Coordination between earth station transmitters in the fixed-satellite service and other services in the 25.5-30 GHz band

Radiocommunications Assignment and Licensing Instruction

**rali: MS 38**

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Amendment history

| Date | Comments |
| --- | --- |
| 24 June 2014 | First release of RALI |
| 18 December 2015 | Increase applicable frequency range to include 26.5-27.5 GHz, include coordination between FSS Earth stations, EESS and SRS below 27.0 GHz, change RALI title, update formatting. |
| December 2018 | Draft for consultation including updates to coordination zone and protection requirements for SRS; Inclusion of coordination information for Tidbinbilla; and, to remove coordination requirements for body scanners. |
| 6 September 2019 | Update finalised |
| 19 August 2020 | Draft for consultation to detail requirements which are applicable to earth stations licensed under an area-wide apparatus licence in the range 27-29.5 GHz and to remove the special condition which limited the minimum elevation angle for earth stations in highly-populated areas. |

Suggestions for improvements to Radiocommunications Assignment and Licensing Instruction MS 38 may be addressed to:

The Manager, Spectrum Planning Section  
Australian Communications and Media Authority  
PO Box 78   
Belconnen ACT 2616

or by email to: [freqplan@acma.gov.au](mailto:freqplan@acma.gov.au).

Please notify the ACMA of any inaccuracy or ambiguity found in this RALI, so that it can be investigated and appropriate action taken.

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# Introduction

## Purpose

The purpose of this Radiocommunications Assignment and Licensing Instruction (RALI) document is to describe procedures for the frequency coordination of fixed-satellite service (FSS) Earth station transmitters with:

* terrestrial fixed service receivers;
* Earth exploration-satellite service (EESS) (space-to-Earth) receivers; and

space research service (SRS) (space-to-Earth) receivers.

The provisions in this RALI, with the exception of the requirements for coordination with terrestrial fixed service receivers, do not apply for FSS earth stations licensed under an area-wide apparatus licence.[[1]](#footnote-2)

The document is primarily intended for use by the Australian Communications and Media Authority (ACMA) and accredited frequency assigners.

The information in this document reflects the ACMA’s statement of current policy in relation to the frequency coordination of FSS Earth station transmitters operating in the 27.0-30.0 GHz band. In making decisions, accredited frequency assigners and the ACMA’s officers should take all relevant factors into account and decide each case on its merits. Issues relating to this document that appear to fall outside the enunciated policy should be referred to:

The Manager, Spectrum Planning Section  
Australian Communications and Media Authority  
PO Box 78   
Belconnen ACT 2616

or by email to: [freqplan@acma.gov.au](mailto:freqplan@acma.gov.au).

## Scope

The scope of the RALI is limited to:

* the coordination of FSS Earth station transmitters and fixed service receivers operating in the frequency range 27.5–30 GHz, and only considers the protection of the latter from potential interference from the former; and
* the coordination of FSS Earth station transmitters and EESS (space-to-Earth) receivers, and only considers the protection of the latter from potential interference from the former; and

the coordination of FSS Earth station transmitters and SRS (space-to-Earth) receivers, and only considers the protection of the latter from potential interference from the former.

Coordination between microwave fixed point-to-point links in the 28 GHz band (27.5–29.5 GHz) is detailed in [RALI FX 3 Microwave fixed services frequency coordination](https://www.acma.gov.au/publications/2019-09/publication/rali-fx3-microwave-fixed-services). As of 23 September 2019, no new fixed point-to-point fixed link assignments may be made in the 28 GHz band.

Fixed-service receivers shall not claim protection from FSS Earth station transmitters that are already recorded in the Register of Radiocommunications Licences.

Matters concerning international coordination of satellite networks are conducted within frameworks specified in the International Telecommunication Union (ITU) Radio Regulations and are not addressed in this RALI. Coordination of intra-Australian satellite networks is also outside the scope of this RALI.

# Frequency coordination

## Identification of potentially affected licensed stations

### FSS transmitters into fixed service receivers

#### Potentially affected licences

In order to identify potentially affected fixed service receivers where more coordination, as defined in Section 2.2, is required, an area and frequency cull are performed on all licences in the Register of Radiocommunications Licences as follows:

1. Area Cull: Identify any licensed fixed service stations within a 300 km radius of the FSS transmitter station’s location.
2. Frequency Cull: Limit the selection of fixed service stations in (1) to those operating within 224 MHz of the upper or lower band edge of the FSS transmitter station’s channel bandwidth

(i.e. ∆f – BWES/2 – BWFS/2 < 224 MHz—more guidance on this is provided below).

#### Determination of co-channel or adjacent-channel configuration

This section specifies whether the FSS Earth station transmitter and the fixed service receiver being coordinated are co-channel or adjacent-channel.

Frequency offset (∆*f*) is the absolute value of the difference between the centre frequencies of the FSS Earth station transmitter and the fixed service receiver being coordinated.

Co-channel:

0 ≤ ∆*f* < (*BWES* + *BWFS*)/2

First adjacent-channel:

(*BWES* + *BWFS*)/2 ≤ ∆*f* < [*max*(*BWES*, *BWFS*) + (*BWES* + *BWFS*)/2]

Second adjacent-channel:

[*max* (*BWES*, *BWFS*) + (*BWES* + *BWFS*)/2] ≤ ∆*f* <

[2∙ *max* (*BWES*, *BWFS*) + (*BWES* + *BWFS*)/2]

Third adjacent-channel and beyond:

∆*f* ≥ [2∙ *max* (*BWES*, *BWFS*) + (*BWES* + *BWFS*)/2]

where *BWES* is the channel (transponder) bandwidth of the earth station transmitter and *BWFS* is the channel bandwidth of the fixed service receiver.

### FSS transmitters into EESS and SRS receivers

An FSS Earth station transmitter, operating in the 27.0-27.5 GHz frequency range, located within:

* any of the areas described in Appendix 5; or

50 km of a potentially affected licensed EESS receiver operating in the 25.5-27.0 GHz frequency range;

is subject to further coordination in Section 2.2.2.

Section 2.1.3 applies only to FSS Earth station transmitter licences issued after 18 January 2016. Services that operated under a 27 GHz spectrum licence that were subsequently converted to apparatus licences are not subject to the requirements of this section.

## Coordination

### FSS transmitters into fixed service receivers

This section covers the processes involved for coordination between an FSS Earth station transmitter and a fixed service receiver identified in Section 2.1.2.

**Step 1**: Calculate the unwanted power received from the transmitting Earth station, at the fixed service receiver as follows:

*Prx\_I* = *Ptx\_I* + *Gtx\_I* – *L(p)* + *Grx* **(1)**

where *Ptx\_I* : Earth station transmit power (see Section 2.2.1.1)[[2]](#footnote-3).

*Gtx\_I* : Earth station antenna gain (dBi) towards the horizon on the azimuth in the direction of the terrestrial station (see Section 2.2.1.2).

*L(p)* : transmission path loss (dB) not exceeded for *p*% time, calculated according to Recommendation ITU-R P.452 (as in force from time-to-time)[[3]](#footnote-4).

*Grx* : terrestrial station antenna gain (dBi) on the azimuth in the direction of the Earth station.

**Step 2**: Use the calculated unwanted power level determined in Step 1 to determine if the relevant maximum permissible interference power, *Pintmax*, has been exceeded. Coordination is successful, and the frequency could be assigned to the proposed station, only if:

*Prx\_I* ≤ *Pintmax* **(2)**

If the fixed service receiver is a receiver in a microwave fixed point-to-point link, the relevant maximum permissible interference power, *Pintmax*, is defined in Section 2.2.1.3.

#### Earth station transmit power

The value of Earth station transmit power (*Ptx\_I*) to be used when calculating the unwanted received power at the fixed service receiver should be assumed to be the total power transmitted by the Earth station. In co-channel scenarios (as determined in Section 2.1.2.2), *Ptx\_I* can be reduced by the on-tune rejection (*OTR*) calculated as in Appendix 3.

#### Earth station antenna gain

In order to calculate the gain of an Earth station in the direction of a fixed service receiver, the information in Table 1 below and the procedures defined in Appendices 1 and 2 of this document should be used. Appendices 1 and 2 provide details on calculating the antenna off-axis angle in two and three dimensions respectively.

|  |  |  |  |
| --- | --- | --- | --- |
| **Satellite type** | **Radiation pattern envelope** | **Off-axis angle (Appendix 2)** | |
| **Horizontal component, *θh*** | **Vertical component, *εs*** |
| GSO | Actual if known, otherwise use Recommendation ITU‑R S.1855 | As defined for the Earth station [Notes 1, 2] | As defined for the Earth station [Notes 1, 2] |
| NGSO | Actual if known, otherwise use Recommendation ITU‑R S.1428 | *θh* = 0° | *εs* = max(0, [*εmin* – *εh*(Θ*S*1,*S*2)])° [Note 3] |

1. Earth Station antenna parameters to be used for coordination

Note 1: If the longitude of the GSO satellite’s orbital position is known, the azimuth and elevation angle, as seen from the Earth station (i.e. the off-axis horizontal and vertical components), can be calculated according to Annex 3 to Appendix 7 of the ITU-R Radio Regulations. Note that the GSO satellite’s orbital position can be determined from ITU information on the satellite network.

Note 2: If neither the azimuth and elevation angle, nor the longitude of the GSO satellite’s orbital location are known, then coordination should be performed as if the earth station is communicating with an NGSO.

Note 3: *εmin* is the minimum elevation angle permitted for an Earth station. Article 21.14 of the ITU-R Radio Regulations defines a minimum elevation angle of 3° for transmitting earth stations. The exception is within highly-populated areas specified in Appendix 4, where *εmin* = 10° (see Section 3.3). *εs*, *εh* and ΘS1,S2 are all defined in Appendix 2.

#### Protection criteria for microwave fixed point-to-point links

For microwave fixed point-to-point links, the maximum permissible interference power is:

Pintmax = Prx\_W – PR **(3)**

Where Prx\_W : wanted received power from the fixed link’s related terrestrial station transmitter[[4]](#footnote-5). This should be calculated according to RALI FX 3.

*PR* : protection ratio (dB).

The relevant protection ratios to use when coordinating with fixed links are defined in Table 2. When calculating *Prx\_I* for microwave fixed point-to-point links, *p* = 20% when calculating path loss *L(p)* using Recommendation ITU-R P.452 (as in force from time-to-time).

|  |  |
| --- | --- |
| **Description** | **Protection ratio (dB)** |
| Co-channel overlap | 65 |
| First Adjacent-channel overlap | 35 |
| Second Adjacent-channel overlap | 15 |
| Third Adjacent-channel and beyond | No coordination required |

1. Protection ratios for victim fixed links and interfering Earth stations

\* The channel configuration is determined to be co-channel, first adjacent-channel or second-adjacent channel in Section 2.1.2.2.

These protection ratio values have been normalised for a particular path length, rainfall rate and time percentage. Accordingly, appropriate corrections must be applied to the tabulated protection ratio values to account for the victim system’s actual path length, geoclimatic zone and time availability in accordance with the relevant protection ratio correction factor curves in Appendix 1 of RALI FX3, or the guidance in Appendix 4 of RALI FX3.

### FSS transmitters into EESS and SRS receivers

This section covers the processes involved for coordination between an FSS Earth station transmitter and an EESS or SRS receiver identified in Section 2.1.3.

The following resources provides information on in-band protection requirements SRS and EESS earth station receivers:

* SRS earth stations: ITU-R Recommendation SA.609[[5]](#footnote-6) “Protection criteria for radiocommunication links for manned and unmanned near-Earth research satellites”. (Note for details of parameters to be used for coordination with earth station receivers at New Norcia refer to RALI MS 43[[6]](#footnote-7));

EESS earth stations: Table 8d of Annex 7 to Appendix 7 of Radio Regulations.

ITU-R Recommendation SA.509 should be used to model antenna radiation patterns.

Operators and licensees of FSS Earth station transmitters must not exceed the requirements for spurious emissions provided in Appendix 3 of the ITU Radio Regulations.

# Assignment instructions

## Antennas

For any FSS Earth station being assigned, its antenna must have an off-axis gain (for all off-axis angles between *φmin* and 180°) that is less than the off-axis gain that would be calculated using Recommendation ITU-R S.1855 for a circular antenna (*θ* = 0°) with the same *D*/*λ* ratio.

For all terrestrial stations and FSS Earth stations, it is essential that licensees advise the ACMA and furnish detailed radiated power envelope (RPE) data for its (discrete and equipment integral) antenna products that are to be used in proposed assignments. Parameters should include an antenna’s physical diameter and on-axis gain as well as the antenna 360° radiation pattern envelope, in order to facilitate its use in frequency coordination and sharing studies.

In order to promote standardisation and electronic working methods (and in the absence of relevant ITU criteria), the “*Standard Format for Electronic Transfer of Terrestrial Antenna Pattern Data*” file data format developed by the National Spectrum Managers Association (NSMA[[7]](#footnote-8)) may be utilised, with a view to facilitating simple, accurate and expedient transfer of coordination data between manufacturers, frequency assigners and users. Although not a formal standard, the format is recognised and supported by most major antenna manufacturers.

## Emission limits

An apparatus licence issued to an FSS Earth station operating in the 27.0-30.0 GHz frequency band, within the areas specified in Appendix 4 (“highly-populated areas”), is subject to an emission limit towards the horizon to minimise spectrum denial to terrestrial services. As such, it must carry the following Special Condition:

*The Earth station authorised by this licence shall not exceed an effective isotropic radiated power (EIRP) power spectral density (PSD) of –60 dBW/Hz in the direction of the horizontal plane, along any azimuth.*

# Exceptions

Exceptions to the requirements of this RALI for prospective assignments require case-by-case consideration by the Manager, Spectrum Planning Section.

A request for exemption from the requirements of this RALI would need to be accompanied by evidence to support the request.

All requests for exemptions should be submitted to [freqplan@acma.gov.au](mailto:freqplan@acma.gov.au).

# RALI Authorisation

[Not approved]

Manager  
Space Planning Section  
Spectrum Planning and Engineering Branch

Communications Infrastructure Division  
Australian Communications and Media Authority

# References

The following documents were used in the development of this RALI.

## ACMA

* Radiocommunications Act 1992
* Australian Radiofrequency Spectrum Plan, January 2013.
* RALI MS 03 - Embargoes
* RALI FX3 – Microwave Fixed Services Frequency Coordination

## International Telecommunications Union

* ITU Radio Regulations, Appendix 7
* ITU Radio Regulations, Article 21
* Recommendation ITU-R P.452 (as in force from time-to-time)
* Recommendation ITU-R P.525
* Recommendation ITU-R P.526-11
* Recommendation ITU-R S.465-6
* Recommendation ITU-R S.735-1
* Recommendation ITU-R S.758-5
* Recommendation ITU-R S.1432-1
* Recommendation ITU-R SF.1006
* Recommendation ITU-R SM.337-6

# Appendix 1: Calculating antenna off-axis angle in two dimensions

The off-axis angle from a station’s antenna boresight can be separated into its horizontal and vertical components. This appendix deals with the horizontal component only, i.e. the off-axis angle in 2-dimensions. For calculations in 3-dimensions involving the vertical component of a station’s off-axis angle, also see Appendix 3.

The horizontal component of the off-axis angle from Station 1 is related to the location of Station 2 relative to Station 1’s antenna boresight direction (Table 3 provides definition of Station 1 and 2). The off-axis angle of Station 2 from Station 1’s antenna boresight in 2-dimensions is given by the equation:

|  |  |
| --- | --- |
|  | **(A1.1)** |

where:

*θh* : Horizontal component of antenna’s off-axis angle

Θ*S1* : Station 1 azimuth (direction of Station 1’s antenna relative to north, in degrees, where 0 ≤ Θ*S1* < 360)

Θ*S1,S2* : Azimuth of Station 2 relative to Station 1 (direction of Station 2’s location from the location of Station 1, relative to north in a clockwise direction, in degrees, where 0 ≤ Θ*S1,S2* < 360)

|  |  |  |
| --- | --- | --- |
| **Interference scenario** | **Off-axis angle to be calculated** | |
| **Receive antenna off-axis angle** | **Transmit antenna off-axis angle** |
| Earth station receive, Terrestrial station transmit | Station 1 = Earth station  Station 2 = terrestrial station  Also see Appendix 3 | Station 1 = terrestrial station  Station 2 = Earth station |
| Earth station transmit, Terrestrial station receive | Station 1 = terrestrial station  Station 2 = Earth station | Station 1 = Earth station  Station 2 = terrestrial station  Also see Appendix 3 |

1. Definitions of Station 1 and Station 2 to be used in calculating θh.

The resulting value of *θh* must be less than or equal to 180°. If *θh* > 180°, then *θh* must be adjusted by the following equation:

|  |  |
| --- | --- |
|  | **(A1.2)** |

The direction of Station 2 as viewed from Station 1 (great circle azimuth bearing) is given by the equation:

|  |  |
| --- | --- |
|  | **(A1.3)** |

atan2(*y,x*) is the two argument variation of the arctangent function, and is given by the equation:

|  |  |
| --- | --- |
|  | **(A1.4)** |

with:

|  |  |
| --- | --- |
|  | **(A1.5)** |

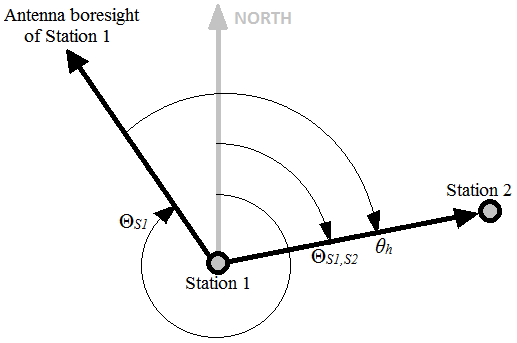
where:

*φ1* = latitude of Station 1

*λ1* = longitude of Station 1

*φ2* = latitude of Station 2

*λ2* = longitude of Station 2

****

1. Diagram of azimuth angles of Station 1 and Station 2 with reference to Station 1 (denoted by Θ*S1* and Θ*S1,S2* respectively), and the horizontal off-axis angle of Station 2 from Station 1’s antenna boresight (denoted *θh*). Note that both angles Θ*S1* and Θ*S1,S2* can range anywhere between 0° to 360°, this figure is just an example.

# Appendix 2: Calculating antenna off-axis angle in three dimensions

Once the horizontal component of an antenna off-axis angle is calculated (see Appendix 1), it can be combined with the vertical component to produce the off-axis angle in 3-dimensions.

where:

is the azimuth of the interference path, relative to the Station 1’s location

is the horizontal component of the antenna off-axis angle, i.e. the difference between the pointing azimuth of the Station 1, Θ*S1*, and Θ*S1,S2*

is the vertical component of the antenna off-axis angle, or the elevation angle of Station 1

*,* if available, is the elevation angle of the horizon at azimuth, as seen from Station 1. This potentially reduces the total 3D off-axis angle.

This formula can be used for any station that has horizontal and vertical components of an off-axis angle. Typically this is only relevant to Earth stations for purposes within this document.

The horizon elevation angle should be calculated using the methods in Attachment 2 to Annex 1 to Rec. ITU-R P.452-15. If Station 1 is the transmitting station, use Θ*td* for line-of-sight paths and Θ*max* = max(Θ*i*) for trans-horizon paths. If Station 1 is the receiving station, use Θ*rd* = – Θ*td* for line-of-sight paths and Θ*r* = max(Θ*j*) for trans-horizon paths.

# Appendix 3: On-tune rejection

This section provides information on helping achieve successful coordination by including on-tune rejection (OTR) in **co-channel** scenarios (as determined in Section 2.1.1). It may be possible to reduce the power at the receiver by accounting for cases in which there is only a partial overlap of the transmitter and receiver bandwidths, which may help achieve coordination.

This means the greater the value of OTR, the lesser the value of received interference power, and improved likelihood of successful coordination.

|  |  |
| --- | --- |
| *for foverlap > 0 MHz* | **(A3.1)** |

where:

*BWES* : Earth station transmitter channel bandwidth (MHz)

*foverlap* : frequency overlap between the transmitter and receiver channel bandwidths

If there is partial channel overlap in the frequency domain:

*foverlap* = *BWFS*/2 + *BWES*/2 – ∆*f*

otherwise, if one channel completely overlaps the other:

*foverlap* = *min*(*BWFS*, *BWES*)

Note: *OTR* should be limited to be no greater than the first adjacent-channel protection ratio in Table 2, i.e. *OTR* ≤ 35 dB.

# Appendix 4: Highly-populated areas

The EIRP PSD limit towards the horizontal plane of –60 dBW/Hz (equivalent to 0 dBW/MHz) applies to Earth stations in highly populated areas. “Highly populated areas” means cities with populations greater than 150,000:

* Sydney, Newcastle-Maitland and Wollongong;
* Melbourne and Geelong;
* Brisbane, Gold Coast-Tweed and Sunshine Coast;
* Perth;
* Adelaide;
* Canberra-Queanbeyan;
* Hobart; and

Townsville.

The EIRP PSD limit for FSS earth stations also applies in the cities of:

* Darwin; and

Cairns.

The “highly populated areas” corresponding to these cities for the purpose of applying the EIRP PSD limit towards the horizontal plane to Earth stations, are defined by the Hierarchical Cell Identification Scheme (HCIS) identifiers listed below[[8]](#footnote-9). HCIS identifiers are a new way of describing geographic areas aligned with the [Australian Spectrum Map Grid (ASMG)](https://acma.gov.au/australian-spectrum-map-grid).

The HCIS identifiers below can be converted to a placemark [here](https://www.acma.gov.au/convert-hcis-area-description-placemark). The areas are also included in the accompanying KMZ file.

**SYDNEY, NEWCASTLE-MAITLAND, WOLLONGONG**

NW1, MV9I, MV9J, MV9K, MV9L, MV9M, MV9N, MV9O, MV9P, MW3C, MW3D, MW3G, MW3H, MW3K, MW3L, MW3O, MW3P, NV4N, NV4O, NV4P, NV5M, NV5N, NV5O, NV5P, NV7B, NV7C, NV7D, NV7E, NV7F, NV7G, NV7H, NV7I, NV7J, NV7K, NV7L, NV7M, NV7N, NV7O, NV7P, MV9D6, MV9D9, MV9E4, MV9E5, MV9E6, MV9E7, MV9E8, MV9E9, MV9F4, MV9F5, MV9F6, MV9F7, MV9F8, MV9F9, MV9G4, MV9G5, MV9G6, MV9G7, MV9G8, MV9G9, MV9H3, MV9H4, MV9H5, MV9H6, MV9H7, MV9H8, MV9H9, MW3B2, MW3B3, MW3B5, MW3B6, MW3B8, MW3B9, MW3F2, MW3F3, MW3F5, MW3F6, MW3F8, MW3F9, MW3J2, MW3J3, NV4I5, NV4I6, NV4I8, NV4I9, NV4J4, NV4J5, NV4J6, NV4J7, NV4J8, NV4J9, NV4K4, NV4K5, NV4K6, NV4K7, NV4K8, NV4K9, NV4L4, NV4L5, NV4L6, NV4L7, NV4L8, NV4L9, NV4M2, NV4M3, NV4M5, NV4M6, NV4M8, NV4M9, NV5I4, NV5I5, NV5I6, NV5I7, NV5I8, NV5I9, NV5J4, NV5J5, NV5J6, NV5J7, NV5J8, NV5J9, NV5K4, NV5K5, NV5K6, NV5K7, NV5K8, NV5K9, NV5L4, NV5L5, NV5L6, NV5L7, NV5L8, NV5L9, NV7A2, NV7A3, NV7A4, NV7A5, NV7A6, NV7A7, NV7A8, NV7A9

**MELBOURNE, GEELONG**

KX3J, KX3K, KX3L, KX3N, KX3O, KX3P, KX6B, KX6C, KX6D, KX6F, KX6G, KX6H, KX6J, KX6K, KX6L, LX1I, LX1M, LX1N, LX1O, LX4A, LX4B, LX4C, LX4E, LX4I, KX3F7, KX3F8, KX3F9, KX3G7, KX3G8, KX3G9, KX3H4, KX3H5, KX3H6, KX3H7, KX3H8, KX3H9, KX3M6, KX3M8, KX3M9, KX6A2, KX6A3, KX6A5, KX6A6, KX6A8, KX6A9, KX6E2, KX6E3, KX6E5, KX6E6, KX6E8, KX6E9, KX6I2, KX6I3, KX6I5, KX6I6, KX6I8, KX6I9, LX1E4, LX1E7, LX1E8, LX1E9, LX1J1, LX1J4, LX1J5, LX1J6, LX1J7, LX1J8, LX1J9, LX1K4, LX1K7, LX4F1, LX4F2, LX4F4, LX4F5, LX4F7, LX4F8, LX4J1, LX4J2, LX4J4, LX4J5, LX4J7, LX4J8

**BRISBANE, GOLD COAST-TWEED, SUNSHINE COAST**

NT9, NT5G, NT5H, NT5K, NT5L, NT5O, NT5P, NT6E, NT6F, NT6G, NT6H, NT6I, NT6J, NT6K, NT6L, NT6M, NT6N, NT6O, NT6P, NT8C, NT8D, NT8G, NT8H, NT8K, NT8L, NT8O, NT8P, NU3A, NU3B, NU3C, NU3D, NU3F, NU3G, NU3H, NT5C4, NT5C5, NT5C6, NT5C7, NT5C8, NT5C9, NT5D4, NT5D5, NT5D6, NT5D7, NT5D8, NT5D9, NT6A4, NT6A5, NT6A6, NT6A7, NT6A8, NT6A9, NT6B4, NT6B5, NT6B6, NT6B7, NT6B8, NT6B9, NT6C4, NT6C5, NT6C6, NT6C7, NT6C8, NT6C9, NT6D4, NT6D5, NT6D6, NT6D7, NT6D8, NT6D9, NU2C1, NU2C2, NU2C3, NU2D1, NU2D2, NU2D3, NU2D5, NU2D6, NU2D8, NU2D9, NU2H2, NU2H3, NU3E1, NU3E2, NU3E3, NU3E5, NU3E6, NU3E8, NU3E9, NU3I2, NU3I3, NU3J1, NU3J2, NU3J3, NU3K1, NU3K2, NU3K3, NU3L1, NU3L2, NU3L3

**PERTH**

BV1I, BV1J, BV1K, BV1L, BV1M, BV1N, BV1O, BV1P, BV2I, BV2J, BV2M, BV2N, BV4A, BV4B, BV4C, BV4D, BV4E, BV4F, BV4G, BV4H, BV4I, BV4J, BV4K, BV4L, BV5A, BV5B, BV5E, BV5F, BV5I, BV5J, BV1E7, BV1E8, BV1E9, BV1F7, BV1F8, BV1F9, BV1G7, BV1G8, BV1G9, BV1H7, BV1H8, BV1H9, BV2E7, BV2E8, BV2E9, BV2F7, BV2F8, BV2F9, BV4M1, BV4M2, BV4M3, BV4N1, BV4N2, BV4N3, BV4O1, BV4O2, BV4O3, BV4P1, BV4P2, BV4P3, BV5M1, BV5M2, BV5M3, BV5N1, BV5N2, BV5N3

**ADELAIDE**

IW3J, IW3K, IW3L, IW3N, IW3O, IW3P, IW6B, IW6C, IW6D, IW6F, IW6G, IW6H, IW3E5, IW3E6, IW3E8, IW3E9, IW3F4, IW3F5, IW3F6, IW3F7, IW3F8, IW3F9, IW3G4, IW3G5, IW3G6, IW3G7, IW3G8, IW3G9, IW3H4, IW3H5, IW3H6, IW3H7, IW3H8, IW3H9, IW3I2, IW3I3, IW3I5, IW3I6, IW3I8, IW3I9, IW3M2, IW3M3, IW3M5, IW3M6, IW3M8, IW3M9, IW6A2, IW6A3, IW6A5, IW6A6, IW6A8, IW6A9, IW6E2, IW6E3, IW6E5, IW6E6, IW6E8, IW6E9, JW1E4, JW1E7, JW1I1, JW1I4, JW1I7, JW1M1, JW1M4

**CANBERRA-QUEANBEYAN**

MW4D, MW4H, MW4L, MW5A, MW5B, MW5E, MW5F, MW5I, MW5J, MW1P4, MW1P5, MW1P6, MW1P7, MW1P8, MW1P9, MW2M4, MW2M5, MW2M6, MW2M7, MW2M8, MW2M9, MW2N4, MW2N5, MW2N6, MW2N7, MW2N8, MW2N9, MW4P1, MW4P2, MW4P3, MW5M1, MW5M2, MW5M3, MW5N1, MW5N2, MW5N3

**HOBART**

LY8L, LY8P, LY9I, LY9J, LY9K, LY9L, LY9M, LY9N, LY9O, LY9P, LZ2D, LZ2H, LZ3A, LZ3B, LZ3C, LZ3D, LZ3E, LZ3F, LZ3G, LZ3H, LY8H4, LY8H5, LY8H6, LY8H7, LY8H8, LY8H9, LY9E4, LY9E5, LY9E6, LY9E7, LY9E8, LY9E9, LY9F4, LY9F5, LY9F6, LY9F7, LY9F8, LY9F9, LY9G4, LY9G5, LY9G6, LY9G7, LY9G8, LY9G9, LY9H4, LY9H5, LY9H6, LY9H7, LY9H8, LY9H9, LZ2L1, LZ2L2, LZ2L3, LZ3I1, LZ3I2, LZ3I3, LZ3J1, LZ3J2, LZ3J3, LZ3K1, LZ3K2, LZ3K3, LZ3L1, LZ3L2, LZ3L3

**TOWNSVILLE**

LR2C, LR2D, LR2G, LR2H, LQ8N8, LQ8N9, LQ8O7, LQ8O8, LQ8O9, LQ8P7, LQ8P8, LQ8P9, LR2B2, LR2B3, LR2B5, LR2B6, LR2B8, LR2B9, LR2F2, LR2F3, LR2F5, LR2F6, LR2F8, LR2F9, LR2J2, LR2J3, LR2J5, LR2J6, LR2K1, LR2K2, LR2K3, LR2K4, LR2K5, LR2K6, LR2L1, LR2L2, LR2L3, LR2L4, LR2L5, LR2L6, LR3A1, LR3A2, LR3A4, LR3A5, LR3A7, LR3A8, LR3E1, LR3E2, LR3E4, LR3E5, LR3E7, LR3E8, LR3I1, LR3I2, LR3I4, LR3I5

**DARWIN**

GO7C, GO7D, GO7G, GO7H, GO7K, GO7L, GO8A, GO8E, GO8I

**CAIRNS**

LQ1K, LQ1L, LQ1O, LQ1P, LQ1J2, LQ1J3, LQ1J5, LQ1J6, LQ1J8, LQ1J9, LQ1N2, LQ1N3, LQ1N5, LQ1N6, LQ1N8, LQ1N9, LQ4B2, LQ4B3, LQ4B5, LQ4B6, LQ4C1, LQ4C2, LQ4C3, LQ4C4, LQ4C5, LQ4C6, LQ4D1, LQ4D2, LQ4D3, LQ4D4, LQ4D5, LQ4D6

# Appendix 5: SRS Coordination Zone

SRS coordination zones are defined in the table below.

|  |  |
| --- | --- |
| **Area Name** | **HCIS** |
| **New Norcia** | BU7, BU8, BU9, BV3, BU4K, BU4L, BU4O, BU4P, BU5I, BU5J, BU5K, BU5L, BU5M, BU5N, BU5O, BU5P, BU6I, BU6M, BU6N, BV1A, BV1B, BV1C, BV1D, BV1E, BV1F, BV1G, BV1H, BV2A, BV2B, BV2C, BV2D, BV2E, BV2F, BV2G, BV2H, BV2K, BV2L, CU7E |
| **Tidbinbilla** | MW5, MW1F, MW1G, MW1H, MW1J, MW1K, MW1L, MW1N, MW1O, MW1P, MW2I, MW2J, MW2K, MW2M, MW2N, MW2O, MW4B, MW4C, MW4D, MW4F, MW4G, MW4H, MW4J, MW4K, MW4L, MW4N, MW4O, MW4P |

1. RALI[new] contain licensing and coordination requirements for area-wide apparatus licensed services (including FSS earth stations) in the frequency range 24.7-29.5 GHz. [↑](#footnote-ref-2)
2. *Prx\_I* and *Ptx\_I* should be in self-consistent logarithmic units of total power (e.g. dBW). [↑](#footnote-ref-3)
3. Terrain height data is required to create a path profile between transmitter and receiver for path loss calculations. A 9 second digital elevation model or better should be used. [↑](#footnote-ref-4)
4. To be calculated as total power in the same units as *Prx\_I*. [↑](#footnote-ref-5)
5. As in force from time to time. [↑](#footnote-ref-6)
6. RALI MS 43 Coordination procedures between New Norcia Earth Station and other services. [↑](#footnote-ref-7)
7. NSMA (USA) Working Group 16, refer to <http://www.nsma.org>. [↑](#footnote-ref-8)
8. From the designated areas in *Radiocommunications (Spectrum Re-allocation) Declaration 2000* (3.4 GHz band) and *Radiocommunications (Spectrum Re-allocation) Declaration No. 2 of 2000* (2 GHz bands). [↑](#footnote-ref-9)