each antenna within the group. The location is to be specified in latitude and longitude with reference to the GDA94 with an error of less than 10 metres.

The location of a transmitter or group of transmitters is used to determine the device boundary of a transmitter in Part 1 of Schedule 2. The location of the transmitter or group of transmitters is recorded on the Register.

Notes 1 and 2 clarify the process for determining the location of transmitters in accordance with the Schedule. Note 1 provides that the ACMA issues site identifiers for established radiocommunications locations (sites) available in the Register. Existing site identifiers (and associated coordinates) can be used when determining the location of devices. Note 2 refers to the ACMA published document "Business Operating Procedure – Radiocommunications site data requirements" (available on the ACMA website) which assists licensees in meeting location measurement error requirements for radiocommunications sites.

Schedule 2 – Device boundaries

This Schedule sets out the technical procedure for calculating the device boundary of a radiocommunications transmitter or group of radiocommunications transmitters. The device boundary is a theoretical boundary calculated around a radiocommunications transmitter, or group of radiocommunications transmitters, using the methodology set out in Schedule 2. Calculation of the device boundary is relevant for applying section 9 of the Determination. Under paragraph 9(1)(b) of the Determination, a transmitter is taken to cause an unacceptable level of interference if any part of its device boundary lies outside the geographic area of the spectrum licence unless it meets the requirements of subsection 9(2). Under paragraph 9(1)(c), if the device boundary of a transmitter cannot be calculated in accordance with Schedule 2, the transmitter is taken to cause unacceptable levels of interference.

Part 1 of Schedule 2 details the steps to be followed in calculating the device boundary for a single radiocommunications transmitter. For a group of radiocommunications transmitters, the device boundary is to be calculated by considering the group as if it were a single transmitter, however, in this case the maximum horizontally radiated power of the group is assumed along all radials.

Part 2 of Schedule 2 defines the device boundary criterion (**DBC**), which is the mathematical expression used in the calculation of a device boundary in Part 1 of Schedule 2. This mathematical function consists of the radiated power of the device minus the maximum power function. The DBC has functional dependencies which include the horizontally radiated power of the device, the level of protection for standard radiocommunications receivers used in the 2.3 GHz band, the nominal receiver antenna gain and the propagation loss over the radiocommunications path for each radial and increment combination.

The calculation of the device boundary in Part 1 of Schedule 2 is an iterative process and involves testing whether the DBC specified in Part 2 of Schedule 2 is met at increasing distances (of 500 meter increments) from the radiocommunications transmitter along radial lines spaced around the centre location of the transmitter. The latitude and longitude of the first point on a radial where the DBC is less than or equal to zero is considered to be the furthest point of the device boundary on this radial. The endpoints of each of the radials must be within the geographic area of the licence under which the transmitter operates for the transmitter to be taken not to cause unacceptable interference, unless the requirements of subsection 9(2) are met.

Part 3 of Schedule 2 specifies the propagation model to be used for determining the propagation loss component of the DBC set out in Part 2 of Schedule 2. Propagation loss is calculated using the method and parameters defined in Section 4.5.2 of Recommendation ITU-R P.526-12. The dependencies in this propagation model include distance from the centre location of the radiocommunications transmitter to the point representing the radial/increment combination, the transmit frequency of the device, antenna heights (the height of the transmitter above ground is determined according to Part 1 of Schedule 3 of the Determination and the nominal receiver height above ground is 5 metres) and a path profile. The path profile is to be developed by sampling the DEM-9S digital elevation model for terrain heights, and then calculating average ground height according to Part 2 of Schedule 3 of the Determination.

Schedule 3 – Antenna height and average ground height

Part 1 of Schedule 3 explains how the antenna height of a radiocommunications transmitter is calculated for the purposes of the Determination. The antenna height is a component necessary to the calculation of the propagation loss component of the DBC described in Part 2 of Schedule 2.

Part 2 of Schedule 3 sets out the procedure for calculating the average ground height for each increment along the path profile, for each radial-increment combination. Average ground height at this location is determined by averaging the terrain heights of cells within a 3x3 matrix around the radial/increment combination point.

Part 3 of Schedule 3 defines Vincenty's Formulae to be used in the calculation of distance in calculating a device boundary. Vincenty's Formulae enable the calculation of the coordinates (in latitude and longitude) of a far-end location based on the known coordinates (in latitude and longitude) of a central location, azimuth angle and the distance between these points. These formulae allow location calculations over the GRS80 ellipsoid (which represents the ellipsoidal parameters specific to GDA94) to a high degree of accuracy using an iterative routine. The datum to be used in these calculations is the GDA94.