EXPLANATORY STATEMENT

Issued by the Australian Communications and Media Authority

Radiocommunications (Unacceptable Levels of Interference – 2 GHz Band) Determination 2016

Radiocommunications Act 1992

Purpose

The Australian Communications and Media Authority (**ACMA**) has made the *Radiocommunications (Unacceptable Levels of Interference – 2 GHz Band) Determination 2016* (the **Determination**).

The purpose of 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 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.

The Determination revokes and replaces the *Radiocommunications (Unacceptable Levels of Interference — 2 GHz Band) Determination 2015* [F2015L00723] (the **2015 Determination**).

Legislative Provisions

The Determination is made by the ACMA in accordance with subsection 145(4) of the Act and in accordance with subsection 33(3) of the *Acts Interpretation Act 1901* (the **AIA**).

Section 69 of the Act requires each spectrum licence to include a condition specifying that a radiocommunications transmitter must not be operated under the licence unless the requirements of 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 in 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 GHz band.

Subsection 33(3) of the AIA relevantly provides that where an Act confers a power to make a legislative instrument, the power shall be construed as including a power exercisable in a like manner and subject to like conditions (if any) to repeal, rescind, revoke, amend or vary any such instrument.

The Determination is a legislative instrument for the purposes of section 8 of the *Legislation Act 2003.*

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 radiocommunications devices and radiocommunications devices operating under apparatus and class licensing arrangements respectively.

The 2 GHz band was re-allocated for spectrum licensing in the year 2000. Current spectrum licences in the 2 GHz band will expire on 11 October 2017. To prepare for the re-issue and/or re-allocation of spectrum licences in the 2 GHz band, the ACMA conducted a review of the 2 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 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 2015 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];
> remove the method of registration for groups of transmitters and groups of receivers using the Roads and Towns Mobile Listing;
> remove references to high altitude platform station (HAPS);
> reduce the distance from the boundary, from 70 km to 46 km, at which a radiocommunications transmitter is deemed to meet the device boundary criteria;
> allow the device boundary to be exceeded at geographical boundaries at the outer edge of the ASMG; and
> remove the 1900-1920 MHz band, as this band will undergo a separate review.

The ACMA will revoke the 2015 Determination and the new Determination will reflect the review recommendations.

The Determination is made under subsection 145(4) of the Act and commences on 12 October 2017. The Determination is one of a set of instruments being made by the ACMA to vary the spectrum licensing technical framework applicable to the 2 GHz band according to the review recommendations. The ACMA has also made the *Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters – 2 GHz Band) 2016,* and the *Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers – 2 GHz Band) 2016* (**the two advisory guidelines**).

Operation

A spectrum licence permits a licensee, subject to specified conditions, to operate radiocommunications devices within the 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 services and services operating under apparatus and class licensing arrangements respectively.

Interference is generally managed by a set of interference management tools given effect by the Act and implemented by the ACMA. These tools include:

> the core conditions of the spectrum licence;
> a determination made under subsection 145(4) of the Act; and
> advisory guidelines made under section 262 of the Act about managing interference in specific circumstances.

[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.

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 GHz band.

Consultation

The ACMA consulted with stakeholders about the review of the spectrum licensing technical framework for the 2 GHz band from 6 January 2016 to mid-August 2016. The ACMA made available a discussion paper which outlined the proposed changes to the spectrum licensing framework for the 2 GHz band. This discussion paper is available on the ACMA website at www.acma.gov.au.

The ACMA received five written submissions in response to its consultation process. The submissions commented on various aspects of the proposed changes to the 2 GHz band technical framework. All written submissions from this consultation process are available on the ACMA website at www.acma.gov.au.

As a result of submissions made to the public consultation process, the ACMA made the following changes:

- an amendment to the proposed level of protection (**LOP**) defined in Part 2 of Schedule 2 from -103.5 dBm/5MHz to -96 dBm/5MHz. This will maintain the LOP as defined in the 2015 Determination.
- changes to allow continued use of an existing part of a device boundary for radiocommunications transmitters that were registered under a 2 GHz band spectrum licence that expires on 11 October 2017 when re-registered under a re-issued spectrum licence, provided technical parameters used for coordination do not change.

Regulatory Impact

The ACMA consulted with the Office of Best Practice Regulation (**OBPR**) on the requirement for a Regulation Impact Statement (**RIS**) for this instrument. The OBPR advised that the Determination did not warrant the preparation of a RIS because it is only likely to have minor and machinery impacts. The OBPR reference for this assessment is ID 19935.

Detailed Description of the Determination

Details of the Determination are set out in Attachment A.

Documents Incorporated by Reference

The Determination incorporates the following instruments and 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 *Radiocommunications (Register of Radiocommunications Licences) Determination 1997* which can be accessed on the Federal Register of Legislation: www.legislation.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**), as in force from time to time. Copies of the Radio Regulations 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 *Legislation Act 2003* applies to cause a statement of compatibility to be prepared in respect of that legislative instrument. The Determination is a legislative instrument that is subject to disallowance under section 42 of the *Legislation Act 2003*. The Statement of Compatibility with Human Rights for the Determination is set out in Attachment B.

Attachment A

Detailed of the *Radiocommunications (Unacceptable Levels of Interference – 2 GHz Band) Determination 2016*

Section 1 – Name of Determination

Section 1 provides that the Determination is the *Radiocommunications (Unacceptable Levels of Interference – 2 GHz Band) Determination 2016*.

Section 2 – Commencement

Section 2 provides that the Determination commences on 12 October 2017.

Section 3 – Revocation

Section 3 provides that the *Radiocommunications (Unacceptable Levels of Interference — 2 GHz Band) Determination 2015* is revoked.

Section 4 – Purpose

Section 4 provides 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 issued in the 2 GHz band. An unacceptable level of interference is defined to limit the level of emissions from radiocommunications transmitters operating under a 2 GHz band spectrum licence leaving the geographic area and frequency bands of the licence under which the radiocommunications 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 radiocommunications transmitter under a spectrum licence if it believes it will cause an unacceptable level of interference for the purposes of subsection 145(1) of the Act.

Note 2 refers to an information paper, titled *Registration of radiocommunications devices under spectrum licences*, which is available on the ACMA website at www.acma.gov.au. The information paper provides further guidance to licensees on the registration of radiocommunications transmitters under Part 3.5 of the Act. This includes information about registering a radiocommunications transmitter in certain cases where the requirements of the Determination cannot be achieved.

Note 3 indicates how the ACMA will consider the two advisory guidelines made under section 262 of the Act about managing interference to spectrum licensed radiocommunications receivers and from spectrum licensed radiocommunications transmitters in the 2 GHz band when managing interference disputes.

Section 5 – Interpretation

Section 5 provides definitions for the terms used in the Determination and provides that unless the contrary intention appears, the range of numbers that identify a frequency band in the Determination includes the higher but not the lower number.

Section 6 – Emission designator

Section 6 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 radiocommunications 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

Section 7 provides that a group of radiocommunications transmitters consists of two or more fixed transmitters that are located at a common site and that have certain specified common features including the same centre frequency and emission designator. This means that radiocommunications transmitters in a group can be registered as if they were a single radiocommunications transmitter. As such, the definition of radiocommunications transmitters as a group may make registration of them easier for licensees. 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

Section 8 provides that a group of radiocommunications receivers consists of two or more fixed receivers that are located at a common site and that have certain specified common features. This means that radiocommunications receivers in a group can be registered as if they were a single radiocommunications receiver. As such, the definition of radiocommunications receivers as a group may make registration of them easier for licensees. The location of a group of radiocommunications receivers is calculated in accordance with Schedule 1. It is the same method used for a group of radiocommunications transmitters.

Section 9 – Unacceptable levels of interference

Section 9 provides a technical definition of what is an unacceptable level of interference for the purposes of registration and interference management in the 2 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 transmitters 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) to (d) of the Determination, a spectrum licensed radiocommunications transmitter is considered to have caused an unacceptable level of interference if:

- the operation of the transmitter in the 2 GHz band breaches the core conditions of the licence relating to the maximum permitted level of radio emission from the 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; or
- the effective height of the transmitter is greater than 20 metres and it operates in the 2 GHz Lower Band.

Under subsection 9(2) of the Determination, an unacceptable level of 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*. However, this does not apply along those radials of the device boundary that cross the geographical area of another spectrum licence first.

Subsection 9(3) provides that a level of interference mentioned in paragraph 9(1)(b) is not unacceptable in relation to a part of the device boundary of the radiocommunications transmitter that lies outside the geographic area of the spectrum licence, if the radiocommunications transmitter has the same device details as a radiocommunications transmitter previously registered under Part 3.5 of the Act for a spectrum licence that expired on 11 October 2017.

Subsection 9(4) sets out the device details for the radiocommunications transmitter that are to remain the same for the purposes of subsection 9(3).

[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 radiocommunications transmitters exempt from registration do not need to adhere to the device boundary criteria specified in the Determination.

Section 10 – Accuracy

Section 10 specifies the level of accuracy required when calculating the values of the parameters that are referred to in Schedule 2 and Schedule 3 of the Determination.

Schedule 1 – Location of a transmitter

Schedule 1 sets out 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 it is 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 radiocommunications transmitter or group of radiocommunications 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 then recorded on the Register.

Notes 1 and 2 clarify the process for determining the location of radiocommunications transmitters in accordance with the Schedule. Note 1 indicates 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 radiocommunications transmitters. Note 2 refers to the ACMA published document *Business Operating Procedure – Radiocommunications site data requirements* (available on the ACMA website at www.acma.gov.au) which assists licensees in meeting location measurement error requirements for radiocommunications sites.

Schedule 2 – Device boundaries and device boundary criteria

Schedule 2 sets out technical procedures on how to calculate 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 radiocommunications 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) or 9(3). Under paragraph 9(1)(c), if the device boundary of a radiocommunications transmitter cannot be calculated in accordance with Schedule 2, it is taken to cause an unacceptable level of interference. This, for example, would apply to a radiocommunications device that is mobile.

Part 1 of Schedule 2 provides the steps to be followed in determining 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 radiocommunications transmitter, however, in this case the maximum horizontally radiated power of the group is assumed along all radials.

Part 2 of Schedule 2 sets out 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 radiocommunications transmitter minus the maximum power function. The DBC has functional dependencies which include the horizontally radiated power of the radiocommunications transmitter, the level of protection for standard radiocommunications receivers used in the 2 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 metre 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 that radial. The endpoints of each of the radials must be within the geographic area of the licence under which the radiocommunications transmitter operates for the transmitter to be taken not to cause an unacceptable level of interference, unless the requirements of subsection 9(2) or 9(3) are met.

Part 3 of Schedule 2 provides the propagation model for determining the propagation loss component of the DBC set out in Part 2 of Schedule 2. The propagation model is Modified Hata as published in the European Radiocommunications Committee Report 68, which was published by the European Conference of Postal and Telecommunications Administrations in 2000 and revised in 2002. The dependencies in this equation include the distance from the centre location of the radiocommunications transmitter to the point representing the radial/increment combination, the transmit frequency of the transmitter and the effective antenna height.

Schedule 3 – Antenna height and average ground height

Part 1 of Schedule 3 sets out 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 provides the steps to be followed in determining 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 sets out the use of Vincenty's Formulae for distance used 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 Geodetic Reference System 1980 (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.

ATTACHMENT B

Statement of Compatibility with Human Rights

Prepared in accordance with Part 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011*

Radiocommunications (Unacceptable Levels of Interference – 2 GHz Band) Determination 2016

The *Radiocommunications (Unacceptable Levels of Interference – 2GHz Band) Determination 2016* (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*.

Overview of the Legislative Instrument

The Determination is made under subsection 145(4) of the Act, which provides that the Australian Communications and Media Authority may, by legislative instrument, determine what an unacceptable levels of interference is for the purposes of deciding whether to refuse to register a radiocommunications transmitter for operation under a spectrum licence in the Register of Radiocommunications Licences.

The purpose of 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 GHz band. The Determination aims to ensure that high levels of emission from radiocommunications transmitters operated under a spectrum licence are kept within the geographic area and frequency band of the licence.

Human Rights Implications

The Determination does not engage any of the applicable rights or freedoms.

Conclusion

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