

RALI : FX 20

DATE OF EFFECT : 19/05/2016

Radiocommunications Assignment and Licensing Instruction

**MILLIMETRE WAVE
POINT TO POINT (SELF-COORDINATED) STATIONS**

**AUSTRALIAN COMMUNICATIONS AND MEDIA AUTHORITY
SPECTRUM PLANNING AND ENGINEERING BRANCH**

Amendment History

Date	Comments
December 2007	Initial release
July 2015	Updated 58 GHz band arrangements. The update includes: <ul style="list-style-type: none"> • Widening the frequency range from 57.2-58.2 GHz to 57.1-58.9 GHz band in line with ITU-R Recommendation F.1497-2; • Explicitly authorising channel aggregation. • Removal of restrictions on use of two frequency (FDD) systems; • Increasing the maximum EIRP from 15 dBW to 25 dBW; Introduction of a maximum transmitter output power limit.
Feb 2016	Updates to 58 GHz band arrangement: <ul style="list-style-type: none"> • Decreasing the minimum antenna gain from 32 to 30 dBi in line with the ECC/REC/(09)/01; Updates to 75 and 85 GHz bands arrangements: <ul style="list-style-type: none"> • Replacing the minimum antenna gain from 43 dBi to be in line with the ETSI EN 302 217-4-2; • Replacing the explicit EIRP limit (45 dBW) by the limits as defined by ETSI EN 302 217; • Introducing the minimum antenna radiation pattern requirement from ETSI EN 302 217-4-2 class 2 in addition to FCC Title 47 Part 101.115.

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MILLIMETRE WAVE POINT TO POINT (SELF-COORDINATED) STATIONS

1. INTRODUCTION

1.1 Purpose

The purpose of this Radiocommunications Assignment and Licensing Instruction (RALI) FX 20 “*Millimetre Wave Point to Point (Self-coordinated) Stations*” is to provide information about, and outline the necessary steps in the coordination and licensing of point to point Fixed links in the 58 (57-59) GHz, 75 (71-76) GHz and 85 (81-86) GHz bands.

The document is primarily intended for use by Australian Communications and Media Authority (ACMA), Industry Representatives, Licensees or Accredited Persons engaged in the coordination and licensing of millimetre wave point to point (self-coordinated) stations. This RALI document also provides links to useful background information and will therefore be of possible interest to telecommunications network operators, system planners and equipment manufacturers or importers.

The information in this document reflects the ACMA’s statement of current policy in relation to the coordination and licensing of point to point (self-coordinated) stations. 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 Engineering Section, PO Box 78, Belconnen, ACT, 2616, or by e-mail to freqplan@acma.gov.au.

1.2 Scope

The scope of this RALI concerns the coordination and licensing of point to point (self-coordinated) stations operating in the Fixed Service comprising point-to-point radiocommunications links in the 58 (57-59) GHz, 75 (71-76) GHz and 85 (81-86) GHz bands.

This RALI provides a guide to matters that should be taken into account as part of the system planning process for the management of interference and compliance with relevant domestic and international radiocommunications regulatory requirements.

2. BACKGROUND

2.1 Millimetre Wave Fixed Links

The term “millimetre wave”, refers to the wavelengths of free space electromagnetic emissions in the frequency range 30 to 300 GHz. The frequencies in this range have physical properties including high propagation spreading and atmospheric absorption losses that limits their use to short-range applications. However these losses together with the availability of conveniently sized highly directional antennas mean that dense frequency

reuse patterns are possible. The state of technology development and the high level of frequency reuse that can be achieved mean that there is greater bandwidth availability in these bands than in lower frequencies bands.

Further background information including typical applications, equipment specifications and overseas regulatory arrangements for the 71-76 GHz and 81-86 GHz can be found in the public discussion paper “[Planning of the 71-76 & 81-86 GHz Bands for Millimetre Wave High Capacity Fixed Link Technology](#)”¹

2.2 Band and Channel Arrangements

Australian fixed service frequency allocations are specified in the [Australian Radiofrequency Spectrum Plan](#)² and generally conform to the International Telecommunication Union (ITU) Radio Regulations fixed service allocations for Region 3. The use of each band is generally determined by national policies.

The specific utilisation of each band is subject to particular implementation arrangements, including relevant intra-service and inter-service sharing and coordination considerations, normally derived from ITU agreed criteria. The fixed service is generally planned to align with well-defined ITU recommendations or other recognised regional or other international standards and to accommodate readily available products.

2.3 Equipment Standards

Although there are no specific Australian radiocommunications standards or regulatory type approval procedure for millimetre wave (self-coordinated) station radiocommunications equipment, it is expected that such equipment will:

- comply with the specified arrangement details;
- be operated in compliance with the technical conditions specified in the relevant ACMA licence; and
- be manufactured to conform with the requirements of the ITU Radio Regulations, relevant ITU Recommendations and/or other recognised world-wide or regional standards. For example, in the case of 58 GHz links the relevant standard is the ETSI EN 302 217, and in the case of the 70 GHz and 80 GHz links the relevant standard is either the ETSI EN 302 217 or FCC Rule 101.

2.4 Registration and Licensing

Regulatory arrangements for millimetre wave links vary around the world but in the particular bands that fall within the scope of this RALI these arrangements are sometimes referred to as “Light Licensing” arrangements. In Australia the operation of stations that make up these links are authorised, under Part 3.3 of the *Radiocommunications Act 1992*, by apparatus licences (Fixed licence type: Point to Point (Self-coordinated) Station licence option).

¹ http://www.acma.gov.au/webwr/radcomm/frequency_planning/planning_71-76_81-86%20ghz%20bands_millimetre.pdf

² <http://acma.gov.au/Industry/Spectrum/Spectrum-planning/About-spectrum-planning/australian-radiofrequency-spectrum-plan-spectrum-planning-acma>

In addition to the requirements of this RALI, information on licence conditions, licence duration, how to apply for a licence, licence fees and other information applicable to the licensing of point to point (self-coordinated) stations can be found in ACMA's [information paper on the fixed licence type](#)³

Licence Fees

Licence fees for the Point to point (self-coordinated) stations licence type are independent of the bandwidth used by the link and its geographic location (unlike most other licence options under the fixed licence type). The licence fee authorises two spectrum accesses covering both stations that make up the link.

This low cost fixed fee structure reflects the bandwidth availability, spectrum reuse capability and the fact that the links are self-coordinated. A summary of ACMA Apparatus Licence fees is provided in the ACMA document [Apparatus Licence Fees](#)⁴ which also incorporates an overview of the Apparatus Licence Fee Framework and the available licence types.

Licence Applications & Station Registration

After self-coordination has been carried out, licence applicants should apply for an apparatus licence. The procedure for [applying for the apparatus licences](#)⁵ involves completing both the ACMA form entitled [Application for apparatus licence\(s\) \(R057\)](#)⁶ and the form entitled [Application for additional station information \(R077\)](#)⁷.

The ACMA has also prepared an [information directory for apparatus licensing](#)⁸ and [index](#)⁹ that lists all necessary documents including business operating procedures that need to be considered in the application process. Note that the applicants are required to [submit the antenna radiation pattern envelope data to the ACMA](#)¹⁰.

Station details provided in the licence application will be placed on the ACMA [Register of Radiocommunications Licences](#)¹¹ (RRL). The required information are listed in the [data elements of the RRL database](#)¹². Note that it is the responsibility of the licence applicant to ensure that those details are correct. The details provided will be recorded on a first in time

³ <http://www.acma.gov.au/theACMA/radiofrequency-spectrum-fixed-licences>

⁴ <http://www.acma.gov.au/theACMA/About/Making-payments/Apparatus-licence-fees/apparatus-licence-fees-acma>

⁵ <http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Apparatus-licences/applying-for-apparatus-licences-acquire-a-licence-acma>

⁶ <http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Apparatus-licences/apparatus-licence-forms-i-acma>

⁷ <http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Apparatus-licences/apparatus-licence-forms-i-acma>

⁸ <http://www.acma.gov.au/Industry/Spectrum/Spectrum-planning/Current-APs-info-and-resources/information-directory-for-apparatus-licensing>

⁹ <http://www.acma.gov.au/Industry/Spectrum/Spectrum-planning/Current-APs-info-and-resources/information-directory-index>

¹⁰ <http://www.acma.gov.au/antenna/help.asp>

¹¹ <http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Register-of-radiocommunications-licences>

¹² http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Register-of-radiocommunications-licences/spectrum_15

basis unless there are particular reasons not to do so, such as security or administrative issues.

Data on the RRL is available for the planning and coordination of millimetre wave point to point (self-coordinated) stations and other radiocommunications services. Access to this information is via the ACMA website. In addition, information about radiocommunications licences and licensees is available via a download at no cost.

3. SYSTEM PLANNING

3.1 Band by Band Requirements

Band by band requirements are detailed in Appendix 1 for millimetre wave bands point to point (self-coordinated) stations. These band by band requirements include advice on bandwidth utilisation, minimum antenna performance, maximum EIRP and/or maximum transmit output power, and channelling or spectrum utilization options.

3.2 Radio Equipment Considerations

In order to meet the minimum requirements for licensing, millimetre wave (self-coordinated) station equipment must comply with the requirements in Appendix 1. The details can include the regulatory criteria for transmit power limits, emission criteria and antennas. It is expected that radio equipment is manufactured to conform to the requirements of the International Radio Regulations, relevant ITU recommendations or other recognised world or regional standards. As an example, the requirements for antenna compliance are based on the relevant ETSI standard and/or the FCC rules as listed for the particular band in the Appendix 1.

3.3 Minimum antenna performance requirements

Minimum antenna performance requirements for millimetre wave self-coordinated links are specified in Appendix 1 in the form of antenna radiation patterns and/or minimum gain and other requirements.

For the 58 GHz links, the minimum antenna performance requirements are based on the class 2 radiation pattern envelope specified in the ETSI standard EN 302 217 Part 4.2.

For the 70 and 80 GHz links, the minimum antenna performance requirements are based on the United States of America Federal Communications Commission (FCC) Rules Title 47 Part 101.115 – Directional antennas.

Note that antennas used for millimetre wave links are very directional (pencil beam radiation pattern). However, it is still important that when registering a link that antenna details are provided to enable more accurate coordination based on actual rather than nominal antenna characteristics. The ACMA has issued [the antenna radiation pattern](#)

[envelope data submission](#) document which should assist during the process of the data submission.

3.4 Radiocommunications Site and System Planning Considerations

Site selection and detailed radiocommunications system engineering issues are the jurisdiction of the system planner and prospective licensees. Geographic and other link planning considerations require detailed treatment due to their potential impact on the overall interference environment. The ACMA has issued the [Radiocommunications site data requirements](#) business operating procedure which should assist system planner and prospective licensees in creating and managing necessary data for the sites.

3.5 Emission Criteria

The relative power spectral density of a given radiofrequency emission may be defined as consisting of two components:

- the major “wanted signal” portion of the transmitted spectra is normally defined as the necessary bandwidth. The necessary bandwidth is a key parameter in frequency coordination and its value is recorded in the ACMA's RRL database as part of the emission designator field used to characterise the nature of a given radiocommunications service emission; and
- a remainder (unwanted emissions), falling outside of the necessary bandwidth. Unwanted emissions include out-of-band and spurious emissions, as defined in the Radio Regulations of the ITU.

It is expected that the necessary bandwidth of a fixed service emission is wholly contained within the RF channel limits of the relevant Appendix 1 channel arrangement as recorded in the ACMA's RRL database.

4. SELF COORDINATION

This section of the RALI FX 20 provides an overview of the self-coordination process intended to facilitate successful coordination and improved spectrum utility. This self-coordination approach is made possible by the physical characteristics of propagation and equipment used in the bands identified for millimetre wave (self-coordinated) links.

4.1 Self-coordination

Millimetre wave point to point (self-coordinated) stations are “coordinated by the licensee, the equipment or industry”. The coordination entity varies from band to band see Appendix 1. The ACMA will treat each application for a point to point (self-coordinated) station licence on the basis that the stations have been coordinated with existing stations in the Register of Radiocommunications Licences (RRL).

The Register is updated regularly and prospective licensees, or coordinators assisting the prospective licensees, should aim to minimise the time between carrying out coordination and applying for a licence as the registration of the licence details effectively date stamps the coordination and allows resolution of issues on a first in time basis.

Equipment Self-coordination

Equipment self-coordinated systems rely on the equipment monitoring available channels in the band at the station site and ‘negotiating’ with the equipment at other station sites to use a common or a pair of common channels that do not contain emissions from other link equipment (that is, a listen before transmit protocol). As it is possible that transmissions from another station in the area might not be detected, because of weather conditions or other reasons at one or both ends of a link, the stations should be capable of re-selecting an appropriate channel within the band to use.

The equipment self-coordination procedure is typically carried out for the 58 GHz links.

Industry or Licensee Self-coordination

Industry self-coordination services may be provided in some bands on behalf of the prospective licensee by the link equipment supplier/installer. Industry self-coordination can take many forms including coordination of individual links on a case by case basis by individual suppliers, or coordination through a common coordination desk set up under agreement between suppliers of equipment in a band. A common coordination desk could be set up in-house within industry or through agreement with an [Accredited Person](#)¹³. The ACMA expects that both suppliers and users could benefit from cooperating to establish such arrangements in areas where significant numbers of deployments are expected.

In many cases it might be possible for an individual prospective licensee to self-coordinate particularly in regional and rural areas where the numbers of other millimetre wave self-coordinated links are low. In metropolitan or other areas where significant numbers of millimetre wave self-coordinated links exist, the complexity of coordination may be such that prospective licensees should obtain the assistance of experienced coordinators.

Note that the licence applicants are responsible for self-coordination of their proposed stations. The ACMA will not undertake any coordination activities for self-coordination stations.

Self-coordination & Interference Management

Failure to undertake self-coordination with other users can lead to interference to either the proposed link or other users. Causing unacceptable interference to other users of the spectrum can lead to penalties under the *Radiocommunications Act 1992*.

The self-coordinated station licences carry the condition “*No interference shall be caused to any radiocommunications station or service and no protection from interference by such stations or services shall be afforded*” (known as no protection/no interference - condition

¹³ <http://www.acma.gov.au/Industry/Spectrum/Spectrum-planning/Current-APs-info-and-resources/accredited-persons-list-spectrum-planning-acma>

27). This means that the ACMA expects licensees, operating self-coordinated stations, will cooperate to manage and resolve interference between self-coordinated stations without the involvement of the ACMA.

4.2 Coordination criteria

Coordination typically involves the calculation of the unwanted signal level of the proposed stations at each existing station in the database that potentially might suffer interference from the operation of the proposed link and vice versa. The calculation takes into account the antenna patterns of the existing and the proposed stations, antenna heights, antenna polarisation, buildings or other obstructions, antenna down tilt, emission overlap and other relevant factors considered as part of good engineering practice.

The equipment self-coordinated links typically have a built in channel allocation procedure for selecting a channel with the interference level below the defined threshold. The technical details regarding the channel allocation procedure, including the interference avoidance requirements, are presented in the [ETSI EN 302 217-3](#)¹⁴ standard.

The industry self-coordinated links have the coordination goal that the Carrier to Interference Ratio (C/I) of an existing link in the presence of emissions from the proposed link is not less than the Threshold to Interference Ratio (T/I) specified by the manufacturer of the existing link equipment. Where information regarding the T/I for equipment making up an existing link is not available then coordination may be based on the requirement that the level of the unwanted signal, with free space propagation loss accounted for, plus 6 dB is less than the noise floor of the victim receiver. The noise floor of the victim receiver, if otherwise not available, can be taken to be the thermal noise floor within the emission bandwidth of the station plus 8 dB, the typical noise figure of equipment operating in these bands.

Propagation in these bands is typically line of sight and a propagation model combining free space attenuation ([ITU-R Rec. P.525](#)¹⁵) plus atmospheric absorption should be used for assessing the levels of potential interference. However for interference emissions over potentially obstructed paths the use of more complex propagation models might be used.

Note that oxygen gas absorption attenuation, especially for the 58 GHz links, is considerable, and has to be taken into account while planning and coordinating the links. The level of attenuation by atmospheric gases should be taken from the [ITU-R Rec. P.676](#)¹⁶. The radio propagation in those frequency bands is also characterized by very high rain attenuation ([ITU-R Rec P.530](#)¹⁷ and [ITU-R Rec. P.838](#)¹⁸). The licensees should take into account this effect when planning the links as the rain attenuation significantly affect the path length of the links.

¹⁴ ETSI EN 302 217-3 v.2.2.1 (2014-04) Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 3: Equipment operating in frequency bands where both frequency and uncoordinated deployment might be applied.

¹⁵ <http://www.itu.int/rec/R-REC-P.525-2-199408-I/en>

¹⁶ <http://www.itu.int/rec/R-REC-P.676/en>

¹⁷ <http://www.itu.int/rec/R-REC-P.530/en>

¹⁸ <http://www.itu.int/rec/R-REC-P.838/en>

4.3 Self-coordination with links not yet operating

While recognising that it takes time to establish new radiocommunications services because of the need to import equipment, gain building approvals or arrange for supply of utilities, ACMA encourages licensees to start operating services as soon as practicable after licence issue noting the first-in-time status envisioned in this RALI and described in the following.

For self-coordinated links in the millimetre wave bands, 12 months is considered a reasonable length of time after licence issue for a link to be operational.

When a prospective licence applicant is undertaking self-coordination or licensees of self-coordinated stations are working to manage and resolve interference between self-coordinated stations, ACMA encourages applicants and licensees to adopt the following principles:

- Self-coordinated stations should commence operation within the first 12 months of the date of licence issue;
- Should self-coordinated stations not commence operation within 12 months of licence issue, then the first in time principle does not need to be applied (ie self-coordination with those stations is not required);
- Licensees should retain documents or other evidence as to the commencement date of operation to assist resolution of interference between licensees of self-coordinated stations.

Because self-coordinated stations operate in a no interference/no protection basis, ACMA expects that licensees operating self-coordinated stations will cooperate to manage and resolve questions of interference between self-coordinated stations.

4.4 Coordination with other services

Based on the [Australian Radiofrequency Spectrum Plan](#), the following radiocommunications services are allocated in or adjacent bands:

- Fixed-Satellite Service
- Mobile Service
- Mobile-Satellite Service
- Amateur and Amateur-Satellite Service
- Broadcasting Service
- Broadcasting Service
- Radionavigation Service
- Radiolocation Service
- Space Research Service
- Radio-Astronomy Service

Except for Radio-astronomy Service, the other services do not have any station operating in the bands listed in this RALI. Should licensing arrangements be proposed for stations in

those services in the future, the additional necessary coordination information will be made available.

Radio-Astronomy Service

Prospective licensees intending to operate in the 58 GHz band are required to provide notification information to the CSIRO if the proposed sites of the stations are within 10 km of The Paul Wild Observatory, The Mopra Observatory and the Canberra Deep Space Communications Complex.

Location	Latitude / Longitude
Paul Wild Observatory, Narrabri	30° 18' 46.40"S / 149° 33' 0.44"E
Mopra Observatory, Coonabarabran	31° 16' 04.451"S / 149° 05'58.732"E
Canberra Deep Space Communications Complex	32° 23' 48.39"S / 148° 58' 44.35"E

Prospective licensees intending to operate in 75 GHz or 85 GHz bands are required to provide notification information to the CSIRO if the proposed sites of the stations are within 40 km of to the Paul Wild and Mopra observatories that may operate in the band 75-115 GHz.

Location	Latitude / Longitude
Paul Wild Observatory, Narrabri	30° 18' 46.40"S / 149° 33' 0.44"E
Mopra Observatory, Coonabarabran	31° 16' 04.451"S / 149° 05'58.732"E

Notification procedure and contact details can be found in [RALI MS31](#)¹⁹.

In this RALI, latitude and longitude are measured with reference to the geodetic datum designated as the "Geodetic Datum of Australia (GDA94)" gazetted in the Commonwealth of Australia Gazette No. GN 35 on 6 September 1995.

Devices Operated Under Class Licences

Under the [Radiocommunications \(Low Interference Potential Devices\) Class Licence](#)²⁰, there are currently arrangements in place allowing the use of transmitters using frequencies in and adjacent bands to those provided for millimetre wave self-coordinated links. At the time of writing this RALI, the class licence contained arrangements supporting the operation of short range radar devices typically fitted to motor vehicles in the 76-77 GHz, 75-85 GHz and 77-81 GHz bands. The class licence also contains arrangements supporting the use of

¹⁹ <http://www.acma.gov.au/theACMA/notification-zones-for-apparatus-licensed-services-around-radio-astronomy-facilities>

²⁰ <http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Class-licences/lipd-class-licence-spectrum-acma>

indoor wireless LAN devices and outdoor short range fixed link equipment in the 57-66 GHz and 59-63 GHz bands.

While there is no requirement to coordinate with such devices it is useful in the planning millimetre wave self-coordinated links to be aware of their existence.

5. RALI Authorisation

Approved 19/May/2016

Mark Arkell
Manager
Spectrum Engineering Section
Spectrum Infrastructure Branch
Australian Communications and Media Authority

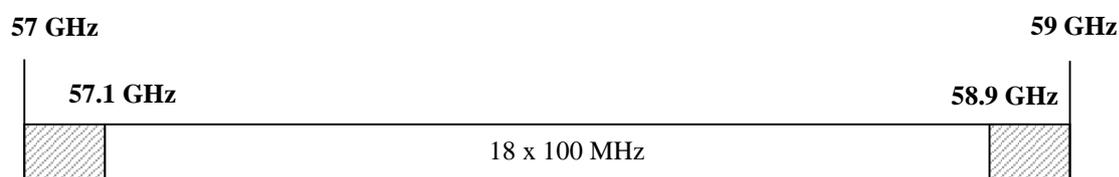
References

1. Spectrum Planning Discussion Paper SPP 2006-11 *“Planning of the 71-76 GHz and 81-86 GHz Bands for Millimetre wave High capacity Fixed Link Technology”*, Dec. 2006.
2. [ETSI EN 302 217-4-2 v1.5.1 \(2010-01\) Fixed Radio Systems; Characteristics and Requirements for Point- to-point Equipment and Antennas: Part 4-2: Antennas;](#)
3. ITU-R Recommendation F.1497-2 *“Radio-frequency channel arrangements for fixed wireless systems operating in the 55.78-66 GHz band”*.
4. ECC Recommendation (09)01 *“Use of the 57-64 GHz Frequency Band for Point-to-Point Fixed Wireless Systems”*, May 2009.
5. ECC Report 54 *“Analysis of Increasing the EIRP of Terrestrial Fixed Links at around 58 GHz”*, October 2004.
6. [ETSI EN 302 217-3 v2.2.1 \(2014-04\) Fixed Radio Systems; Characteristics and Requirements for Point-to-point equipment and antennas; Part 3: Equipment operating in frequency bands where both frequency coordinated and uncoordinated deployment might be applied.](#)
7. [The United States of America Federal Communication Commission, Title 47 Part 101 Fixed Microwave Services §101.115 “Directional Antennas”](#)
8. Spectrum Planning Report SPP 5/98 *“Fixed Services in the Band 57.2 to 58.2 GHz”*, October 1998.
9. Addendum 1 to SPP 5/98, May 1999.

Appendix 1

THE 58 GHz BAND (57–59 GHz)

1. RF CHANNEL ARRANGEMENTS



Guard bands = 

the centre frequencies of individual channels are expressed by the following relationships:

$$f_n = f_r + 100n \quad \text{MHz}$$

where f_n is the centre frequency of a radio-frequency channel in the band 57.1-58.9 GHz

and f_r is the reference frequency of 57050 MHz,

and $n=1,2,3,\dots,18$

ASSIGNMENT REQUIREMENTS

This band is designated for use by self-coordinated fixed point-to-point links.

Self-coordination will typically be carried out by the link station equipment.

Typical Use	: Fixed local area network extension
Assignment Priority	: not specified.
Minimum Path Length	: not specified.
Antenna Requirements	: Minimum gain 30 dBi.

Notes:

1. Detailed frequency coordination is not required in this band. Apparatus licences are required to record device location (see ref. 7).
2. For equipment self-coordination, equipment should listen for a free channel before transmission to recognise existing transmissions to minimise the risk of interference and to ensure continued operation of existing transmissions (see ref. 2).
3. Channel aggregation is permitted to enable wider bandwidth. Single frequency (TDD) systems and two frequency (FDD) systems may use any channel. (see refs. 1 and 2).
4. Licences will carry a no interference / no protection condition (condition 27).

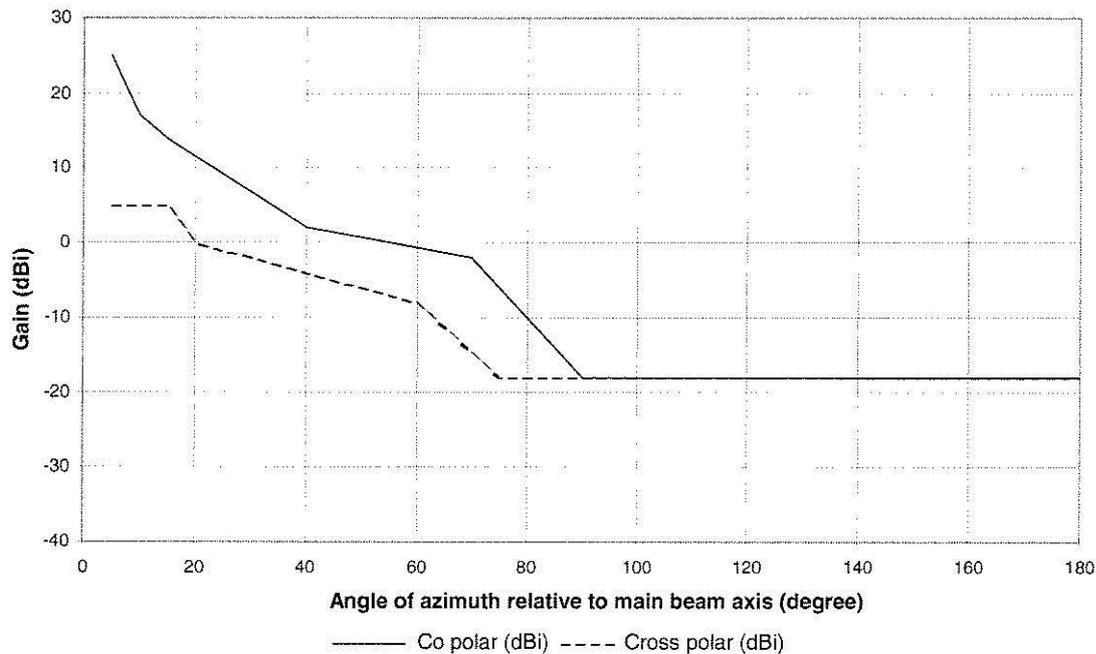
THE 58 GHz BAND (57–59 GHz) Continued

5. Fixed point-to-point (self-coordinated) licensing arrangements and fees apply in this band. See the ACMA [“Apparatus licence fee schedule”](#). (see ref. 3).
6. Note that at the time of this update of the RALI, the definition of a point to point (self-coordinated) station in the 58 GHz band is limited to stations operating within the frequency range 57.2 to 58.2 GHz as in the [Radiocommunications \(Interpretation\) Determination 2015](#). Until the definition is updated, the fixed tax for point-to-point (self-coordinated) licence apply only to stations operating in the band 57.2-58.2 GHz, otherwise the licence fee should be calculated as for the other fixed point-to-point apply (see refs. 3 and 4).
6. System EIRP is limited to a maximum of 25 dBW (see ref. 5).
7. The maximum output power should be limited to 10 dBm. (see ref. 5).

THE 58 GHz BAND (57–59 GHz) Continued

2. ANTENNA COMPLIANCE REQUIREMENTS

For the 58 GHz band, the minimum requirements for antenna compliance has been specified in terms of minimum antenna gain and radiation pattern envelope shown in Figure 1 (ref to ETSI standard EN 302 217 class 2 antennas for the band 47 - 66 GHz).



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	25	5	5
10	17	15	5
15	14	20	0
40	2	60	-8
70	-2	75	-18
90	-18	180	-18
180	-18		

Figure 1: Radiation pattern for antennas used in the 58 GHz band.

THE 58 GHz BAND (57–59 GHz) Continued**References**

1. ITU-R Recommendation F.1497-2 “*Radio-frequency channel arrangements for fixed wireless systems operating in the 55.78-66 GHz band*”.
2. ECC Recommendation (09)01 “*Use of the 57-64 GHz Frequency Band for Point-to-Point Fixed Wireless Systems*”, May 2009.
3. [Apparatus licence fees schedule – October 2014](#)
4. [Radiocommunications \(Interpretation\) Determination 2015](#), the ACMA, February 2015.
5. ECC Report 54 “*Analysis of Increasing the EIRP of Terrestrial Fixed Links at around 58 GHz*”, October 2004.
6. [ETSI EN 302 217-4-2 v1.5.1 \(2010-01\) Fixed Radio Systems; Characteristics and Requirements for Point-to-point Equipment and Antennas; Part 4-2: Antennas;](#)
7. Spectrum Planning Report SPP 5/98 “*Fixed Services in the Band 57.2 to 58.2 GHz*”, October 1998.
8. Addendum 1 to SPP 5/98, May 1999.

THE 75 GHz BAND (71 – 76 GHz)

1. RF CHANNEL ARRANGEMENTS



ASSIGNMENT INSTRUCTIONS

This band is designated for use by self-coordinated fixed point-to-point links.
Self-coordination by link station equipment is not permitted in this band.

Typical Use	: high capacity, short haul data links
Assignment Priority	: none
Minimum Path Length	: not specified
Antenna Requirements	: Ref. to Note 5

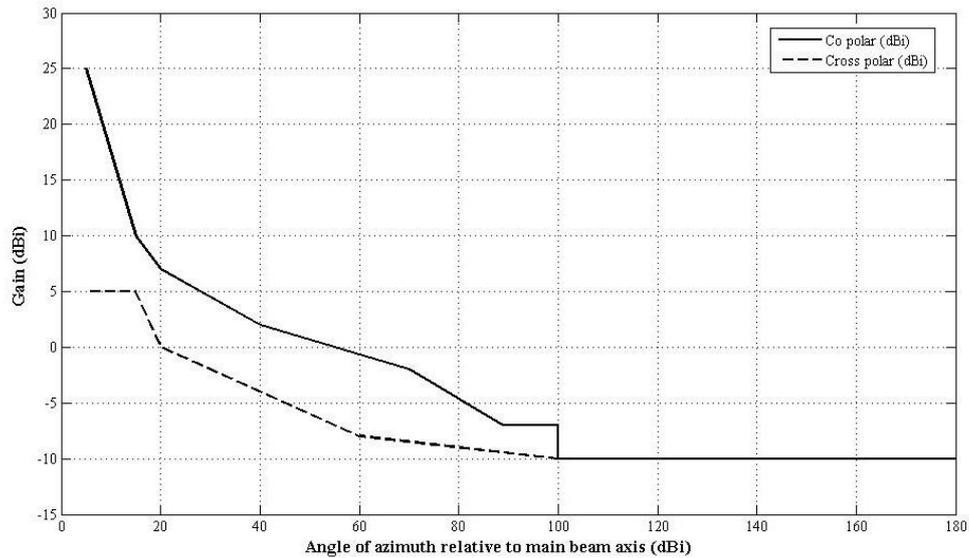
Notes:

1. Apparatus licences are required to register device location to allow self-coordination with existing licensees to avoid interference (see ref. 1);
2. No channel plan between the guard bands is specified. Single frequency (TDD) systems and two frequency (FDD) systems may use all or any portion of the band between the guard bands;
3. Licences will carry a no interference / no protection condition (condition 27);
4. Fixed point-to-point (self-coordinated) licensing arrangements and fees apply in this band. See the ACMA *“Apparatus Licence Fee Schedule”* and ref. 1;
5. EIRP limits and minimum antenna gain requirements are defined by the ETSI EN 302 217-3 (see ref. 3);
6. Maximum transmitter power shall not exceed 30 dBm (see ref.1).

THE 75 GHz BAND (71 – 76 GHz) Continued

2. ANTENNA COMPLIANCE REQUIREMENTS

For the 75 GHz band, the minimum requirements for antenna radiation pattern are defined by either ETSI standard EN 302 217-4-2 class 2 antennas for the band 66 - 86 GHz (Figure 2) or the requirements specified in the FCC Title 47 Part 101.115 (Table 1).



Angle (°)	Co-polar	Angle (°)	Cross-polar (dBi)
5	25	5	5
15	10	15	5
20	7	20	0
40	2	60	-8
70	-2	100	-10
88.75	-7	180	-10
100	-7		
100	-10		
180	-10		

Figure 2: Radiation pattern for antennas used in the 75 GHz band (ETSI standard)

THE 75 GHz BAND (71 – 76 GHz) Continued

Frequency (GHz)	Maximum beamwidths to 3 dB points (included angle in degrees)	Minimum antenna gain (dBi)	Minimum radiation suppression to angle in degrees from centreline of main beam in decibels						
			5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
71-76 (co-polar)	1.2	43	35	40	45	50	50	55	55
71-76 (cross-polar)	1.2	43	35	50	50	55	55	55	55

Table 1: Minimum antenna gain and minimum radiation suppression to angle requirement for antennas used in the 75 GHz band (FCC rules)

References

1. Spectrum Planning Report, SPP 2006/11 “*Planning of the 71-76 GHz and 81-86 GHz Bands for Millimetre Wave High Capacity Fixed Link Technology*”.
2. [ETSI EN 302 217-4-2 v1.5.1 \(2010-01\) Fixed Radio Systems; Characteristics and Requirements for Point-to-point Equipment and Antennas; Part 4-2: Antennas;](#)
3. [ETSI EN 302 217-3 v2.2.1 \(2014-04\) “Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 3: Equipment operating in frequency bands where both frequency coordinated and uncoordinated deployment might be applied”;](#)
4. [The FCC Title 47 Part §101.115 “Directional antennas”](#)

THE 85 GHz BAND (81 – 86 GHz)

1. RF CHANNEL ARRANGEMENTS



ASSIGNMENT INSTRUCTIONS

This band is designated for use by fixed point-to-point links.

Self-coordination by link station equipment is not permitted in this band.

Typical Use	: high capacity, short haul data links
Assignment Priority	: none
Minimum Path Length	: not specified
Antenna Requirements	: Ref. to Note 5.

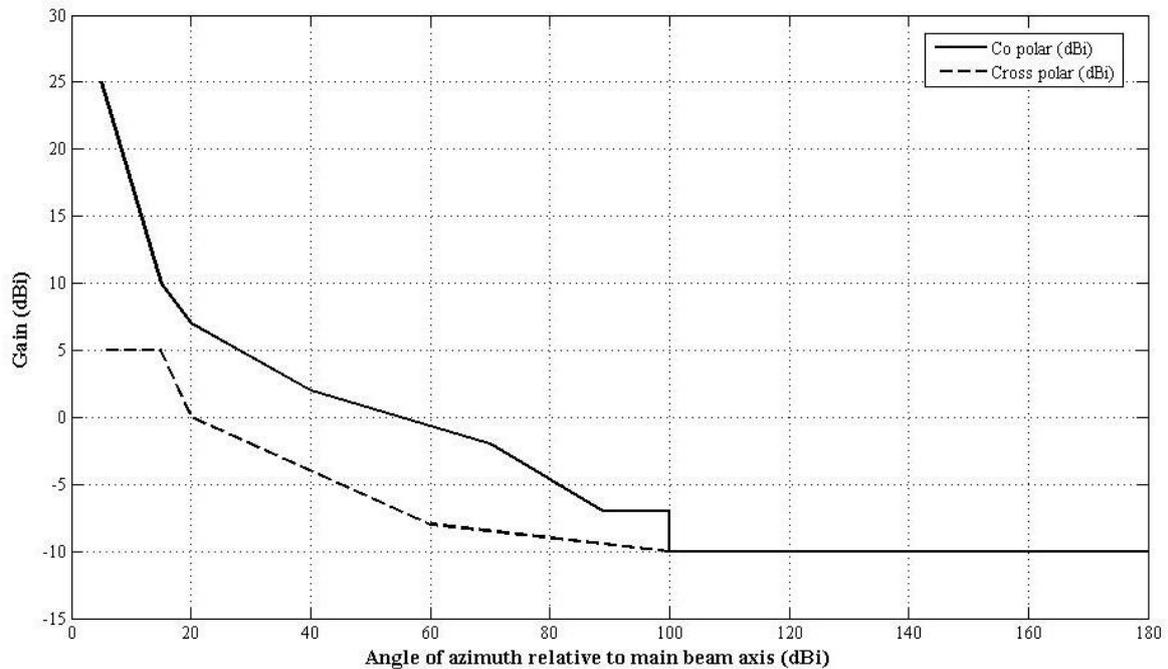
Notes:

1. Apparatus licences are required to register device location to allow potential users to coordinate with existing licensees to avoid interference (see ref. 1);
2. No channel plan between the guard bands is specified. Single frequency (TDD) systems and two frequency (FDD) systems may use all or any portion of the band between the guard bands;
3. Licences will carry a no interference / no protection condition (condition 27);
4. Fixed point-to-point (self-coordinated) licensing arrangements and fees apply in this band. See the ACA *"Apparatus Licence Fee Schedule"* and ref. 1;
5. EIRP limits and minimum antenna gain requirements are defined by the ETSI EN 302 217-3 (see ref. 3);
6. Maximum transmitter power shall not exceed 30 dBm (see ref.1).

THE 85 GHz BAND (81 – 86 GHz) Continued

2. ANTENNA COMPLIANCE REQUIREMENTS

For the 85 GHz band, the minimum requirements for antenna radiation pattern are defined by either ETSI standard EN 302 217-4-2 class 2 antennas for the band 66 - 86 GHz (Figure 3) or the requirements specified in the FCC Title 47 Part 101.115 (Table 2).



Angle (°)	Co-polar (dBi)	Angle (°)	Cross-polar (dBi)
5	25	5	5
15	10	15	5
20	7	20	0
40	2	60	-8
70	-2	100	-10
88.75	-7	180	-10
100	-7		
100	-10		
180	-10		

Figure 3: Radiation pattern for antennas used in the 85 GHz band (ETSI standard)

THE 85 GHz BAND (81 – 86 GHz) Continued

Frequency (GHz)	Maximum beamwidths to 3 dB points (included angle in degrees)	Minimum antenna gain (dBi)	Minimum radiation suppression to angle in degrees from centreline of main beam in decibels						
			5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
81-86 (co-polar)	1.2	43	35	40	45	50	50	55	55
81-86 (cross-polar)	1.2	43	35	50	50	55	55	55	55

Table 2: Minimum antenna gain and minimum radiation suppression to angle requirement for antennas used in the 85 GHz band (FCC rules)

References

1. Spectrum Planning Report, SPP 2006/11 “*Planning of the 71-76 GHz and 81-86 GHz Bands for Millimetre Wave High Capacity Fixed Link Technology*”.
2. [ETSI EN 302 217-4-2 v1.5.1 \(2010-01\) “Fixed Radio Systems; Characteristics and Requirements for Point-to-point Equipment and Antennas; Part 4-2: Antennas”](#);
3. [ETSI EN 302 217-3 v2.2.1 \(2014-04\) “Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 3: Equipment operating in frequency bands where both frequency coordinated and uncoordinated deployment might be applied”](#);
4. [The FCC Title 47 Part §101.115 “Directional antennas”](#).