

Radiocommunications (Unacceptable Levels of Interference — 26 GHz Band) Determination 2020

Radiocommunications Act 1992

made under subsection 145(4) of the

*Radiocommunications Act 1992*.

Prepared by the Australian Communications and Media Authority, Melbourne

1 Name of Determination

This Determination is the *Radiocommunications (Unacceptable Levels of Interference — 26 GHz Band) Determination 2020*.

2 Purpose

This Determination is made for the purposes of section 145 of the Act and sets out what is an unacceptable level of interference caused by a radiocommunications transmitter operating under a spectrum licence issued in the 26 GHz band, so as 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.

*Note 1* Under section 145 of the Act, the ACMA may refuse to register a radiocommunications transmitter if it is satisfied that the operation of the radiocommunications 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.

*Note 2* The ACMA information paper, *Registration of radiocommunications devices under spectrum licences,* (available on the ACMA website: www.acma.gov.au), provides further information about the registration of radiocommunications transmitters under Part 3.5 of the Act.

*Note 3* The ACMA has issued written advisory guidelines under section 262 of the Act about compatibility requirements in relation to the assignment of frequencies to radiocommunications transmitters operated under apparatus licences and the operation of radiocommunications transmitters under spectrum licences. The ACMA will take these guidelines into account during the settlement of interference disputes. Each case will be assessed on its merits. The guidelines do not prevent a licensee negotiating other compatibility requirements with another licensee. The guidelines are:

* *Radiocommunications Advisory Guidelines (Managing Interference from Spectrum Licensed Transmitters — 26 GHz Band) 2020*; and
* *Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 26 GHz Band) 2020.*

These instruments can be accessed on the ComLaw website: www.comlaw.gov.au.

3 Interpretation

(1)In this Determination, unless the contrary intention appears:

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

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

***active antenna system or 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.

***Australian Spectrum Map Grid (ASMG)*** means the *Australian Spectrum Map Grid 2012* published by the ACMA, as existing from time to time.

*Note* The ASMG can be accessed on the ACMA website: www.acma.gov.au.

***centre frequency***, in relation to a radiocommunications transmitter, means the frequency midway between the lower and upper frequency limits of the transmitter’s occupied bandwidth.

***DEM-3S*** means the “SRTM-derived 3 *Second Digital Elevation Models Version 1.0*”(Australia New Zealand Land Information Council unique identifier ANZCW0703014182) containing modelled terrain height information for Australia, published by Geoscience Australia, as existing from time to time.

*Note* Copies of the DEM-3S can be obtained from the Geoscience Australia website: www.ga.gov.au.

***DEM-3S cell*** means an individual height element of the DEM-3S.

***device boundary***, in relation to a radiocommunications transmitter or a group of radiocommunications transmitters operated under a spectrum licence, means the device boundary established in accordance with Part 1 of Schedule 2.

***device boundary criterion*** means the value of the mathematical expression calculated in accordance with Part 2 of Schedule 2.

***EIRP***, in relation to a radiocommunications device, means the Effective Isotropic Radiated Power of the device.

***emission designator*** means the designation of a radiocommunications transmitter’s emission, determined in accordance with section 6.

***fixed receiver*** means a radiocommunications receiver located at a fixed point on land or sea and not designed or intended for use while in motion.

***fixed transmitter*** means a radiocommunications transmitter located at a fixed point on land or sea and not designed or intended for use while in motion.

***Geocentric Datum of Australia 1994***means 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.

*Note* The Geocentric Datum of Australia 1994 is a coordinate reference system. More information on the GDA94 can be obtained from the Geoscience Australia website: www.ga.gov.au.

***geographic area***, for a spectrum licence, means the area within which operation of a radiocommunications device is authorised under the licence.

***HCIS identifier*** means an identifier used to describe a geographic area in the HCIS.

***hierarchical cell identification scheme*** or ***HCIS*** means the cell grouping hierarchy scheme used to describe areas in the Australian Spectrum Map Grid 2012 published by the ACMA on its website, as existing from time to time.

***horizontally radiated power***,for a radiocommunications device,means the sum of:

(a) the maximum true mean power, in dBm per specified rectangular bandwidth at the antenna connector that is located within the frequency band of the spectrum licence authorising the operation of the radiocommunications device; and

(b) the antenna gain relative to an isotropic antenna in a specified direction in the horizontal plane containing the phase centre of the antenna used with the radiocommunications device, in dBi.

***ITU*** means the International Telecommunication Union.

***ITU-R*** means the International Telecommunication Union Radiocommunication Sector.

***location***,in relation to a radiocommunications transmitter or group of radiocommunications transmitters, means the location of the transmitter or group of transmitters, as the case may be, calculated in accordance with Schedule 1.

***mean power*** means the average power measured during an interval of time that is at least 10 times the period of the lowest modulation frequency.

***occupied bandwidth***, in relation to a radiocommunications transmitter, means the width of a frequency band having upper and lower limits that are necessary to contain 99% of the true mean power of the transmitter’s emission at any time.

***Radio Regulations*** means the ‘Radio Regulations’ published by the ITU, as in force from time to time.

*Note* Copies of the Radio Regulations can be obtained from the ITU website: www.itu.int.

***Recommendation ITU-R P.526-14*** means the ITU-R Recommendation P.526-14 *Propagation by diffraction*published by the ITU, as in force from time to time.

*Note* Recommendation ITU-R P.526-14 can be accessed through the ITU website: www.itu.int.

***Recommendation ITU-R P.2108-0*** means the ITU-R Recommendation P.2108-0 *Prediction of clutter loss* published by the ITU, as in force from time to time.

*Note* Recommendation ITU-R P.2108-0 can be accessed through the ITU website: www.itu.int

***total radiated power***, is defined as the integral of the power transmitted in different directions over the entire radiation sphere. It is measured considering the combination of all radiating elements on an antenna panel or individual device.

***true mean power*** means:

(a) if an unmodulated carrier is present — the mean power measured while the unmodulated carrier is present; and

(b) if an unmodulated carrier is not present — the mean power measured while transmitted information is present.

(2) In this Determination, unless otherwise specified, the range of numbers that identifies a frequency band includes the higher, but not the lower, number.

*Note* A number of terms used in this Determination are defined in the Act and unless the contrary intention appears, have the meanings given to them by the Act. Those terms include:

* + - * ACMA
* core condition
* frequency band
* interference
* radiocommunications device
* radiocommunications receiver
* radiocommunications transmitter
* radio emission
* Register
* spectrum licence

4 Emission designator

(1) In this Determination, the designation of a radiocommunications transmitter’s emission (***emission designator***) is determined using the methods specified in the Radio Regulations.

(2) For the purpose of determining the designation of a radiocommunications transmitter’s emission using the methods specified in the Radio Regulations, the references to necessary bandwidth for a given class of emission are taken to be references to the occupied bandwidth of the transmitter.

*Note* At the date of the making of this Determination, Appendix 1 of the Radio Regulations made provision for determining the designation of a radiocommunications transmitter’s emission.

5 Group of radiocommunications transmitters

(1)In this Determination, two or more fixed transmitters are a group of radiocommunications transmitters if:

(a) they have the same centre frequency and emission designator;

(b) they are operated for the purpose of communicating with the same radiocommunications receiver or group of radiocommunications receivers;

(c) each has an antenna of the same type, model and manufacturer;

(d) the antenna used with each fixed transmitter is located on the same structure and within 20 metres of the phase centre of all antennas within the group of radiocommunications transmitters; and

(e) the identification number assigned by the ACMA to the antenna used with each radiocommunications transmitter is the same.

(2) A radiocommunications transmitter must not belong to more than one group of radiocommunications transmitters.

(3) The location of a group of radiocommunications transmitters is calculated in accordance with Schedule 1.

6 Group of radiocommunications receivers

(1)In this Determination, two or more fixed receivers are a group of radiocommunications receivers if:

(a) they are operated for the purpose of communicating with the same radiocommunications transmitter or group of radiocommunications transmitters;

(b) each has an antenna of the same type, model and manufacturer;

(c) the antenna used with each fixed receiver is located on the same structure and within 20 metres of the phase centre of all antennas within the group of radiocommunications receivers; and

(d) the identification number assigned by the ACMA to the antenna used with each radiocommunications receiver is the same.

(2)A radiocommunications receiver must not belong to more than one group of radiocommunications receivers.

(3) The location of a group of radiocommunications receivers is calculated in accordance with Schedule 1 as if the group of receivers were a group of radiocommunications transmitters.

7 Unacceptable level of interference

(1) A level ofinterference caused by a radiocommunications transmitter operated under a spectrum licence issued for the 26 GHz band is unacceptable if:

(a) the operation of the transmitter in the 26 GHz band results in a breach of a core condition of the licence relating to the maximum permitted level of radio emission from the transmitter:

(i) outside the parts of the spectrum the use of which is authorised under the licence; or

(ii) outside the geographic area of the licence; or

(b) subject to subsections (2), (3) and (4) any part of the device boundary of the transmitter lies outside of the geographic area of the licence; or

(c) the device boundary of the transmitter cannot be calculated in accordance with Part 1 of Schedule 2.

(2) A level of interference mentioned in paragraph 7(1)(b) is not unacceptable in relation to a part of the device boundary that:

(a) lies outside the boundary of the ASMG; and

(b) is connected to a radial that:

(i) is mentioned in Part 1 of Schedule 2; and

1. does not cross the geographic area of another spectrum licence in the 26 GHz band.

(3) A level of interference mentioned in paragraph 7(1)(b) is not unacceptable in relation to a part of the device boundary that:

(a) lies outside the geographic area of the licence; and

(b) lies inside the following HCIS: MW4H6; and

(c) is connected to a radial that:

(i) is mentioned in Part 1 of Schedule 2; and

(ii) does not cross the geographic area of another spectrum licence in the 26 GHz band.

(4) A level of interference mentioned in paragraph 7(1)(b) is not unacceptable in relation to a part of the device boundary that:

(a) lies outside the geographic area of the licence; and

(b) is connected to a radial that:

(i) is mentioned in Part 1 of Schedule 2; and

(ii) does not cross over land outside the geographical area of the licence that is permanently above the Australian territorial sea baseline as defined by Geoscience Australia.

*Note* The definitions referred to at paragraph (4)(b)(ii) are found at Geoscience Australia’s website ([www.ga.gov.au](http://www.ga.gov.au)).

*Note* Some radiocommunications transmitters are exempt from the requirement to be registered in the Register under their 26 GHz band spectrum licence – see subsection 69 (2) of the Act. These transmitters are not required to meet the device boundary criteria specified in this Determination.

8 Accuracy

Unless otherwise specified, the value of a parameter in Schedules 2 and 3 must be estimated with a level of confidence not less than 95 percent that the true value of the parameter will always remain below the requirement specified in this Determination.

**Schedule 1 Location of a transmitter**

(subsections 5(1), 7(3) and 8(3))

1. The location of a radiocommunications transmitter, (*lt*, *Lt*) is the location (by latitude and longitude with reference to the Geocentric Datum of Australia 1994) of the phase centre of the radiocommunications transmitter’s antenna.

2. The location of a group of radiocommunications transmitters, (*lt*, *Lt*) is the location (by latitude and longitude with reference to the Geocentric Datum of Australia 1994) of the centre point between the phase centre of each radiocommunications transmitter antenna within the group.

3. In determining the location of a radiocommunications transmitter, or a group of radiocommunications transmitters, the measurement error should be less than 10 metres.

*Note 1* The ACMA issues site identifiers for established radiocommunications locations available in the Register.

*Note 2* The ACMA provides advice on its website at www.acma.gov.au to assist licensees in determining the location and measurement error of a transmitter site in the document *Business Operating Procedure (BOP) – Radiocommunications site data requirements.*

Schedule 2 Device boundaries and device boundary criteria

(subsections 5(1), 9(1) and 9(2), and section 10)

Part 1 Device boundary of a transmitter

1. The device boundary of a single radiocommunications transmitter is established as follows:

Step 1: Calculate the device boundary criterion at each m×100 metre increment along each of the n-degree radials, where:

(a) m is the values 2 through 300; and

(b) n is the values 0 (true north) through 359.

Step 2: For each radial, find the latitude and longitude of the first point (lowest value of m) where either:

(a) RP-MP is less than or equal to 0; or

(b) m is equal to 300.

Step 3: The end point of each radial is the device boundary of the radiocommunications transmitter.

Note: RP-MP (device boundary criterion) is calculated under Part 2.

2. For a group of radiocommunications transmitters the device boundary is to be calculated as if for a single radiocommunications transmitter. The radiated power (RP) for groups of radiocommunications transmitters is taken:

(a) to be equal for each bearing *σn*; and

(b) to have a value that is the maximum horizontally radiated power, in any direction, of any radiocommunications transmitter in the group.

Part 2 Device boundary criterion

1. The device boundary criterion is the value of the mathematical expression:

RP – MP

where:

|  |  |  |
| --- | --- | --- |
| MP | : | is *PL*(*lmn,Lmn*) *+ LOP – Gr*; |
| RP | : | is the horizontally radiated power, measured in dBm EIRP per MHz, for each bearing, *σn*; |
| Note |  | For a device with an active antenna system, the RP at bearing σn is defined as the sum of the gain of the antenna towards the horizontal plane and towards azimuth σn (dB) 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 RP is not exceeded. |
| *LOP* | : | is the level of protection. For radiocommunications transmitters with AAS, LOP is set to –102 dBm per MHz, for a radiocommunications transmitters without AAS, LOP is set to -110 dBm per MHz; |
| *Gr* | : | is the nominal radiocommunications receiver antenna gain including feeder loss set to 0 dBi; |
| *PL(lmn,Lmn)* | : | is the propagation loss (dB) set out in Part 3 of the mth increment on the nth radial. |

Part 3 Calculation of propagation loss

1. The propagation loss (*PL(lmn,Lmn)*) for the mth increment on the nth radial is established using:

(a) For transmitters conntected to an antennan which is greater than 6 metres above ground level: the method and parameters defined in section 4.5.2 of Recommendation ITU-R P.526-14.

(b) For transmitters connected to an antenna which is at or below 6 metres above ground level: the method and parameters defined in section 4.5.2 of Recommendation ITU-R P.526-14 and in section 3.2 of Recommendation ITU-R P.2108-0.

2. In implementing the method in section 4.5.2 of Recommendation ITU-R P.526-14 and section 3.2 of Recommendation ITU-R P.2108-0, the height of the nominal receiver is 5 metres above ground level, the height of the transmitter above ground level is determined in Part 1 of Schedule 3, and the height of a profile point is determined in Part 2 of Schedule 3.

3. In implementing the method in section 4.5.2 of Recommendation ITU-R P.526-14, the path profile is developed by sampling the DEM-3S at 100 metre increments along each radial. At each increment along the path profile, the procedure for determining the average ground height described in Part 2 of Schedule 3 is implemented.

4. In implementing the method in section 3.2 of Recommendation ITU-R P.2108-0, the percentage of locations is to be set at 0.0001% and the correction is to be applied at only one end of the path. If the loss calculated using the method in section 3.2 of Recommendation ITU-R P.2108-0 is less than 0 dB, the calculated loss value should be replaced with 0 dB.

Schedule 3 Antenna height and average ground height

(section 10, Schedule 2)

**Part 1 Antenna height of a transmitter**

1. The antenna height of a fixed transmitter, isthe vertical height in metres of the phase centre of the transmitter’s antenna measured with an error of less than 5 parts in 100 and relative to the point:

(a) located on the line of intersection between the external surface of the structure supporting the antenna and the surface of the ground or sea; and

(b) having the lowest elevation on that line.

1. For a group of radiocommunications transmitters, the antenna height for the group is the greatest of the heights of each individual transmitter in the group, calculated in accordance with this Part.

Part 2 Average ground height

1. The average ground height for the mth increment on the nth radial is calculated as follows:

Step 1: determine the associated latitude and longitude ** of the mth increment on the nth radial as calculated in Part 3.

Step 2: identify the DEM-3S cell represented by the latitude and longitude of the mth increment on the nth radial.

Step 3: bound the identified DEM-3S cell with the 8 adjacent DEM-3S cells in a 3x3 matrix and obtain each DEM-3S cell height attribute (as shown in Diagram 1).

Step 4: determine the average value of height from the 3x3 matrix

2.If the latitude or longitude ** of the mth increment on the nth radial as calculated in Part 3 has a modulus of zero when divided by 0.00083, then the corresponding DEM-3S cell, as identified in Step 2 above, is the adjacent DEM-3S cell with the minimum height.

*Note* Additional information for the case where the associated latitude or longitude of the mth increment on the nth radial as calculated in Part 3 corresponds to a DEM-3S cell boundary is provided in the document titled ‘*Digital Elevation Model Interpretation*’ available on the ACMA website: [www.acma.gov.au](http://www.acma.gov.au).

**Diagram 1 Calculating average ground height**

m=100 m

m=200 m

σn=n.10

**Part 3 Vincenty’s Formulae**

*Note* This implementation of Vincenty’s Direct Formulae uses the parameters from the GRS80 ellipsoid as referenced by the Geocentric Datum of Australia 1994 (GDA94).

1. In calculating:

|  |  |  |
| --- | --- | --- |
| *lt* | : | is the latitude of the fixed transmitter (decimal radians) |
| *Lt* | : | is the longitude of the fixed transmitter (decimal radians) |
| *α* | : | is the azimuth angle (decimal radians) |
| *d* | : | is the separation distance to required point (m×250 metres) |
| *a* | : | is the semi-major axis with value 6378137 metres |
| *fl* | : | is the flattening of the value 1/298.25722210 |
| *b* | : | is the semi-minor axis of (*a×(1-fl)*) |















2. Using an initial value, iterate the following three equations until the change in  is less than 10-12.







3. Then:



*Note* use the four-quadrant inverse tangent, *atan2*.



*Note* use the four-quadrant inverse tangent, *atan2*.







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**

|  |  |
| --- | --- |
| 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) |