Australian Government

Australian Communications and Media Authority

Regulation Impact Statement

Area-wide licences in remote areas of the 3.4-4.0 GHz band

APRIL 2023

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Contents

Contents (Continued)

Executive Summary

There is considerable global interest in mid-band spectrum[1] due to its suitability for a range of applications, including fixed satellite services and wireless broadband (WBB) such as 5G. WBB use-cases include wireless internet service providers, public mobile services, including to address “mobile blackspots”, and localised enterprise and campus-style private networks, such as for mine sites or industrial uses.

We anticipate the pressure on spectrum needed to support the ever-increasing growth in mobile and fixed WBB applications will continue in the short and medium term. In planning for future spectrum demand in accordance with our responsibilities under the *Radiocommunications Act 1992*, we recognise three broad categories of WBB use-cases and note that network deployments may reflect combinations of these categories.

The first category is wide-area subscriber networks, served by ubiquitous base stations operated by one or more service providers – this category could be considered ‘conventional’ telecommunications carrier public network fixed or mobile broadband operations.

The second category reflects more limited market subscriber networks over smaller, localised areas, including, but not limited to, fixed WBB and fleet-oriented services. Services provided by wireless ISPs (WISPs) are a good example of this type of use.

The third category of WBB covers business enterprise services operated by private entities within the confines of their own premises or land estate – for example, a hospital, education precinct or an industrial or transport facility.

Having considered interest in these various types of WBB, on 15 January 2021 the Australian Communications and Media Authority (ACMA) released the *Replanning the 3700–4200 MHz band - Outcomes paper* that described the ACMA’s planning outcomes and preliminary views to introduce wireless broadband services in the 3.7–4.2 GHz band[2], using a combination of apparatus and spectrum licensing arrangements. The Outcomes paper represented conclusions arising from an earlier consultation on planning options.

The Outcomes paper also stated that the ACMA would, as far as practical, extend or align technical and licensing frameworks and the timing of their development with similar ones in the 3.4–3.7 GHz (3.4 GHz) band. The paper *Optimising arrangements for the 3400–3575 MHz band: Planning decisions and preliminary views* outlines the planning outcomes for the 3400-3575 MHz part of the 3.4 GHz band.

These two papers stated the ACMA’s intent to facilitate WBB in these frequency ranges in a staged approach with licensing of spectrum in remote areas before other parts of Australia.[3]

[1] ‘Mid-band’ spectrum is considered the spectrum between 1 GHz and 6 GHz.

[2] 1 GHz is equivalent to 1000 MHz, so 3.7–4.2 GHz is equivalent to 3700-4200 MHz.

[3] Remote areas are defined in Appendix B.

The focus of this RIS – Area-wide licences (AWLs) in remote areas of the 3.4-4.0 GHz band

Note that this analysis, and this regulation impact statement (RIS) is distinct from broader work and regulatory analysis that the ACMA has conducted to inform the higher-level decision to plan for WBB in these bands. The ACMA presented the case for reorganising and 'defragmenting' spectrum in the Optimisation of arrangements in the 3400-3575 MHz band, and in the Replanning of the 3700-4200 MHz band estimated overall net benefits of $560m derived from WBB in the band. Part of this work involves the ACMA auctioning spectrum licences in the 3.4 GHz and 3.7 GHz band for wide-area WBB.

However, the focus of this RIS is on spectrum access to facilitate the second and third categories of WBB mentioned above (in remote areas), sometimes referred to as local area wireless broadband (LA WBB). While the ACMA can currently facilitate these services under existing apparatus licence arrangements in this band, those arrangements are not optimised for LA WBB because existing licence types are designed for other services. Consequently, the ACMA is proposing to adopt a relatively new licence type (the area wide licence or AWL[4]) and optimise it for LA WBB in this band for remote areas.

Unlike 'service-specific' apparatus licence types, which typically align with specific uses and purposes, the AWL type can authorise a variety of services, uses, applications and technologies, and be tailored in geographical size and frequency range based on the user's proposed business activities. This flexibility is intended to allow the licensee to tailor the spectrum capacity and geographic reach of the licence to highly specific use-cases. With these attributes we expect AWLs to better suit the many LA WBB use cases, compared with other licensing options.

Introducing AWLs in remote areas to authorise access to the 3.4-4 GHz band requires the following regulatory changes:

1. Amendments to the Radiocommunications (Area-Wide Licences) Licence Conditions Determination 2020 (AWL LCD) to include technical conditions for the operation of radiocommunications stations operated under an area-wide licence operating in the 3.4-4 GHz band, and draft new and amended Radiocommunications Assignment and Licensing Instructions (RALIs) for setting coordination rules with other services in the band. These technical conditions mitigate the risk of interference between services operating in the band. (Note: RALIs are administrative planning documents used to facilitate licensing and station coordination.)
2. Amendments to the Radiocommunications (Transmitter Licence Tax) Determination 2015 (the Tax Determination) to determine pricing arrangements for area-wide licences in the 3.4-4 GHz band. Depending on future analysis, amendments to the Radiocommunications (Receiver Licence Tax) Determination 2015 may also be required.

[4] AWLs were first introduced in 2020 to facilitate WBB in the 26/28 GHz bands. It is not yet available in other bands.

The ACMA submitted an early stage RIS (addressing the first 4 RIS questions) to the OBPR on 3 February 2022. After public consultation on the proposed allocation between 2 March to 4 May 2022 and further consultation on technical framework matters in February-March 2023, the ACMA prepared this full RIS which details the regulatory analysis and impacts of the AWL proposals and addresses the 7 RIS questions:

1. What is the policy problem?
2. Why is government action needed?
3. What policy options have been considered?
4. What are the expected benefits of the options?
5. Who did you consult and how did you incorporate their feedback?
6. What is the best option from those you have considered?
7. How will you implement and evaluate your chosen option?

This RIS informs the ACMA's decision to allocate AWLs in remote areas of this band. Introducing AWLs to facilitate LA WBB does not preclude other service types, but rather broadens the scope for services interested in using the band. The analysis and stakeholder feedback shows that introducing AWLs in remote areas is expected to be net beneficial by at least $51,000 each year over the next 10 years compared with the status quo.

1. What is the policy problem?

The ACMA wants to facilitate a variety of WBB use cases in remote areas of the 3.4 – 4 GHz band to promote the long-term public interest derived from the use of the spectrum in this band. Some of these use cases can be accommodated using existing licensing arrangements, however these licensing arrangements are not optimal for that purpose. Consequently, we want to introduce AWLs optimised for a wide range of expected use cases, while supporting a range of existing services.

The importance of spectrum

Spectrum is essential to a digitally networked economy and a major contributor to Australia's economic and social wellbeing. It is critical infrastructure enabling production for industrial, commercial, educational and other social services. The economic value of Australia's spectrum to the national economy is estimated to be $177 billion over 15 years.[5]

As technology advances, there are increasingly novel ways to use spectrum to communicate and send information. Sector wide changes are challenging the efficiency, productivity, and accessibility of the current arrangements for spectrum management. The extent to which the benefits of spectrum are realised or improved upon will depend in part on the ability of the spectrum management regulatory arrangements to accommodate this rapid technological change and respond to increasing demand.

Facilitating wireless broadband (WBB) services in remote areas

Affected stakeholders - Demand for WBB

Through ongoing engagement with stakeholders via the ACMA's rolling Five-year spectrum outlook (FYSO), and consultations for particular allocations (such as the 3.6 GHz allocation), the ACMA expects high demand for WBB in general in the short to medium term.

We continue to see strong demand for spectrum from wide-area subscriber networks, served by ubiquitous base stations operated by one or more service providers, as evidenced by the last 3 spectrum auctions that the ACMA has conducted which have supplied spectrum mostly to large mobile network operators or fixed broadband network operators to deliver 5G services.[6] This WBB category could be considered 'conventional' wide area telecommunication carrier fixed or mobile broadband operations.

We are also seeing increasing interest for smaller, more localised broadband applications (LA WBB) through feedback from stakeholders and overseas trends. For example, in the deployment of private networks due to a growing number of enterprises place greater value on having dedicated local area WBB networks for advanced, secure connectivity. In this enterprise market, automation, artificial intelligence (AI) and advanced sensing requirements are driving demand for high-speed connectivity and low latency. The construction and mining sectors were early adopters of private networks, with those types of networks now increasingly found in

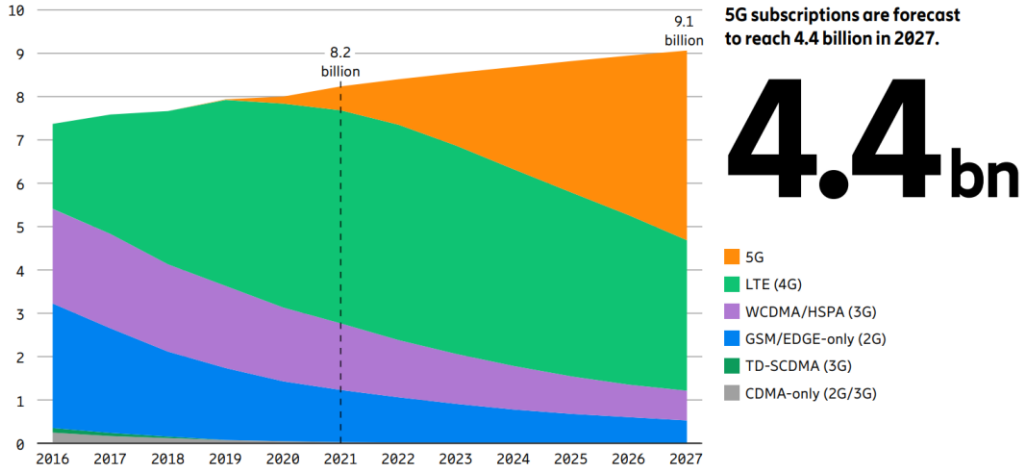
[5] Centre for International Economics (2015) *The economic value of spectrum*, Research report prepared for the Department of Communications

[6] See Spectrum auctions | ACMA.

the agribusiness, transport and logistics, utilities, and hospitality sectors. We are supporting these use cases through licensing arrangements for local area WBB and the internet of things (IoT).

Many private networks are currently delivered using 4G or proprietary technology. Industry trials to deploy private 5G options, which can deliver higher speeds and sustained high throughput, will maintain the pressure for spectrum to support 5G connectivity. It is expected that private networks will continue to increase in number, and most new networks will use 5G technology[7]. Research suggests that the uptake of 5G is expected to be faster than 4G globally, and that by 2027, just under half of global mobile subscriptions will be 5G[8] (see figure 1). To support this, we continue to provide spectrum for this sector, with our immediate focus on forthcoming mid-band allocations to release spectrum for WBB use.

Figure 1: mobile subscriptions by technology (billion)



Source: Ericsson Mobility Report, June 2022, p 4.

Introducing AWLs to facilitate LA WBB does not preclude other service types, but rather broadens the scope of services interested in using the band.

Note that the work proposed here to allocate AWLs in this band is one of a many ACMA workstreams and bands that are planned to accommodate WBB and 5G services. The broader work program is detailed in the Five-year spectrum outlook | ACMA. The bulk of the demand for these services will be in metropolitan and urban areas. The lower demand expectations for this remote area allocation is reflected in analysis in Appendix A.

Current licensing options v area-wide licences (AWLs): Why AWLs are better tailored to meet expected demand for LA WBB

Facilitating wireless broadband (WBB) services in remote areas will facilitate 5G services which is expected to generate economic benefits for licensees, and also generate flow-on benefits for their customers. Submissions to our consultations indicate underlying demand for these services in this band.

The area-wide licence (AWL) type was introduced in 2020 in the 26 GHz and 28 GHz bands to facilitate rollout of millimetre wave (mmWave) band 5G wireless broadband services. There is a similar opportunity here to introduce AWLs in the 3.4-4 GHz band

[7] Analysys Mason Research, 2022 telecoms, media and technology predictions, accessed January 2022.

[8] Ericsson, Ericsson Mobility Report November 2021, accessed December 2021.

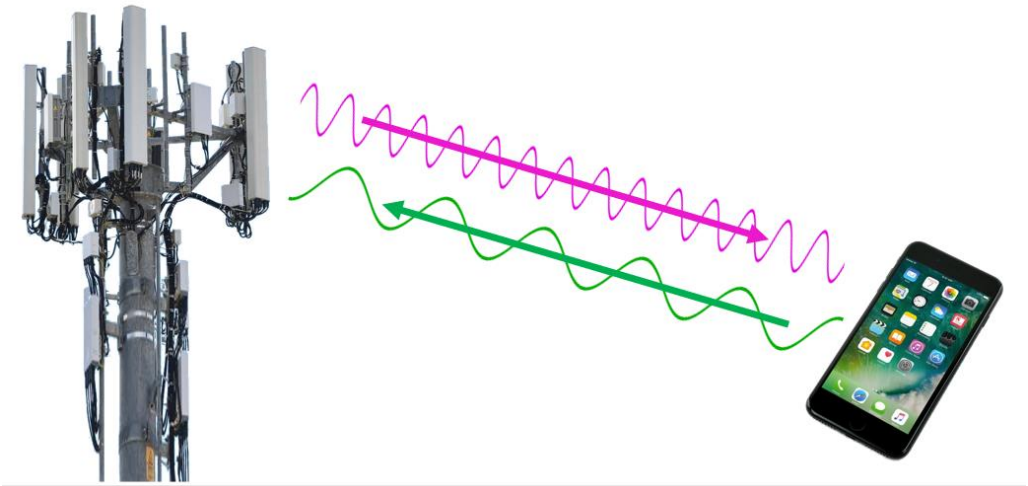
in remote areas to support a variety of wireless broadband (WBB) services to improve the efficient planning, allocation and use of the spectrum.

The AWL type is intended to support scalable applications, enabling its use for authorising access to different-sized geographic areas and bandwidths. Unlike existing apparatus licence types – which typically align with specific uses and purposes – the AWL type is intended to authorise a variety of services, uses, applications and technologies. For each frequency band, conditions are developed to suit the intended range of services and/or use cases.

In this RIS we use the current number of AWL licences in the 26/28 GHz band (88 licences as at 24 May 2022) as a proxy for demand that we might expect for AWLs in this band (see Appendix A – Estimated Cost and Benefits).

The ACMA can meet the demand for this spectrum for WBB using the current apparatus licensing and pricing framework for access to the 3.4-4 GHz band. However, the current framework it is not optimised for the variety of relatively new use cases (such as 'small-area' wireless broadband multi-device deployments) that are expected in the 3.4-4 GHz band in remote areas. These small-area deployments are referred to as 'local area WBB' or LA WBB. Thus, there is an opportunity for the ACMA to adopt licensing and pricing arrangements to better address the expected demand for these localised uses of spectrum and so meet government and regulatory objectives (see 'Government objectives' section). Not creating this licensing option is likely to hinder these expected LA WBB use cases from obtaining spectrum and deploying services (see Section 4. What are the expected benefits of the options?).

2. Why is government action needed?



Government objectives

Access to spectrum is regulated because it is a scarce resource and a valuable factor of production that needs to be coordinated to ensure its operational utility (i.e. mitigate the risk of unacceptable interference).

The ACMA's spectrum management decisions are guided by the object of the *Radiocommunications Act 1992* (the Act) to promote the long term public interest derived from the use of the spectrum by providing for the management of the spectrum in a manner that:

a. facilitates the efficient planning, allocation and use of the spectrum

b. facilitates the use of the spectrum for:

   i. commercial purposes

   ii. defence purposes, national security purposes and other non-commercial purposes (including public safety and community purposes)

c. supports the communications policy objectives of the Commonwealth Government.

The ACMA manages the spectrum in accordance with the object of the Act through tools such as planning arrangements, licensing frameworks, pricing structures and compliance and enforcement programs. These arrangements are often made in regulation.

Relevant to the communications policy objectives of the government, on 1 February 2022, the then Minister for Communications, Urban Infrastructure, Cities and the Arts issued the *Radiocommunications (Ministerial Policy Statement – 3.4–4.0 GHz) Instrument 2022* (MPS) under section 28B of the Act, specifying four policy objectives which the ACMA must have regard to when making spectrum management decisions in the 3.4-4.2 GHz frequency range. The objectives are:

> Supporting the deployment of new and innovative technology, including 5G

> Supporting a range of use cases and users

- Supporting digital connectivity and investment in regional Australia
- Promoting competitive markets

Further to the band-specific objectives, on 7 December 2023 the Government issued to the ACMA a broad statement of expectation (SoE) to guide it in its regulatory remit and approach. The SoE included an expectation that the ACMA would support the Government's policy priorities with respect to its communications and media objectives, including:

- promoting investment, innovation and the adoption of new and emerging technologies, while continuing to safeguard the interests of consumers and small businesses;
- supporting government policies related to regional, rural and remote Australia including by having regard to relevant ministerial policy statements in the planning and allocation of spectrum to support innovation and competition in these areas; and
- promoting the long term public interest derived from spectrum, including the benefits of technological developments that improve spectrum utilisation and efficiency

The ACMA will have regard to the object of the Act, the MPS, and the SoE during its consultation and decision-making for this allocation.

Chapter 3 of the Act requires that radiocommunications use of the spectrum be licensed.[9] Compared with the current licensing options/framework available in the band, implementing the AWL licensing and pricing framework for the 3.4-4 GHz band is expected to better accommodate new LA WBB use cases. Facilitating AWLs in this band in remote areas directly support the ministerial objectives of supporting innovative technologies (e.g. 5G) and a diverse range of use cases and users and also supports digital connectivity and investment in regional Australia. Without the ACMA changing or introducing new regulations, new WBB services would need to be licensed with existing licence types that are not optimised for WBB, and this is likely to reduce uptake of the spectrum (see section 4).

To implement the AWL licensing and pricing framework we propose to:

- amend the Radiocommunications (Area-Wide Licences) Licence Conditions Determination 2020[10] (AWL LCD) to include technical conditions for the operation of radiocommunications stations operated under an area-wide licence operating in the 3.4-4 GHz band.
- draft new and amended Radiocommunications Assignment and Licensing Instructions (RALIs) MS47, FX3 and FX19 for setting coordination rules with other services in the band.[11]
- amend the Tax Determination.[12] The tax levied on apparatus licences allows the ACMA to create economic incentives for efficient use of the spectrum. It

[9] The Act prohibits unlicensed radiocommunications, except in emergency situations, and allows for civil proceedings to be taken in some circumstances.

[10] Section 110A(2) of the Radiocommunications Act 1992 provides that the ACMA may by legislative instrument, determine that each apparatus licence included in a specified class of apparatus licences is taken to include one or more specified conditions.

[11] RALIs are not legislative instruments, rather they are administrative planning documents used to facilitate licensing and station coordination.

[12] Subsection 7(1) of the Radiocommunications (Transmitter Licence Tax) Act 1983 provides that the ACMA may determine the amount of tax for apparatus licences.

also encourages licensees to use the minimum amount of bandwidth for their needs, to move to less congested bands, and to surrender licences that are no longer needed.

Facilitating WBB / 5G services in remote areas is expected to improve digital connectivity and communications services in remote areas, and directly contributes the policy objectives discussed in the MPS in section 1. The framework here also paves the way for the ACMA to allocate WBB in other parts of Australia.

Some measures of success for achieving these objectives are included in section 7.

Constraints / limitations

These regulatory proposals are not expected to impose constraints compared with the status quo. Rather they are intended to provide access to spectrum for a broader range of WBB services and in a form the provides greater flexibility to the licensee.

3. What policy options have been considered?

Option 1 - facilitate LA WBB via existing licence types (status quo)

This option has no additional regulatory intervention. Rather, we would accommodate expected demand for LA WBB through existing licence types.

The Act requires that a radiocommunications transmitter must be operated in accordance with a licence issued under the Act. Services proposed for this band (i.e. local area wireless broadband) could be licensed under the existing fixed point-to-multi-point (PMP) or public mobile telecommunications service (PMTS) Class B apparatus licence types. However, these licence types do not provide optimal operational utility because they are designed for and or restricted to particular service types or use cases. In contrast an area-wide licence provides flexibility for a licensee to deploy and operate stations across a wide geographical area depending on the licensee's business case.

The proposed AWL type offers advantages over and above existing licence types, such as increased flexibility of spectrum use and network deployment arrangements, and interference management at the geographic and frequency boundary of the licence, rather than by detailed technical specifications for radiocommunications devices authorised under the licence. These features of use are better able to address stakeholder concerns and remove any of the potential disincentives associated with the existing licence types available in the band (see option 3).

Option 2 – facilitate LA WBB on a 'per licence' basis (alternative option)

This option also requires no regulatory changes. We would accommodate expected demand for LA WBB through bespoke modifications to existing licences.

This option involves determining bespoke technical and pricing arrangements on a 'per licence' basis[13], rather than across all licences to be issued. Under this approach new LA WBB services may be authorised under current licence types of PMP or PMTS Class B, however, normal licensing and interference management settings for these licences may be adjusted via 'out-of-policy requests' to suit licences that don't neatly fit within those defaults. That is, the ACMA would need to make exception to settings in well-established licensing and coordination policies set out in documents such as the Radiocommunications Assignment and Licensing Instructions (RALI) FX14 that would be used in option 1. These licensing exceptions would be included directly in the licence.

This approach, while theoretically possible, could accommodate the different use cases that we anticipate for LA WBB in this band. However, the bespoke nature of this approach would reduce the operational certainty to licensees (e.g. because of confusion in relation to non-standardised technical coordination of licensed services), thereby undermining potential business benefits that might otherwise derive from the use of the licence(s). It may deter potential licensees from obtaining licences or

[13] With special conditions written into specific licences.

impose higher administrative costs and delay costs if they do decide to obtain licences.

Specific pricing arrangements for these bespoke licensing arrangements may need to be made in the Tax Determination, which would add to the uncertainty for licensees.

Option 3 - AWL is optimised for LA WBB (preferred option)

Under this option, we would accommodate expected demand for LA WBB through the new AWL licence type.

This approach would determine the basic technical and pricing arrangements through transparent and consistent regulatory and administrative arrangements in the new AWL licence type. Whilst AWLs have recently been used in the 26/28 GHz band, for it to apply here, it needs to be customised for the expected use cases (LA WBB) and the incumbent services in this band.

We expect this to be the best option because the licence type has several characteristics that we expect would be useful for different types of LA WBB use cases (see 'What is an area-wide licence?' section below). Further, the AWL will be customised for the intended and expected LA WBB services, rather than using partially compatible licence types that are not designed for LA WBB.

What is an area-wide licence?

The AWL type is intended to provide licensees with 'building blocks' – aggregate frequency and geographical area blocks in a single licence, which can meet a range of network sizes or topographies and can be service or technology neutral, as long as the standard licence conditions for the relevant band are met.

The AWL transmitter licence type can authorise the operation of one or more radiocommunications devices within a defined geographic area at a frequency or frequencies specified on the licence, subject to the conditions included in the licence.

An AWL is more flexible than a site-based apparatus licence (AL) as it can be designed to fit the needs of a range of service types and does not tie licensees to specific site locations, topologies or exact technical parameters.

The key attributes of the AWL type include:

- **Area-based**: A licence authorises radiocommunications devices within a specified area, rather than at specific location(s). Interference with other services is primarily managed through the use of technical conditions that apply to the geographic and frequency boundary of the licence, rather than by detailed technical specifications for radiocommunications devices authorised under the licence. This is an easier process to plan area wide deployments than a via site-based AL framework with specific coordination requirements.
- **Broad application**: The licences may be used for a wide range of purposes, uses, services, applications and technologies, subject to the technical framework for the relevant band set out in Radiocommunications Assignment and Licensing Instructions (RALIs) and licence conditions.
- **Scalable**: The licences are capable of being adapted to a variety of technologies and/or uses, with different sized areas and frequency bandwidths. For example, this style of licence has been used previously to support wireless broadband and satellite technology use cases.

- **Aggregable**: A number of AWLs, adjacent in geography, frequency or both, can be consolidated into a single transmitter licence, with boundary conditions applying to the boundary of the aggregated licence.

These attributes are not available to licences in Options 1 and 2.

This licensing approach reflects developments internationally, where a number of other jurisdictions have developed a licensing option for small-area, multi-device deployments, including for proposed 5G applications. These overseas arrangements, while not exclusively restricted to industrial or commercial applications of spectrum, have often been utilised by a variety of 'industry verticals' – industries outside of the MNOs, such as mining and infrastructure that use spectrum to facilitate their operations.

4. What are the expected benefits of the options?

Option 3 (introduction of AWLs) is expected to be the most beneficial option. Table 1 summarises the expected annual benefits to be at least $51,000 over the next 10 years. The discussion focuses on costs/benefits to LA WBB since these regulatory proposals are not expected to impact other users of the band. The discussion after the table provides more detail about the expected benefits of each option.

Table 1: Summary of relative benefits of options

Options	Description Cost / Benefit	Estimated annual costs/ Benefits ($)
Option 1 – facilitate WBB via currently existing licence types in the band (status quo)	Some expected use cases are not sufficiently accommodated under current fixed point-to-multipoint (PMP) and PMTS Class B licence types. Consequently, there is likely **deadweight loss** (DWL) (forgone benefits) associated with nascent demand for the spectrum not being adequately supplied or tailored to the relevant use case.	The DWL is not counted under option 1. Rather, the *reduction in DWL* is presented as benefits in the other options.
Option 2 facilitate WBB on a 'per licence' basis (alternative option)	'Out of policy' requests can accommodate new use cases that aren't currently supported by the PMP and PMTS class B licence types, which will **reduce the DWL mentioned in Option 1 by $23,000** each year. However, we expect **some administrative costs of $4,000** per year to reduce that benefit.	$19,000 (Calculations are presented in Appendix A)
Option 3 - introduce AWLs optimised for WBB (preferred option)	AWL is optimised for WBB. This is likely to lead to more LA WBB services being established by industry compared to other options (and at a faster rate) and is expected **reduce/eliminate the DWL mentioned in Option 1.**	$51,000 (Calculations are presented in Appendix A)

Option 1 - facilitate LA WBB via existing licence types (status quo)

The current licensing and pricing framework is well-known to licensees. LA WBB can be authorised under current licensing arrangements in the band, via either the fixed point to multipoint (PMP) licence or the Public Mobile Telecommunications Service (PMTS) class B licence type. However, PMP and PMTS Class B licence types are not optimised for LA WBB and the breadth of use cases that we expect with it (as shown in section 3). Consequently, there is likely deadweight loss (DWL) (forgone benefits) associated with nascent demand for the spectrum not being adequately supplied via

the current PMP and PMTS licence types. Some nascent service providers may not roll out services due to this incompatibility or may only roll out limited services that conform to the existing licence types, but not to their ideal business plans.

Option 2 - facilitate LA WBB on a ‘per licence’ basis (alternative option)

PMP and PMTS Class B licence types are less suited to LA WBB services, however, 'out of policy requests' can make them more suitable. 'Out of policy' requests can accommodate new use cases that aren’t currently supported by the PMP and PMTS class B licence types, which will reduce the DWL mentioned in Option 1. I.e. The ACMA can make exceptions to the rules outlined in the relevant RALIs to better accommodate LA WBB services under existing licensing arrangements by modifying them on a 'per licence' basis. The ACMA could customise PMP / PMTS Class B licences and pricing arrangements to better suit individual licensee needs as best it could. By doing this, the ACMA can reduce the DWL (better meet demand for the spectrum). In our estimates of this benefit, we estimate that around 50% of requests could be accommodated.

However, the ACMA will need to consider these requests on a case-by-case basis so will likely involve some delay costs compared with Option 1 and 3. Furthermore, the bespoke nature of those arrangements mean that operational details and interference protection requirements are not well known to other licensees with whom they need to coordinate, leading to an increase in coordination costs for other licensees entering the band. Both costs will detract from the reductions in DWL.

Option 3 - AWL is optimised for LA WBB

AWL allows for customised and scalable geographic coverage to suit the broad range of LA WBB use cases. The optimisation of the framework is known up front (specified in the proposed legislative instruments and supporting planning documentation) which means that prospective licensees and incumbent licensees can coordinate their services and operate with greater confidence. Compare this with option 2 where the bespoke licensing parameters are not in a common framework; rather they are detailed in individual licences meaning they are not well known to prospective licensees. A prospective licensee will likely need more time and resources to plan and coordinate their services with neighbouring services. The ‘friction’ in Option 2 makes it less beneficial compared with Option 3.

The AWL also allows for other service types so long as they adhere to the technical conditions for the licence type. Only 'boundary transmitters' need to be registered with the ACMA, allowing for flexibility in network design and network changes. These benefits are likely to lead to more LA WBB services being established by industry compared to other options (and at a faster rate) and is expected eliminate the DWL mentioned in Option 1. This increased accommodation of the demand for spectrum will yield more benefits to licensees, and may flow on to higher GDP through productivity enhancing 5G capabilities such as monitoring and automation on mine sites.

Establishing a framework for AWLs in remote areas of the 3.4 GHz band also paves the way forward for facilitating similar services in regional and metropolitan areas of Australia.

No delay costs are expected because licensees will understand deployment and coordination parameters outlined in the AWL LCD and the associated RALIs.

No material regulatory burden is expected from this licensing option compared with others. Radiocommunications equipment operated under AWLs will

need to comply with the technical and other operating conditions (e.g. frequency range, power limits) in the licences, and also be required to pay a charge for issue of the licence ($152) and a tax for access to the relevant spectrum (see pricing section below). Similar obligations are also expected of licensees under the alternate licensing options.

Pricing

The impact of the proposed AWL pricing structure flows on from the difference between the modular/customised nature of AWLs and the limitations of PMP and PMTS licences when applied to LA WBB services.

The ACMA is proposing an AWL tax of $0.0041/MHz/pop where the population is based on the area authorised in the licence. This proposed tax rate for the 3.4–4.0 GHz band is the same tax as has applied to PMTS Class B licences in the 3.5 GHz and 3.6 GHz bands. Given that similar services will be using AWLs across the broader spectrum range, we consider that a similar tax rate to that for PMTS Class B licences should apply.

Whilst the PMTS tax rate and the proposed AWL tax rates are the same, they are applied differently. For a PMTS licence each transmitter is registered with the ACMA and each transmitter incurs a $0.0041/MHz/pop tax for each HCIS[14] level 2 cell that each transmitter is in. The proposed AWL tax is applied more granularly (at the smaller HCIS level 0) providing a better incentive to use the spectrum more efficiently. The tax for an AWL licence is calculated for the entire geographic area specified in the licences, regardless of the number of transmitters operating within it. This provides licensees with more flexibility for network configuration and network changes.

The proposed AWL tax structure/rate is not easily compared to the PMP licence type. The tax rates for this licence type is a $/kHz rate governed by the assigned licence tax formula (see apparatus licence fee schedule) and is designed more for individual base stations rather than a network of base stations used for broad coverage.

For comparison, an individual PMP licences in a remote area using 20 MHz in the frequency range >2.69 to 5.0 GHz would cost $767 per year. This licence may provide coverage approximately the areas of a HCIS level 2 block. Tax is applied in a remote area regardless of whether the transmitter location is in Alice Springs or in Bourke.

In contrast, the AWL price varies depending on the population density of the area. For example, in Alice Springs the AWL price for an equivalent HCIS level 2 block (with population of 23,222) would be $1,904, whereas for Bourke (with population of 1,847) it would be $151. The $/MHz/pop tax rate is based on population being a key driver of demand for spectrum and hence the value of the spectrum.

This $/MHz/pop pricing structure proposed for AWLs is able to account for more granular demand drivers and opportunity cost, and so can provide clearer pricing signals and incentives for WBB services to deploy precisely where they need to (at the HCIS level 0). The use of a more granular HCIS area coupled with the $/MHz/pop pricing structure gives a higher potential for spectrum reuse and thus a high potential for more efficient spectrum use.

[14] The Hierarchical Cell Identification Scheme (HCIS) is described in the Australian Spectrum Map Grid 2012.

5. Who did you consult and how did you incorporate their feedback?

In planning for mid-band spectrum the ACMA has conducted a number of consultations for different mid-band subsegments in recent years which have undergone OBPR independent review processes:

> Optimising the 3400–3575 MHz band – consultation 12/2019 | ACMA[15]

> Planning options for the 3700–4200 MHz band - consultation 22/2020 | ACMA[16]

These workstreams have now converged to enable implementation of licensing and allocation arrangements in the 3.4–4.0 GHz range. Collectively these consultations identified AWLs as a way to licence WBB. This was initially flagged in the 7 August 2019 discussion paper on the planning arrangements in the 3.7-4.2 GHz band.

A number of stakeholders supported the consideration of AWLs in this band. For example, wireless ISP (WISP) stakeholders are one of the stakeholder groups that we expect to seek AWLs in this band. They generally promoted localised WBB applications in all or part of the 3.7–4.2 GHz band, for apparatus licensing, including AWLs. The WISP industry body, WISPAU, strongly expressed opinions that existing licensing mechanisms in these bands are no longer fit for purpose.

In the ACMA's 15 January 2021 Outcomes Paper, the ACMA stated that AWLs were likely to be the preferred licensing mechanism for LA WBB in at least the metro and regional areas for the reasons discussed in section 3 of this RIS e.g. AWLs more scalable and customisable for the use cases expected in the band, etc.

Technical Liaison Group (TLG) consultation

In July 2021, the ACMA opened ongoing consultation with industry on the technical arrangements for the apparatus licensed segments of the 3.4–4.0 GHz band for remote areas through the ACMA's 3.4–4.0 GHz band Technical Liaison Group (TLG). The TLG informed the ACMA's drafting of radiocommunications assignment and licensing instructions (RALIs) and other technical instruments designed to manage/mitigate interference between planned services in the band. The TLG process ended in January 2022.

Consultation

On 2 March 2022, the ACMA opened a public consultation on its proposal to allocate AWLs in the 3.4–4.0 GHz frequency range, in remote areas of Australia. By defining common technical arrangements and conditions across area-wide licences, the ACMA sought to minimise the risk of interference between licensed services/stations, thereby optimising the operational utility of the licence and the business benefits deriving from use of the licence. Determining the pricing arrangements that reflect the characteristics of the AWLs will allow prospective licensees to calculate the expected cost of licence

[15] Optimisation of arrangements in the 3400-3575 MHz band | OBPR (pmc.gov.au)

[16] Replanning of the 3700-4200 MHz Band | OBPR (pmc.gov.au)

configurations and identify the most appropriate and cost-effective licensing solution for the applicant's business needs.

The 2 March 2022 consultation paper sought stakeholder feedback on key regulatory settings to test whether they were appropriate or whether they required refinement. We sought feedback on:

1. The technical framework: Amendments to the Radiocommunications (Area-Wide Licences) Licence Conditions Determination 2020 (AWL LCD) to include technical conditions for the operation of radiocommunications stations operated under an area-wide licence operating in the 3.4-4 GHz band, and draft new and amended Radiocommunications Assignment and Licensing Instructions (RALIs) MS47, FX3 and FX19 for setting coordination rules with other services in the band. The technical conditions in these instruments serve to manage the risk of interference of AWLs with incumbents and other licence types in the band.[17]
2. Pricing: the proposed amendments to the Tax Determination to establish pricing arrangements for area-wide licences in the 3.4-4 GHz band. The ACMA is proposing an AWL tax of $0.0041/MHz/pop where the population is based on the area authorised in the licence. This proposed tax rate for the 3.4–4.0 GHz band is the same tax as has applied to PMTS Class B licences in the 3.5 GHz and 3.6 GHz bands. Given that similar services will be using AWLs across the broader spectrum range, we consider that a similar tax rate to that for PMTS Class B licences should apply. The $/MHz/pop price structure allows for AWL licence price to be scaled based on spectrum bandwidth and geographic coverage of the licence, to suit the diverse use cases in this band.

The consultation closed on 4 May 2022 and the ACMA received submissions from 30 parties. Submitters included members of industry, peak bodies and government agencies. The ACMA has consulted with a wide set of stakeholders including smaller stakeholders such as WISPs and have provided numerous opportunities and avenues for consultation including written submissions and 'in person' spectrum tune ups. Stakeholders have provided feedback on the use of AWL, and the supporting framework. On the use of AWLs, stakeholders were supportive. Though have provided some further feedback on how AWLs might be implemented. Informed by feedback, the ACMA has adjusted implementation details on the following issues.

The technical framework

> Most stakeholders expressed general support for the proposed technical framework, however a range of amendments were proposed to address concerns about specific aspects. We have considered feedback from this consultation and the spectrum tune-up[18] held on 29 March 2022 and made appropriate changes.

[17] These include fixed point to point services (PTP), fixed satellite services (FSS), point to multipoint (PMP) services.

[18] Spectrum tune-ups are ACMA events where we discuss current and emerging spectrum management issues in Australia with industry experts. Spectrum tune-ups | ACMA.

- These mostly dealt with suggested changes to the draft framework to provide additional protection to incumbent services or to increase deployment flexibility for new wide area (WA) WBB and local area (LA) WBB services.[19]

ACMA Response

- Comments on relevant aspects of the technical framework were also received during the September 2022 -January 2023 TLG on the spectrum licensing technical framework in 3.4-3.8 GHz.
- In response the ACMA has modified some proposals such as:
  - Proposing to make changes to RALI FX3 to restrict future PTP licences in the 3.8 GHz band to 3.8–4.2 GHz but permit more technical flexibility in use of the restricted number of channels available.
  - Revising RALI MS47 to include an additional coordination requirement for earth stations to limit the impact it may have on an existing AWL (or spectrum) licensee registering devices.
  - Reviewing some aspects of AWL coordination with spectrum licensed devices.
  - Revising coordination arrangements between AWLs and earth stations.
- Some comments were also received on common elements of the remote technical framework that were exposed in the February/March 2023 consultation on another technical framework.
- In response the ACMA has made further changes such as:
  - Requiring new PTP services to coordinate with AWL boundaries so they do not deny large amounts of spectrum to future AWL device registrations.
  - Changes to coordination of AWLs with fixed satellite services to ensure that bandpass filters are fitted to satellite receivers, to improve overall spectrum efficiency outcomes.

Radio altimeter concerns

- The aviation industry has expressed concern about potential interference of WBB with radio altimeters (RA) in the nearby 4.2-4.4 GHz range.

[19] WA WBB services are typically network deployments over large, often contiguous, geographical areas, such as those traditionally undertaken by mobile network operators (MNOs). LA WBB services are deployments by operators needing smaller geographic areas, including wireless internet service providers (WISPs), fixed wireless access providers, as well as campus-style and private network deployments by industry vertical and enterprise users.

ACMA Response

- The ACMA continues to consult with the aviation industry, and the Civil Aviation Safety Authority (CASA), after the close of the March consultation. We presented a revised proposal to the TLG in September-October 2022 for comment.
- In addition to the 2022 consultation, the ACMA sought further views about RA interference concerns in a February/March 2023 consultation.
- With some new evidence presented to the ACMA in submissions to the consultation, the ACMA revised some of the proposed ongoing and interim mitigations.
- In June, the ACMA intends to release a wireless broadband and radio altimeter outcomes paper which details our planning decisions.
- The ACMA is taking a precautionary approach and intends to apply several temporary and ongoing mitigations in remote areas. These are based on approaches used in France and Canada but modified to account for WBB operating conditions in Australia and developed after consultation with the aviation and telecommunications industries.
- It is planned that the interim mitigations will end after 31 March 2026, which is considered sufficient time for better performing RAs to be retrofitted to affected aircraft. The ACMA may, if supported by emerging evidence, conduct a further consultation on mitigation measures before that date.
- The ACMA considers that the updated technical framework achieves the right balance of opportunities for new applications against protecting access and utility of existing users of the band as well as adjacent and nearby bands.

The allocation process

- Broad support was expressed by several stakeholders for the allocation approach outlined in the consultation paper. This approach includes:
  - issuing AWLs in a two-stage administrative allocation; and
  - assessing competing applications in accordance with allocation principles where there is not sufficient spectrum to facilitate a negotiated outcome between applicants.
- An allocation quantum of 100 MHz was supported by most stakeholders, with a caveat that ACMA discretion be exercised where greater than 100 MHz quantum is required for particular use cases. One submission suggested that the allocation quantum may need to be less than 100 MHz in high demand areas, whilst others supported up to 200 MHz in areas of low demand after the allocation window.

> The ACCC also conducted a separate consultation to inform the ACMA allocation quantum proposal.

ACMA Response

> The ACMA continues to support an allocation quantum of 100 MHz for each licensee as this facilitates more licensees at a given location and likely preserves spectrum in the longer term for smaller operators who generally seek spectrum on a needs basis. An allocation quantum greater than 100 MHz can be applied for, where justified.

> Tenure and renewal: the ACMA's proposed policies for the duration and renewal arrangements for AWLs.

> Some stakeholders expressed different views about the relative benefits of short verses longer licence durations.

ACMA Response

> The ACMA views remain unchanged and will proceed with tenure arrangements for AWLs restricted to 13 December 2030, aligning with the expiration of spectrum licences in 3.4 GHz to facilitate potential replanning or defragmentation activity.

Pricing

> Pricing: the proposed AWL tax arrangements.

> Overall, the submissions received from this consultation process supported the $/MHz/pop pricing construct for the AWLs, as well as a transmitter licence tax rate of $0.0041/MHz/pop for AWLs in the 3.4–4.0 GHz band.

6. What is the best option?

In order for the ACMA to facilitate a variety of WBB use cases in remote areas of the 3.4 – 4 GHz band to promote the long-term public interest derived from the use of the spectrum in this band, based on the analysis in section 4, the ACMA considers it net beneficial to implement option 3. The ACMA estimates that the average annual benefit from that option to be at least $51,000 each year over the next 10 years.

Whilst options 1 and 2 can accommodate some of the demand for the spectrum in the band, the optimised AWL framework (option 3) is expected to fully accommodate new localised WBB use cases.

Stakeholders have been instrumental in informing regulatory proposals. Stakeholders were broadly supportive of the AWL proposals and have provided further input in the latest consultation to help refine them.

7. How will you implement and evaluate your chosen option?

The ACMA intends to commence the process for allocating these AWL licences in remote areas of this band in Q2 of 2023 (subject to the ACMA resolving technical frameworks and radio altimeter concerns by making/amending the legislative instruments, and registering them with the Federal Register of Legislation). Shortly after the ACMA will also publish the Applicant Information Package with all the details of the allocation at least 4 weeks prior to the commencement of the allocation process, and invite applications for AWL.

The ACMA will monitor and evaluate the impacts and efficacy of this decision through:

- levels of participation in the initial AWL allocation / number of AWLs allocated.
- successful coexistence of AWLs with incumbents / low or no interference complaints. For example, has there been any evidence of interference with the airline industry in the nearby >4.2 GHz band.
- demand/requests for AWLs elsewhere (e.g. in regional/urban areas)
- any suggestions for improvements to the AWL framework.
- any other feedback from licensees.

This information will inform our future ideas and plans for AWLs in other bands and other areas of Australia.

The ACMA's work relating to the AWLs in remote areas in this band is detailed in the Five-year spectrum outlook 2022–27 | ACMA, and we will evaluate this work in our regular progress reports.[20] We consult stakeholders when we publish our FYSO evaluations.

[20] See past progress reports here: Five-year spectrum outlook | ACMA.

Appendix A – Estimated Cost and Benefits

Option 1 - facilitate LA WBB via currently existing licence types (status quo)

Option 1 is expected to yield an economic dead weight loss (DWL) or foregone benefit from nascent demand for spectrum in the band for the purposes of rolling out LA WBB. This is due to current PMP and PMTS licences being relatively less suited to these use cases.

Table 2: Assumptions for determining dead weight loss

Mode assumptions	Value	Notes
average bandwidth	100 MHz	
value of average licence	$7,500	This figure draws on examples in the pricing section of the consultation paper. We use $1500 as a mid-point between the price of AWL licences in Alice Springs and Port Headland. Those examples use a bandwidth of 20 MHz and we scale it up here to 100 MHz. The price of the AWL licences is used as proxy for the value of the licences and not as a change in revenue.
discount rate	0.07	see OBPR Cost Benefit Analysis guidance note, March 2020
DWL (%) associated with current licence types	50%	We assume some LA WBB demand can be accommodated with current licence types, however, we assume that up to 50% cannot be accommodated because the licence types are not fit for purpose.
Demand for spectrum		Demand for spectrum is highly uncertain a priori. However, for the purposes of estimating costs/benefits we look to the number of AWL licences allocated in the 26/28 GHz band over the past few years. There are 88 AWL licences as at 24 May 2022. Using that level of demand in that band we map out a demand schedule in row 2 of Table 3 below. There will be an initial allocation window where we anticipate most of the demand is accommodated, followed by tapered demand over time.
Time value of an hour	$73.05	See OBPR Regulatory Burden Measurement Framework, March 2020.

Rather than assign the dead weight loss as a cost to option 1, we specify reductions in DWL in options 2 and 3.

Table 3: Estimate of deadweight loss associated with option 1

year	0	1	2	3	4	5	6	7	8	9	total	average annual
expected number of licences	75	15	10	5	5	5	5	5	5	5	135	13.5
value of total licence	$562,500	$112,500	$75,000	$37,500	$37,500	$37,500	$37,500	$37,500	$37,500	$37,500	$1,012,500	$101,250
DWL ($)	$281,250	$56,250	$37,500	$18,750	$18,750	$18,750	$18,750	$18,750	$18,750	$18,750	$506,250	$50,625
DWL ($) - present value	$281,250	$52,570	$32,754	$15,306	$14,304	$13,368	$12,494	$11,677	$10,913	$10,199	$454,834	$45,483

Option 2 - facilitate LA WBB on a ‘per licence’ basis (alternative option)

The ‘out of policy’ requests will help more prospective licensees obtain appropriate licences for their business cases, reducing DWL.

Table 4: Assumptions for option 2

Mode assumptions	Value	Notes
Reduction in DWL due to 'out of policy' requests	50%	
Time for bespoke consideration per licence (hours)	4	

Table 5: Estimate of the benefits of reductions in deadweight loss

year	0	1	2	3	4	5	6	7	8	9	total	average annual
benefit of reduced DWL (halved)	$140,625	$26,285	$16,377	$7,653	$7,152	$6,684	$6,247	$5,838	$5,456	$5,099	$227,417	$22,742
administrative costs for per licence consideration	$21,915	$4,096	$2,552	$1,193	$1,115	$1,042	$974	$910	$850	$795	$35,441	$3,544
Net benefit	$118,710	$22,189	$13,825	$6,460	$6,038	$5,643	$5,273	$4,928	$4,606	$4,305	$191,976	$19,198

Option 3 - AWL is optimised for LA WBB

The AWLs are expected to meet all demand for the spectrum, and therefore eliminate the DWL from option 1.

Table 6: Estimate of the benefit of eliminated deadweight loss

year	0	1	2	3	4	5	6	7	8	9	total	average annual
Benefit from elimination of DWL	$281,250	$56,250	$37,500	$18,750	$18,750	$18,750	$18,750	$18,750	$18,750	$18,750	$506,250	$50,625

Appendix B – Geographical area definitions

The ACMA has defined geographical areas[21] to assist in the analysis of, use of, and potential future use scenarios for, the 3.7–4.2 GHz band. A brief description of each follows:

- Metropolitan – covers all capital cities (except Darwin and Hobart). It mirrors the metropolitan areas defined in the Radiocommunications (Spectrum Re-allocation—3.6 GHz Band for Adelaide and Eastern Metropolitan Australia) Declaration 2018 and the Radiocommunications (Spectrum Re-allocation—3.6 GHz Band for Perth) Declaration 2018.
- Regional – mirrors the regional areas subject to spectrum licensing in the 3.6 GHz band as defined in the Radiocommunications (Spectrum Re-allocation—3.6 GHz Band for Regional Areas) Declaration 2018.
- Remote – includes those areas of Australia not covered by metropolitan and regional areas.
- Australia-wide – covers all of Australia but excludes Australian external territories.

The Australian Spectrum Map Grid (ASMG) is used to define geographical areas over which spectrum licences are issued. The Hierarchical Cell Identification Scheme (HCIS) is a naming convention developed by the ACMA that applies unique 'names' to each of the cells that make up the ASMG. The ASMG and HCIS are described in detail in the Australian spectrum map grid.

The HCIS coordinates in HCIS description of areas below can be converted into a Placemark file (viewable in Google Earth) through a facility on the ACMA website.

[21] These definitions do not include any areas of appropriate exclusion from licensing such as the ESPZs or the mid west radio quiet zone (RQZ), among others.