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Notification zones for apparatus licensed services around radio astronomy facilities

RALI: MS31

DATE OF EFFECT: 12TH SEPTEMBER 2025

Amendment history

Date	Comments
August 2006	Initial release.
September 2025	Notification zone parameters added for the 71-76 GHz and 81-86 GHz bands at Narrabri and Mopra. Coordinates of Observatory Locations updated to GDA94. Minor editorial changes including to the Information Form in Annex 3.

Suggestions for improvements to Radiocommunications Assignment and Licensing Instruction MS31 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.

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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1 Introduction

1.1 Purpose

The purpose of this Radiocommunications Assignment and Licensing Instruction (RALI) is to prescribe a process for notification to the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of prospective frequency assignments to apparatus licensed services that might impede or degrade the operation of key radio astronomy facilities. Affected apparatus services are those in zones around the radio astronomy facilities and within the frequency bands listed in Australian Radiofrequency Spectrum Plan (ARSP) Australian footnote AUS87.

The potential assignment is then analysed to determine whether the use of the planned transmitter at that location might be detrimental to the operation of radio astronomy at one or more of the locations listed in footnote AUS87 (this footnote is provided in Annex 1). The analysis may be done by the CSIRO, or by the accredited person or ACMA assigner progressing the assignment. The CSIRO may then opt to negotiate with the assigner (who would liaise with the prospective licensee) for a better outcome for radio astronomy, before the prospective assignment is passed to ACMA for licensing.[1] ACMA would not participate in or arbitrate on these negotiations as the radio astronomy service is not afforded protection from interference in the AUS87 bands.[2]

1.2 Background

The radio astronomy service uses extremely sensitive radio receiving systems to detect very faint signals of cosmic origin, at much lower power levels than are generally used in other radio services. It is highly susceptible to interference from emissions from other radiocommunications services. To minimise such interference, radio astronomy antennas are usually operated in geographically remote locations.

Specific frequency allocations to the radio astronomy service have been made in spectrum of particular importance to radio astronomers, such as the 1660–1670 MHz band. The operators of radio astronomy facilities may take out radiocommunications licences in these bands, giving them rights to protection from interference from other spectrum users. Radio astronomers also conduct observations in other bands, on a fortuitous basis, and cannot take out licences there because these bands are not allocated for the purpose of radio astronomy. In these other bands radio astronomy receivers are particularly vulnerable to degradation from transmitters in the same spectrum bands.

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[1] The intention of the negotiations is not to change the regulatory status of the services, but rather to encourage mutually acceptable technical solutions that would prevent avoidable interference to the radio astronomy service without imposing undue delay on non-radio astronomy services. ACMA would not normally become involved in these negotiations.

[2] There are some segments with the AUS87 bands that have allocations to the radio astronomy service, for example 1400–1427 MHz, but the bulk of the bands do not.

Radio astronomy is regarded by the Australian Government as an important scientific undertaking, with value for the broader community. Substantial investment has been made in radio astronomy and support facilities around Australia, and there is strong international involvement in radio astronomy science taking place in Australia. There is therefore an advantage to the Australian community in protecting the effectiveness of radio astronomy facilities.

1.3 Australian Productivity Commission Recommendation

In 2002 the Australian Productivity Commission (APC) conducted a public inquiry, *Review of Radiocommunications Acts and of the Market Based Reforms and Activities undertaken by the Australian Communications Authority.* A submission by the CSIRO's Australia Telescope National Facility (ATNF) argued that footnote AUS87 is not effective in managing the interference to radio astronomy receivers in these bands. The ATNF suggested that it would be more effective to designate major radio astronomy facilities as 'radio sensitive zones'. Under this proposal, it would be mandatory to notify radio telescope facilities that another user has applied for a transmitter licence within the zone. This would allow the ATNF the opportunity to propose a technical solution that overcomes any interference to radio astronomy facilities.

The APC did not receive any submissions arguing against this proposal. The ATNF did not suggest that other services be prohibited from using the spectrum. Further, the ATNF stated it would be responsible for finding a solution to interference.

The inquiry report, 'Radiocommunications' released on 5 December 2002[3] made the following recommendation:

> Radioastronomy facilities should be designated as 'radio sensitive sites' under the Australian Radiofrequency Spectrum Plan. These facilities must be notified that another user has applied for a transmitter licence wholly or partially within the bands specified in footnote AUS87.

1.4 Implementing the APC Recommendation

At the time, the then Australian Communications Authority advised the APC that it would implement the recommendation, but it would need to be done in a different manner from that suggested.

The ARSP is not an appropriate vehicle to convey the concept described by the APC. Its prescribed purpose, as defined in Section 30 of the *Radiocommunications Act 1992*, is to partition the radio spectrum into bands and define the general purposes for which these bands may be used. It has no mechanism to trigger a notification that a user has applied for a radiocommunications licence within a particular band.

[3] See https://www.pc.gov.au/inquiries/completed/radiocommunication for details.

It was decided that the recommendation is more usefully implemented during the frequency assignment process by way of a RALI. The frequency assignment process is usually followed by an application for, and issuing of, a radiocommunications licence that authorises the use of a radio transmitter. Once a licence is issued a transmitter is generally installed and operated. A RALI, then, can trigger notification to radio astronomy facilities of potentially interfering transmitters before they are turned on.

2 Scope

A potential assignment falls within the scope of this RALI if:

- the assignment is for an apparatus licensed, coordinated terrestrial service station or earth station, and
- its geographical position lies within one or more of the prescribed areas, and
- any part of its licensed bandwidth falls within the frequency bands listed in Table 1 of this RALI.

This RALI does not apply to radiocommunications systems that operate in an itinerant fashion, that is systems that may operate within the coordination zones from time to time.

The procedure described in this RALI does not apply to existing transmitters authorised for use by apparatus licences, nor do they apply to transmitters whose use is authorised by spectrum or class licences within the bands listed in Table 1 of this RALI.

The procedure described in this RALI does not apply to assignments to licences whose details would be kept confidential under section 152 of the *Radiocommunications Act 1992.*

3 Notification Zones

The frequency bands and radii listed in Table 1 are recommended for notification zones for the recognised observatory locations detailed in Table 2.

Table 1 Notification Zone Parameters

Band (MHz)	Notification Zone radii (km)					
	Parkes	**Narrabri**	**Mopra**	**Hobart**	**Ceduna**	**Tidbinbilla**
1250–1780	200	250	150	100	N/A	120
2200–2550	180	180	130	80	120	80
4350–6700	160	160	120	70[4]	120	70
8000–9200	150	110	100	50	120	50
16000–26000	110	90	80	30	80	30[5]
71000–76000	N/A	60	60	N/A	N/A	N/A
81000–86000	N/A	60	60	N/A	N/A	N/A

Table 2 Co-ordinates of Observatory Locations (Geocentric Datum of Australia 1994)

Location	Latitude	Longitude
Parkes Observatory	32° 59' 54.25" S	148° 15' 48.65" E
Paul Wild Observatory Narrabri	30° 18' 46.40" S	149° 33' 0.44" E
Mopra Observatory Coonabarabran	31° 16' 04.12" S	149° 05' 58.72" E
Mount Pleasant Observatory Hobart	42° 48' 12.92" S	147° 26' 25.86" E
Ceduna Observatory	31° 52' 03.69" S	133° 48' 35.40" E
Canberra Deep Space Communication Complex Tidbinbilla	35° 23' 54.46" S	148° 58' 39.66" E

[4] Excluding the 5 GHz band (4.4–5 GHz), the 6 GHz band (5.925–6.425 GHz) and the 6.7 GHz band (6.425–7.11 GHz).

[5] Excluding the 18 GHz band (17.7–19.7 GHz) and the 22 GHz band (21.2–23.6 GHz).

4 Procedure

If the proposed assignment lies within the scope of this RALI (see section 2.0) the assigner has two options.

Option 1: Provide the following information by e-mail to the CSIRO and await a response:

- Contact details of assigner:
  - name,
  - company, employer or organisation name,
  - address,
  - phone number,
  - fax number, and
  - E-mail address.
- For each transmitter:
  - type of service(s) proposed (e.g. fixed point-to-point, radiodetermination).
  - location(s) (Site ID, site address or site local name, site coordinates including reference datum).
  - operating frequency,
  - emission designator,
  - transmitter power,
  - antenna gain in the direction of the radio astronomy observatory or observatories[6], and
  - antenna height above ground.

The CSIRO will send an e-mail confirming receipt of the information and is then required to respond[7] to the assigner within five working days[8] to advise whether a proposed assignment causes them no difficulty, or may be problematic at one or more of the recognised observatory locations. Assessment of prospective assignments is based on the procedure provided in **Annex 2**. If a proposed assignment is problematic for the CSIRO it may then seek to negotiate a different outcome with the licensee and/or assigner[9]. If no

[6] Alternatively, a relative antenna gain compared to the maximum antenna gain could be provided.

[7] A timely response is required, that is, communication in person, or by e-mail, fax or telephone. Response by posted letter is not appropriate.

[8] 'Working day' means any day other than a Saturday, Sunday or public holiday (including public service holidays) for the whole of the State or Territory in which the assigner's registered office is located, and other than any day between 25 December and 1 January.

[9] The intention of the negotiations is not to change the regulatory status of the services, but rather to encourage mutually acceptable technical solutions that would prevent avoidable interference to the radio astronomy service without imposing undue delay on non-radio astronomy services.

advice is received from the CSIRO within five working days then the assigner can proceed with processing the proposed assignment(s).

A form that may be used to supply the required information to the CSIRO is provided at **Annex 3**.

OR

Option 2: Perform the assessment on the assignment(s) as per the procedure given in Annex 2. If any proposed assignments fail the assessment, then advise the CSIRO by e-mail, providing the information detailed in Option 1 above for those assignments. The CSIRO will send an e-mail confirming receipt of the information and is then required to respond to the assigner within five working days to advise of how it might like to proceed. The CSIRO may seek to negotiate a different outcome with the licensee and/or assigner.

If the proposed assignment passes the assessment, advise the CSIRO by e-mail of this. The e-mail does not need to include all of the information detailed in Option 1 but must provide the Licensee name and Site ID for the proposed assignment(s). For advice where no assignments fail the assessment no confirmation e-mail is required to be sent by the CSIRO.

Contact details for the CSIRO are:

Email: **atnf-spectrum@csiro.au**

Parkes Fax: 02 6861 1730

Narrabri Fax: 02 6790 4090

5 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.

6 RALI Authorisation

Approved 8th September 2025

Manager
Spectrum Planning Section
Spectrum Planning and Engineering Branch

Communications Infrastructure Division
Australian Communications and Media Authority

Annex 1: Australian Radiofrequency Spectrum Plan Footnote AUS87

AUS87 Radio astronomy facilities operated by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) at the Paul Wild Observatory Narrabri (latitude 30° 18' 46.40" S, longitude 149° 33' 0.44" E), the Parkes Observatory (latitude 32° 59' 54.25" S, longitude 148° 15' 48.65" E) and the Mopra Observatory Coonabarabran (latitude 31° 16' 04.12" S, longitude 149° 05' 58.72" E) and by the University of Tasmania at the Mount Pleasant Observatory Hobart (latitude 42° 48' 12.92" S, longitude 147° 26' 25.86" E) and the Ceduna Observatory (latitude 31° 52' 03.69" S, longitude 133° 48' 35.40" E), and at the Canberra Deep Space Communication Complex (latitude 35° 23' 54.46" S, longitude 148° 58' 39.66" E) conduct passive observations in the frequency bands 1.2–1.8 GHz, 2.2–2.7 GHz, 4.5–6.7 GHz, 8–10 GHz and 16–26 GHz using receivers that are highly sensitive to interference. The Paul Wild and Mopra observatories also operate in the frequency bands 30–50 GHz and 75–115 GHz.

Annex 2: Assessment Procedure

Assessment is based on determining the signal level arriving at the potentially affected radio astronomy site(s) from the proposed transmitter. CSIRO consideration of negotiating with the assigner is triggered if the potential signal arriving at the radio astronomy (RA) site is greater than or equal to the relevant threshold level, calculated by:

$$\text{Tx PSD}_{(\text{dBm/Hz})} - \text{PPL} - 3.9 \geq \text{Threshold Level}$$

Where:
$\text{Tx PSD}_{(\text{dBm/Hz})}$ = Transmitter power spectral density
PPL = Propagation Path Loss

Propagation path loss is determined by use of the cascaded knife edge method of diffraction described in the most recent version of ITU-R Recommendation P.526, using a 'K-factor' of 4/3 and a 9 second digital elevation model or better.

Effective antenna heights for the radio astronomy sites are provided in Table 3, and signal threshold levels are provided in Table 4.

Table 3 Effective Antenna Heights

Effective Antenna Heights (metres)					
Narrabri	Parkes	Mopra	Hobart	Ceduna	Tidbinbilla
18	30	13	15	12	30

Table 4 Threshold Levels

Band (MHz)	Threshold Level (dBm/Hz)					
	Parkes	**Narrabri**	**Mopra**	**Hobart**	**Ceduna**	**Tidbinbilla**
1250–1780	–223	–234	–204	–204	N/A	–204
2200–2550	–237	–232	–204	–204	–204	–204
4350–6700	–237	–232	–204	–204	–204	–204
8000–9200	–240	–235	–204	–204	–204	–204
16000–26000	–241	–236	–200	–200	–200	–200
71000–76000	N/A	–243	–243	N/A	N/A	N/A
81000–86000	N/A	–243	–243	N/A	N/A	N/A

Transmitter power spectral density (Tx PSD) in the direction of the potentially affected radio astronomy site(s) is determined by:

$$\text{Tx PSD}_{(\text{dBm/Hz})} = \text{Tx(dBm)} - 10\log(\text{BW(Hz)}) + \text{AG(dBi)}$$

Where:
$\text{Tx PSD}_{(\text{dBm/Hz})}$ = Transmitter power spectral density
BW = Bandwidth in Hertz
AG = Antenna Gain towards RA site relative to an isotropic radiator in dBi
Tx(dBm) = Transmitter Power into the antenna in dBm

Annex 3: Information Form: RALI MS31

Name in full of assigner:	
Company, employer or organisation name:	
Address:	
Telephone number:	
Fax number:	
E-mail address:	

Transmitter: (duplicate as necessary for multiple transmitters)

Type of service (e.g. fixed point-to-point, mobile, etc):	
Location (Site ID, Site address or site local name, site coordinates including reference datum):	
Operating frequency:	
Emission designator:	
Transmitter power:	
Antenna gain in the direction of the radio astronomy observatory or observatories[10]:	
Antenna height above ground:	

[10] May be provided as information on the antenna's horizontal pattern.