Licensing and coordination procedures for area-wide apparatus licensed services in the 26/28 GHz bands

Radiocommunications Assignment and Licensing Instruction

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Amendment history

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| August 2020 | Initial draft covering arrangement for area-wide apparatus licences in the 26 GHz and 28 GHz bands |
|  |  |
|  |  |

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

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

Contents

[1 Introduction 1](#_Toc48721701)

[1.1 Purpose 1](#_Toc48721702)

[1.2 Scope 1](#_Toc48721703)

[1.2.1 Basic principles 1](#_Toc48721704)

[1.3 RALI structure 3](#_Toc48721705)

[2 Coexistence arrangements 5](#_Toc48721706)

[2.1 Identification of potentially affected services 5](#_Toc48721707)

[2.2 Coexistence arrangements 5](#_Toc48721708)

[2.2.1 Coexistence with frequency and area adjacent AWL services 5](#_Toc48721709)

[2.2.2 Coexistence between AWL devices operating in the same frequency and area 7](#_Toc48721710)

[2.2.3 Coexistence with 26 GHz band spectrum licensed services 9](#_Toc48721711)

[2.2.4 Coexistence with space research service (SRS) earth stations 10](#_Toc48721712)

[2.2.5 Coexistence with the passive Earth Exploration Satellite Service (EESS) 11](#_Toc48721713)

[2.2.6 Coexistence with space-receive stations 11](#_Toc48721714)

[2.2.7 Coexistence with ubiquitous FSS earth stations 13](#_Toc48721715)

[2.2.8 Coexistence with legacy point-to-point services 13](#_Toc48721716)

[2.2.9 Coexistence with class licensed services 13](#_Toc48721717)

[2.2.10 Notional receiver and compatibility requirement 14](#_Toc48721718)

[3 Coordination procedures and pre-registration requirements 16](#_Toc48721719)

[3.1 Preliminary coordination procedures 16](#_Toc48721720)

[3.2 Registration of FSS earth stations 17](#_Toc48721721)

[3.2.1 Earth station antennas 17](#_Toc48721722)

[3.3 Coordination at the geographic boundary 18](#_Toc48721723)

[3.3.1 Coordination at the AWL boundary 18](#_Toc48721724)

[3.3.2 Coordination at the boundary of a 26 GHz band spectrum licence 20](#_Toc48721725)

[3.4 Fallback synchronisation uplink-downlink configuration 20](#_Toc48721726)

[3.5 Coordination requirements with SRS earth stations 21](#_Toc48721727)

[3.6 Coexistence with passive EESS 22](#_Toc48721728)

[3.7 Coordination with legacy point-to-point fixed links 22](#_Toc48721729)

[3.8 Requirements contained in other RALIs and business operating procedures (BoPs) 24](#_Toc48721730)

[4 Licensing 26](#_Toc48721731)

[4.1 Overview of Licensing 26](#_Toc48721732)

[4.2 Licence conditions 26](#_Toc48721733)

[4.3 Assignment rules 26](#_Toc48721734)

[4.3.1 Assignment instructions 26](#_Toc48721735)

[4.3.2 Channel raster 27](#_Toc48721736)

[4.3.3 Assignment priority 27](#_Toc48721737)

[4.3.4 Advisory notes and special conditions 28](#_Toc48721738)

[5 Exceptions 31](#_Toc48721739)

[6 RALI Authorisation 32](#_Toc48721740)

[Appendix A: Examples of compliance at the geographic boundary 33](#_Toc48721741)

[Appendix B: Protection criteria for fixed link receivers 36](#_Toc48721742)

# Introduction

## Purpose

The purpose of this Radiocommunications Assignment and Licensing Instruction (RALI) is to provide information about, and describe the necessary steps for:

* administratively issuing area-wide apparatus licences (AWLs) in the 26 GHz (24.7-27.5 GHz) and 28 GHz (27.5-29.5 GHz) bands (referred to collectively as the 26/28 GHz bands), and
* the coordination of devices operated under these licences.

The information in this document reflects the ACMA’s statement of current policy in relation to devices authorised under an AWL in the 26/28 GHz bands. 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:

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## Scope

The scope of the RALI covers the administrative allocation and coordination arrangements for AWLs in the 26/28 GHz bands. This RALI should be read in conjunction with the Allocation of apparatus licences in the 26 GHz and 28 GHz band – Applicant information pack (the Applicant Information Pack).

### Basic principles

The basic principles for issuing and operating devices under an AWL in the 26/28 GHz bands are:

* An AWL provides service-flexible and technology-flexible access to a frequency range and geographic area (its ‘licence area’) specified on the licence. Conditions applicable to all AWLs in the 26/28 GHz band are detailed in the Radiocommunications Licence Conditions (Area-Wide Licence) Determination 2020 (the AWL LCD),[[1]](#footnote-2) as in force from time to time.
* Consistent with the Radiocommunications (Interpretation) Determination 2015, an AWL may be used to operate an area-wide service that consists of one or more area-wide stations (radiocommunications transmitters), and which may also consist of one or more area-wide receive stations. In this RALI, ‘AWL receiver’ means a radiocommunications receiver which is used for the reception of radio emission from area-wide stations and that does not require an area-wide receive licence.
* The technical arrangements for AWLs in the 26/28 GHz bands have been designed to accommodate wireless broadband and fixed satellite service (FSS) earth stations (simply referred to as ‘earth stations’ for many of the purposes of this RALI) – although other services may be deployed as long as devices comply with the applicable licence conditions.[[2]](#footnote-3)
* An AWL is issued prior to device coordination (if required). Where applicable, any necessary device coordination is to be undertaken prior to including applicable devices in the Register of Radiocommunications Licences (RRL).
* An AWL will generally only be issued if it complies with the licensing arrangements detailed in Chapter 4 of this RALI.
* Subject to the limitations detailed in Chapter 4, an AWL can be issued to authorise access:
* In any area within the ranges 24.7-25.1 GHz and 27.5-29.5 GHz
* In the range 25.1-27.5 GHz in areas not subject to the [*Radiocommunications (Spectrum Re-allocation—26 GHz band) Declaration 2019*](https://www.legislation.gov.au/Details/F2019L01374) (26 GHz band reallocation declaration)
* In general, a new AWL will not be issued if it would overlap with an existing AWL in both frequency and area. The exception is when the new AWL, or the existing AWL(s), includes a condition which restricts operation to transmitting earth stations and requires the licensee to provide protection to AWL receivers operating in the frequencies and area which are being overlapped (see section 2.2.2 and Chapter 4).
* A device must not be operated under an AWL in the 26/28 GHz bands unless it complies with the AWL LCD and with any conditions included on individual licences.
* Before a transmitter can be operated under an AWL, details of the transmitter must be recorded in the RRL (except for exempted transmitters listed in the AWL LCD).
* A transmitter must not be operated if its operation is inconsistent with this RALI (see paragraph 4 of schedule 1 of the AWL LCD).
* Before a transmitter can be included in RRL, it must comply with the provisions in this RALI and any other applicable RALI and/or ACMA policy – see sections 3.2 and 3.8.
* Fixed satellite service (FSS) earth stations operated under an 26/28 GHz band AWL have primacy over AWL receivers operating in the frequency ranges:
* 27.5-28.1 GHz for AWL receivers which are located outside areas subject to the 26 GHz band reallocation declaration (referred to as ‘defined areas’ in this RALI), or
* 28.1-29.5 GHz.

## RALI structure

This RALI is structured as follows:

* Chapter 2 – outlines the coexistence arrangements between devices authorised under a 26/28 GHz band AWL and other services.
* Chapter 3 – details the requirements and procedures to be undertaken before the details of a radiocommunications transmitter can be included in the RRL.
* Chapter 4 – details the rules when assigning a new AWL in the 26/28 GHz bands (noting that other arrangements about the licence application process are included in the Applicant Information Pack).[[3]](#footnote-4)

Table 1 further expands on the rules and requirements set out in Chapters 3 and 4.

1. RALI structure

|  |  |  |
| --- | --- | --- |
|  | **Topic** | **Reference** |
| Pre-registration requirement | Coexistence with existing AWL receivers or 26 GHz band spectrum licence | 3.1 |
| International coordination (FSS earth stations) | 3.2 |
| Geographic boundary coordination | 3.3 |
| Coordination with SRS earth stations | 3.5 |
| Coexistence with passive EESS in 23.6-24 GHz | 3.6 |
| Coordination with legacy point-to--point links | 3.7 |
| Requirements in other RALIs and business operating procedures (BoPs) | 3.8 |
| Licence issue rules[[4]](#footnote-5) | Assignment instructions | 4.3.1 |
| Channel raster | 4.3.2 |
| Assignment priority | 4.3.3 |
| Advisory notes and special conditions | 4.3.4 |

# Coexistence arrangements

## Identification of potentially affected services

Services operated under an AWL in the 26/28 GHz bands will need to coexist with the following other services:

* Other AWL services in the 26/28 GHz bands, including managing interference from AWL licensed FSS earth stations.
* 26 GHz spectrum licensed devices operating in the range 25.1-27.5 GHz
* Space research service (SRS) earth stations operating in the range 25.5-27 GHz
* Passive earth exploration satellite services (EESS) operating in the range 23.6-24 GHz
* Space receive stations operating in the range 24.7-29.5 GHz
* Ubiquitous FSS earth station up-links operating in the range 27.5-29.5 GHz
* Legacy fixed point-to-point services operating in the range 27.5-28.5 GHz

Class licensed devices operating in the frequency range 24.25-29.5 GHz.

Coexistence arrangements with the above services are detailed in the section 2.2.

## Coexistence arrangements

### Coexistence with frequency and area adjacent AWL services

All AWL devices which are required to be included in the RRL must meet a defined power flux density (pfd) limit at the geographic boundary of the licence area[[5]](#footnote-6) – see Table 4 in section 3.3.1. This pfd limit is designed to provide adequate protection of user devices (which are not included in the RRL) without placing overly onerous restrictions on where base stations could be deployed.

Coexistence between services operated under adjacent AWLs is managed on a case-by-case basis, where necessary. This approach reflects that the requirement to meet a boundary PFD condition and out-of-band emission limits minimises interference potential in the first instance and is intended to optimise the utility and efficiency of deployments in the band. Section 3.1 sets out the processes for case-by-case management, which initially encourages negotiation between impacted parties where possible.

Many of the technologies authorised by AWLs in these frequency bands will utilise time-division duplex arrangements, which means interference between similar services can be minimised through transmit/receive frame synchronisation, where possible (acknowledging that some services, in particular transmitting earth stations, do not use these duplexing arrangements).

Where TDD synchronisation is necessary, affected operators are initially encouraged to negotiate a synchronisation solution. To optimise coexistence, a fall-back synchronisation requirement has been specified in the AWL LCD which will apply for all devices except earth station transmitters to ensure coexistence can continue in the event that negotiations fail. Section 3.4 details the applicable uplink-downlink configuration to be used when the synchronisation requirement has been triggered.

A summary of the coexistence arrangements between adjacent AWLs is provided below:

* At the frequency boundary:
* The unwanted emission limits specified in the AWL LCD; and
* For interference from:
* transmitters other than earth stations: The synchronisation requirement specified in the AWL LCD
* earth stations: new earth stations are to coordinate with existing frequency-adjacent AWL receivers.
* At the geographic area boundary:
* Compliance with the area boundary pfd limits detailed in section 3.3.1; and
* For interference from:
* transmitters other than earth stations: The synchronisation requirement specified in the AWL LCD
* earth stations: new earth stations are to coordinate with existing area-adjacent AWL receivers.

*Managing interference from FSS earth stations*

Apparatus licensed earth stations may be operated in the 26/28 GHz band under AWLs. The potential for interference from earth stations to AWL receivers will depend on a number of factors, in particular the earth station transmit power and unwanted emission limits, geographical separation between the earth station and AWL receivers and any antenna discrimination.

Unwanted emission limits for transmitters operated under an AWL in the 26/28 GHz band are defined in the AWL LCD. Earth stations operated under an AWL are required to meet the same unwanted emissions as other AWL transmitters, except for unwanted emissions in frequencies and areas where Fixed Wireless Access (FWA) services are secondary.[[6]](#footnote-7) Accordingly, the AWL LCD exempts earth stations from the unwanted emission limits in frequencies:

* Above 27.5 GHz for earth stations located outside a defined area, and

Above 28.1 GHz for earth stations located inside a defined area.

Given apparatus licensed earth stations operate at known (registered) locations and the interference potential will likely be limited to only short distances from the site, the onus is on other AWL licensees to ensure their devices do not receive harmful interference from existing registered earth stations. No protection will be afforded to AWL receivers from interference caused by an existing FSS earth station (i.e. where an earth station which was licensed and had its details recorded in the RRL before the AWL receiver had its details recorded in the RRL). Advisory note [WW] is to be included on all AWLs issued in the 26/28 GHz bands – see section 4.3.4.

New earth station transmitters, which are exempt from the fallback synchronisation requirement, are required to coordinate with existing AWL and spectrum licensed receivers which are recorded in the RRL (except AWL- receivers in 27.5-28.1 GHz outside defined areas or in the range 28.1-29.5 GHz) – see section 3.1.

AWL-authorised FWA services in the range 27.5-28.1 GHz outside defined areas or in the range 28.1-29.5 GHz in all areas are secondary in relation to FSS services. Therefore, AWL receivers in these frequency ranges and areas will not be provided protection from existing or future FSS gateway earth stations. Advisory note [YY] is to be included on all AWLs issued in the range 27.5-28.1 GHz outside defined areas or in the range 28.1-29.5 GHz – see section 4.3.4.

In planning deployments under an AWL, licensees should take account of the arrangements detailed in this section and plan their services accordingly.

### Coexistence between AWL devices operating in the same frequency and area

In general, a new AWL will not be issued if it would overlap with an existing AWL in both frequency and area. This arrangement provides a degree of exclusive spectrum access to a single licensee which minimises the need for direct device-to-device coordination.

However, in some scenarios, this arrangement may act to unnecessarily restrict spectrum access to a new licensee where there is minimal or no risk of interference. For example, two earth stations can be operated on the same frequency and in the same area without causing interference between the two satellite networks (assuming international coordination has, or is being, completed – see section 3.2). Similarly, FWA networks might be able to operate with stations in proximity to transmitting earth stations, if they are sited/planned in such a way that avoids interference from the earth station (i.e. ‘work around’ the earth station while still providing a service).

To avoid such unnecessary restrictions, a new AWL may be issued which has a frequency and area that overlaps those of existing AWL(s) for the following scenarios:

* When the proposed licence includes special condition [AA], or
* When the proposed licence includes advisory note [ZZ1] and it overlaps existing AWL(s) which all include special condition [AA].

The application of special condition [AA] and advisory note [ZZ1] (detailed in section 4.3.4) acts to provide spectrum access to a new licensee without degrading the utility of the AWL(s) being overlapped.

This arrangement will:

* Allow co-frequency earth stations, which are operated by different licensees, to operate at the same location without impacting terrestrial services operated by an existing licensee.
* ensure that access to spectrum by a prospective earth station operator will not be impeded by an AWL used to operate lower-priority services.
* allow AWLs with special condition [AA] to be issued for a frequency range which does not comply with the channel raster or assignment priory, limited to AWLs in the frequency range 27.5-28.1 GHz outside defined areas or in 28.1-29.5 GHz
* Allow a new wireless broadband service to be deployed on a ‘best-efforts’ basis by accepting (and/or planning around) any potential interference from earth stations operating under an existing AWL which is being overlapped.

This arrangement is currently limited to overlapping AWLs where:

* one or more authorises earth-stations only, and
* no more than one of the AWLs can authorise FWA services (as well as earth stations).

This means that ACMA will not issue two (or more) AWLs which authorise wireless broadband services and which overlap in frequency and area, owing to the increased risk of interference between co-frequency wireless broadband services in the same area.

See Figure 1 and section 4.3 for further details.

1. Arrangements for overlapping AWL (see notes)



Note 1: Special condition [AA] permits only earth stations to be operated. The licensee must not cause harmful interference to AWL receivers communicating with transmitters operating under an AWL which is being overlapped (limited to receivers in co-primary frequencies and areas).

Note 2: Advisory note [ZZ1] states that AWL receivers communicating with transmitters operating under the licence will not be afforded protection from transmitters operating under an AWL which is being overlapped.

### Coexistence with 26 GHz band spectrum licensed services

Similar to spectrum licences, AWLs authorise the operation of devices in a defined frequency/area combination with licence conditions to manage out-of-area and out-of-band interference. Therefore, interference is primarily managed at the AWL boundary (frequency and area) and not the device.

The technical framework for AWLs in the 26/28 GHz bands has been optimised for 5G wireless broadband services and is, in effect, very similar to the proposed technical framework for spectrum licences in the 26 GHz band. This will result in a reciprocal interference scenario at the licence boundaries between apparatus and spectrum licences in most cases.

Coexistence between spectrum licensed and AWL-authorised services will be managed through the application of the following measures, noting that the synchronisation requirement does not apply to earth stations operated under an AWL:

* At the frequency boundary:
* The unwanted emission limits specified in the AWL LCD; and
* For interference from:
* transmitters other than earth stations: The synchronisation requirement specified in the AWL LCD and on spectrum licences
* earth stations: new earth stations are to coordinate with existing frequency-adjacent spectrum licensed receivers.
* At the geographic area boundary between AWL and spectrum licensed areas:
* The device boundary criteria (DBC) specified in the Radiocommunications (Unacceptable Levels of Interference — 26 GHz band) Determination 2020. This coordination requirement is detailed in section 3.2; and
* For interference from:
* transmitters other than earth stations: The synchronisation requirement specified in the AWL LCD and on the spectrum licences
* earth stations: new earth stations are to coordinate with existing area-adjacent spectrum licensed receivers.

At both the frequency and area boundaries the synchronisation requirement provides the fallback (on a case-by-case basis), should interference occur which cannot be resolved through negotiation between relevant parties, except when managing interference from earth station transmitters. This same requirement is placed on both AWLs in the 26/28 GHz bands as well as 26 GHz band spectrum licences.

Coordination procedures are contained in section 3.1.

Section 3.4 details the applicable uplink-downlink configuration to be used when the synchronisation requirement has been triggered.

### Coexistence with space research service (SRS) earth stations

Earth-receive stations support SRS activities in the range 25.5-27 GHz and are currently limited to space communications facilities at New Norcia, WA, and Tidbinbilla, ACT. Coexistence of AWL devices with these SRS earth stations is managed via:

* Exclusion zones around SRS earth stations where AWL transmitters cannot be operated. These exclusion zones are included as a condition in the AWL LCD.
* A requirement for AWL transmitters (limited to transmitters which are required to be included in the RRL and high-powered outdoor UEs[[7]](#footnote-8)) not to exceed a defined maximum aggregate interference level at the receiver input of these SRS earth stations. Protection requirements and coordination details are contained in section 3.5.
* A policy restricting the issue of AWLs in the HCIS level 1 cells which contain these SRS earth stations – see section 4.3.1.[[8]](#footnote-9)
* AWL-authorised earth stations in sole-primary frequency and areas must not exceed the requirements for spurious emissions provided in Appendix 3 of the ITU Radio Regulations.[[9]](#footnote-10)

### Coexistence with the passive Earth Exploration Satellite Service (EESS)

Space-borne passive sensing EESS services operate in the 23.6-24 GHz band. Coexistence between AWL devices and passive EESS is managed through imposing more restrictive unwanted emission limits from devices authorised under AWLs into the frequency range 23.6-24 GHz – these additional limits are detailed in the AWL LCD.

Section 3.6 mandates density limits for AWL base stations operating in the range 24.7-25.1 GHz to manage the potential for aggregate out-of-band interference into the EESS below 24 GHz.

### Coexistence with space-receive stations

Article 5 of the ITU-R Radio Regulations prescribes allocations for various space services in the range 24.25-29.5 GHz on a co-primary basis with terrestrial services (including IMT). Domestically, FSS gateway uplinks operate in the range 27-29.5 GHz.

The AWL LCD places additional licence conditions on some AWL devices to safeguard coexistence with space receive stations including FSS gateway uplinks. These conditions are summarised in Tables 2 and 3.

1. TRP limits and additional mitigations – except earth stations

|  |  |  |
| --- | --- | --- |
| **Frequency/area** | **TRP limit** | **Additional conditions[[10]](#footnote-11)** |
| 24.7-27 GHz all areas | 40 dBm/200 MHz (baseline) | No extra conditions |
| 45 dBm/200 MHz  (upper limit) | Antenna pointing restrictions\* and  EIRP mask (see Table 2) |
| 27-27.5 GHz outside footprint areas | 37 dBm/200 MHz (baseline) | No extra conditions |
| 42 dBm/200 MHz  (upper limit) | Antenna pointing restrictions\* and  EIRP mask (see Table 2) |
| 27-27.5 GHz inside footprint areas | 25 dBm/200 MHz (baseline) | Extra antenna restrictions developed in the TLG\*\* |
| 30 dBm/200 MHz  (upper limit) | Antenna pointing restrictions\* and  EIRP mask (see Table 2) |
| 27.5-29.5 GHz | 25 dBm/200 MHz (baseline) | Antenna pointing restrictions\*\*\* |
| 30 dBm/200 MHz  (upper limit) | Antenna pointing restrictions\* and  EIRP mask (see Table 2) |

\* The main antenna beam is not to be mechanically or electrically steered above the horizon. This restriction applies to all outdoor transmitters.

\*\* Outdoor base stations must not be mechanically steered above the horizon and must not direct the main beam (via electrical steering) to elevation angles greater than 5° above the horizon for more than 5% of time within a 24 hour period. Outdoor fixed transmitters, which are not base stations, must not direct their main beam to within defined angles from the geostationary orbit.

\*\*\* The main base station antenna beam is not to be mechanically or electrically steered above the horizon. Outdoor fixed transmitters, which are not base stations, must not direct their main beam to within defined angles from the geostationary orbit.

1. EIRP masks

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Radiated maximum true mean power**  **(dBm/200 MHz EIRP)** | | |
| **Elevation angle above the horizontal plane**  **(el)** | **For transmitters in 24.7–27 GHz** | **For transmitters in 27–27.5 GHz and outside footprints** | **For transmitters in 27–27.5 GHz and inside footprints, and 27.5-29.5 GHz** |
| 5 degrees ≤ el < 15 degrees |  | - | - |
| 15 degrees ≤ el < 25 degrees | 49 | 46 | 34 |
| 25 degrees ≤ el < 55 degrees |  |  |  |
| 55 degrees ≤ el ≤ 90 degrees | 36.1 | 33.1 | 21.1 |

### Coexistence with ubiquitous FSS earth stations

Ubiquitous FSS earth stations operate in the 28 GHz band in accordance with the Radiocommunications (Communication with Space Object) Class Licence 2015 (the CSO class licence).

Ubiquitous FSS earth stations authorised under the CSO class licence have priority over AWL services operating in the range 27.5-28.1 GHz outside defined areas, and in the range 28.1-29.5 GHz. Therefore, AWL receivers which operate in these frequency ranges and areas will not be provided protection from existing or future ubiquitous FSS earth stations. Advisory note [YY] is to be included on all AWLs issued in the range 27.5-28.1 GHz outside defined areas or in the range 28.1-29.5 GHz – see section 4.3.4.

In planning deployments under an AWL, the licensee should take account of the above arrangements and plan their services accordingly.

### Coexistence with legacy point-to-point services

No new point-to-point links are to be permitted in the 28 GHz band.[[11]](#footnote-12) Legacy point-to-point services will be able to continue to operate for a minimum of 7 years with a possibility of continued operation beyond this timeframe (subject to further review). During this time, AWL services will need to coexist with existing point-to-point services.

Coordination requirements to protect legacy point-to-point links are detailed in section 3.7 for all transmitters other than earth stations. Coordination requirements for earth stations are detailed in RALI MS 38.

AWL receivers will not be afforded protection from interference from existing point-to-point links. Advisory note [XX], which is to be included on all AWLs in the 26/28 GHz bands, is also applicable to this interference scenario – see section 4.3.4. In planning deployments under an AWL, the licensee should take account of existing point-to-point transmitters and plan their services accordingly.

### Coexistence with class licensed services

Various class licensed devices currently operate in the 24.25-29.5 GHz range, including:

* Aviation security body scanning devices operating in the frequency range 24.25-30 GHz, authorised under the Radiocommunications (Body Scanning – Aviation Security) Class Licence 2018
* Devices authorised under the Radiocommunications (Low Interference Potential Devices) Class Licence 2015 (the LIPD class licence) including:
* Wireless broadband services operating in the frequency range 24.25-25.1 GHz[[12]](#footnote-13)
* Radiofrequency identification transmitters operated in the frequency range 24.1-26.5 GHz
* Radiodetermination transmitters operating in the frequency range 24.05-26.5 GHz
* Ultra-wideband short-range vehicle radar systems operating in the range 22-26.5 GHz

The risk of interference between AWL services and class licensed systems is low; however, in the unlikely event there is interference between these services the following arrangements apply:

* LIPD class licensed devices operate on a no-interference, no-protection basis with respect to other radiocommunications devices, including AWL services in the 26/28 GHz bands. It is expected that facility owners will assist in the management of interference between AWL and LIPD class licensed services which are both operating within the boundary of their property.

A device operated under an AWL must not cause interference to, nor is it provided protection from, a device operated under the Radiocommunications (Body Scanning – Aviation Security) Class Licence 2018, as in force from time to time (see the AWL LCD)

### Notional receiver and compatibility requirement

In addition to the coexistence arrangements identified above, a notional receiver and compatibility requirement is established to aid in the resolution of interference to AWL receivers.

The level of interference caused by unwanted emissions depends on the interference susceptibility of a receiver and the level of the unwanted signal. Emission levels from transmitters should not have to be reduced below a point where the performance of the radiocommunications receiver is the main cause of the problem.

Therefore, it is necessary to establish a benchmark notional receiver performance level when setting a compatibility requirement for radiocommunications receivers. The recommended notional receiver performance for AWL receivers is detailed in Schedule 1 of the Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 26 GHz Band) 2020 (RAG Rx).

Unless otherwise stated[[13]](#footnote-14), AWL receivers will be afforded protection from apparatus and spectrum licensed transmitters to the level specified in Schedule 1 of the RAG Rx, if the receiver:

* has at least the notional level of receiver performance set out in Schedule 1 of the RAG Rx; and

has had its details recorded in the RRL prior to the transmitter with which compatibility is sought has its details recorded in the Register.

Advisory note [ZZ] is to be included on all AWLs issued in the 26/28 GHz bands – see section 4.3.4.

The notional receiver is intended to be used when coordinating a proposed transmitter with an existing receiver (i.e. the coordination will be based on protecting the existing receiver to the level of the notional receiver). The adjacent channel selectivity and in-band blocking requirements are specified in Schedule 1 of the RAG Rx using relative values (i.e. the ratio between the minimum wanted signal level and the interference signal level).

To calculate the maximum tolerable absolute interference signal level at frequencies adjacent to an existing receiver, a reference bandwidth of 50 MHz is to be used. For example:

* the maximum interference level within the 50 MHz adjacent to the receiver is calculated as:

wanted signal level + ACS – Rx antenna gain in the direction of the transmitter (from the RRL)

=-88 dBm/50 MHz +21.7 dB – 23 dBi

=-89.3 dBm/50 MHz at the receive antenna input

* the maximum interference level at a frequency offset of greater than 50 MHz is:

Wanted signal level (from the RAG Rx) + in-band blocking – antenna gain in the direction for the transmitter (from the RRL)

= -88 dBm/50 MHz + 27 dB – 23 dBi

= -84 dBm/50 MHz at the receive antenna input

# Coordination procedures and pre-registration requirements

This chapter details the coordination procedures and requirements which must be met before the details of a radiocommunications transmitter can be included in the RRL. As required by the AWL LCD, a transmitter must not be operated under a 26/28 GHz band AWL if its details are not included in the RRL, except for transmitters which are specifically exempt.

## Preliminary coordination procedures

Licensees planning to deploy radiocommunications transmitters in the 26/28 GHz bands under an AWL must have regard to AWL and spectrum licensed receivers that are recorded in the RRL. The only exception to this is when the planned transmitter is operated under the fixed satellite service and the subject AWL receiver is secondary.

In planning for the operation of fixed transmitters under an AWL, the licensee must coordinate with any radiocommunications receivers recorded in the RRL. The coordination performed must:

* use the parameters of the radiocommunications receivers as recorded in the Register;
* use the compatibility requirement set out in Schedule 2 of the *Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 26 GHz Band) 2020* as in force from time to time;
* although there are no receiver performance requirements, the notional receiver performance level set out in Schedule 1 of *Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 26 GHz Band) 2020,* as in force from time to time, is to be used for coordination purposes.
* make use of a suitable propagation model to model path loss between the fixed transmitters and radiocommunications receivers;[[14]](#footnote-15)
* take into account terrain and any other relevant factors; and

consider any special conditions and/or advisory notes which are included on the relevant licences.

In the event that the above coordination indicates that interference may occur, the AWL licensees should consider:

* replanning the deployment of the fixed transmitters to avoid causing harmful interference; or

negotiating with the licensee of the affected receiver to find a resolution.

In the event that replanning the deployment is not possible and a negotiated resolution cannot be reached:

* for transmitters other than earth stations, interference is managed in accordance with the synchronisation requirementcondition included in the AWL LCD, unless other arrangements are agreed to by the affected licensees.
* For earth station transmitters:
* If the receiver is an AWL receiver and it is operating in the range 27.5-28.1 GHz outside a defined area or in the range 28.1-29.5 GHz, the details of the proposed transmitter may be included in the RRL; or
* For other receivers, the details of the proposed transmitter must not be included in the RRL

*Note:* For a device with an active antenna system, the radiated power in the direction of a receiver operated under another licence is defined as the sum of the gain of the antenna in the direction of the receiver (accounting for azimuth and elevation) 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 a defined level of radiated power in a specific direction is not exceeded.

The ACMA will take these coordination procedures into account when resolving an interference dispute.

## Registration of FSS earth stations

This RALI does not cover all matters relevant to coordination and licensing for earth stations. It should be read in conjunction with other applicable documentation including earth station licensing procedures as outlined the ACMA Business Operating Procedure [Submission and processing of applications for earth and earth receive apparatus licences for fixed earth stations](https://www.acma.gov.au/procedure-earth-and-earth-receive-licensing).

Additional coordination may be required for earth stations located near the territory of neighbouring countries (mainly applicable for sites in northern Australia due to proximity to Papua New Guinea).

The details of an earth station must not be included in the RRL until all relevant coordination requirements and procedures have been completed.

### Earth station antennas

For any earth station being registered under an area-wide licence in the range 27-29.5 GHz, its antenna must have an off-axis gain (for all off-axis angles between *φmin* and 180°) that is lower 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 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 supplied should include an antenna’s physical diameter and on-axis gain as well as the antenna’s 360° radiation pattern envelope, in order to facilitate its use in frequency coordination.

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[[15]](#footnote-16)) 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.

## Coordination at the geographic boundary

### Coordination at the AWL boundary

The details of an AWL transmitter must not be included in the RRL if the pfd at the geographic area authorised by the licence, caused by the proposed transmitter, would exceed the levels detailed in Table 4. The limits in Table 4 only need to be met at the licence boundary, higher pfd levels beyond the boundary can be ignored. Further examples are contained in Appendix A. The limits in Table 4 apply at all frequencies authorised by the licence.

1. Pfd limits at the geographic boundary

|  |  |
| --- | --- |
|  | pfd limit (dBW/m²/MHz measured at a height of 5 metres above the ground) |
| Transmitter with an active antenna system[[16]](#footnote-17) | -83 |
| Transmitter without an active antenna system9 | -91 |

The pfd limits in Table 4 do not apply:

* In the range 25.1-27.5 GHz and at parts of the geographic boundary authorised by the AWL which are directly adjacent to the geographic areas listed in the Radiocommunications (Spectrum Re-allocation—26 GHz Band) Declaration 2019 (the 26 GHz reallocation declaration). See subsection 3.3.2 for coordination at the spectrum licence boundary.

In the range 25.5-27 GHz and at parts of the geographic boundary authorised by the AWL which are directly adjacent to HCIS cells MW4H6 or BV2A3 (requirements to protect SRS earth stations in these cells are detailed in section 3.5).

* For earth station transmitters,[[17]](#footnote-18)
* in the range 28.1-29.5 GHz; and
* in the range 27.5-28.1 GHz except at a boundary of a defined area. If the pfd limit is exceeded at a defined area boundary then additional area within the defined area can be included on the licence (subject to availability).

Calculation of the pfd at the area boundary is only required when the distance from the proposed transmitter to the licence boundary exceeds the minimum distances shown in Figure 1. When calculating the pfd at the boundary the assigner should apply good engineering practices and consider all factors which may impact the actual pfd level for the proposed transmitter. These factors may include, but are not limited to, the following:

* Transmitter parameters including:
* Transmit and feeder losses
* Antenna gain and directivity. For transmitters with an active antenna system, the radiated power at a particular bearing can be defined as the sum of the gain of the antenna in the bearing and the total radiated power. This allowance is based on the assumption that beam pointing angles and/or power can be controlled dynamically.
* Propagation losses including losses from:
* Terrain – all modelling must use a 9 second digital elevation model (such as RadDEM) or better
* Clutter/shielding from structure/vegetation etc
* Building penetration loss (for transmitter located indoors).

As radio waves propagate in different ways because of factors such as frequency, terrain, atmospheric conditions and topography, there are a number of ways to predict path loss. ITU-R Recommendation P.1144 “Guide to the application of the propagation methods of Radiocommunications Study Group 3” provides a guide on the application of various propagation methods developed internationally by the ITU‑R. It advises users on the most appropriate methods for particular applications as well as the limits, required input information, and output for each of these methods. It is recommended that the most recent version of propagation models defined by the ITU-R should be used.

1. Minimum distance from licence boundary where the pfd limits do not apply

### Coordination at the boundary of a 26 GHz band spectrum licence

The details of an AWL transmitter must not be included in the RRL if it would operate in the range 25.1-27.5 GHz and any part of the device boundary of the transmitter lies inside a geographic area subject to the 26 GHz reallocation declaration. The device boundary is to be calculated in accordance with Part 1 of Schedule 2 of *Radiocommunications (Unacceptable Levels of Interference — 26 GHz band) Determination 2020*, as in force from time to time*.*

## Fallback synchronisation uplink-downlink configuration

Spectrum licences in the 26 GHz band and the AWL LCD (for AWLs in the 26/28 GHz bands) include a synchronisation requirement which may be invoked to resolve interference if negotiation between affected parties to resolve the interference fails (also see sections 2.2.1 and 2.2.3).[[18]](#footnote-19) The uplink-downlink configuration to be used when the synchronisation requirement is invoked is:

* [An uplink-downlink configuration which is consistent with the FR2.120-2 UL-DL pattern described in Table A.1.3-2 of 3GPP TS 38.101-4 V15.4.0[[19]](#footnote-20), where:
* The period of the slot configuration pattern is 0.5 ms;
* The period of a slot is 0.125 ms; and
* There are 14 symbols within a slot.]
* [An uplink-downlink configuration which is consistent with the FR2.120-1 UL-DL pattern described in Table A.1.3-2 of 3GPP TS 38.101-4 V15.4.0[[20]](#footnote-21), where:
* The period of the slot configuration pattern is 0.625 ms;
* The period of a slot is 0.125 ms; and
* There are 14 symbols within a slot.]

The uplink-downlink configuration detailed above is incorporated by reference by 26 GHz band spectrum licences and in the AWL LCD. The ACMA will not make any amendment to the uplink-downlink configuration detailed in this section without consulting with relevant licensees.

## Coordination requirements with SRS earth stations

This section details the requirements for coordinating relevant transmitters with SRS earth stations. ‘Relevant transmitters’ are transmitters which are operated under the licensee’s 26/28 GHz AWLs in the range 25.5-27 GHz and:

* Are required to be included in the RRL; or

Are exempt from registration under subsection 3(2)(c) of Schedule 1 of the AWL LCD.

The details of an AWL transmitter must not be included in the RRL if it would operate in the 25.5-27 GHz range and the aggregate interference level of the proposed transmitter and all other relevant transmitters exceeds the limit detailed in Table 5.

A transmitter which is exempt from registration under paragraph 3(2)(c) of Schedule 1 of the AWL LCD must not be operated in the 25.5-27 GHz range if the aggregate interference level of the proposed transmitter and all other relevant transmitters exceeds the limit detailed in Table 5.

In undertaking assessment against the maximum interference level, the SRS earth station operating parameters as recorded in the RRL, in addition those included in Table 5, are to be used.

1. Additional SRS earth station parameters to be used in coordination

|  |  |  |
| --- | --- | --- |
|  | Canberra Deep Space Communications Complex | New Norcia Deep Space Ground Station |
| Maximum co-channel aggregate interference level[[21]](#footnote-22) | -156 dBW/MHz at the input of the receiver | |
| Location | Latitude: -35.3951°N  Longitude: 148.9785°E | Latitude: -31.0484°N  Longitude: 116.1914°E |
| Antenna pattern | Defined in ITU-R Recommendation SA.509-3 | |
| Minimum antenna elevation angle above horizon | Maximum of:   * 6 degrees, or * The angle to clear terrain in the direction of the proposed transmitter plus 0.5° | Maximum of:   * 5 degrees, or * The angle to clear terrain in the direction of the proposed transmitter plus 0.5° |

## Coexistence with passive EESS

Table 6 provides the maximum number of transmitters in the range 24.7-25.1 GHz (which are required to be included in the RRL) which can be deployed within a 9km radius. The details of an AWL transmitter must not be included in the RRL if it would operate in the range 24.7-25.1 GHz and the number of existing AWL transmitters in the RRL is equal to or exceeds the limit in Table 6 for the operating range of the proposed transmitter.

In assessing compliance with Table 6, a transmitter (either existing or proposed) with emissions overlapping more than one frequency segment in Table 6 is to be counted as a service in each of the overlapping frequency ranges. There is no deployment limit in the frequency range 25.1-29.5 GHz.

1. Deployment limits for AWL transmitters (which are required to be recorded in the RRL) in the frequency range 24.7–25.1 GHz

|  |  |
| --- | --- |
| Wireless broadband operating frequency range | Maximum number of AWLs transmitters (which are required to be recorded in the RRL) within a 9km radius |
| 24.7–24.9 GHz | 44 |
| 24.9­­–25.1 GHz | 44 |

## Coordination with legacy point-to-point fixed links

Coordination requirements for all transmitters other than earth stations are contained in this section. Coordination requirements between earth stations and point-to-point links are detailed in RALI MS 38. The details of a prospective AWL transmitter are not to be included in the RRL if the relevant coordination requirements detailed in this section, or in RALI MS 38 for earth stations, are not met.

Interference from a proposed AWL transmitter into a fixed link receiver is assessed using the steps described below. There is no requirement to assess interference from a point-to-point transmitter to an AWL receiver – see section 2.2.8.

The coordination process calculates a wanted-to-unwanted signal level ratio at the fixed link receiver input and compares it against the relevant protection ratio value(s) given in the tables at Appendix B.

A prospective AWL transmitter is not to be included in the RRL if it fails this coordination process.

**Step 1**: The first step is to identify all fixed link receivers that may be affected by the operation of the proposed AWL transmitter. To identify potentially affected fixed link receivers, a required minimum distance cull around the site of the proposed transmitter of 100 km is required.

A frequency cull is then applied to further reduce the number of cases requiring more detailed coordination calculations and are based on protecting fixed link receivers from emissions at frequency offsets up to and including the second adjacent channel of the AWL transmitter. Assuming a maximum transmit channel bandwidth of 400 MHz[[22]](#footnote-23), all fixed links with a centre frequency within 1056 MHz of the proposed transmitter centre frequency are to be included in the detailed coordination calculations.

**Step 2**: Calculate the level of wanted power at each receiver identified in step 1.

**Step 3**: Calculate the level of unwanted power at each receiver identified in step 1. Two separate cases exist – unwanted levels are to be calculated for both cases):

Case 1 – applies to AWL transmitters which are required to be included in the RRL. Calculate the unwanted power level on the basis of the application details for the AWL transmitter, using transmit power and antenna gain (with any discrimination taken into account), the licensed fixed link receiver gain (with any discrimination taken into account), and propagation loss from an appropriate propagation model.

Case 2 – applies to AWL transmitters which are not required to be in the RRL but may communicate with a registered device (e.g. user equipment). If the geographical location of the transmitter in case 1 is within 20 km[[23]](#footnote-24) of the fixed link receiver, coordination is deemed to fail. However, an AWL transmitter may still be included in the RRL if it can be shown that the coverage area of the case 2 transmitter does not overlap the interference zone of the fixed link receiver, assuming the notional transmitter characteristics in Table 7.

1. Notional parameters for transmitters not required to be included in the RRL

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Unit** |
| TRP | 35 (for transmitters operating in the range 24.7-27 GHz band in areas outside those defined in Schedule 2 of the AWL LCD  23 (for all other transmitters) | dBm/occupied bandwidth |
| Antenna gain | 17 (in the direction of the case 1 transmitter for calculation of coverage area and in the direction of the fixed link receiver for unwanted level calculations) | dBi |
| Antenna height | 5 | metres |

If the fixed link receiver is greater than 20 km from the case 1 transmitter, calculate the unwanted power level at the fixed link receiver assuming a transmitter located at the same coordinates as the case 1 transmitter and operating with the notional parameters in Table 7, the licensed fixed link receiver gain (with any discrimination taken into account), and propagation loss from an appropriate propagation model.

**Step 4**: Determine the applicable protection criteria for each victim receiver identified in step 1. To protect receivers from unacceptable interference, the unwanted power levels at a victim receiver must not exceed the required protection criteria for that receiver.

Protection ratios are used in this RALI for the protection of fixed link receivers. Protection ratios should be adjusted to take account of actual path length and rainfall rate. Protection ratio correction factor graphs are also provided in Appendix B.

**Step 5**: Compare the calculated wanted-to-unwanted ratios from steps 2 and 3 with the relevant protection ratio value(s) in the tables in Appendix B to determine if the required protection criteria at the victim fixed link receiver is achieved. If the required protection ratio is not met, the coordination is deemed to fail and the prospective AWL transmitter is not to be included in the RRL.

## Requirements contained in other RALIs and business operating procedures (BoPs)

This RALI does not cover all matters relevant to coordination of AWL transmitters with other services and it should be read in conjunction with other applicable RALIs and BoPs.

The details of an AWL transmitter must not be included in the RRL if it does not comply with the requirements in any other applicable RALI and BoP, including:[[24]](#footnote-25)

* RALI MS31 – Notification zones for apparatus licensed services around radio astronomy facilities.
* RALI MS32 – Coordination of apparatus licensed services within the ARQZWA.
* RALI MS44 – Frequency coordination procedures for the earth station protection zones.
* Business Operating Procedure – [Submission and processing of applications for earth and earth receive apparatus licences for fixed earth stations.](https://www.acma.gov.au/procedure-earth-and-earth-receive-licensing)
* Business Operating Procedure – [Restriction on earth station licensing near Alice Springs](https://www.acma.gov.au/restriction-earth-station-licensing-near-alice-springs).

# Licensing

This chapter provides an overview of the licensing arrangements for AWLs in the 26/28 GHz band and sets out the rules for issuing these licences. The Applicant Information Pack (AIP) for AWLs in the 26/28 GHz bands contains information regarding the licence application process and should be read in conjunction with this RALI.

## Overview of Licensing

An AWL authorises the operation of radiocommunications devices within a frequency range and geographic area specified on the licence.

AWLs authorising operation in the 24.7-29.5 GHz band will only be issued in geographic areas that are located outside the embargo areas defined in *RALI MS03: Spectrum Embargos* for the 24.7-29.5 GHz band.

## Licence conditions

The operation of radiocommunications devices authorised by an AWL in the 26/28 GHz bands is subject to:

* Conditions specified in the *Radiocommunications Act 1992* (the Act), including an obligation to comply with the Act;
* Conditions specified in the Radiocommunications Licence Conditions (Apparatus Licence) Determination 2015 (as is force from time to time), the Radiocommunications Licence Conditions (Area-Wide Licence) Determination 2020 (as in force from time to time), and any other applicable determinations made by the ACMA under section 107(1)(f) of the Act;
* Conditions specified in the licence; and
* Any further conditions imposed by the ACMA under section 111 of the Act.

## Assignment rules

This section outlines the rules for administratively issuing an AWL in the 26/28 GHz bands. An AWL in the 26/28 GHz bands can be issued, subject to the rules in this section, prior to device coordination requirements detailed in Chapter 3.

### Assignment instructions

Unless the ACMA is satisfied that good reasons exist to do otherwise, AWLs will be administratively issued in the 26/28 GHz bands in accordance with the following instructions:

* The upper and lower frequency limits authorised by the licence must align with the channel raster in section 4.3.2, except for proposed licences which will have special condition [AA] attached which authorise operation in the frequency ranges 27.5-28.1 GHz outside defined areas or 28.1-29.5 GHz.
* An AWL cannot be issued if its frequency range would overlap with the frequency range authorised by an existing AWL in the same HCIS cell, except when either:
* the proposed licence will have special condition [AA] attached, or
* the proposed licence includes advisory note [ZZ1] and it overlaps existing AWL(s) which all include special condition [AA].
* The geographic area authorised by an AWL will consist of only whole HCIS cells. The smallest geographic area authorised by an AWL is a single HCIS level 00 cell comprising an area of 20x15 seconds (approximately 500m x 500m).
* An AWL will not be issued if it would include frequencies in the range 25.5-27 GHz and it:
* Contains either of the following HCIS: MW4H6 or BV2A3, or
* Only contains one or more of the HCIS listed in Table 8.
* The allocation must comply with any Spectrum Embargo issued by the ACMA[[25]](#footnote-26)

1. SRS exclusion zones

| Area name | HCIS |
| --- | --- |
| New Norcia | BU7K, BU7L, BU7O, BU7P, BU8E, BU8F, BU8G, BU8I, BU8J, BU8K, BU8L, BU8M, BU8N, BU8O, BU8P, BV2A, BV2B |
| Tidbinbilla | MW4H1, MW4H2, MW4H4, MW4H5, MW4H6, MW4H7, MW4H8, MW4D7, MW4L2 |

### Channel raster

Channelling arrangements in 26/28 GHz bands provide for a total of 96 x 50 MHz channels across the frequency range 24.7-29.5 GHz. The upper and lower frequency limits of the 50 MHz channels are calculated using the following formula:

Lower frequency limit = [24.65 + n(0.05)] MHz

Upper frequency limit = [24.7 + n(0.05)] MHz

Where:

n = channel number (integer range is between 1 to 96).

A licence can be issued which authorises operation over multiple aggregated 50 MHz channels.

### Assignment priority

Unless the ACMA is satisfied that good reasons exist to do otherwise, the frequency range assigned to a licence will either:

* align with any existing 26/28 GHz band licences held by the licensee (either apparatus or spectrum), if that frequency range is available; or
* if the licensee does not already hold licences in the 26/28 GHz bands, the first frequency range available in the desired geographic area is to be assigned, following the assignment priority in Table 9.

The assignment priority in Table 9 does not apply for proposed licences which have special condition [AA] attached and authorise operation in the frequency range:

* 27.5-28.1 GHz outside defined areas, or
* 28.1-29.5 GHz.

1. Assignment priority

|  |  |
| --- | --- |
| **Frequency range (GHz)** | **Channel assignment direction** |
| 24.7-25.1 | Descending order |
| 25.1-27.5 | Ascending order |
| 27.5-29.5 | Ascending order |

### Advisory notes and special conditions

*General advisory notes*

The following advisory note [WW] is to be included on all AWLs in the 26/28 GHz bands:

*A radiocommunications receiver, that is receiving radio emissions from a radiocommunications transmitter that is operated under this licence, is not afforded protection from interference cause by an earth station operated under an apparatus licence if the details of the earth station were included in the RRL before details of the receiver were included in the RRL.*

*In planning deployments under this licence, the licensee should take account of existing apparatus licensed services and plan their services accordingly.*

The following advisory note [XX] is to be included on all AWLs in the 26/28 GHz bands:

*A radiocommunications receiver, that is receiving radio emissions from a radiocommunications transmitter that is operated under this licence, is not afforded protection from interference cause by a radiocommunications transmitter operated under an apparatus licence which was issued before the commencement for this licence. This provision does not apply if the transmitter is operated under an area-wide licence.*

*In planning deployments under this licence, the licensee should take account of existing apparatus licensed services and plan their services accordingly.*

The following advisory note [YY] is to be included on all AWLs in the range 27.5-28.1 GHz outside defined areas or in the range 28.1-29.5 GHz:

*A radiocommunications receiver that is:*

*(a) that is receiving radio emissions from a radiocommunications transmitter that is operated under this licence; and*

*(b) operating in the range 27.5-28.1 GHz and located outside the areas* *subject to the Radiocommunications (Spectrum Re-allocation—26 GHz band) Declaration 2019, or in the range 28.1-29.5 GHz;*

*is not afforded protection from interference caused by an earth station operated under an apparatus licence or under the Radiocommunications (Communication with Space Object) Class Licence 2015, as in force from time to time.*

The following advisory note [ZZ] is to be included on all AWLs in the 26/28 GHz bands:

*The notional receiver performance level and compatibility requirement for radiocommunications receivers recorded in the RRL and that receive radio emissions from radiocommunications transmitters that are operated under this licence are detailed in Schedule 1 and 2 of the Radiocommunications Advisory Guidelines (Managing Interference to Spectrum Licensed Receivers — 26 GHz Band) 2020, as in force from time to time.*

*Compliance with these provisions is not mandatory for radiocommunications receivers that are receiving radio emissions from radiocommunications transmitters that are operated under this licence, however the ACMA will take these provisions into account in determining whether interference has occurred.*

*Special condition and advisory note to facilitate overlapping AWLs*

The following special condition [AA] may be included on an AWL in the frequency segment 27-29.5 GHz where the licensee plans to only use their AWL to operate an earth station(s). AWLs with this special condition will be able to overlap, or be overlapped, in frequency and area by other AWLs (see section 4.3.1):

*(1) The licensee must not operate a radiocommunications transmitter under this licence that is not an earth station.*

*(2) The licensee must not cause harmful interference to a radiocommunications receiver communicating with a transmitter operated under another area-wide licence which was issued before this licence and authorises operation in the same frequency range and geographic area as this licence, if that receiver is operating in the frequency range:*

* *24.7-27.5 GHz, or*
* *27.5-28.1 inside an area subject to the* [*Radiocommunications (Spectrum Re-allocation—26 GHz band) Declaration 2019*](https://www.legislation.gov.au/Details/F2019L01374)*.*

The following advisory note [ZZ1] is to be included on all new AWLs which do not include special condition [ZZ1] and are issued with a frequency and area overlap with an existing AWL(s).

*Radiocommunications receivers, that are receiving radio emissions from radiocommunications transmitters that are operated under this licence, will not be afforded protection from a transmitter operated under another area-wide licence which was issued before this licence and authorises operation in the same frequency range and geographic area as this licence.*

# 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] xx/xx/2020

Manager  
Spectrum Planning Section  
Spectrum Planning and Engineering Branch

Communications Infrastructure Division  
Australian Communications and Media Authority

# Appendix A: Examples of compliance at the geographic boundary

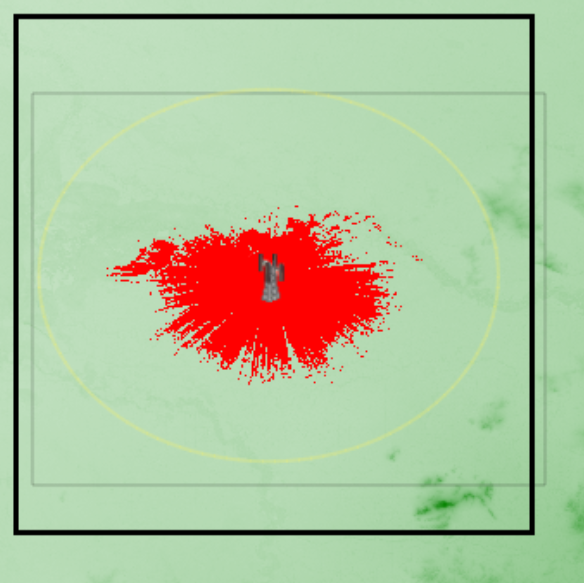
As detailed in section 3.3.1, the prescribed pfd limits in Table 4 are to be met at the boundary of the geographic area authorised by the AWL. The follow figures provide examples of when a transmitter would pass or fail this criterion.

In Figure 2, the calculated pfd limit (red) from a proposed AWL transmitter is fully contained within the AWL licence area (black square), therefore this transmitter will comply with the boundary criteria.

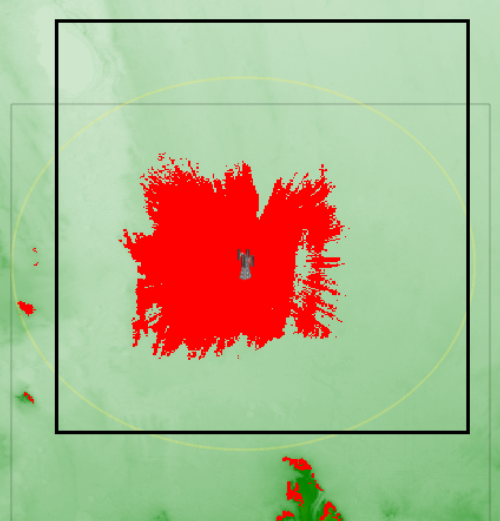
In Figure 3, the calculated pfd limit is not exceeded at the licence boundary, therefore this transmitter would comply with the boundary criteria even though there are locations beyond the boundary where the pfd limit is exceeded.

In Figure 4, the calculated pfd level (red) exceeds the limit at the licence boundary, therefore this transmitter would not comply with the boundary criteria.

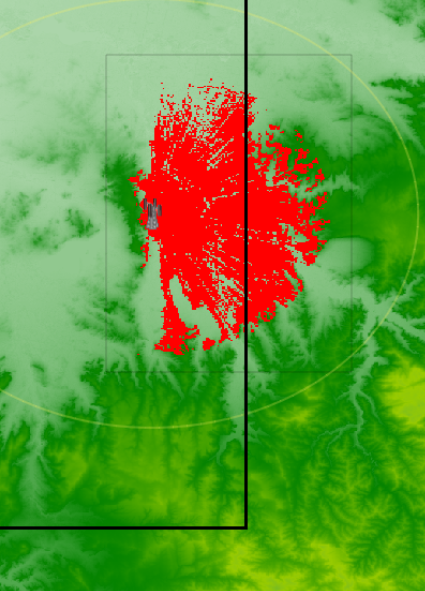
1. Example of pass (black = geographic boundary of licence, red = locations where pfd exceeds the Table 4 limits)



1. Example of pass (black = geographic boundary of licence, red = locations where pfd exceeds the Table 4 limits)



1. Example of fail (black = geographic boundary of licence, red = locations where pfd exceeds the Table 4 limits)



# Appendix B: Protection criteria for fixed link receivers

Protection ratios for 28 GHz band fixed services are provided in the following tables. Protection ratios apply at frequency offsets (between the channel edge of the receiver and the edge of the transmitter’s occupied bandwidth) of up to and including two-times the transmitters occupied channel bandwidth.

1. Protection ratios for victim 28 MHz channel fixed link receiver and interfering AWL transmitter

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency offset (foffset)  (note 1) | BW < 100 MHz | 100 MHz ≤ BW < 200 MHz | 200 MHz ≤ BW < 400 MHz | BW ≥ 400 MHz |
| foffset < 0 MHz (note 2) | 62 | 59 | 56 | 53 |
| 0 MHz ≤ foffset < BW | 50 | 47 | 44 | 41 |
| BW ≤ foffset < 2xBW | 42 | 39 | 36 | 33 |

1. Protection ratios for victim 56 MHz channel fixed link receiver and interfering AWL transmitter

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency offset (foffset)  (note 1) | BW < 100 MHz | 100 MHz ≤ BW < 200 MHz | 200 MHz ≤ BW < 400 MHz | BW ≥ 400 MHz |
| foffset < 0 MHz (note 2) | 64 | 62 | 59 | 56 |
| 0 MHz ≤ foffset < BW | 52 | 49 | 46 | 43 |
| BW ≤ foffset < 2xBW | 44 | 42 | 39 | 36 |

1. Protection ratios for victim 112 MHz channel fixed link receiver and interfering AWL transmitter

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency offset (foffset)  (note 1) | BW < 100 MHz | 100 MHz ≤ BW < 200 MHz | 200 MHz ≤ BW < 400 MHz | BW ≥ 400 MHz |
| foffset < 0 MHz (note 2) | 64 | 64 | 62 | 59 |
| 0 MHz ≤ foffset < BW | 52 | 49 | 47 | 44 |
| BW ≤ foffset < 2xBW | 47 | 44 | 42 | 39 |

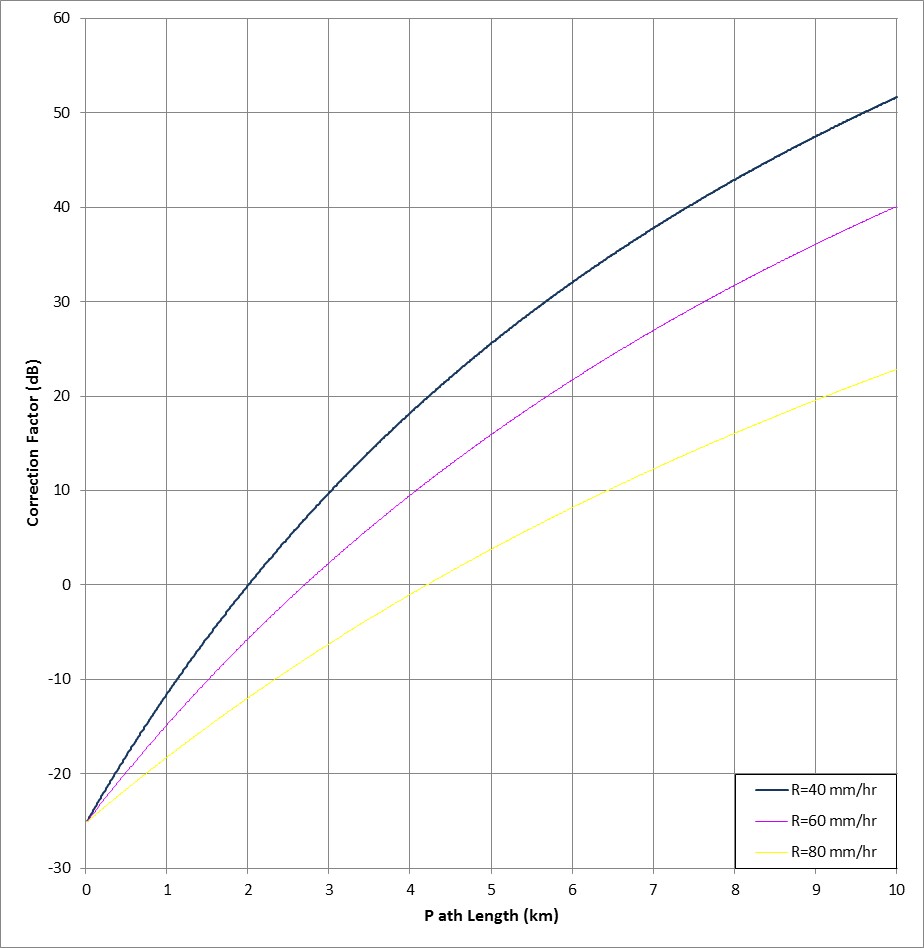
General notes:

1. foffset is the frequency offset between the channel edge of the receiver and the edge of the transmitter’s occupied bandwidth.
2. foffset is less than 0 MHz when there is an overlap of the receiver channel and the occupied bandwidth of the transmitter.
3. BW is the occupied bandwidth of the AWL transmitter
4. Protection ratios are based on a 2 km path length and R (Rainfall rate in mm/hr for 0.01% of the worst month) of 40 mm/hr using Recommendation ITU-R P.530-15, section 2.4 as outlined in spectrum planning report SPP 2014/07. For other path lengths and rainfall rates refer to the appropriate path length correction factors graph on the following page.
5. Separate protection ratios for analog victims have not been defined. The above-mentioned protection ratios for digital systems shall be applied in such cases.

**THE 28 GHz BAND (27.5 – 29.5 GHz)**

**PROTECTION RATIO CORRECTION FACTORS**

**RAIN FADE**



R: Rainfall rate in mm/hr for 0.01% of the worst month.

For further details refer to Annex A to Appendix 1 of RALI FX-3.

1. The AWL LCD and all other legislative instruments referred to in this RALI may be accessed, free of charge, on the Federal Register of Legislation at [www.legislation.gov.au](http://www.legislation.gov.au). [↑](#footnote-ref-2)
2. Noting that licence conditions will preclude the operation of some services in segments of the 26/28 GHz bands. [↑](#footnote-ref-3)
3. The Applicant Information Pack for 26/28 GHz band AWLs is available on the [ACMA website](http://www.acma.gov.au). [↑](#footnote-ref-4)
4. To be read in conjunction with the Applicant Information Pack. [↑](#footnote-ref-5)
5. The pfd limit is not required to be met at some geographic boundaries – see section 3.3.1. [↑](#footnote-ref-6)
6. FWA is secondary with respect to FSS in the range 27.5-28.1 GHz outside defined areas, and in the range 28.1-29.5 GHz. [↑](#footnote-ref-7)
7. High-powered outdoor UEs (operate with a TRP of > 23 dBm and ≤ 35 dBm per occupied bandwidth) are exempt from registration under subsection 3(2)(c) of Schedule 1 to the AWL LCD. [↑](#footnote-ref-8)
8. HCIS is a naming convention developed by the ACMA that applies unique ‘names’ to each of the cells that make up the Australian Spectrum Map Grid (ASMG) – more information is on the [ACMA website](https://acma.gov.au/australian-spectrum-map-grid). [↑](#footnote-ref-9)
9. All other AWL transmitters must comply with the unwanted emission limits set out in the AWL LCD. [↑](#footnote-ref-10)
10. In addition to adhering to resolves 2.1 and 2.2 of ITU-R Resolution 242 (WRC-19) for transmitters in the range 24.7-27.5 GHz. [↑](#footnote-ref-11)
11. Also see Appendix 1 of RALI FX 3. [↑](#footnote-ref-12)
12. Amendment to the LIPD class licence to include these devices is expected before the end of 2020. [↑](#footnote-ref-13)
13. In this RALI, or another document published by the ACMA. [↑](#footnote-ref-14)
14. An example of a suitable propagation model is that set out in section 4.5.2 of ITU-R Recommendation P.526-14 *Propagation by diffraction.* [↑](#footnote-ref-15)
15. NSMA (USA) Working Group 16, refer to <http://www.nsma.org>. [↑](#footnote-ref-16)
16. An active antenna system refers to an 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. [↑](#footnote-ref-17)
17. The exemption will mean that at a minimum only the single HCIS cell which contains the earth station is required to be included on the licence. [↑](#footnote-ref-18)
18. The synchronisation requirement is detailed on 26 GHz band spectrum licences and in the AWL LCD. [↑](#footnote-ref-19)
19. Available on the [3GPP website](https://www.3gpp.org/DynaReport/38-series.htm). [↑](#footnote-ref-20)
20. Available on the [3GPP website](https://www.3gpp.org/DynaReport/38-series.htm). [↑](#footnote-ref-21)
21. The interference level is based on Recommendation ITU-R SA.609-2 [↑](#footnote-ref-22)
22. Based on the maximum channel bandwidth of 400 MHz in the current 3GPP 38-series standard. [↑](#footnote-ref-23)
23. 20 km is considered the maximum cell radius expected to be achievable under an AWL. Should larger cells be used, AWL licensees are remined that transmitters which are not required to be recorded in the RRL operate on a no interference basis as defined in the AWL LCD. [↑](#footnote-ref-24)
24. All RALIs are available on the [ACMA website](https://www.acma.gov.au/ralis-frequency-coordination). [↑](#footnote-ref-25)
25. Spectrum embargos are detailed on the [ACMA website](https://www.acma.gov.au/spectrum-embargoes). [↑](#footnote-ref-26)