Proposed updates to the LIPD Class Licence for 6 GHz RLANs

Consultation paper

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Executive summary

Following a [consultation](https://www.acma.gov.au/consultations/2021-04/rlan-use-5-ghz-and-6-ghz-bands-consultation-122021) by the ACMA in April 2021 (the April 2021 consultation paper) on the possible use of radio local area network (RLAN) devices in the 5925–7125 MHz band (the 6 GHz band), we are proposing to update the Radiocommunications (Low Interference Potential Devices) Class Licence 2015 (LIPD Class Licence) to authorise use of RLANs in the range 5925–6425 MHz (the lower 6 GHz band). These proposed new LIPD Class Licence arrangements for low power indoor and very low power devices were set out in the April 2021 consultation paper, with industry responses either supporting or not opposing them.

If implemented, these changes to the LIPD Class Licence will make the 500 MHz of the lower 6 GHz band available for RLANs in the near term for low power indoors and very low power devices. This will provide significant benefits to consumers and industry alike by enabling access to the latest technologies in the 6 GHz band, including the ‘Wi-Fi 6e’ suite of RLAN technologies. These technologies will represent a step up in local wireless delivery through significant latency reduction, increased speed and greater capacity, which will partially or fully address the ‘weakest link’ problem of terminal-end wi-fi choking the significant capacity that can be delivered by modern wired (for example, fibre) broadband networks.

Responses to the April 2021 consultation paper provided mixed views on the use of the 6425–7125 MHz frequency range (the upper 6 GHz band). While the ACMA is open to investigating further opportunities for RLAN use in the upper 6 GHz band, we are not proposing changes to the LIPD Class Licence to support such use at this time. Rather, this paper seeks comment on a set of more detailed options for the possible use of the upper 6 GHz band, in terms of potential services that might be accommodated, and technical constraints or access management systems that might be useful.

Similarly, there was interest in arrangements to support higher power ‘standard power’ devices across the entire 6 GHz band, with some accompanying measures mandated to mitigate interference potential. While not adopting arrangements supporting these devices now, we are seeking further comment to inform future consideration.

The April 2021 consultation paper also discussed possible updates to existing LIPD arrangements for RLANs in the 5150–5250 MHz frequency band to reflect outcomes of WRC-19. Just as with the upper 6 GHz band, we are not proposing changes to the LIPD Class Licence to support these changes at this time.

We are also taking the opportunity to address 2 typographical errors in the current LIPD Class Licence regarding the 41–44 MHz and 928–935 MHz bands.

Released with this paper is a draft variation to the LIPD Class Licence. This reflects proposed changes supporting the establishment of RLANs in the lower 6 GHz band and addresses the typographical errors in the 41–44 MHz and 928–935 MHz bands. We will consult separately on any further updates to the LIPD Class Licence, for example, arrangements in support of RLANs in the upper 6 GHz band or 5150–5250 MHz band, and/or further changes to operating parameters in the lower 6 GHz band.

# Issues for comment

The ACMA invites comments on the following issues set out in this paper:

## Lower 6 GHz band/proposed update to the LIPD Class Licence

1. Are the proposed out-of-band emission limits of -37 dBm/MHz for outdoor very low power (VLP) devices and -27 dBm/MHz for low power indoor devices suitable, both in terms of protecting intelligent transport systems (ITS) services and their effect on the operation of RLAN devices near/adjacent to the 5925 MHz boundary?
2. Is the specification of contention management protocols in the LIPD Class Licence necessary to enable equitable access between potentially competing technologies such as RLANs and 5G new radio-unlicenced (NR-U) services? If so, is the proposed condition, and the language used to express it, appropriate?
3. Are there any broader comments on the proposed update to the LIPD Class Licence?

## Upper 6 GHz band/higher power RLAN devices

1. Should the ACMA make arrangements that permit high-gain directional antennas (for example, for wireless internet service providers in remote areas) under a class licensing regime?
2. If ‘high power’ class-licensed devices were to be introduced under an AFC system, what aspects of the system would need to be considered in setting it up? Is there interest from industry in administering such a system?
3. If ‘high power’ class-licensed devices were to be introduced under an AFC system:

Is there interest from industry in administering such a system?

Are there any impediments to developing and/or operating a system in Australia? What could be done to help enable, or otherwise encourage, the development and/or operation of a system in Australia?

To what extent would an Australian system need to be aligned with those to be implemented elsewhere? What scope could there be for customisation in an Australian system?

What aspects of an AFC system would need to be considered in the design, establishment, and ongoing operation, of such a system, including:

regulator and industry commitments

technical spectrum coordination and coexistence rules – for example, a tiered hierarchy framework for spectrum uses

IT infrastructure and system design, including security and system reliability issues

communication interfaces between an AFC system, the ACMA’s Register of Radiocommunications Licences (RRL) and devices

ongoing interaction between the ACMA and system operators

If ‘high power’ devices were to be introduced under a manual registration process, what might those arrangements look like? Would the introduction of apparatus licensing for such devices be an appropriate option?

1. Would there be advantages in implementing different licensing and/or access management arrangements in different geographic areas for the use of high power RLAN devices?
2. Are there additional sharing scenarios and/or studies relevant to this band that have not been identified in this paper?

## 5 GHz band

1. In addition to comments made to the April 2021 consultation paper, do you have any comments on the other proposals for updates to the 5 GHz band listed in this paper?
2. If outdoor and/or higher power RLAN devices were authorised in parts of the 5 GHz band (for example, 5150–5250 MHz), would it be appropriate to implement measures similar to those being considered for high power devices in the 6 GHz band (for example, a registration system, or apparatus licensing)?
3. If high power devices were to be authorised in both the 5 GHz and 6 GHz band, would it be appropriate to use the registration/authorisation method and system for both?

# Introduction

The 6 GHz band (5925–7125 MHz) is generating substantial interest internationally, with numerous countries opening up access to the band – or parts of it – for use by radio local area network (RLAN) systems, the most common of which are wi-fi networks and devices.

Regulators around the world have made parts of the band available for unlicensed or equivalent[[1]](#footnote-2) use, or have announced their intention to do so, under a range of different technical and regulatory arrangements. Many other countries are in the process of considering such arrangements. New arrangements in the UK have mostly been based on studies and recommendations undertaken by the European Conference of Postal and Telecommunications Administrations (CEPT). The map in Figure 1 shows all countries we are aware of that have either proposed or introduced arrangements for ‘unlicensed’ use of the 6 GHz band. This includes Australia with the proposed addition of the lower 6 GHz band to the LIPD Class Licence described in this paper.

The amount of spectrum proposed or made available for ‘unlicensed’ (or equivalent) RLAN use in the 6 GHz band across the world



This international momentum, along with the important role RLANs play in the broader broadband connectivity ecosystem and interest indicated domestically through the ACMA’s [five-year spectrum outlook](https://www.acma.gov.au/five-year-spectrum-outlook) (FYSO) process, triggered a review by the ACMA of the 6 GHz band for possible RLAN use in Australia.

# Previous consultation

On 7 April 2021, the ACMA released the consultation paper [*Exploring RLAN use in the 5 GHz and 6 GHz bands*](https://www.acma.gov.au/consultations/2021-04/rlan-use-5-ghz-and-6-ghz-bands-consultation-122021). In it, we sought industry feedback on the potential introduction of arrangements for RLAN devices in the 6 GHz band (5925–7125 MHz) and updating existing arrangements in parts of the 5 GHz band (5150–5725 MHz).

Specifically, the ACMA indicated a preliminary disposition towards updating the LIPD Class Licence to allow the following 2 classes of devices to operate in the lower part of the 6 GHz band (5925–6425 MHz), with the follow restrictions, including limits on maximum equivalent isotropic radiated power (EIRP) and power spectral density (PSD):

1. Low power indoor (LPI) devices:

maximum power: 24 dBm EIRP

maximum PSD: 14 dBm/MHz EIRP

must operate indoors.

1. Very low power (VLP) devices:

maximum power: 11 dBm EIRP

maximum PSD: 1 dBm/MHz EIRP

may operate in any location.

We also asked for feedback on the possibility of expanding the proposal to:

include the entire 6 GHz band in the LIPD Class Licence for these devices

allow a third class of devices that could operate at higher power levels.

The ACMA also considered possible updates to the existing arrangements for RLAN devices in part of the adjacent 5 GHz (5150–5250 MHz) band. This could include potentially permitting outdoor use, thus reflecting updates to international regulations made at the International Telecommunication Union (ITU) 2019 World Radiocommunication Conference (WRC-19).

## Summary of submissions

The ACMA received 21 submissions to the consultation from AMTA, Apple, Cisco, Communications Alliance Satellite Services Working Group (CASSWG), Dynamic Spectrum Alliance (DSA), Echostar, Ericsson, HP, Intel, NodeOne, Nokia, Omnispace, Oppo, Optus, Pivotel, Qualcomm, Swoop, Telstra, Wi-Fi Alliance, Wireless Broadband Alliance (WBA), and a joint submission from Apple, Broadcom, Cisco, Facebook, Google, HP, Intel, Microsoft and Qualcomm.

The responses are all available on the [consultation webpage](https://www.acma.gov.au/consultations/2021-04/rlan-use-5-ghz-and-6-ghz-bands-consultation-122021).

Overall, submitters were generally supportive of the proposals made in the consultation paper to introduce class-licensed arrangements for RLANs in the lower 6 GHz band with low power limits. No responses specifically opposed these measures, and all respondents noted there was a demand or a requirement for class-licensed spectrum in the 6 GHz band.

However, there were differing views on the additional options discussed in the paper – allowing the use of the upper 6 GHz band, and of higher power devices. Most submissions supported both additional options, but there was explicit opposition to some, or all, of these extra scenarios, mostly from operators of satellite and mobile networks. The opposition was mainly due to either:

a preference for the upper band to be used for licensed International Mobile Telecommunication (IMT) systems, or at least to wait and see if this was a viable option for the future (subject to WRC-23 deliberations and establishment of IMT equipment markets); or

concerns about interference from RLANs to satellite systems operating in the upper band. In these cases, the use of the upper band for IMT was also opposed.

Views on the proposed changes to arrangements in the 5 GHz band were also mixed. Again, most respondents supported changes being made – but with varying views on what those changes should be. Two respondents opposed any changes in the 5 GHz band.

The following sections briefly summarise the responses to specific issues raised in the consultation paper.

### Demand for spectrum

Discussion on the demand for spectrum focused on the perceived demand or requirements for new spectrum for RLANs and/or IMT in the mid-band[[2]](#footnote-3) in the medium term. Comments noted that both licensed and unlicensed services will need more mid-band spectrum to support the growth of the services within the next 5 years.

RLAN proponents focused on the need for spectrum arrangements that would enable signal bandwidths wider than can be accommodated in existing spectrum, along with congestion in those existing bands.

### Use of the lower 6 GHz band

No submissions opposed the introduction of unlicensed RLAN use in the lower 6 GHz band, although some noted they wanted to see sufficient protection for incumbent services and technologies – such as adjacent-band fixed links and Cellular Vehicle-to-Everything (C-V2X). Others wanted to ensure that support was given to other unlicensed technologies (such as New Radio Unlicensed (NR-U)) in the band.

### Use of the upper 6 GHz band

The question of whether the upper 700 MHz should also be made available for class-licensed use was heavily contested. Most respondents supported enabling the upper band for unlicensed RLAN use, but there was some explicit opposition. Opponents mainly preferred to wait for other developments and/or further studies before deciding what the best use of the upper band may be.

Supporters of both unlicensed and licensed use in the upper 6 GHz band cited high demand for their preferred use of the spectrum, and the need for more mid-band spectrum for that use.

Satellite operators were the main opponents of unlicensed use of the upper band – or indeed, any changes in the use of this band. Mobile network operators mostly supported a wait-and-see approach, preferring to defer a decision on the upper band until WRC-23 had decided on agenda item 1.2, in anticipation of increasing international momentum towards IMT in this band.

Arguments in support of class-licensing the upper band included:

alignment with other jurisdictions and economies of scale

current international studies demonstrating compatibility between prospective and incumbent uses of the band (incumbency in Australia is the same as elsewhere)

high demand for more wi-fi spectrum

the ability of mobile operators to use other unlicensed technologies in the band, such as 5G NR-U, to complement their licensed networks.

Satellite industry respondents were concerned about aggregate interference to satellite receivers from potentially high numbers of terrestrial class-licensed devices. IMT proponents tended to support a wait-and-see approach, or suggested that further studies are necessary, rather than advancing a clear case against RLAN use.

### Proposed low power limits

Many respondents supported the power limits and other operating restrictions proposed in the consultation paper for VLP and LPI devices and endorsed the use of these types of devices. Several submissions requested an increase in operating power limits, mainly on the basis that higher limits would be needed to support larger bandwidths that can be used under the new wi-fi standards. Alternative limits suggested in submissions were generally based on those used or proposed in other countries.

### Higher power devices and AFC

Interest in a ‘standard power’ (sometimes called ‘high power’) category was mixed. Generally, supporters of RLAN use in the upper band also supported the use of high-power devices, while others generally opposed both matters. CA SSWG and Telstra were the two exceptions, being in favour of class licensing in the upper band but against the use of high-power devices (Telstra only opposed high-power use in the upper band).

All supporters of high-power devices agreed that these devices would need to be subject to additional regulation, and most agreed that implementing an Automatic Frequency Control (AFC) system along the lines of similar systems being considered overseas would be the best option. Some suggested that an online database-based AFC system may be unnecessary for Australia, and that a ‘light licensing’ or ‘simple registration’ system may be sufficient.

Some opponents of high-power devices also claimed that AFC systems were unproven, too complex, and difficult to manage.

### 5 GHz band

Most responses were supportive of making changes to existing 5 GHz arrangements, which are broadly in line with those made to Resolution 229[[3]](#footnote-4) at WRC-19 – that is, increased power limits and allowing outdoor use, with the introduction of restrictions on radiated powers at different elevation angles to protect satellite receivers. However, there were a range of different views on exactly what those changes should be, and several suggestions for other unrelated changes that respondents thought might be considered.

### Other issues raised

One response identified interest in making the 5600–5650 MHz band available for RLANs. As noted in the submission, the existing apparatus-licensed arrangements for point-to-multipoint services were established to support possible alternatives for licensees affected by the reallocation of the 3.6 GHz band for spectrum licences. The ACMA also notes the use of the band by Bureau of Meteorology weather radars.

The existing point-to-multipoint arrangements were established after extensive and careful consideration regarding coexistence with radar and as an alternative in some cases for 3.6 GHz licensees. Given the reallocation period for the 3.6 GHz apparatus licensees has not yet concluded and the existing point-to-multipoint arrangements explicitly retain opportunities (where available) for these, the ACMA does not consider it appropriate to potentially impact these opportunities at this time. Furthermore, coexistence with incumbent radar use of the band is non-trivial, with there being historically divergent views on the ability of RLANs and radars to successfully coexist.

Accordingly, while acknowledging the desirability for access to this band from an RLAN perspective, the ACMA does not currently intend to investigate this matter further and instead sees other RLAN considerations elsewhere in the 5 GHz and 6 GHz bands as higher relative priorities.

## Case for action

The April 2021 consultation paper described a range of benefits that might be realised by making additional spectrum available for RLAN devices. These included catering for the growth in demand for data capacity in wi-fi networks, an expanded variety of uses for wi-fi devices, the economic value and benefits of enabling these technologies, and the expectation from consumers that wi-fi performance will not impede the performance of increasingly fast home and business fixed-broadband connections.

Enabling access to the lower 6 GHz band in the short term will pave the way for a significant increase in wi-fi capacity, through approximately doubling the amount of spectrum currently available for wi-fi across the 2.4 and 5 GHz bands. This will provide tangible benefits to consumers and industry alike by enabling access to the latest technologies in the 6 GHz band, including the suite of Wi-Fi 6e RLAN technologies, even while options for use of the upper 6 GHz band remain under consideration.

# Lower 6 GHz band

Given the level of general support for, and lack of explicit opposition to, the preliminary proposal made in the original consultation paper, we now intend to proceed with consulting on an update to the LIPD Class Licence that will allow LPI and VLP RLAN devices to operate in the lower 6 GHz band.

Some responses to the consultation suggested amending the power limits or other aspects of the initial proposal. This section discusses those suggestions and provides details of the LIPD Class Licence updates we propose making. A draft of the proposed legislative instrument to make variations to the class licence is available alongside this paper on the [ACMA website](https://www.acma.gov.au/have-your-say).

## Initial proposal and responses

The ACMA’s preliminary view in the initial consultation paper was to permit devices to operate in the lower 6 GHz band (5925–6425 MHz) with the following power limits:

1. Low power indoor (LPI) devices:

maximum power 24 dBm EIRP

maximum power density 11 dBm/MHz EIRP

must operate indoors

1. Very low power (VLP) devices:

maximum power 14 dBm EIRP

maximum power density 1 dBm/MHz EIRP

may operate in any location.

In addition to supporting (or not opposing) the use of these devices, a number of submissions suggested variations of these restrictions or additional requirements for these devices. These details are discussed in detail in the following sections.

## Response to submissions

### Choice of power level (LPI)

A number of submissions from RLAN proponents requested that the proposed power limit be increased – most commonly to 30 dBm EIRP. The main argument was to better support wider bandwidth devices, as higher total power limits would allow devices with wider bandwidths to maintain higher power densities.

While there have been discussions within industry around a potential 320 MHz channel bandwidth, the 802.11ax standard currently only supports channel bandwidths up to 160 MHz. Requests to accommodate higher bandwidths were based on supporting future generation standards (for example, Wi-Fi 7), which are still some years away from being completed, so we are not considering these use cases at the moment. We are aware that future technologies may have requirements beyond those that would be accommodated by the current proposed arrangements – including higher PSDs and a larger contiguous block of spectrum (see above discussion regarding maximum 320 MHz channel sizes being considered under Wi-Fi 7). This is a contributing factor to our current inclination that the upper 6 GHz band might eventually be made available for RLANs.

Amending operating conditions to increase powers to accommodate future technologies or standards, if appropriate, can be implemented though a future update to the LIPD Class Licence.

Table 1 shows power spectral densities for a range of radiated power and operating bandwidth combinations. Values highlighted in green are the combinations that would be available under the proposed limits. For systems operating at a 160 MHz bandwidth, an EIRP limit of 24 dBm would enable a 2 dBm/MHz power density, which under normal deployment conditions would not preclude operation at that bandwidth.

1. Power spectral densities produced by devices operating at various combinations of bandwidth and effective isotropic radiated power. Highlighted values are those allowed under our proposed limits

|  |  |  |
| --- | --- | --- |
|  |  | **EIRP limit (dBm)** |
|  |  | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| **Bandwidth** | **20** | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| **(MHz)** | **40** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|   | **80** | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|   | **160** | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|   | **320** | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |

Internationally, EIRP limits for LPI devices have been proposed or set at values in the range 23–30 dBm, and the power density limits in the range 5–14 dBm (other than South Korea, where the maximum is 11 dBm/MHz). The proposed 24 dBm power limit closely aligns with a large number of other jurisdictions, including the EU and UK, allowing the Australian market to take advantage of worldwide economies of scale.

It is acknowledged that this limit is at the lower end of EIRP allowances internationally, but this value could be revisited (potentially increased) in a possible future update to the LIPD Class Licence if a case is established to do so. Conversely, it would be difficult and impractical to subsequently reduce power limits and enforce those reduced limits once class-licensed devices have already been deployed. Accordingly, the ACMA considers it prudent to permit lower power devices in the first instance and observe domestic and international developments over time to see if there is a case and possibility for allowing higher power devices.

### Choice of power level (VLP)

Some submissions requested that the proposed EIRP limit for VLP devices be increased from 14 dBm to 17 dBm, as is the case in some other countries. These VLP devices are intended only for short-range personal networks and direct communications, and would be allowed to operate in all locations, both indoors and outdoors. The vast majority of international arrangements/proposals are set at a 14 dBm EIRP limit, and even in the few jurisdictions allowing higher total EIRP limits, power density limits above 1 dBm/MHz (that 14 dBm will allow for a 20 MHz channel) are not permitted. In the interests of coexistence with other spectrum uses, and noting that this can be revisited in the future, the ACMA is of the view that 14 dBm remains appropriate for VLP devices at this time.

### Separate power levels for access points and client devices (LPI)

Several submissions requested raising the power limit for access points, with client devices to remain at the proposed value of 24 dBm EIRP. It is proposed that all devices be limited to 24 dBm, so we are not contemplating separate device-specific power limits at this time.

### Client-to-client communication

As the proposed arrangements do not distinguish between client devices and access points, there is no need to make explicit arrangements for client-to-client communication. Any devices that meet the requirements that are proposed to be listed the LIPD Class Licence will be able to operate, irrespective of the type of communication or device.

### Definition of ‘indoor’

Other international jurisdictions have implemented specific restrictions to preclude outdoor operation. For example, the US and some other jurisdictions have prescribed a set of requirements to this effect, such as devices not being able to operate on battery power and not being weather-proof.

The ACMA’s view is that such prescriptive rules are not necessary in the Australian environment and would likely result in unnecessary regulation. The restriction of devices to indoor use already exists in other ACMA regulations (including RLAN use in some 5 GHz band ranges in the LIPD Class Licence). There is no need to impose additional specific restrictions or definitions to ensure indoor use rules are adhered to in the 6 GHz band in Australia. In practice, it is also likely that the regulations in place in other jurisdictions will result in some devices supplied to the Australian market already incorporating these additional restrictions.

### High-gain directional links

Several submissions to the consultation recommended allowing 6 GHz devices with fixed locations to use high-gain directional antennas. This would further assist, for example, fixed wireless access to be deployed in some or all of the 6 GHz band by wireless internet service providers (WISPs) in regional and remote locations.

If this type of use were to be enabled, it would fall under a separate category of device alongside ‘high’ or ‘standard’ power devices, which would be implemented under some form of coordination or registration system. See the discussion later in this paper on high power devices and AFC.

The ACMA does not propose to make provision for this type of operation in the current update to the LIPD Class Licence, however we may consider it further in a future update.

### Protection of adjacent-band Intelligent Transport Systems (ITS)

Interference protection for intelligent transport systems (ITS) operating in the adjacent 5850–5925 MHz band was also mentioned in responses to consultation and has been considered in European recommendations for the 6 GHz band. CEPT propose[[4]](#footnote-5) to constrain RLAN operation to above 5945 MHz, which will essentially provide a 10 MHz guard band above lower-adjacent urban rail ITS (noting that in Europe, communication-based train control (or CBTC systems) are operated up to 5935 MHz in some countries). Note that in the UK, spectrum for RLANs is being made available down to 5925 MHz.

CEPT has also recommended out-of-band (OOB) emission limits of -45 dBm/MHz and 22 dBm/MHz below 5935 MHz for VLP outdoor and LPI devices, respectively. The -45 dBm/MHz permitted for VLP outdoor devices is expected to enable rollout of VLP devices in the short term but will be revised to -37 dBm/MHz at the end of 2024, unless further studies in the intervening period result in a different value being recommended.

In other jurisdictions such as the US, Brazil and Mexico, an OOB limit of ‑27 dBm/MHz has been prescribed for all devices. A submission to the April 2021 consultation paper discussed this issue, noting the matter has been jointly considered by various other parties, and proposed both an OOB limit below 5925 of ‑37 dBm/MHz for VLP devices and that VLP devices should prioritise use of channels above 6000 MHz. The submission also recommended a value of ‑27 dBm/MHz for LPI (and standard power) devices.

We are of the view that some measures are prudent to support coexistence with ITS in Australia. Noting the variety of approaches adopted globally, we are proposing the inclusion of the following OOB emission limits below 5925 MHz:

-37 dBm/MHz for VLP devices

-27 dBm/MHz for LPI devices

The LPI limit aligns with FCC regulations for these devices, noting that ITS use in the US is more closely aligned with Australian than with European arrangements. This will ensure that RLAN access point devices designed for use in the US and brought into Australia – which is a likely scenario – will meet the prescribed criteria for indoor use. Adoption of the post-2024 CEPT limit for VLP devices is proposed to manage interference potential into Australian ITS systems in the longer term. We have not, however, proposed any additional constraint regarding operation of VLP above 6000 MHz. We consider the use of OOB limits is adequate and may, by default, require operation away from the 5925 MHz boundary in any event.

We seek feedback on the suitability of these values, both in terms of protecting ITS services and their effect on the operation of RLAN devices near/adjacent to the 5925 MHz boundary.

## Technologies other than wi-fi

In our initial consultation, we focused on wi-fi technologies, as it is expected they would constitute the main use of the 6 GHz band under class licensing. However, it is not intended to restrict use of the band solely to wi-fi devices – any other devices which meet the prescribed requirements will also be authorised. The ACMA proposes to include conditions to ensure that any devices operating in the band are able to coexist.

The other main technology that is currently expected to make use of the 6 GHz band under class licensing is 5G NR-U – a feature of 5G standards that allows ad hoc localised networks to be deployed in unlicensed (class-licensed) spectrum. The standards defining that technology have been developed with the ability to seamlessly share spectrum with wi-fi networks as an important feature.

Both wi-fi and NR-U technologies incorporate listen-before-talk/collision avoidance (CA) protocols for channel access. These contention-based protocols allow multiple users to share spectrum by providing a reasonable opportunity for the different users to transmit. In the absence of conditions on sharing spectrum, any device that does not implement similar protocols could effectively block, or significantly hinder, the ability of other devices to access a channel by transmitting indiscriminately.

In order to enable coexistence for these technologies in the 6 GHz band, we propose to include a condition that requires implementation of contention-based protocols (for example, CA type multiple access collision avoidance (MACA), carrier sense multiple access (CSMA) or similar). Devices that do not include provisions to invoke these types of protocols will therefore not be permitted to operate.

While all aspects of the proposed LIPD Class Licence variation are open for comments, the ACMA is especially interested in industry views on the need for such a condition and, if so, the nature of the requirement and language used to describe it.

# Proposed updates to the LIPD Class Licence

Considering the issues relating to the lower 6 GHz band discussed in the preceding chapter, and our responses, we propose adding 2 new items to the LIPD Class Licence to enable the use of the band for low power RLAN devices.

We are also taking the opportunity to propose 2 minor edits to current provisions in the LIPD Class Licence to correct typographical errors – a misspelling of the word ‘transmitters’ in item 39C of the table in Schedule 1, and a numbering error in item 25(b).

The details of the new items for RLANs are shown below, and a draft instrument to make these variations to the LIPD Class Licence is available alongside this paper on the on the [ACMA website](https://www.acma.gov.au/have-your-say).

## New items

| **Item #** | **Class of transmitter** | **Permitted operating frequency band (MHz)** | **Maximum EIRP** | **Limitations** |
| --- | --- | --- | --- | --- |
| 63AA | Radio Local Area Network transmitter | 5925–6425 | 250 mW | (a) The transmitter must only be used indoors.(b) The power spectral density of a transmitter must not exceed 12.5 mW EIRP per MHz.(c) Contention-based protocols for multiple access such as Carrier Sense Multiple Access (CSMA) or Multiple Access Collision Avoidance (MACA) must be implemented. |
| 63AB | Radio Local Area Network transmitter | 5925–6425 | 25 mW | (a) The power spectral density of a transmitter must not exceed 1.25 mW EIRP per MHz.(b) Contention-based protocols for multiple access such as Carrier Sense Multiple Access (CSMA) or Multiple Access Collision Avoidance (MACA) must be implemented. |

## Updated items

The items being modified to correct typographical errors are shown below. The changes are illustrated with bold, underlined text.

| **Item #** | **Class of transmitter** | **Permitted operating frequency band (MHz)** | **Maximum EIRP** | **Limitations** |
| --- | --- | --- | --- | --- |
| 25 | Auditory assistance transmitters | (a) 41–42, with a carrier frequency of: (i) 41.55 (ii) 41.65 (iii) 41.75 (iv) 41.85; or (v) 41.95(b) 43–44, with a carrier frequency of: (i) 43.05 (ii) 43.15 (iii) 43.25**~~; or~~** (iv) 43.35**; or (v) 43.45****~~(c) 43.45~~** |  |  |
| 39C | Fixed telecommand or telemetry **~~trasmistters~~ transmitters** | 928–925 | 25 mW | (a) The maximum radiated power spectral density must not exceed ‑14.5 dBm/kHz.(b) The maximum duty cycle must not exceed 0.1% averaged over one hour on any given frequency. |

# Further considerations for the upper 6 GHz band and higher power devices

In the short term, making the lower 500 MHz of the 6 GHz band available for RLANs will provide significant benefits and allow Australian consumers and industry to use the latest technologies available in the 6 GHz band.

The next key decision to be made regarding use of the 6 GHz band is what (if any) changes should be made to arrangements in the upper 6 GHz band (6425–7125 MHz).

Potential use of the upper 6 GHz band for RLANs was discussed in our previous consultation. However, this part of the band was subject to more diverse views, is far more contestable, and further consultation will be necessary before making any new arrangements. Given the lack of other clear options for new RLAN spectrum and the current (and continuing) international momentum towards releasing the entire 6 GHz band for RLAN use, the ACMA is keen to explore further opportunities for RLANs in the upper 6 GHz band. However, we are not proposing changes to the LIPD Class Licence to support such use at this time.

In this section, we discuss potential use of the upper 6 GHz band in more detail.

Internationally, there are different approaches being taken by national regulators in terms of whether they are proposing/introducing RLAN access across the entire 6 GHz band, or just the lower part of the band. The US is the most notable administration to have made arrangements for access to the entire 6 GHz band, while the European block is the most significant entity that is only opting for the lower band at this stage. There seems to be a fairly even split between those considering/authorising the entire band, and those opting only for the lower band.

## IMT in the upper 6 GHz band

### WRC-23 Agenda item 1.2

Agenda item 1.2 for WRC-23 is looking at possible identifications for IMT in additional bands, including the entire upper 6 GHz band (in ITU Region 1) and for the upper 100 MHz of the band (all regions). While the more significant part of this agenda item is not directly applicable to Australia (being in Region 3), the outcomes could lead to future interest in IMT use in the upper band, including development of economies of scale for 5G equipment.

The ongoing nature of studies under this agenda item and lack of a formal resolution until WRC-23 are, arguably, reasons for holding off on making any decisions on the future use of the upper 6 GHz band. However, it should be noted that any identification under this item:

is not guaranteed

is only directly relevant to Australia (Region 3) in the upper 100 MHz of the band

would not occur for several years

does not guarantee that the band would be widely allocated to IMT, even within Region 1

would not oblige Australia to follow, even if the band becomes used for IMT on a significant scale.

We do not consider that WRC-23 agenda item 1.2 is a sufficient reason to delay a decision on the upper 6 GHz band – indeed, how other major international jurisdictions choose to use the band will provide a better gauge than studies under/outcomes of that agenda item. Although further consideration will be given before making any decisions on the upper band, we do not currently intend to wait for WRC-23 outcomes and any subsequent global adoption.

### IMT sharing with other services

An introduction of IMT services into the upper band would require IMT to share with incumbent services. In the US, it was decided that the upper band would not be made available for IMT as it would require the band to be cleared of incumbent fixed services. Responses to our previous consultation from the satellite industry indicated that although they have some opposition to RLANs in the upper band, the use of IMT in that band would be more strongly opposed, noting that some ITU studies[[5]](#footnote-6) indicate that in frequency bands close to 6 GHz, there is likely difficulty in sharing between satellite and IMT services.

Relevant ITU sharing studies regarding IMT in the upper band, including those that come out of agenda item 1.2, will be considered in determining whether spectrum in the upper band might be made available for IMT use.

### IMT sharing with RLAN

One consultation response suggested that by allowing only lower power RLAN devices in the upper band, in conjunction with specification of an appropriate coordination system, the upper band – or part of it – could be used for both RLAN and IMT services.

While it may be possible to implement sharing models that would enable the co-existence – to some extent – of RLAN, IMT, and all existing services in the upper band, there has not been sufficient work done at this stage to understand exactly how such a model would work, if indeed it could. It is not intended that operation of any service in the upper band would be restricted on a contingency basis for possible future sharing with other services that may or may not be introduced. In making any decision to accommodate multiple services on a shared basis, the ACMA would closely examine how the overall shared arrangement would look (for example, by referring to international proposals/examples and/or sharing studies carried out elsewhere or by the ACMA). Such arrangements may also make use of a system-level coordination process – for example, something similar to an automatic frequency control (AFC) system (discussed later).

The ACMA notes that in the past, wireless broadband operators, especially those authorised by spectrum licences, have expressed reservations about sharing spectrum with class-licensed devices. In some cases, the ACMA has made decisions along these lines on the basis that coexistence was achievable. Sharing between RLAN (or similar) systems and wide-area wireless broadband services, regardless of the technical model, could create new precedents and opportunities in other circumstances (although we would of course need to carefully consider such opportunities on a case-by-case basis).

## High power RLANs

### Class licensing

If the upper band were to be made available for RLAN use, a starting point for device operating requirements would be simply extending the frequency range upwards for existing LPI and VLP devices.

There was agreement among respondents to the consultation paper that if higher power devices were to be allowed (in either or both parts of the 6 GHz band), that some form of coordination or registration of these devices would be required. That is, they should not be allowed to be deployed on a solely ad-hoc contention-limited basis, as is usually the case with class-licensed devices.

The previous consultation discussed the use of AFC systems. In the small number of jurisdictions where these systems are already used or planned, operation under the AFC requires that device users need to connect to an online service to determine which channels and power levels can be used, according to the device’s geographic location. AFC systems are proposed for use in the 6 GHz band in a number of countries, including the US, Canada and South Korea.

While there was some support in submissions to the consultation for implementing this type of system in Australia, no respondents indicated any interest in deploying, operating and/or administering it. The ACMA sees this type of third-party management arrangement as being industry, rather than government, led ­– although we acknowledge that ACMA would be required to have some involvement, particularly in the initial process of setting up an AFC system. In particular, the ACMA is seeking to facilitate any industry interest in supporting AFC type systems being developed for Australian spectrum management arrangements. Accordingly, we have included a set of questions on this issue below to further encourage industry considerations. We expect more industry interest in this type of arrangement to emerge as AFC-type systems roll out internationally.

### Apparatus licensing

Other responses suggested potential alternative ways to manage access by higher power devices, through a form of manual registration (under class licensing for visibility) or a ‘light-licensing’ process under apparatus licensing.

Both of these approaches would provide visibility of device locations if there were any interference issues. In addition, depending on the circumstances, it may be possible to include some form of point-in-time coordination to manage coexistence issues with existing incumbents. However, this approach is not dynamic and, therefore, unable to coordinate prospective and incumbent services in the same way as an AFC would. The implications of this limitation are not clear and would likely depend on the geography and demand from other services, and the degree to which it might be a problem would depend on the demand for/concentration of new standard/high power RLANs.

Under an apparatus licensing regime, it may be possible to implement different approaches for different geographic areas – for example, enabling a ‘lighter’ licensing regime in regional and remote areas where demand and co-existence issues are likely to be more manageable.

The ACMA has no preferred approach regarding high power RLANs at this time. We are seeking comments on whether consideration of apparatus licensing for higher power, ‘standard power’ (indoor and outdoor) RLAN devices is worthy of further consideration, including if there are any opportunities to take advantage of geographic considerations.

## Coexistence with incumbent services

### Satellite services

The key coexistence issue in the upper 6 GHz band is potential interference from new services into satellite services – particularly due to aggregate interference into satellite receivers. This would be the case if either (or both) RLAN and IMT services were to be accommodated in the upper band. Submissions to the consultation from the satellite sector contained mixed views on the potential introduction of RLAN services but were universally opposed to the introduction of IMT.

We will continue to consider coexistence aspects of the upper band, as they relate to the various types of satellite services that are present in the band. Existing studies indicate that sharing between RLAN and satellite services is possible, given appropriate conditions on RLAN devices. However, studies[[6]](#footnote-7) regarding IMT coexistence with satellite services indicate sharing is significantly more difficult.

This gives support to focusing on possible RLAN, as opposed to IMT, use of the upper 6 GHz band.

### Fixed services

Noting the outcomes of previous studies conducted in jurisdictions where arrangements for RLANs in the 6 GHz band have been made, along with a lack of feedback in submissions to the April 2021 consultation[[7]](#footnote-8), we are comfortable that the LPI and VLP devices proposed can co-exist with existing and future fixed point-to-links in the band.

## Issues for comment

The previous consultation paper discussed and elicited responses on general issues regarding the use of the entire 6 GHz band – which parts of the band might be used for RLAN and/or IMT, and what power levels should be included in class licensing arrangements. We are still considering whether some or all of the upper part of the band should be made available for RLAN services, and now seek views on more detailed aspects of arrangements for access to the band that could be considered if further changes were to be made.

We are also still considering possibilities for enabling higher power levels for LPI operation (in both the lower band and, potentially, the upper band), as was discussed by a number of submissions to the April 2021 consultation, and for potentially allowing a separate ‘high power’ class of device.

We are seeking responses to:

Should the ACMA make arrangements that permit high-gain directional antennas (for example, for WISPs in remote areas) under a class licensing regime?

If ‘high power’ class-licensed devices were to be introduced under an AFC system:

Is there interest from industry in administering such a system?

Are there any impediments to developing and/or operating a system in Australia? What could be done to help enable, or otherwise encourage, the development and/or operation of a system in Australia?

To what extent would an Australian system need to be aligned with those to be implemented elsewhere? What scope could there be for customisation in an Australian system?

What aspects of an AFC system would need to be considered in the design, establishment, and ongoing operation, of such a system, including:

regulator and industry commitments

technical spectrum coordination and coexistence rules – for example, a tiered hierarchy framework for spectrum uses

IT infrastructure and system design, including security and system reliability issues

communication interfaces between an AFC system, the ACMA’s Register of Radiocommunications Licences (RRL) and devices

ongoing interaction between the ACMA and system operators

If ‘high power’ devices were to be introduced under a ‘manual’ registration process, what might those arrangements look like? Would the introduction of apparatus licensing for such devices be an appropriate option?

Would there be advantages in implementing different licensing and/or access management arrangements in different geographic areas for the use of high power RLAN devices?

Are there additional sharing scenarios and/or studies relevant to this band that have not been identified in this paper?

# Further considerations for the 5 GHz band

In the April 2021 consultation paper, we asked about making updates to parts of the 5 GHz band – specifically 5150–5250 MHz. There was general support for some degree of change to RLAN use in the 5 GHz band, but views were mixed on exactly what those changes should be.

The specific proposal in the April 2021 consultation paper was to implement changes made to the ITU Radio Regulations at WRC-19 in the 5150–5250 MHz range. That is, allowing devices to operate outdoors in this frequency range, and allowing higher power (up to 1 W) if an appropriate emission mask was applied to the power transmitted at a range of elevation angles.

Currently, we do not consider making changes in this band as a high priority and are interested in further exploring the different views and options for this band expressed in the April consultation. As such, we are not yet proposing any updates to the LIPD Class Licence for any part of the 5 GHz band. We will consider the matter further and may propose updates to the LIPD Class Licence in the future, which will be based on the updates to the ITU Radio Regulations made at WRC-19, and the responses received to the April 2021 consultation paper and to this paper.

Other preferences for updates to the 5 GHz band expressed during the consultation for this band included:

following the regulations in place in the US, which allow a maximum power in 5150–5250 MHz of 4 W EIRP (rather than 1 W)

allowing outdoor operation in the existing indoor-only 5250–5350 MHz range

increasing PSD limits in 5150–5350 MHz from 10 dBm to 11 dBm.

Specifically, we are now seeking views on some follow-up questions:

In addition to comments made to the April 2021 consultation paper, do you have any comments on the other proposals for updates to the 5 GHz band listed above?

If outdoor and/or higher power RLAN devices were authorised in parts of the 5 GHz band (for example, 5150–5250 MHz), would it be appropriate to implement measures similar to those being considered for high power devices in the 6 GHz band (for example, a registration system, or apparatus licensing)?

If high power devices were to be authorised in both the 5 GHz and 6 GHz band, would it be appropriate to use the registration/authorisation method and system for both?

# Invitation to comment

## Making a submission

We invite comments on the issues set out in this consultation paper.

[Online submissions](https://www.acma.gov.au/have-your-say) can be made by uploading a document on the ACMA website. Submissions in PDF, Microsoft Word or Rich Text Format are preferred.

Submissions by post can be sent to:

The Manager

Spectrum Planning Section

Australian Communications and Media Authority

PO Box 78

Belconnen ACT 2616

The closing date for submissions is COB, **Friday 19 November 2021**.

Consultation enquiries can be emailed to xavier.halliwell@acma.gov.au.

#### Publication of submissions

We publish submissions on our website, including personal information (such as names and contact details), except for information that you have claimed (and we have accepted) is confidential.

Confidential information will not be published or otherwise released unless required or authorised by law.

#### Privacy

View information about our policy on the [publication of submissions](https://www.acma.gov.au/publication-submissions), including collection of personal information during consultation and how we handle that information.

Information on the *Privacy Act 1988,* how to access or correct personal information, how to make a privacy complaint and how we will deal with any complaints, is available in our [privacy policy](https://www.acma.gov.au/privacy-policy).

1. In Australia, operation of a radiocommunications device without a licence is illegal, however standing authorisations such as the LIPD Class Licence capture devices that might be permitted on an unlicenced basis elsewhere. [↑](#footnote-ref-2)
2. Mid-band is generally considered to be spectrum between approximately 1 GHz and 6 GHz. [↑](#footnote-ref-3)
3. ‘Use of the frequency bands 5150–5250 MHz, 5250–5350 MHz and 5470–5725 MHz by the mobile service for the implementation of wireless access systems including radio local area networks’. [↑](#footnote-ref-4)
4. [CEPT Report 75](https://docdb.cept.org/download/135). [↑](#footnote-ref-5)
5. See, for example, Reports [ITU-R S.2367](https://www.itu.int/pub/R-REP-S.2367-2015) and [ITU-R S.2368](https://www.itu.int/pub/R-REP-S.2368-2015). [↑](#footnote-ref-6)
6. See, for example, ITU Reports [ITU-R S.2367](https://www.itu.int/pub/R-REP-S.2367-2015) and [ITU-R S.2368](https://www.itu.int/pub/R-REP-S.2368-2015). [↑](#footnote-ref-7)
7. The only material discussion on this issue in consultation responses was from Telstra (in its capacity as a fixed link operator), who agreed that fixed links would be suitably protected, even from higher indoor RLAN devices. [↑](#footnote-ref-8)