Five-year spectrum outlook 2021–26 work program

Consultation draft

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# Foreword

The Australian Communications and Media Authority (ACMA) is Australia’s spectrum manager, responsible for managing the radiofrequency spectrum to maximise the overall public benefit from its use. Since 2009, we have consulted annually with industry about spectrum management priorities through the five-year spectrum outlook (FYSO). Since 2018, we have published a draft FYSO for consultation, ahead of settling the final FYSO.

On 17 December 2020, the [*Radiocommunications Legislation Amendment (Reform and Modernisation) Act* 2020](https://www.legislation.gov.au/Details/C2020A00151) (the Modernisation Act) received Royal assent, together with the [*Radiocommunications (Transmitter Licence Tax) Amendment Act 2020*](https://www.legislation.gov.au/Details/C2020A00153) and the [*Radiocommunications (Receiver Licence Tax) Amendment Act 2020*](https://www.legislation.gov.au/Details/C2020A00152). The substantive provisions of the Acts will come into force on 17 June 2021. The ACMA is primarily responsible for implementing the new spectrum management arrangements resulting from the Acts. The Modernisation Act requires that once each financial year, the ACMA must determine a work program of not less than 5 financial years. These provisions give legislative recognition to our current practice of publishing a FYSO and a detailed annual workplan. The FYSO 2021–26 will be the first to be determined as a work program in accordance with the new statutory provisions.

The Australian Government has called 2021 the ‘Year of 5G’. We acknowledge the importance of addressing 5G spectrum needs and are committed to ensuring that Australia is well-placed to take advantage of the opportunities offered by 5G.

Our extensive planning activity to support the deployment of 5G services in Australia continues to inform priorities in our allocation workplan. Following recent spectrum releases for spectrum licensing in the 3.6 GHz band and via class licensing in the 60 GHz band, we completed an initial apparatus licence allocation in the millimetre wave spectrum 26 GHz and 28 GHz bands. We are progressing the spectrum licence allocation and further apparatus licence allocation in the 26 GHz band, followed by the reallocation of low-band spectrum in the 900 MHz and 850 MHz expansion bands and optimising licensing arrangements across the entire 3400–3575 MHz band over the next 12 months. This year we are also implementing planning outcomes from the reviews of the 2 GHz and 3.7–4.2 GHz bands.

We have also identified a number of new projects for 2021–22. These include potential new planning arrangements in the 6 GHz band (possibly for a range of wireless broadband applications) and the 1880–1920 MHz band, which may be a candidate for changes to support new technologies including local area wireless broadband applications such as private networks. The 600 MHz band is moving to the initial investigation stage and scoping of potential options for domestic replanning of the band, informed by media reform considerations. The 1.5 GHz band and Extended MSS L-Band projects (which will likely be considered together) will also look at optimising planning arrangements to support new technologies. The issue of support for private networks will also be a consideration.

We are working with a range of government spectrum users whose capability requirements continue to evolve, as they access new technologies needed to support law enforcement, national interest, and government service delivery activities.

We are continuing implementation of relevant outcomes from the 2019 World Radiocommunication Conference (WRC) in our domestic planning arrangements – these will remain key priorities in 2021–22.

# Issues for comment

We invite comments on the draft FYSO 2021–26 and on the following specific questions:

**Part 1**

1. Do you have any feedback on the ACMA’s approach to the five-year spectrum outlook?
2. Are there other technology developments or sources of spectrum demand that the ACMA should be aware of in considering spectrum management over the next 5 years?

**Part 2**

1. Do you have any feedback on the ACMA’s plans for monitoring, initial investigation, preliminary replanning or implementation of bands?
2. Do you have any comments about the ACMA’s approach to forward allocations?
3. Do you have any other comments on Part 2?

**Overall: FYSO format**

1. How do you use the FYSO (for example, read once a year or regularly refer to)?
2. Do you find the 6-month and annual progress reports useful?

# Using the FYSO

The draft FYSO is set out as follows:

Part 1 – an outlook of the technology, market competition, and policy drivers likely to shape the demand of spectrum over the next 5 years.

Part 2 – a detailed annual work program for 2021–22.

Although the FYSO is prepared on a financial year basis, for ease of interpretation, references to quarters are calendar year quarters:

quarter 1 (Q1): 1 January to 31 March

quarter 2 (Q2): 1 April to 30 June

quarter 3 (Q3): 1 July to 30 September

quarter 4 (Q4): 1 October to 31 December.

Some timelines provided in the draft FYSO 2021–26 include activities expected to be completed in Q1–2 2021. Before publishing the final FYSO, we will update the timelines to reflect any completions since the release of the draft FYSO.

Please note the FYSO title reflects that the draft FYSO 2021–26 covers the full 5 financial years from 2021–22 to 2025–26.

## Key to icons

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| --- | --- | --- | --- |
| Wireless broadband icon | Wireless broadband | Point to point icon | Point-to-point |
| A close up of a logo  Description automatically generated | Satellite | Defence icon | Defence |
| Class licensing icon | Class licensing | Aviation icon | Aviation |
| Internet of Things icon | Internet of Things | Maritime icon | Maritime |
| Radio/TV broadcasting icon | Radio and television broadcasting | International spectrum interests icon | International interests and engagement |
| Amateur radio icon | Amateur radio | Pricing icon | Pricing |
| Point to multipoint icon | Point-to-multipoint |  |  |

# Part 1: Five-year spectrum outlook

Part 1 provides an outlook of the trends in markets, technology and spectrum uses that inform the ACMA’s medium-term planning, allocation and reallocation activities.

## **Overview of current industry landscape**

With over 167,000 radiocommunications licences on issue[[1]](#footnote-2) representing a diverse range of spectrum uses, demand for new spectrum and changes to existing arrangements for licensees continues to evolve quickly.

Two important influences on future demand for spectrum are international cooperation on the use of scarce spectrum and orbital resources, and technology developments that create new use-cases and have potential to improve spectrum utilisation and efficiency.

International trends driving demand for spectrum include the appetite for wireless broadband, particularly in the context of 5G services, enterprise-based network developments, ongoing commercialisation of Internet of Things (IoT) applications, advances in broadcasting technology, and rapid innovations in satellite technologies and services. We are also seeing a rapid evolution of drones and remotely-piloted aircraft being deployed across private, commercial and government uses.

The ACMA; the Department of Infrastructure, Transport, Regional Development and Communications (the Department); other government stakeholders; and Australian industry participate in international radiocommunications forums to promote and protect Australian interests in spectrum management, including spectrum harmonisation and international frequency coordination. The peak international forum is the International Telecommunication Union’s (ITU) World Radiocommunication Conference (WRC), which reviews and revises the Radio Regulations – the international treaty-level document regarding use of the spectrum and satellite orbits. The next WRC will be held in 2023 (WRC-23) and will consider new frequency allocation and procedural matters across a range of services.

As a wholesale input, the value of spectrum for commercial uses comes from its use in downstream output markets to deliver services to end-users such as consumers and businesses. Spectrum is a significant determinant of an operator’s competitive ability, as it influences network capacity and quality of service, as well as the geographic areas where an operator can offer services and entry into new markets. Accordingly, competition in downstream markets can influence the demand for spectrum.

The management and allocation of scarce spectrum resources, including the timing of major spectrum allocations, can have a significant impact on the nature of competition in downstream markets that rely on spectrum. In order to promote competition and maximise the public benefit from spectrum, we seek input from stakeholders to ensure competition is considered in the planning and management of spectrum.

The COVID-19 pandemic has changed the way Australians use mobiles and mobile networks. Consumers now use more fixed-line telecommunications services from home[[2]](#footnote-3) with less use of mobile broadband.[[3]](#footnote-4) While the COVID-19 pandemic is expected to only have short-term impacts financially, it has resulted in the deployment and adoption of digital communications technologies at a greater speed. This is evident in commentary relating to 2021 trends and opinions provided by the telecommunications operators,[[4]](#footnote-5) and thematic research released by Globaldata on the future of work.[[5]](#footnote-6) We are monitoring these trends to identify potential impacts on future spectrum demand. In the immediate term, we see that over the next 5 years, data growth will inform continued investment in 5G networks and complementary technologies are likely to spur spectrum demand.

## **Spectrum management environment**

Our work program is informed by the policy environment in which we operate. During 2020, the government started or continued a number of initiatives that influence the environment in which we plan and manage spectrum.

The enactment of the [*Radiocommunications Legislation Amendment (Reform and Modernisation) Act* 2020](https://www.legislation.gov.au/Details/C2020A00151) (the Modernisation Act) – taking effect on 17 June 2021 – is part of the government’s response to the recommendations of the 2015 Spectrum Review. The ACMA is primarily responsible for developing and implementing the new spectrum management arrangements introduced by the Modernisation Act.

The Modernisation Act:

adds flexibility to the licensing framework, which will allow quicker release of spectrum so that changes in spectrum demand can be met faster

provides more certainty about key licence conditions that underpin investment certainty, such as licence duration and renewal terms

provides a more graduated set of compliance and enforcement powers to enable proportionate responses by the ACMA to address non-compliance

enables the ACMA to develop equipment rules that will regulate devices across modern supply chains, including recognition of online supply arrangements

allows for more external involvement in spectrum management by allowing the ACMA to accredit people and organisations to make decisions under spectrum management arrangements.

The Modernisation Act changes the respective spectrum management roles of the ACMA and the minister by simplifying and streamlining critical allocation and re-allocation processes. This will assist us in making spectrum available faster in response to demand. Our forward allocation workplan is now informed by these changes and we are focused on taking the regulatory actions necessary for a smooth transition to the new arrangements. This provides for the continuity of existing regulatory processes, such as standards compliance (transitioned to ‘equipment rules’), and maintains the important role of accredited persons in radiocommunications licensing.

In March 2021, we published an information paper about our intended [approach to radiocommunications licensing and allocation](https://www.acma.gov.au/radcomms-licensing-and-allocation-reform) after the Modernisation Act reforms commence. This paper includes information about how we will consult further with stakeholders about the application of our new and revised powers in our decision-making.

The government has called 2021 the ‘Year of 5G’.[[6]](#footnote-7) In November 2020, the government released the response to the House of Representatives Standing Committee on Communications and the Arts, *'The Next Gen Future' Inquiry into the deployment, adoption and application of 5G in Australia*.[[7]](#footnote-8)

We are committed to ensuring that Australia is well placed to take advantage of the opportunities offered by 5G, consistent with the government’s 5G strategy.[[8]](#footnote-9) We have undertaken extensive planning activities to support the deployment of 5G services in Australia, and this is informing priorities in our spectrum allocation workplan.

In 2020, the government announced its JobMaker Digital Business Plan to enable businesses to take advantage of digital technologies to grow their business. The ACMA has received funding under this program to develop a new spectrum management licensing system and our spectrum auction systems capability. This will enable us to meet the timing for our forward spectrum allocation workplan, which is focused on bringing 5G spectrum to market.

Another part of the Digital Business Plan is the [Australian 5G Initiative](https://www.communications.gov.au/what-we-do/spectrum/australian-5g-innovation-initiative); a grants program to help small to large businesses in Australia test and develop 5G uses, applications, services and products, including IoT applications. We are supporting this initiative by providing information to prospective applicants on bands where suitable spectrum might be available ‘over the counter’. In late 2020, we made available 2400 MHz of 26–28 GHz millimetre wave (mmWave) 5G spectrum through administrative allocation of apparatus licences to 15 different companies. A number of the successful applicants intend to provide wireless broadband services across all states and territories, and across urban, regional and rural areas. There was also considerable uptake from fixed satellite service providers, including from existing providers and new entrants to the Australian satellite market. We will allocate apparatus licences for a further tranche of 26 GHz mmWave spectrum in regional areas in the third quarter of 2021.

Australia plays an important role in the global space community, having made substantial contributions to satellite communications, signal processing and astronomy. It is this expertise in long-range communications that has connected our geographically dispersed communities. The Australian Space Agency was established in 2018 with a goal to triple the size of the Australian space sector by 2030. Recognising the importance of communications in the space industry, communications technologies and services is identified as one of Australia’s 7 national civil space priority areas.[[9]](#footnote-10)

The Space Agency’s [communications roadmap](https://www.industry.gov.au/sites/default/files/2020-12/communications-services-and-technologies-roadmap.pdf)[[10]](#footnote-11) outlines 6 focus segments: low earth orbit satellite services; optical ground stations; hybrid RF-optical communications; reconfigurable networks, radios, modems and waveforms; satellite communication network management tools; and quantum-enabled communications. The Department of Defence, in cooperation with the Australian Space Agency, will develop an Australian owned and controlled military communications satellite and, in cooperation with the Australian Space Agency, will invest $50 million in the Australian space industry for research and innovation in satellite communication technologies.[[11]](#footnote-12) Grants available under the government’s [modern manufacturing strategy](https://www.industry.gov.au/data-and-publications/space-national-manufacturing-priority-road-map) are expected to further transform the space manufacturing sector. This strategic focus on space is attracting interest in satellite communications and leading to increased filing and coordination activity being undertaken by the ACMA to support this developing sector.

Critical communications infrastructure and public safety mobile broadband (PSMB) remain an area of ongoing interest for governments. The Australian Government has identified 2 x 5 MHz of spectrum at the lower end of the 850 MHz expansion band for a national PSMB capability.

In response to the [2018 Regional Telecommunications Review](https://www.communications.gov.au/who-we-are/department/regional-telecommunications-review), the Australian Government’s Regional Connectivity Program (RCP) provides $93 million of targeted investment in ‘place-based’ telecommunications infrastructure projects that maximise economic and social opportunities in regional, rural and remote Australian communities. State governments across the country have also introduced additional funds and initiatives to support connectivity in such communities. These initiatives also inform future spectrum demand, particularly in regional areas.

State governments continue to invest in government radio networks to improve emergency and day-to-day operational communications for state government agencies and essential services.

## **Market drivers of change in spectrum demand**

We are seeing increasing demand for spectrum from a wide range of sectors. While supply is largely finite, there is some growth in terms of overall spectrum availability and efficiency of use, as we optimise bands through planning and licensees adopt spectrally-efficient technologies.

Growing demand for data capacity remains a key environmental factor driving demand for new spectrum or changes to existing spectrum management arrangements.

The past decades have seen the evolution of broadband technologies enabling applications with ever greater demand for data. Mobile networks that once enabled voice and simple text messages are now ubiquitous broadband networks, delivering video on demand and an always-connected cloud environment, among other things. A decade ago, 20 MHz channels were considered optimal for wireless broadband needs, but today, claims of 100 MHz in mid-band and 800 MHz or more in mmWave spectrum per operator are common.

Beyond overall network capacity and individual user peak speeds, reduced network latency is of increasing importance to support technologies and services such as virtual and augmented reality, intelligent transport systems, robotics, industrial and factory applications, and drones. This push for reduced latency not only has implications for the radio access network (RAN), with its impact on spectrum access arrangements, but for the core network as well.

Importantly, commercial and technology factors are seeing increased interest in the deployment of private networks – those operated by a specific entity independent of established, wide-area networks offered by major telecommunications carriers.

Referred to as local area wireless broadband, users providing these networks can benefit from planning, licensing and allocation approaches designed specifically for their needs. A key innovation is the establishment of area-wide apparatus licensing by the ACMA. While first used in the 26 and 28 GHz bands, we expect that localised spectrum access needs will be an ongoing trend.

Advances in data analytics, machine learning, and artificial intelligence are increasing the importance of machine-to-machine communications and the associated IoT. An especially vibrant area of IoT activity has been the space sector. Many companies have, or intend to, deploy satellite systems (usually NGSO) to service the IoT market. In addition to the use of terrestrial wireless broadband networks that support IoT needs (for example, NB-IoT), an increasing number of dedicated low-power, wide-area networks have been deployed using technologies such as LORA and Sigfox. While it is yet unclear what further regulatory actions will be required to support these needs, we expect that the IoT and related market will continue to place pressures on spectrum management arrangements.

Developments in space hardware (such as nanosats, cubesats or smallsats) and reduced launch costs are supporting growth in the diversity and capability of services delivered by satellite, as well as placing demands on the spectrum/orbit resource, especially in non-geostationary orbits. These technology developments are enabling a wide range of new space uses – large NGOSO constellations providing broadband to consumers, IoT networks and access to space to scientific and educational institutions. More traditional geostationary satellite capabilities are also evolving, with increases in broadband capacity from orbit via the move from high throughput satellites (HTS) to very high throughput satellites (VHTS) both to fixed and mobile terminals.

Higher frequency bands have become useable at an increasing pace, especially for broadband purposes (satellite and terrestrial). mmWave bands 26 GHz and above have opened the potential for many gigahertz of spectrum supply for some applications. For example, the 26 GHz band in Australia provides twice the amount of bandwidth previously available for all the existing spectrum bands planned for terrestrial wireless broadband.

Beyond the ‘established’ new frontier of mmWave bands, the upper limits of usable spectrum are continuing to be pushed in the 100–200 GHz range. Ofcom, the regulator in the United Kingdom, notes that beyond additional capacity and high-density networks, these bands may offer new opportunities for sensing and high precisions applications.[[12]](#footnote-13) The amount of spectrum available and its potential for sharing due to propagation characteristics, has opened significant new opportunities for spectrum availability in these bands, subject to further technology advances and the development of commercial use-cases.

In addition to the increasing utility of high band spectrum, technology improvements continue to deliver on the utility that can be extracted from the spectrum resource. For example, the continued growth in digital systems using improved modulation and coding schemes has seen technology inch closer to theoretical information theory limits (that is, the amount of data that can be supported per unit of bandwidth). However, with the increased use of spatial multiplexing through multiple input, multiple output (MIMO) technologies to transmit multiple channels over the same spectrum resource, modern systems are, in essence, circumventing these limits and continuing to improve spectral efficiencies.

In wireless broadband applications, active (or advanced) antenna systems (AAS) are increasingly being deployed in both 4G and 5G wireless broadband networks. While providing increased spectrum utility and enabling use the mmWave bands, AAS has required existing technical frameworks to be revisited to best enable the technology while maintaining coexistence with existing spectrum uses.

Reconfigurable satellites using software defined capabilities are increasing the utility of the spectrum resources used by satellites. The ability to configure satellites to provide dynamic capacity where needed throughout their service life, instead of being tied to decisions made years before launch, is expected to offer significant commercial benefits to operators and spectrum efficiency dividends.

We are following developments in spectrum sharing, including the impact of neutral host business models for RANs.

In the remainder of Part 1, we consider particular spectrum uses and the demand for spectrum that is being shaped by the evolving technologies and market drivers.

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## Wireless (mobile and fixed) broadband, including 5G

Demand for spectrum to support both mobile and fixed wireless broadband applications has been a major driver for changes in highest-value spectrum use across a range of bands.

We anticipate further spectrum will be needed to support the growth in broadband applications and mobile data in the short and medium term.

### Wireless broadband use-cases

In planning for future spectrum demand, we recognise 3 broad categories of wireless broadband 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’ telecommunication carrier fixed or mobile broadband operations.

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

Many of the bands suitable for fixed wireless access (FWA) are subject to spectrum licensing in the relevant geographical areas. Spectrum licensing arrangements may not be ideal for small and medium enterprises (SME), with more local area apparatus-licensed arrangements often preferred. There are a number of possible bands and access arrangements at various stages of maturity that may provide options for SME FWA interests (recognising that not all bands, if implemented, will be suitable for all FWA deployment models).

Most notably, these bands are:

* 3.4 GHz: arrangements will be developed to make 35–67.5 MHz of spectrum available in regional areas and an extra 175 MHz in remote areas
* 3700–4200 MHz: to be made available for apparatus licensing in the 3700–3800 MHz frequency range in remote areas and 3800–4000 MHz Australia-wide
* 26 GHz (24.25–27.5 GHz): arrangements are in place for apparatus licensing in the 24.7–25.1 GHz frequency range and in the 25.1–27.5 GHz range outside the geographic areas designated for spectrum licensing
* 28 GHz (27.5–30 GHz): arrangements are in place for apparatus licensing for FWA in the 27.5–29.5 GHz range.

There are also a number of other bands being monitored or under review that may be candidates for new spectrum-sharing approaches.

The third category of wireless broadband 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. These uses are sometimes generically referred to as ‘private LTE’ and usually best align with local area licensing approaches, and can utilise the access arrangements and bands identified above in the context of FWA. However, we are aware of interest in other bands and have included a work item to look at the 1880–1920 MHz band as a possible option to provide other opportunities for these uses. The review of the 1.5 GHz band will include consideration of private networks.

Reviewing the arrangements in bands that are already licensed for wireless broadband is important to ensure existing allocations are efficient and can cater for new technology developments, such as 5G. Our work program includes projects that consider optimising existing planning frameworks.

### Spectrum bands supporting wireless broadband use

From a spectrum management perspective, 5G uses spectrum across a wide range of frequency bands. This will include:

* ‘low-band’ spectrum below 1 GHz, much of which is already used for mobile broadband networks
* ‘mid-band’ spectrum between 1 GHz and 6 GHz, some of which is already used for wireless broadband

’high-band’ spectrum, above 6 GHz, specifically the previously little-used mmWave bands.[[13]](#footnote-14)

In addition to considering the use of ‘new’ frequency bands (bands previously unused for wireless broadband), we expect that many of the bands already available for broadband in Australia will be re-farmed over time by incumbent users for 5G technologies.

The existing technical frameworks provide flexibility for licensees to re-use spectrum and adopt new technologies. However, where appropriate, we will revise existing technical frameworks to ensure they are suitable for 5G. Of course, this has to be balanced with the need to manage interference with other licensed services.

Each of the spectrum bands identified for wireless broadband (sub-1 GHz, 1–6 GHz, above 6 GHz) requires a specific approach. This is because different considerations apply, such as intrinsic features of the band (for example, propagation characteristics), as well as international regulations and standards, domestic policy, legacy planning and allocation arrangements, and other incumbency factors.

#### Low-band spectrum

In the bands below 1 GHz, the ACMA has 2 primary short-to-medium-term objectives:

* working with industry to optimise the efficient configuration of the existing 850 MHz (825–845 MHz and 870–890 MHz) and 900 MHz (890–915 MHz and 935–960 MHz) band allocations already licensed for mobile broadband purposes, including by securing a 1 MHz downshift of the existing 850 MHz spectrum licences

implementing the existing planning decision to make additional spectrum available for mobile broadband in the 850 MHz expansion band (809–824 MHz and 854–869 MHz).

#### Mid-band spectrum

The mid-band between 1 GHz and 6 GHz forms part of a suite of 5G deployments. In Australia, the 3400–3700 MHz band has been made available for this use.

We also see a major opportunity for efficiency gains through the defragmentation of the current 3400–3575 MHz frequency range. Work is underway to implement this, which will require both industry commitment and ACMA assistance to achieve. Spectrum in the 3700–4200 MHz band has been the subject of considerable interest internationally and domestically, from large mobile network operators (MNOs) and FWA operators (such as WISPs), with several processes underway to consider arrangements in the band. We have completed our review of planning arrangements in the 3700–4200 MHz band and released an [outcomes paper](https://www.acma.gov.au/consultations/2020-07/planning-options-3700-4200-mhz-band-consultation-222020), which is discussed in Part 2.

Due to increasing interest, we plan to review the 1880–1920 MHz band. This will consider developments in the band such as work on Digitally Enhanced Cordless Telecommunications (DECT)-2020 standardisation[[14]](#footnote-15), Multefire[[15]](#footnote-16), the European review of 1900–1910 MHz band for future railway mobile communication systems (FMRCS)[[16]](#footnote-17) and increasing interest in more apparatus-licensed spectrum for fixed and mobile wireless broadband use.

We are also taking the first steps towards reviewing the 5 GHz and 6 GHz bands (5150–5925 MHz and 5925–7125 MHz, respectively). The latter is currently of particular interest internationally, with several countries opening up access to the band – or parts of it – for use by Radio Local Area Network (RLAN) systems (for example, wi-fi), and other countries looking at it for potential International Mobile Telecommunications (IMT) use. International regulatory arrangements in the 5 GHz band were discussed and updated at WRC-19, so we are exploring what those arrangements might mean domestically.

In addition to our current planning and allocation activities, we continue to monitor several other bands for possible replanning for 5G wireless broadband services. The bands are identified in the *Monitoring* section of Part 2 (see *Bands being studied under WRC-23 agenda item 1.2* and *Bands being studied under WRC-23 agenda item 1.4*).

#### High-band spectrum

Our consideration of high-band spectrum for wireless broadband is focused on the mmWave in the bands above 24 GHz. We have developed arrangements for fixed and mobile wireless broadband in the 26 and 28 GHz bands, including licensing and allocation arrangements conducive to a wide range of uses/users (including private networks).

We will also continue to monitor 40 GHz, 46 GHz (mainly in Region 1 countries) and 47 GHz identified for IMT use at WRC-19. Of these, the 40 GHz and 47 GHz bands are the most mature in terms of standardisation and equipment availability.

The 40 GHz and 47 GHz bands are of significant interest for both terrestrial 5G and satellite broadband services – the United States, for example, has established arrangements supporting both services. We will consider global trends and local circumstances, including domestic and international take-up of mmWave 5G services, to determine whether replanning for possible 5G in the 40 and 47 GHz bands is appropriate. We note that the best spectrum management outcomes are likely to be achieved when both bands are considered simultaneously.

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## Private/industry vertical networks

Private or integrated networks are expected to become more popular with the increased availability of long-term evolution (LTE) advanced pro and 5G technologies.

Other industries where standalone networks have been used include manufacturing, transportation, airports, utilities, primary industries and stadiums.

Several network deployment models are currently in use by industry operators:

1. Using their own equipment and class-licensed spectrum to operate.
2. Using their own equipment and licensed spectrum to run their own network (for example, public safety).

Having a private network built and designed by a third party (for example, a telecommunications company or network design business) with equipment sourced from vendors (for example, base stations and core network), which is separate to other mobile networks (for example, mining companies).

Spectrum considerations for these uses are discussed above in the broader discussion on wireless broadband.



## Machine-to-machine communications and the Internet of Things

A key element in several private networks to enable automated processes (for example, factories) is machine-to-machine (M2M) communications[[17]](#footnote-18) and IoT.[[18]](#footnote-19)

IoT also involves unprecedented numbers of wireless and wired interconnections of personal, consumer and industrial devices supporting a range of applications.[[19]](#footnote-20)

IoT is not limited to any specific technology platform and is likely to use frequency allocations across the entire spectrum. For example, 4G and 5G standards have made– or are in the process of being made – to contain specific provisions for dedicated IoT service delivery and dedicated terrestrial IoT technologies have been developed and deployed that usually utilise class-licensed bands.

Devices providing industrial metering, switching and/or control (including smart infrastructure) are a subset of IoT communications technologies that have seen substantial deployments in recent years. They require very low data rates and/or very low duty cycles and operate in low-power wide-area (LPWA) networks.[[20]](#footnote-21) An international market has emerged for LPWA networks and devices that operate in the 900 MHz band. Arrangements for dedicated LPWA IoT access to the 928–935 MHz band were made in our recent update to the LIPD class licence.

In Australia, mobile network operators have positioned themselves in the Australian market to offer IoT and M2M services to customers. MNOs have been deploying IoT-specific variants of the 4G standard, such as Narrowband IoT and Category M1, commonly known as Cat-M1. In both cases, services are, or are expected to be, largely deployed using existing spectrum management frameworks and established bands.

Given the unique capabilities of satellite systems, for example in terms of coverage, multiple companies are delivering or pursuing new space-based IoT services, with some enabled through new small-satellite technology.

Some of these services are being pursued or delivered within established satellite bands in the existing regulatory framework. However, in some cases, enabling satellite IoT may require specific changes to the regulatory regime. As part of the implementation of 2 GHz band replanning outcomes, 2 x 5 MHz (2005–2010 MHz paired with 2195–2200 MHz) will be dedicated for satellite IoT and similar narrowband services to be used on a shared basis between operators.



## Broadcasting services

Broadcasting services may be delivered using radiocommunications spectrum, including AM and FM frequencies (for radio), UHF and satellite frequencies (for television) and other parts of the spectrum (using mobile broadband and other wireless delivery systems).

Changing spectrum requirements are needed to support the ongoing evolution of broadcasting services and their audiences. Evolving digital transmission technology and changes in viewer and listener behaviour are altering the modes of delivery and, consequently, changing the broadcasting demand for spectrum.

In recognition of the technological evolution occurring in broadcasting, we have actively supported new technology trials, such as the DVB-T2 trials for television.

The government released a Media Reform Green Paper[[21]](#footnote-22) in November 2020 for public consultation, outlining proposed measures including reforming television broadcasting licensing taxation, how spectrum might be used and shared between broadcasters, formalising the role of broadcasters as key providers of Australian content, and funding public policy initiatives that deliver value for the Australian public and support the media sector. Proposed reforms include incentivising broadcasters to share spectrum. The spectrum could then be freed up for other uses.

The government has not taken any decisions on these possible reforms. The potential plan set out in the Green Paper is subject to ongoing consultation and is in the early stages of development. The Green Paper provides a possible timeline, noting that any work would take place over several years after proposals are considered and the reform model finalised. The government will consider its response to the Green Paper following consideration of the responses to the current consultation.

In radio, the work we have done with the radio industry through the [*Future delivery of radio*](https://www.acma.gov.au/publications/2020-03/report/future-delivery-radio) report provides an ongoing path for the industry to evolve in response to new technologies and changing audience preferences. Frequency planning arrangements have been prioritised to support radio broadcasters to make the best choices about their future service delivery.

Our priorities outlined in that report include the continued transitioning of commercial, community and national services in regional areas from AM to FM where spectrum is readily available; arrangements to allow further rollout of digital radio where feasible; coverage improvements for national, commercial and community broadcasting where spectrum is available; and support for trials of new types of broadcasting technology.

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## Satellite communications

Satellite communications are experiencing a significant period of technological innovation and disruption in the provision and delivery of communications and space-based science services.

Collectively, market and technology changes are driving several spectrum management challenges. Many of these are being addressed, to some extent, on an international basis given the nature of satellite systems. For example, WRC-19[[22]](#footnote-23) developed new satellite filing procedures for short duration satellite missions. Even with such measures, there are still practical challenges for national spectrum managers, which are generally eager to support these missions but need to ensure practical interference management considerations are addressed.

There has also been ongoing growth in satellite broadband high throughput systems (HTS) and very high throughput systems (VHTS) that increase the demand for spectrum arrangements to support ubiquitous earth stations for user terminals and gateway earth stations.

The current Australian spectrum management framework already provides for ubiquitous, uncoordinated earth stations suitable for broadband HTS/VHTS.

In December 2020, the Australian Space Agency released the [*Advancing Space: Communications Technologies and Services Roadmap 2021-2030*](https://www.industry.gov.au/sites/default/files/2020-12/communications-services-and-technologies-roadmap.pdf)(the communications roadmap), which identifies areas of opportunity for the industry and considers the role of Australia in the global industry.

The communications roadmap outlines the next phase of space communications capability to drive economic growth and industry transformation. Australia plays an important role in the global space community, making substantial contributions to satellite communications, signal processing and astronomy. It is this expertise in long-range communications that has connected our geographically-dispersed communities.

In July 2020, the Australian Government announced a $7 billion investment in space capabilities over the next 10 years. The Department of Defence, in cooperation with the Australian Space Agency, will invest $50 million in the Australian Space industry for research and innovation in satellite communication technologies for future consideration.



## Spectrum for government requirements

The Australian Government is a large user of spectrum for important public service provisions. Government spectrum users primarily incorporate Commonwealth and state agencies responsible for the provision of defence, national security, law enforcement, and emergency services, as well as scientific, meteorological and transport services.

Generally, government spectrum users operate within the same spectrum management framework as all other users. However, in recognising their unique needs and responsibilities, on some occasions government spectrum needs require specific consideration and regulatory arrangements. For example, a significant portion of Defence spectrum access is authorised under the Defence apparatus licence, which can be issued in bands with certain footnotes ascribed in the Table of Allocations in the Australian Radiofrequency Spectrum Plan [2017/2021] (ARSP) (commonly termed ‘Defence bands’). Similarly, bands accessed by Airservices Australia for aeronautical communications, navigation and surveillance services, in particular VHF (108–137 MHz) and L-band (960–1215 MHz), are set aside through ARSP footnotes.

The ACMA works closely with the Department of Defence’s Chief Information Officer Group to ensure its ongoing access to spectrum to support a range of key capabilities. We have been working with Defence towards reissuing their 20/30 GHz spectrum licences that support important military Ka band satellite services. We also work with Commonwealth and state-based law enforcement and emergency services bodies to accommodate their critical, and often unique spectrum needs.

The ACMA supports the Department’s leadership of the Government Spectrum Steering Committee (GSSC) in a technical advisory capacity. The GSSC comprises Commonwealth agencies that rely on spectrum access to meet their business objectives. The GSSC was set up to improve transparency around the nature and management of Commonwealth-held spectrum.

We continue to work with law enforcement agencies to assist with operation under the [Radiocommunications (Prohibited Devices) (Use of Electronic Counter Measures for Bomb Disposal Activities) Exemption Determination 2010](https://www.legislation.gov.au/Details/F2010L00821) and are working with the Department, the Department of Home Affairs and law enforcement agencies to put into place similar arrangements to support countermeasures against remotely piloted aircraft systems (RPAS, also known as drones).

The ACMA has also been engaged in a whole-of-government working group, led by the Department, to develop the appropriate policy settings to support the growth of RPAS in Australia. As part of this work, we have been monitoring RPAS regulatory arrangements, both internationally and within the Civil Aviation Safety Authority (CASA), as a precursor to reviewing planning and licensing arrangements for RPAS command and control radiocommunications systems.

Currently, these RPAS systems are generally authorised under the LIPD class licence, however we are taking the first steps towards creating new RPAS-specific planning and licensing arrangements in bands allocated in the ITU’s Radio Regulations (RRs) to the aeronautical mobile services in the range 5030–5091 MHz. This type of licensing would only be required for command and control of certain classes of RPAS operating in particular classes of airspace – other consumer RPAS would continue to operate under the LIPD class licence.



## Spectrum sharing

Spectrum sharing is fundamental to effective spectrum management and a key tool in maximising the benefits achieved through use of the spectrum resource. The ACMA, like many national spectrum managers, implements a range of spectrum-sharing approaches to maximise the overall public benefit derived from using spectrum. This typically involves traditional static sharing approaches.

We will continue to monitor developments and remain open to facilitating discussions between affected/interested operators and assist with licensing arrangements that might help enable technology trials in this space. We are also in the early stages of considering potential new arrangements for RLANs in the 6 GHz band, including examining automatic frequency selection (AFC), a form of dynamic spectrum access, as a potential option for part of the band.

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## Class licensing and the spectrum commons

Class licensing is the approach used in Australia to implement less-closely-managed spectrum arrangements, including ‘spectrum commons’. The fundamental idea of a spectrum commons is that anyone can use commons spectrum, so long as they follow the set rules[[23]](#footnote-24) – in Australia, those rules are set out in class licences.

Class licences make available spectrum used by services that operate on a limited set of common frequencies under a common set of conditions and, which must often comply with industry or legislative standards. Class licences authorise users of designated segments of spectrum to operate on a shared basis. Class licences do not involve licence fees, and there is minimal regulatory overhead for spectrum users. Most class licences authorise ubiquitous access to commons spectrum, although there are exceptions that limit access to certain classes of use/user (for example, the public safety and emergency response class licence authorising public safety agencies (PSA) access to the 4.9 GHz band).

Currently, there are 15 class licences in force, which authorise the use of:

[27 MHz handphone stations](https://www.acma.gov.au/node/1840)

[aircraft and aeronautical mobile stations](https://www.acma.gov.au/node/1841)

[body scanners](https://www.acma.gov.au/node/1842)

[cellular mobile telecom devices](https://www.acma.gov.au/node/1843)

[citizen band radio stations](https://www.acma.gov.au/node/1803)

earth stations [communication with a space object](https://www.acma.gov.au/node/1865)

[cordless communications devices](https://www.acma.gov.au/node/1866)

[emergency locating devices](https://www.acma.gov.au/node/1871)

[intelligent transport systems](https://www.acma.gov.au/node/1872)

[low interference potential devices (LIPD)](https://www.acma.gov.au/node/1873)

[maritime ship stations – 27 MHz and VHF](https://www.acma.gov.au/node/1874)

equipment used by [overseas amateurs visiting Australia](https://www.acma.gov.au/node/1878)

[public safety and emergency response](https://www.acma.gov.au/node/2593) communications in the 4.9 GHz (4.94–4.99 GHz) frequency band

[radio-controlled models](https://www.acma.gov.au/node/1876)

[radio navigation satellite service](https://www.acma.gov.au/node/1877)receivers (including those embedded in mobile phones).

In Australia, the most widely-used class licences by everyday consumers are the LIPD, cellular mobile and RNSS class licences. The LIPD class licence authorises the widest range of class-licensed devices, including wi-fi and Bluetooth services, along with a range of other uses including certain spread spectrum and ultra-wideband transmitters. The LIPD class licence is reviewed regularly with the most recent variation coming into force in December 2020.

In many class-licensed bands, particularly those included in the LIPD class licence, use of the spectrum is on an uncoordinated basis and sharing mechanisms are implemented via technical and operational conditions on device use, and, in some cases, network or system design considerations. In such bands, protection of individual devices from interference cannot be guaranteed. This relatively low level of interference protection means that these bands are not useful for all applications – though in some cases, system engineering approaches can improve the utility of these bands for uses not immediately associated with a low interference protection environment. This is balanced by the high degree of flexibility that is possible in the use of these class-licensed bands.

This flexibility, and the absence of licensing fees, has enabled massive innovation both in technology use and deployment approaches in some class-licensed bands. Relevant examples are the 2.4 GHz (2400–2483.5 MHz) and 5 GHz (various parts of 5150–5875 MHz) bands that are class licensed and used for RLANs, especially wi-fi.

Wi-fi devices now carry approximately half of all global Internet Protocol (IP) traffic[[24]](#footnote-25), with wi-fi networks almost ubiquitous in homes and businesses along with many public spaces.

We will continue to review class-licensing arrangements to assess whether regulatory settings can be changed to support RLANs and wi-fi. Considerations will include whether more spectrum is required and if changes to existing arrangements are necessary. For example, we can consider whether existing class licence conditions, such as power levels and other operating conditions (for example, indoor use limitations in some frequency ranges), should be reviewed.

The ACMA is investigating possible changes to class-licensing arrangements in Australia in the existing 5 GHz band and the potential new 6 GHz band.



## Amateur radio

The amateur service is a longstanding user of radiofrequency spectrum, with a range of bands made available for qualified amateurs. The amateur service is designed primarily to facilitate hobby radiocommunications and technical experimentation. Amateur radio operators communicate using transmission modes including, but not limited to, Morse code, voice and data.

Apparatus licences are issued authorising the operation of amateur radio across a wide range of frequencies. Licence conditions applying to these licences are set under the [Radiocommunications Licence Conditions (Amateur Licence) Determination 2015](https://www.legislation.gov.au/Series/F2015L01113), depending on the level of qualification held and any applicable geographic limitations.

The ACMA’s amateur-related work program is multidimensional. We support the amateur service through planning arrangements that recognise the requests of amateur radio operators to access frequency bands, while balancing other demands for spectrum. We also work with the Australian Maritime College on examinations for certificates and call sign allocations.

In early 2021, we sought views on our review of non-assigned amateur licensing arrangements. Our aim was to find the best licensing mechanism to reduce regulatory burden and minimise costs for licensees, while also keeping the current benefits and uses. We have identified a set of options:

* keep the existing apparatus licensing arrangements and conditions
* simplify the existing licensing arrangements and conditions
* transition non-assigned stations to class licensing arrangements, while keeping apparatus licensing arrangements for assigned stations.

Our preferred approach is to authorise the operation of non-assigned amateur and outpost stations under a class licence. We will assess submissions received against our objectives for the review and our preferred option.

We are also aware that many amateurs continue to be interested in operating their stations at higher power limits. Pending implementation of the outcomes associated with the review of licensing arrangements, we are examining the feasibility of, and options for, higher power licensing. We will consult with the amateur community on regulatory proposals.

# Part 2: The 2021–22 detailed annual work program

In Part 1, we discussed the medium- and longer-term pressures shaping and informing the overall demand environment for spectrum. We also discussed technology advances that are enabling us to harness higher spectrum bands. In response to these influences, we have developed our detailed annual work program.

Part 2 provides information about the spectrum management work program that will be the ACMA’s focus over 2021–22.

Our work program supports the evolution of technical frameworks that encourage more efficient technologies within an existing use. Over time, adjustments to technical frameworks have freed up additional spectrum for new uses or by new spectrum users. This year’s detailed annual work program also identifies bands and frequencies where we are updating and optimising technical frameworks to support more efficient technologies and spectrum use.

We aim to optimise spectrum planning, allocation and licensing arrangements in each band for the use or uses that maximise the overall public benefit. These arrangements are intended to allow the allocation (or movement) of spectrum with no, or minimal, further regulatory intervention, and may remain stable over long periods of time.

However, where there is evidence of changing optimal use, we may identify a net public benefit in the band moving to a new or changed use or being reconfigured to better support an existing use. Often a key step in achieving this is to review spectrum planning arrangements in the band in question.

Spectrum planning consists of the investigations and decisions that determine general service and application-level uses[[25]](#footnote-26) of the spectrum. This includes the technical framework that establishes the coexistence framework between uses and users and heavily influences the ‘product’ to be allocated. This includes the licensing mechanisms that best meet these objectives. Collectively, the spectrum planning role is often referred to as the ‘town planner’ function.

After consulting where appropriate with existing and future users, we then consider how best to accommodate additional uses or users within the available spectrum. In considering replanning options, we seek where possible to identify alternative bands or alternative arrangements within the same band for incumbents, as part of our responsibilities to ensure spectrum is used and managed to maximise overall public benefit.

We note that planning outcomes have implications on allocations decisions. For example, planning outcomes will determine the type of user likely to be interested in an allocation simply by determining what uses are permitted and which are not. Licensing choices can also influence likely users – for example, spectrum licences issued over wide areas are often allocated by auction, both aspects not being well suited for some use-cases and hence users. In addition, in order to optimise efficient use of the spectrum, the interference management framework is often optimised for an expected use even if such use is not mandatory. For example, while spectrum licences may be ‘technology flexible’ in that they do not explicitly preclude any use, they are designed and optimised with a likely technology in mind, in order to maximise the efficiency of these licences for their expected use, consistent with coexistence requirements of other spectrum uses/users.

Work program activities are grouped under the following headings in accordance with the ACMA’s spectrum management functions and powers:

band planning and forward allocation

optimising established planning frameworks

licensing and licensing systems

pricing

compliance

international engagement.

The planned timelines are subject to change. We are continually monitoring factors that may impact spectrum management, including any short-term changes in spectrum demand, technological developments, government priorities and available resourcing.

The outcomes of WRC-19 are being implemented with the making a new ARSP to ensure that Australian spectrum arrangements take account of changes arising from the ITU WRC-19.

We commenced scoping this work in Q3 2020, however finalisation has been delayed by longer-than-expected ratification of the updated RRs (an international treaty) by government. Amendments to the RRs agreed at WRC are subject to parliamentary review through the Joint Standing Committee on Treaties, which is administered by the Department. We expect to be in a position to make the new ARSP in Q2 2021.

In responding to suggestions about our spectrum management priorities, we consider a range of relevant matters, including domestic and international trends in spectrum uses, developments in international spectrum harmonisation and technology standardisation, evolution of communications technology, and the lowest cost and least restrictive approach to achieve policy objectives.

# Band-planning and forward spectrum allocations

Band-planning activities support the establishment of new spectrum uses.

In establishing new planning frameworks, we consider bands at 4 distinct stages: *monitoring*, *initial investigation*, *preliminary replanning* and *implementation*. These are shown below in Figure 1.

A band’s possible progression through each stage will depend on a range of factors and, in some cases, may move ‘backwards’ if consultation processes, information gathering, or work program prioritisation suggest this is appropriate. Similarly, bands may ‘jump’ stages if circumstances warrant doing so. In other words, these planning stages are descriptive of a general, common framework but not prescriptive. Furthermore, there is no set period a band must remain at a particular stage. Timing of any progression is based on the circumstances at hand and not on any predetermined cadence.

In addition, only a relatively small number of bands are subject to active consideration (that is, being considered beyond the monitoring stage) under this process at any one time – most spectrum is subject to a relatively stable environment that does not necessitate replanning considerations.

1. Four stages in spectrum management band planning

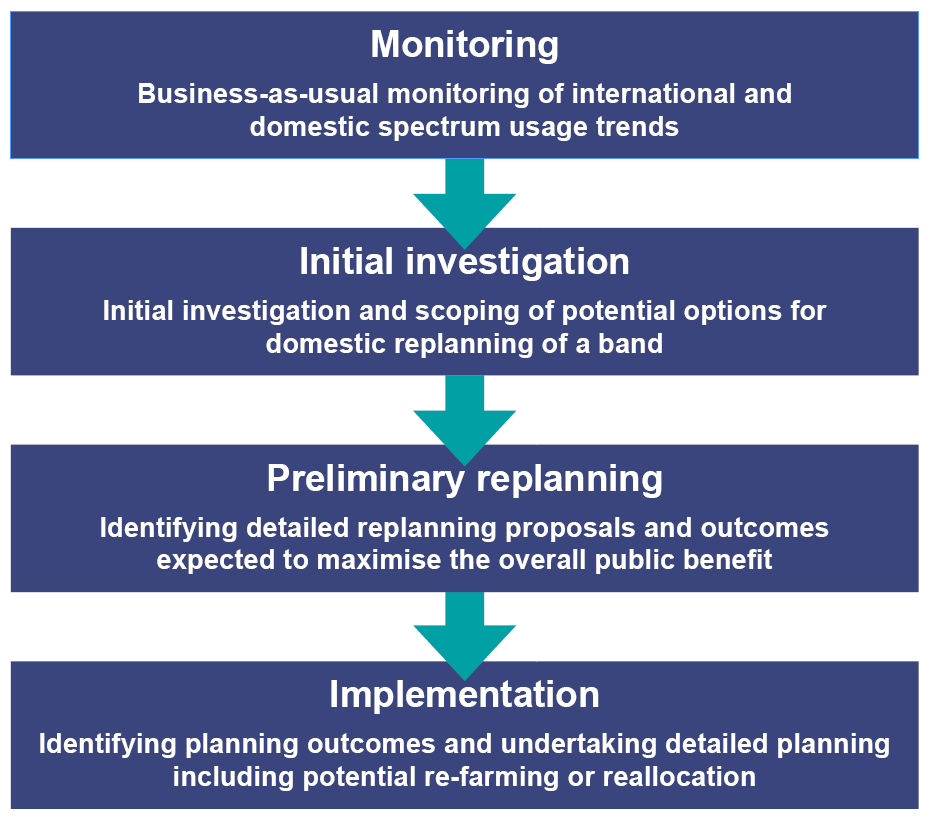


Table 1 summarises the proposed band planning activities for 2021–22.

1. Band-planning activities

| **Planning stage** | **Project priorities** | **Proposed timelines** |
| --- | --- | --- |
| **Monitoring** | 3.3 GHz (3300–3400 MHz)  4.5 GHz (4400–4500 MHz)  4.8 GHz (4800–4990 MHz)  13 GHz (12.75–13.25 GHz)  40 GHz (37–43.5 GHz)  46 GHz (45.5–47 GHz)  47 GHz (47.2–48.2 GHz)  Bands being studied under WRC-23 agenda item 1.2  Bands being studied under WRC-23 agenda item 1.4 | Continue to monitor domestic and international developments in these bands to identify usage trends |
| **Initial investigation** | 600 MHz (617–698 MHz) | Media reform green paper developments will inform the initial investigation and scoping of options for possible domestic replanning of the band |
| 1.5 GHz (1427–1518 MHz) | Q2 2022: discussion paper  Likely simultaneous review with the extended mobile satellite service (MSS) L-band |
| Extended MSS L-band (1518–1525 MHz and 1668–1675 MHz) | Q2 2022: discussion paper  Likely simultaneous review with the 1.5 GHz band |
| 1880–1920 MHz | Q3 2021: discussion paper |
| 2300–2302 MHz | Not scheduled for 2021–22 |
| 5030–5091 MHz | Q3 2021: consideration of submissions following earlier discussion paper |
| 6 GHz | Q3 2021: Consideration of submissions following earlier discussion paper |
| **Preliminary replanning** | No activities in this stage |  |
| **Implementation** | 850 MHz expansion band (809–824 MHz and 854–869 MHz) | Band is being cleared progressively. We continue to consider options for optimising its use. Allocation timeframes are tied to those of the 900 MHz band |
| 900 MHz (890–915 MHz and 935–960 MHz) | Allocation timeframes are tied to those of the 850 MHz expansion band  Late Q4 2021: expect to commence auction |
| 1800 MHz (1710–1785 MHz and 1805–1880 MHz) in remote areas | Q4 2021: discussion paper |
| 2 GHz (1980–2010 MHz and 2170–2200 MHz): consultation on updates to the 7.2 GHz band in RALI FX3 to better accommodate current digital technology use in this band and provide more efficient use of the 7.2 GHz band by television outside broadcast (TOB) operators, including those that will need to transition out of the 2 GHz band  Consult on updates to the TOB band plan to include TOB transition arrangements | Q3 2021: consultation paper on updates to RALI FX 3  Q4 2021: consultation on updates to the TOB band plan |
| 3400–3575 MHz | Q3 2021: consultation on variation to 3.4 GHz technical framework to support urban excise  Q3–Q4 2021: consultation on wireless broadband apparatus licence arrangements. This work will be combined with 3700–4200 MHz implementation activities |
| 3700–4200 MHz | Q1–Q4 2021: review RALI FX3 3.8 GHz point-to-point arrangements  Q3–Q4 2021: develop the apparatus licensing framework for local area wireless broadband in 3700–4000 MHz  Q3–Q4 2021: develop framework for the allocation of spectrum licences in 3700–3800 MHz (including technical liaison group)  Q1 2023: allocation of spectrum licences and market-based allocation of apparatus licences |

## Monitoring

The monitoringstage consists of business-as-usual monitoring of international and domestic spectrum-related developments. At this stage, we maintain an awareness of developments and interest in potential changes to the use of the band that may require substantial planning activities.

There is no direct action required by stakeholders at this stage. However, there is an opportunity for stakeholders to keep us appraised of relevant developments and issues.

In general, bands and issues included at the monitoring stage represent potential work items beyond our immediate detailed annual work program. Importantly, not every band being monitored will subsequently be considered in detail.



### 3.3 GHz (3300–3400 MHz)

The 3.3 GHz band is currently allocated in the RRs on a primary basis to the radiolocation service worldwide. In Australia, this band is designated to be used principally for the purposes of defence and national security, as described in footnote AUS101A of the ARSP. The Department of Defence is normally consulted in considering non-defence use of this service. At WRC-15, the 3.3 GHz band was identified for IMT by several countries. Recommendation ITU-R M.1036 includes frequency arrangements for the implementation of the terrestrial component of IMT in the 3.3 GHz band with some implementation aspects included.

Recent developments

The band is the subject of WRC-23 agenda item 1.2 within Regions 1 and 2. This agenda item will consider identifying the band for IMT in more countries within those regions. Over the past few years, there has been increasing interest in this band, with countries in Asia, South America and the Middle East proposing to make the band available for 5G.[[26]](#footnote-27)

Next steps

The ACMA will continue to monitor developments in this band.



### 4.5 GHz (4400–4500 MHz)

The 4.5 GHz band is currently allocated in the RRs on a co-primary basis to fixed and mobile services worldwide. In Australia, the band is designated to be used principally for the purposes of defence and national security as described in footnote AUS101 of the ARSP. The Department of Defence is normally consulted in considering non-defence use of this service. Typical use is for aeronautical mobile telemetry for flight testing by aircraft stations.

Recent developments

Over the past few years, there has been increasing interest in this band. Japan has made the 4400–4900 MHz band available for 5G.[[27]](#footnote-28) China is also considering use of the band.[[28]](#footnote-29) There is some interest from domestic fixed and mobile wireless broadband users in pursuing this band for mobile broadband in Australia.

Next steps

The ACMA will continue to monitor developments in this band.



### 4.8 GHz (4800–4990 MHz)

The 4.8 GHz band is currently allocated in the RRs on a primary basis for fixed and mobile services in Australia.

In Australia, the fixed and mobile services in this band are designated to be used principally for defence and national security purposes, as defined in footnote AUS101A of the ARSP. The Department of Defence is normally consulted in considering non-defence use of these services. The 4950–4990 MHz part of the band is also allocated to the radio astronomy service on a primary basis under footnote 443 of the ARSP.

At WRC-03, the 4940–4990 MHz band was identified to support public safety services in ITU Regions 2 and 3 for use by government agencies responsible for the provision of defence, national security, law enforcement and emergency services.[[29]](#footnote-30)

There is some interest domestically from large MNOs as well as WISPs and other FWA operators in pursuing this band for wireless broadband in Australia. However, the ACMA is not aware of any significant interest in this band by regional bodies, such as the European Conference of Postal and Telecommunications Administrations (CEPT), Inter-American Telecommunication Commission or APT.

Several countries, including Australia, have implemented arrangements in the 4940–4990 MHz band for defence and national security purposes. This is principally to support high-speed localised coverage around an incident or event. The [Radiocommunications (Public Safety and Emergency Response) Class Licence 2013](https://www.comlaw.gov.au/Details/F2013L00827) (the PSER class licence) outlines arrangements for the use of this band, which allows PSAs to enhance their ability to perform public safety activities and provide significant flexibility in deployment during emergency response and disaster recovery activities.

Recent developments

Recommendation ITU-R M.1036 on frequency arrangements for implementation of the terrestrial component of IMT in the bands identified for IMT in the RRs was recently updated. It now includes arrangements for the 4.8 GHz band.

Separately, the 4940–4990 MHz band is included in IEEE standard 802.11y Public Safety Wireless Local Area Network (WLAN) and has also been included in 5G standards (3GPP band n79), which may enable PSAs in Australia to deploy their own 5G capabilities under the PSER class licence.

Conditions for access to the band will be studied as part of WRC-23 agenda item 1.1.

Next steps

The ACMA will continue to monitor developments in this band.

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### 13 GHz (12.75–13.25 GHz)

The 13 GHz band has primary allocations in the RRs for fixed, fixed-satellite (earth-to-space) and mobile services in Australia. In accordance with footnote 441, the use of this band by geostationary-satellite systems in the fixed satellite service shall be in accordance with the provisions of Appendix 30B.

In Australia, there are currently arrangements in place to support fixed point-to-point services and television outside broadcast (TOB) services in this band. There are over 2200 point-to-point links licensed in the band and 4 Australia-wide licences for TOB, as well as a single licence covering Western Australia.

Recent developments

The band is the subject of WRC-23 agenda item 1.15.

Next steps

The ACMA will continue to monitor developments in this band.

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### 40 GHz (37–43.5 GHz)

The 40 GHz band has primary allocations in the RRs for a range of services across different portions of the band. This includes space research, fixed, mobile, mobile satellite and fixed satellite services in Australia. Some of the footnotes in the ARSP that apply to the 40 GHz band include:

* footnote 516B, which identifies different portions of the band in Regions 1, 2 and 3 for use by high-density fixed satellite service applications
* footnote 547, which identifies the 37–40 GHz and 40.5–43.5 GHz bands for use by high-density applications of the fixed service
* footnote AUS87, which identifies several radio astronomy facilities that use the 40 GHz band to conduct passive observations

footnote AUS101, which states the 37–37.5 GHz band is designated to be used principally for the purposes of defence and national security. The Department of Defence is normally consulted in considering non-defence use of this service.

In Australia, there are currently arrangements in place for point-to-point use of the 37.5–39.5 GHz band.

Recent developments

At WRC-19, the 40 GHz band was identified globally for IMT. In December 2019, the United States auctioned licences in the 37.6–38.6 GHz, 38.6–40 GHz and 47.2–48.2 GHz frequency ranges to support 5G.

The European Communications Commission (ECC) has commenced activities to develop an ECC decision on fixed/mobile wireless broadband harmonisation in the 40.5–43.5 GHz band.[[30]](#footnote-31)

As a result of these developments, it is likely a viable ecosystem could develop for fixed and mobile broadband systems in this band.

The ACMA is also aware of interest from the satellite industry for access to this band. This includes for uncoordinated class licence and coordinated earth station use.

Next steps

The ACMA will continue to monitor developments in this band.

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### 46 GHz (45.5–47 GHz)

The 46 GHz band has primary allocations in the RRs for mobile, mobile satellite, radionavigation and radionavigation satellite services in Australia. Some of the footnotes in the ARSP that apply to the 46 GHz band include:

* footnote 62, which indicates that parts of the band might be used in the future for defence

footnote AUS87, which identifies several radio astronomy facilities that use the 46 GHz band to conduct passive observations.

In Australia, there are currently no formal arrangements for any services in the band.

Recent developments

At WRC-19, more than 50 countries (mainly from Region 1) identified the 46 GHz band for IMT.

Next steps

The ACMA will continue to monitor developments in this band.

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### 47 GHz (47.2–48.2 GHz)

The 47 GHz band has primary allocations in the RRs for fixed, mobile and fixed satellite services in Australia. Footnote AUS87 in the ARSP identifies several radio astronomy facilities that use the 47 GHz band to conduct passive observations.

In Australia, there are currently no formal arrangements for any services in the band.

Recent developments

At WRC-19, Region 2 and 68 other countries in Regions 1 and 3, including Australia, identified the 47 GHz band for IMT.

In December 2019, the United States commenced an auction for licences in the 37.6–38.6 GHz, 38.6–40 GHz and 47.2–48.2 GHz frequency ranges to support 5G.[[31]](#footnote-32)

We are also aware of interest from the satellite industry for access to this and the adjacent 48.2–50.2 GHz band. This includes for uncoordinated class licence and coordinated earth station use.

Next steps

The ACMA will continue to monitor developments in this band.

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### Bands being studied under WRC-23 agenda item 1.2

WRC-23 agenda item 1.2 considers identification of the frequency bands 3300–3400 MHz, 3600–3800 MHz, 6425–7025 MHz, 7025–7125 MHz and 10.0–10.5 GHz for IMT, including possible additional allocations in the RRs to the mobile service on a primary basis. This agenda item is widely acknowledged to be focusing on spectrum harmonisation requirements for 5G mobile broadband technologies.

Recent developments

Working Party 5D has been identified as the responsible party for conducting work under this agenda item. Work on this issue has commenced.

Next steps

The ACMA will continue to engage with stakeholders via the usual international preparatory process to develop Australian positions on WRC‑23 agenda item 1.2. Developments in Europe and other regions and countries (such as the United States) will be monitored.



### Bands being studied under WRC-23 agenda item 1.4

WRC-23 agenda item 1.4 considers the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level.

Recent developments

Working Party 5D has been identified as the responsible party for conducting work under this agenda item. Work on this issue has recently commenced.

Next steps

The ACMA will continue to engage with stakeholders via the usual international preparatory process to develop Australian positions on WRC‑23 agenda item 1.4. Developments in Europe and other regions and countries (such as the United States) will be monitored.

## Initial investigation

The *initial investigation* stage normally includes initial consideration and scoping of potential options for domestic replanning of a band. Triggers that influence when a band moves from monitoring to initial investigation include international spectrum harmonisation, technology standardisation, developments in other countries, the existing domestic spectrum environment and domestic demand drivers.

This stage normally includes initial consideration of whether the new spectrum use/s contributes to maximising the overall public benefit derived from use of the spectrum, along with preliminary assessments on coexistence and other technical considerations.

Formal public consultation may occur through mechanisms including public industry meetings (such as spectrum tune-ups) and/or discussion papers where general feedback on issues is sought.



### 600 MHz (617–698[[32]](#footnote-33) MHz)

The 600 MHz band is currently used by digital television services in Australia and is available for some services under the LIPD class licence.

Current television channel arrangements include spectrum both inside and outside of the 600 MHz band and would require a further restack (sometimes referred to as a ‘second digital dividend’) to yield a contiguous block of spectrum in the 600 MHz range. The sixth channel is currently available for trials of more advanced digital television technology. We note previous trials of DVB-T2 technologies conducted in 2018 and 2019 and will continue to support industry-driven initiatives for trials of the new TV transmission technologies in the future.

#### Recent developments

In 2017, a United States Federal Communications Commission (FCC) incentive auction in the 600 MHz band resulted in a repurposing of 84 MHz of spectrum – 70 MHz for licensed use and another 14 MHz for wireless microphones and unlicensed use.[[33]](#footnote-34) In December 2019, an operator in the United States was the first to deploy a 5G service in the band.[[34]](#footnote-35)

In 2019, Canada issued licences for use of the 600 MHz band. In September 2019, Mexico announced it would auction spectrum in the 600 MHz band for use by mobile broadband including 5G.[[35]](#footnote-36)

In addition, the Radio Spectrum Policy Group (RSPG) of the European Commission (EC) has also provided a [long-term strategy for the future of the UHF band](http://rspg-spectrum.eu/wp-content/uploads/2014/03/RSPG14-555final_Request-for-Opinion-UHF-band.pdf), which suggests the band remain available for broadcasting services until at least 2030. It also recommends that the band should be available for downlink-only broadband services on a secondary basis. This outcome is reflected in the [EC’s inception assessment](http://ec.europa.eu/smart-regulation/roadmaps/docs/2015_cnect_017_uhf_en.pdf), but a final decision is still pending.

WRC-23 agenda item 1.5 will review spectrum use and needs of existing services in the frequency band 470–960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470–694 MHz in Region 1 on the basis of the review in accordance with Resolution 235 (WRC-15).

Recommendation ITU-R M.1036 was recently amended to include frequency arrangements for the implementation of the terrestrial component of IMT in the 600 MHz band.

There has also been some recent interest within the Asia–Pacific Region for variations to the United States plan.

Next steps

The [Media Reform Green Paper](https://www.communications.gov.au/have-your-say/new-rules-new-media-landscape-modernising-television-regulation-australia), released for public consultation in November 2020, asked for submissions on possible reforms that would rationalise the spectrum currently used for television broadcasting and realise a second digital dividend in the 600 MHz band. The potential plan set out in the Green Paper is subject to ongoing consultation and is in the early stages of development.

The ACMA acknowledges interest in the 600 MHz band, but also notes that any consideration of changes would need to be made in the context of broad implications on broadcasters and viewers. Similar to the original 700 MHz digital dividend, mobile broadband is a likely candidate for use of the freed-up UHF broadcast spectrum in the 600 MHz band, proposed in the Media Reform Green Paper.

The idea put forward in the Media Reform Green Paper is that broadcasters could transition from their ‘traditional licence’ to a ‘new licence’ for which they would no longer be required to pay a tax for the use of spectrum providing they transition to using less radiofrequency spectrum. The Green Paper includes an approach that could make 84 MHz of spectrum available in the 600 MHz band for reallocation as the result of consolidation of television services onto shared multiplexes. This would align the 600 MHz band in Australia with the United States 600 MHz channel plan.

The consolidation of TV channels into the lower part of the band and reallocation of the spectrum would require different planning and implementation paths depending on broadcast technology and multiplex sharing scenarios. This would inform the timeframe and complexity of the restack implementation and impact on viewers.

The 600 MHz band is moving to the initial investigation stage and scoping of potential options for domestic replanning of the band. Media Reform Green Paper considerations will inform this process.

The ACMA will continue to monitor international developments in this band and engage with industry and government on the technology and spectrum transition path for terrestrial digital television.

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### 1.5 GHz (1427–1518 MHz)

At WRC-15, all of the 1.5 GHz band was harmonised for IMT within ITU Regions 2 and 3, while ITU Region 1 identified 1427–1452 MHz and 1492–1518 MHz via regional footnotes. In ITU Region 1, only African and Arab states identified the 1452–1492 MHz range (CEPT did not identify this band due to an ongoing dispute with Regional Commonwealth in the Field of Communications countries over the protection of aeronautical mobile telemetry services).

Domestically, the impact on aeronautical telemetry services and fixed services, including the digital radio concentrator system, will need to be considered in any replanning process.

As referred to in Resolution223 (Rev. WRC-15), some satellite industry representatives have also pointed out that compatibility with MSS operating above 1518 MHz will need to be considered.

There is support domestically from mobile broadband representatives for progressing the re-farming of this band. We released the discussion paper, [*Future use of the 1.5 GHz and 3.6 GHz bands*](https://www.acma.gov.au/publications/2020-02/report/future-use-15-ghz-and-36-ghz-bands-discussion-paper) in October 2016, and received 72 submissions from industry.

In June 2017, we released a [consultation package](https://www.acma.gov.au/future-approach-36-ghz-band) including [*Future use of the 1.5 GHz and 3.6 GHz bands—Summary of and response to 3.6 GHz submissions*](https://www.acma.gov.au/publications/2017-10/report/future-approach-36-ghz-band-response-report). This detailed our decision to progress both the 1.5 and 3.6 GHz bands to the preliminary replanning stage for consideration of additional spectrum for mobile broadband services.

Recent developments

WRC-19 agenda item 9.1.2 considered the compatibility of IMT and broadcasting-satellite service (BSS) (sound) in the frequency band 1452–1492 MHz in Regions 1 and 3 as detailed in Resolution 761 (WRC-15). This resolution invited the ITU-R to conduct, in time for WRC-19, the appropriate regulatory and technical studies, with a view to ensuring the compatibility of IMT and the BSS (sound) in the frequency band 1452–1492 MHz in ITU Regions 1 and 3, considering IMT and BSS (sound) operational requirements.

At WRC-19, it was decided to retain and modify Resolution 761 (WRC-19)to define restrictions and coordination triggers on BSS (sound) to protect IMT. Limits on IMT emissions from IMT near country borders were also introduced.

Recommendation ITU-R M.1036 was updated to include frequency arrangements for implementation of the terrestrial component of IMT in the 1.5 GHz band. This includes a note to indicate studies are still being conducted in accordance with Resolution 223 (Rev.WRC-15) to provide possible technical measures to facilitate adjacent band compatibility. This work is underway in Working Party 5D and may result in a revision to the frequency arrangements contained in Recommendation ITU-R M.1036.

The AWG has a work plan to develop a report on frequency arrangements for the 1.5 GHz band. The report will be again considered at the next AWG-27 in 2021, but finalisation of the report will depend on progress at the meeting.

Next steps

We will continue to monitor and engage with stakeholders via the usual international preparatory process to develop Australian positions on studies under Resolution 223 (Rev. WRC-15)and Resolution761 (WRC-15), and other international issues related to the 1.5 GHz band, such as possible new band plans. Stakeholders have also indicated interest in the band for private LTE networks, subject to equipment availability.

As the coexistence with possible MSS use above 1518 MHz is likely to be a substantial consideration, the simultaneous review of the Extended MSS L-band and the 1.5 GHz band is considered to be appropriate. We intend to release an initial discussion paper in Q2 2022.

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### Extended MSS L-band (1518–1525 MHz and 1668–1675 MHz)

In Australia, channel planning arrangements are in place to support use of the band by fixed service digital radio concentrator systems.

Recent developments

WRC-03 and WRC-07 allocated additional spectrum in the RRs to the MSS to complement existing L-band allocations used by numerous satellite operators.

The upper and lower frequency ranges also have mobile and fixed allocations in the RR, while the upper band also has various meteorological, radio astronomy and space research service allocations.

Discussion on WRC-19 developments under 1.5 GHz above is also relevant here.

Next steps

We recognise the need to review planning arrangements in these bands to identify the spectrum use or uses that would maximise the overall public benefit and, if appropriate, vary spectrum management arrangements to support this use.

As the coexistence with potential broadband use below 1518 MHz is likely to be a substantial consideration, we are looking to undertake a simultaneous review of the Extended MSS L-band and the 1.5 GHz band. We intend to release an initial discussion paper in Q2 2022.



### 1880–1920 MHz

The 1880–1920 MHz band is allocated in the ARSP to fixed and mobile services on a primary basis. There are arrangements in place for Digitally Enhanced Cordless Telecommunications (DECT) technology under the Radiocommunications (Cordless Communications Devices) Class Licence 2014 in the 1880–1900 MHz range and point-to-point and point-to-multipoint licensing in the 1900–1920 MHz range in regional and remote areas.

Recent developments

Metropolitan areas of the 1900–1920 MHz band were previously subject to spectrum licensing. However, when licences expired in 2017, licensees did not seek to have them re-issued. While the band is identified internationally for IMT by the ITU, to date, domestic use for wireless broadband services has been low in metropolitan, regional and remote areas.

Other developments include standardisation work on DECT-2020 standardisation[[36]](#footnote-37), and the European review of 1900–1910 MHz band for future railway mobile communication systems (FMRCS).[[37]](#footnote-38)

Next steps

Recognising that arrangements have been in place for the 1880–1900 MHz range for some time, and the increased interest in reviewing both 1880–1900 MHz and 1900–1920 MHz ranges, the frequency range as a whole is in the initial investigation stage. We expect to develop a discussion paper in Q3 2021.



### 2300–2302 MHz

The 2300–2302 MHz band is allocated in the ARSP to the fixed and mobile services on a primary basis and amateur services on a secondary basis. It is currently used by amateur services. The adjacent 2302–2400 MHz (2.3 GHz) frequency range has been subject to spectrum licensing since the year 2000.

Recent developments

The 2300–2400 MHz band was identified globally for IMT at WRC-07. The 2.3 GHz band is currently being used to provide wireless broadband services across Australia. The most spectrally efficient profile bandwidths for internationally standardised wireless broadband equipment are in multiples of 5 MHz.

In addition, carrier aggregation and emerging 5G technologies will allow operators to deploy services in bandwidths of up to 100 MHz. The current 98 MHz of spectrum available in the 2.3 GHz band is not optimised for such use. Consequently, there is interest from spectrum licensees in the 2.3 GHz band in making the 2300–2302 MHz band available for wireless broadband use.

Next steps

Recognising competing interests for use of the 2300–2302 MHz band from incumbent and new services, we have moved it to the initial investigation stage and will reassess its timing priority in FYSO 2022–26. Any review will necessarily consider the interests of incumbent amateur services and the importance of the band for activities such as earth-moon-earth operations**.**

### 5030–5091 MHz

At WRC-12, the 5030–5091 MHz band was identified for use by line-of-sight (LoS) and beyond line-of-sight (BLoS) remotely piloted aircraft systems (RPAS) command and control radio links (known as control and non-payload communication, or CNPC) in the RRs. LoS and BLoS CNPC equates to terrestrially and satellite-based control of RPAS, respectively. Commercial and non-commercial (excluding Defence) RPAS operating in non-controlled airspace currently predominantly use technologies authorised under the LIPD class licence for both CNPC and payload communications. In controlled airspace, however, operation of remotely piloted aircraft is far more heavily regulated, and systems authorised under the LIPD class licence may not have the level of protection from interference required for safety-critical control links. The band is being considered internationally as a potential candidate for CNPC in controlled airspace. Consideration of LoS arrangements is more advanced than BLoS.

Recent developments

Since the WRC-12 identification, the International Civil Aviation Organisation (ICAO) has been working towards development of standards and recommended practices (SARPs) for RPAS CNPC in 5030–5091 MHz – these are expected to be finalised in 2022. The United States is currently in the final stages of establishing regulatory arrangements for use of the band by LoS RPAS CNPC operating in controlled airspace, and some countries in Europe and the Asia–Pacific are also currently considering implementation of the WRC-12 outcomes.

Next steps

Acknowledging domestic and international momentum in this space, we expect to release a discussion paper in Q2 2021 on international trends in the 5030–5091 MHz band and seek industry feedback on potential arrangements for LoS RPAS CNCP. Our role in enabling CNPC operation in the band will be confined to making licensing arrangements for access to this spectrum. Specific technologies and procedures for safe operation of RPAS are matters for other regulatory agencies, such as the Civil Aviation and Safety Authority (CASA) and Airservices Australia and any arrangements in the band will be developed in consultation with those agencies.

Given consideration of BLoS CNPC arrangements using other bands is ongoing within ITU-R (and is the subject of a WRC-23 agenda item) and noting the lack of progression on these arrangements relative to LoS CNPC internationally, BLoS CNPC will not be within the scope of the discussion paper. We will continue to monitor developments in the BLoS CNPC space and may consider consulting on arrangements if/when international momentum warrants doing so.



### 6 GHz Radio Local Area Networks (RLANs)

Given the significant interest in recent and ongoing international developments in the 6 GHz band (5925–7125 MHz), this topic has been moved to the initial investigation stage. The investigation will also include relevant parts of the neighbouring 5 GHz band, some of which are already included in the LIPD class licence for use by RLAN devices.

Recent developments

The FCC and Ofcom have recently implemented changes to the 6 GHz band aimed at enabling the use of next-generation wi-fi (Wi-Fi 6E). Regulators in other countries – such as Brazil and South Korea – have also started planning possible changes to the band. Parts of the 6 GHz band are also included in the current WRC study cycle (WRC-23, agenda item 1.2) to identify possible additional spectrum for IMT, including 5G.

During the WRC-19 study process, several segments of the 5 GHz band (5150–5350 MHz and 5725–5925 MHz) were also considered, resulting in changes to the RRs in some parts of those bands, most notably in 5150–5250 MHz. Arrangements already exist in Australia for RLANs in the 5150–5350 MHz band (low power indoor use only) and the 5725–5850 MHz band. We have also received requests to review existing Australian arrangements with a view to aligning them with United States arrangements. The 5150–5350 MHz and 5725–5850 MHz bands are also included in the IEEE 802.11 series of standards for WLAN. There are no arrangements in place for RLANs in the 5350–5470 MHz and 5850–5925 MHz bands in Australia.

Next steps

We expect to release a discussion paper in Q2 2021 as part of the initial investigationstage, looking at the state of both the 5 GHz and 6 GHz bands, and recent international developments in those bands. In 2021–22, we will progress consideration of the band, including examining potential new uses for the band in Australia, and consider industry submissions on the discussion paper.

## Preliminary replanning

The *preliminary replanning* stage includes identification of detailed replanning options based on feedback received at the initial investigation stage, along with a detailed consideration of the spectrum uses/s that would maximise the overall public benefit. Considerations are informed by detailed technical coexistence studies and include identification of draft, high-level technical planning frameworks. Analysis is undertaken of ongoing incumbent spectrum needs and identification of available mitigations necessary to address the impact potential changes in the planning environment may have on incumbent users.

Formal public consultation may occur through mechanisms such as public industry meetings (such as spectrum tune-ups) and/or options papers where feedback on issues is sought.

There are no activities at the preliminary replanning stage for 2021–22.

## Implementation

The *implementation* stage is the conclusion of the ACMA band-planning activities and identifies planning outcomes expected to maximise the overall public benefit. This stage includes further development of detailed technical planning frameworks (including further consultation where necessary). Licensing and allocation frameworks are also developed as required. Depending on the nature of the existing use of the band and the outcome of the planning process, this stage could potentially lead to re‑farming or reallocation activities.

Conclusions from our planning process are communicated in outcomes (decision) papers that may include decisions on issues within our remit and/or identify preliminary views on future activities subject to further legislative process – for example, decision or actions to be undertaken by the minister.



### 850 MHz expansion band (809–824 MHz and 854–869 MHz)

In November 2015, we released our [*Long-term strategy for the 803–960 MHz band*](https://www.acma.gov.au/publications/2015-12/report/acmas-long-term-strategy-803-960-mhz-band-decision-paper) decision paper. A key decision was to make available 2 x 15 MHz of 4G-standardised spectrum for new mobile broadband services from 2024. This spectrum is known as the 850 MHz ‘expansion band’, which is lower adjacent to the current 850 MHz 3G band used by Telstra and TPG Telecom.

Recent developments

The project is now geared towards the clearance and/or relocation of incumbent services operating in the 850 MHz expansion band frequencies earmarked for mobile broadband.

As per the [Council of Australian Governments (COAG) communique of December 2018](https://www.coag.gov.au/meeting-outcomes/coag-meeting-communique-12-december-2018), all Australian jurisdictions agreed to a strategic roadmap that set out a plan to design, implement and operate a public safety mobile broadband (PSMB) service, and to continue to work together to resolve the supporting spectrum arrangements in parallel with proof-of-concept trials. The Australian Government has identified 2 x 5 MHz of spectrum at the lower end of the 850 MHz expansion band for a national PSMB capability.

Next steps

The implementation plan contains milestones for the transition to long-term arrangements by incumbent services. As described in the [decision paper](https://www.acma.gov.au/sites/default/files/2019-12/Reconfiguring%20the%20900%20MHz%20band_decision%20paper.docx) released in December 2019, we intend to allocate the 850 MHz expansion band in combination with the 900 MHz band (see below).



### 900 MHz (890–915 MHz and 935–960 MHz)

In December 2019, we released a [decision paper](https://www.acma.gov.au/sites/default/files/2019-12/Reconfiguring%20the%20900%20MHz%20band_decision%20paper.docx) outlining that we remained of our view that the best way to achieve reconfiguration of the 900 MHz band is to undertake a band clearance and price-based allocation, in conjunction with an allocation of spectrum in the 850 MHz expansion band.

Recent developments

We have commenced work on the reallocation of the 900 MHz band and the 850 MHz expansion band. This included consultation in Q2 2020 on a draft reallocation recommendation for the minister.

The minister made the [Radiocommunications (Spectrum Re-allocation-850/900 MHz Band) Declaration 2020](https://www.legislation.gov.au/Details/F2020L01407) in October 2020.

Next steps

We are currently preparing draft allocation instruments and expect to commence the auction in late Q4 2021. See the *Forward allocation work plan* section for more information.



### 1800 MHz (1710–1785 MHz and 1805–1880 MHz) in remote areas

In 2016, we released arrangements for use of the 1800 MHz band in remote areas for fixed and mobile wireless broadband services.

Recent developments

We have been monitoring the band and are developing a discussion paper on possible options for the band.

Next steps

We plan to release a discussion paper in Q4 2021 to gather feedback on the future of the band. Following this, we expect to implement decisions using appropriate changes to RALIs in Q4 2021 – Q1 2022.

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### 2 GHz (1980–2010 MHz and 2170–2200 MHz)

The 1980–2010 MHz and 2170–2200 MHz bands are currently used for television outside broadcast (TOB) services on a shared and non-exclusive basis for short-term applications, such as covering special events. TOB was introduced in the 2 GHz band in 2012 on an interim basis.

Recent developments

In January 2021, we released the [*Replanning the 2 GHz band (1980–2010 and 2170–2200 MHz) Outcomes paper*](https://www.acma.gov.au/consultations/2020-07/replanning-options-2-ghz-band-consultation-232020) after considering issues and suggestions raised in submissions to the discussion paper, [*Planning of the 2 GHz band*](https://www.acma.gov.au/consultations/2019-09/planning-2-ghz-band-consultation-262019) in August 2019.

We have decided to replan the 2 GHz band for mobile-satellite services, with:

* 2 x 25 MHz (1980–2005 MHz paired with 2170–2195 MHz) replanned for mobile-satellite services Australia-wide under apparatus licensing arrangements with:
* our preliminary view – given demand is likely to exceed supply (as expressed in responses to the options paper) – is that the most appropriate mechanism to resolve competing demand is a price-based allocation mechanism via auction
* arrangements to provide support for terrestrial applications where a mobile-satellite licensee wishes to supplement/extend its mobile-satellite service. For example, extending coverage of a satellite network with terrestrial-based complementary ground component infrastructure or direct air-to-ground communications services (involving ground-based wireless broadband links to aircraft) to provide inflight communication services.

2 x 5 MHz (2005–2010 MHz paired with 2195–2200 MHz) dedicated for satellite IoT and similar narrowband services to be used on a shared basis between operators. This arrangement will provide spectrum access with a low barrier to entry for innovative satellite applications and will assist in growing the Australian space industry.

To support introduction of mobile-satellite services, existing TOB services will be required to stop operation. Our preliminary view is that a timeframe of 5 years is appropriate for this in capital cities, and 3 years in regional areas where TOB use is minimal.

Next steps

We have started implementing the actions outlined in the outcomes paper.

Consultation is expected on updates to the 7.2 GHz band in RALI FX3 to better accommodate current digital technology use in this band by existing users, including broadcasters and other TOB operators. We expect this to occur in Q3 2021 after a review of arrangements in Q2 2021. These updates are expected to provide more efficient use of the 7.2 GHz band by TOB operators, including those that will need to transition out of the 2 GHz band.

Consultation will be undertaken regarding updates to the [Television Outside Broadcast Service (1980–2110 MHz and 2170–2300 MHz) Frequency Band Plan 2012](https://www.legislation.gov.au/Details/F2012L00731) to reflect the outcomes of the 2 GHz band replanning outcomes in Q4 2021 after a review of the band plan in Q3 2021.

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### 3400–3575 MHz band

We recognise that optimising spectrum and apparatus licence arrangements in the 3400–3575 MHz band, adjacent to the 3.6 GHz band auctioned in 2018, is an important priority. This is expected to result in more efficient use of spectrum and a reduction in deployment costs, supporting the implementation of 5G services in Australia.

We consulted on [options for optimising arrangements in the 3400–3575 MHz band](https://www.acma.gov.au/consultations/2019-08/optimising-3400-3575-mhz-band-consultation-122019) in in April 2019 and announced the outcomes of this review in November 2019. These included:

restacking incumbent services to consolidated arrangements

if the minister decided to designate spectrum, converting NBN Co’s apparatus licences to spectrum licences

making more spectrum available for point-to-multipoint apparatus licensing in regional and remote areas

if the minister decided to designate spectrum, making more spectrum available for spectrum licensing in regional areas

excising unused urban areas of NBN Co’s licences in the band and making them available for use by other wireless broadband operators.

Recent developments

The first step of the optimisation process, the restacking of incumbent services, was finalised on 30 November 2020.

In December 2020, the minister made the Radiocommunications (Spectrum Designation—3.4 GHz Band) Notice 2020. We are currently implementing processes required by that instrument.

Next steps

We are in the process of implementing the remaining outcomes of our review of the 3400–3575 MHz band. All steps to enable spectrum licensees to defragment a majority of their 3.4 GHz spectrum holdings have been completed. We will continue to develop arrangements for urban excise areas and apparatus-licensed use of relevant portions of the band (this latter task will be done as part of the implementation of the outcomes for the 3700–4200 MHz band review).

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### 3700–4200 MHz

The 3700–4200 MHz band is currently allocated on a co-primary basis in the ARSP to the fixed, fixed-satellite (space-to-earth) and mobile services.

Use of the 3700–4200 MHz band has been debated internationally for several years. Recently, there has been increasing interest in the lower and lower-adjacent parts of this band for 5G services, particularly given the large bandwidths potentially available in this range.

We have been alert to the needs of existing fixed satellite and point-to-point uses of the band, as well as the potential for both wide-area and site-based – for example, FWA – wireless broadband. Considering the whole band simultaneously will maximise the opportunity for balanced approaches that take appropriate account of all interests.

Recent developments

In January 2021, in the United States, the FCC auctioned[[38]](#footnote-39) the 3700–3980 MHz segment of the band for 5G (that is, wireless broadband) use, preserving only the 4000–4200 MHz segment for FSS.

We released an [outcomes paper](https://www.acma.gov.au/consultations/2020-07/planning-options-3700-4200-mhz-band-consultation-222020) describing the future uses of the 3700–4200 MHz band in January 2020. We propose to reallocate 3700–3800 MHz to exclusive wide-area wireless broadband in metropolitan and regional areas. In addition, we propose to introduce local-area wireless broadband services on a shared basis in remote areas in 3700–3800 MHz and Australia-wide in 3800–4000 MHz. Arrangements in the 4000–4200 MHz segment were not proposed to change.

Next steps

We have commenced the next steps as outlined in the outcomes paper.

Consultation will be undertaken regarding updates to RALI FX3 3.8 GHz PTP arrangements to reflect the 3700–4200 MHz band replanning outcomes.

Also, consultation is expected to commence on development of the licensing frameworks for local area WBB and wide area WBB across 3700–4000 MHz. This will include development of apparatus- and spectrum-licensing frameworks for the various situations under consideration, including remote and low demand regional areas and high demand regional and metro areas. A technical liaison group will be formed to assist in the development of the frameworks.

## Forward allocation workplan

Timely access to spectrum is increasingly important to an innovative and dynamic economy.

Under current law, specific allocation processes depend on ACMA and, in some cases, ministerial decisions and reflect other relevant government policy considerations about planning priorities. Information from incumbent and prospective spectrum users about the demand for access to specific bands and the timing of any possible allocation will also provide important input to allocation decisions.

There is no certainty that any band will move to changed allocation arrangements until the relevant formal decision has been made. We emphasise that the information presented here does not in any way pre-empt such decisions.

Even once a decision has been made to move towards a changed allocation arrangement, the specific design of each arrangement is dependent on a range of planning and allocation decisions yet to be made. These considerations include, for example, allocation timing, methodology (such as whether it involves an auction, other price-based allocation or conversion of existing apparatus licences to spectrum licences, and whether it involves the issue of apparatus or spectrum licences, or a combination) and lot configuration.

The *Radiocommunications Act 1992* establishes a set of mandatory processes for allocating spectrum. In our experience, this process can be expected to take at least 16 to 18 months from confirmation of the planning decision, to the start of an auction for a price-based allocation of spectrum licences of the bands under consideration. This process will take longer where there is uncertainty – for example, if there is optionality around how the spectrum can be configured, the process will take longer because further consultation and engagement with potential bidders will be necessary and important. The process can also be expected to be longer if there is a need to acquire new auction tools.

The Modernisation Act changes the respective spectrum management roles of the ACMA and the minister by simplifying and streamlining critical allocation and re-allocation processes. This will assist us in making spectrum available faster in response to demand. However, the minister will still be able to have input in processes and decisions where considered appropriate, through Directions and ministerial policy statements.

We recognise that while there may be timing, administrative and potentially efficiency benefits in running an allocation of multiple bands concurrently, there may be an additional burden on auction participants associated with capital funding, as well as potential auction complexity considerations. Taking feedback into account, we will plan for a space of at least 6 months between major spectrum licence allocations, unless there are clear reasons to auction bands together, such as that the characteristics of the bands complement each other or where one band can be a substitute for the other.

Table 2 summarises our timing expectations for future allocations under current law. Timing expectations cannot be definitive.

1. Forward allocation timing

| Band | Stage | Proposed allocation timing | Notes | Allocation method |
| --- | --- | --- | --- | --- |
| 26 GHz apparatus licences | Availability of apparatus licences | Following completion of 26 GHz spectrum licence auction, expected Q 3 2021 | The ACMA will invite applications for area-wide licences in the 26 GHz band outside designated areas following completion of the spectrum licence auction | Administrative allocation |
| 28 GHz | Availability of apparatus licences | Following finalisation of current licence issue process, expected Q2 2021 | The ACMA will invite applications for area-wide licences in the unallocated 27.5–30 GHz spectrum | Administrative allocation |
| 850/900 MHz | Consult on draft allocation instruments | Q4 2021 | Auction at least 6 months after 26 GHz spectrum licence auction | Spectrum licence auction |
| 3700–4200 MHz low demand regional areas | Implementing planning decision | Q4 2021 – Q1 2022 | Administrative allocation of apparatus licences for remote and low demand regional areas | Administrative allocation |
| 3400–3575 MHz | Implementing planning decision | Q1 2023 | The allocation of spectrum licences in any additional frequencies and areas could occur in the 3700–3800 MHz band | Spectrum licence auction for new allocations |
| 3700–4200 MHz high demand regional areas | Implementing planning decision | Q1 2023 | For both spectrum licences and apparatus licensing in high demand regional areas. Type of allocation being finalised | To be determined |
| 2 GHz  (mobile satellite services) | Implementing planning decision | Q3 2023: apparatus licences  (Our preliminary view is subject to further consideration)[[39]](#footnote-40) | New services not to commence until TOB services have transitioned to new arrangements; anticipated to occur over 5-years | To be determined |

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### 26 GHz

In October 2019, the minister declared the 25.1–27.5 GHz frequency range for reallocation by issue of spectrum licence in 29 defined areas.

Following consultation in July/August 2020, the technical and allocation instruments were made in late November 2020. Applications opened for the auction of spectrum licences on 14 December 2020 and closed on 21 January 2021. We expect the auction to take place between April and June 2021.

In October 2020, we invited applications for area-wide apparatus licences in the 24.7– 25.1 GHz frequency range (round 1), and subsequently issued one licence.

We will invite applications for area-wide licences outside areas designated for spectrum licensing (round 2) after the spectrum licence auction.

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### 28 GHz

In October 2020, the ACMA invited applications for area-wide apparatus licences in the 27.5–30 GHz frequency band. In December 2020, the ACMA agreed to issue 70 licences to 14 companies, comprising 45 new fixed satellite service licences, 13 conversions of existing earth station licences and 12 fixed-wireless access licences.

A number of the successful applicants intend to provide wireless broadband services across all states and territories and across urban, regional and rural areas. There was also considerable uptake from fixed satellite service providers, including from existing providers and new entrants to the Australian satellite market.

We will invite applications for area-wide licences in the unallocated 27.5–30 GHz spectrum after the issue process for the round 1 28 GHz area-wide licences.



### 850 MHz expansion band

In October 2020, the minister made the Radiocommunications (Spectrum Re-allocation-850/900 MHz Band) Declaration 2020. We are now preparing for allocation of this spectrum by auction, expected to commence in late Q4 2021. We expect to consult on the draft allocation instruments in Q2 2021.

A technical liaison group is currently being conducted to consider elements of technical frameworks for the band.



### 900 MHz

In October 2020, the Minister made the Radiocommunications (Spectrum Re-allocation-850/900 MHz Band) Declaration 2020. We are now preparing for allocation of the declared spectrum by auction, expected to commence in late Q4 2021. We expect to consult on the draft allocation instruments in Q2 2021.

A technical liaison group is currently being conducted to consider elements of technical frameworks for the band.

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### 3400–3575 MHz

We are in the process of implementing the outcomes of our review of the 3400–3575 MHz band. Restacking of incumbent services in the band was completed on 30 November 2020. In December 2020, the minister made the Radiocommunications (Spectrum Designation—3.4 GHz Band) Notice 2020.

We continue to progress the process to convert NBN Co’s apparatus licences to spectrum licences, which is expected to be finalised in Q2 2021. After conversion is completed, NBN will have the option to surrender the spectrum licence relating to unused urban areas, potentially in Q3 or Q4 2021.

Work on the allocation process for the 25–42.5 MHz of spectrum will start after the conversions of NBN Co’s licences is completed and unused urban areas have been excised from their licence holdings. Notionally, an allocation would be combined with spectrum identified in the 3700–4200 MHz band, this could occur in Q1 2023. This may also include 75 MHz of spectrum excised from NBN Co’s spectrum licences. If it does not, these areas will be made available by other appropriate means.

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### 3700–4200 MHz

The replanning phase for the 3700–4200 MHz band concluded with the release of the [outcomes paper](https://www.acma.gov.au/consultations/2020-07/planning-options-3700-4200-mhz-band-consultation-222020) in January 2021. We are in the process of implementing the outcomes of our review.

The type of apparatus-licensing framework for local-area wireless broadband services, methods of allocation and whether they should be different in areas of high contention, such as metropolitan areas, are currently being considered.

A technical liaison group will be convened to consider elements of the technical frameworks for the band. Availability of spectrum for local-area wireless broadband services will depend upon the apparatus-licensing framework and methods of allocation in each region.

The indicative timing for the allocation of spectrum and apparatus licences in high demand regional areas using a market-based method is Q1 2023.

### 2 GHz

Our focus in 2021 is development of transition arrangements for existing TOB services. Work is underway to implement replanning decisions.

Timing for an allocation of mobile-satellite service licences will be considered alongside other allocation processes, but at this stage does not appear likely before mid-2023.

# Optimising established planning frameworks

The optimisation of existing spectrum planning arrangements is also a significant priority for the ACMA. This is typically achieved through updates to elements of the spectrum planning technical framework, such as band plans (either administrative or legislative) and RALIs.

These changes are intended to address band and service-specific issues identified within existing frameworks – for example, by addressing technology developments and enabling sharing opportunities and other changes to improve the efficient use of the spectrum. Our optimisation work across a range of different spectrum uses is outlined below.

Table 3 summarises the proposed optimisation activities for 2021–22.

1. Optimising established planning frameworks

| **Planning area** | **Project priorities** | **Proposed timelines** |
| --- | --- | --- |
| Broadcasting | Develop and consult on a proposal to vary the Deniliquin LAP | Q3 2021: consult |
| Develop and consult on proposals for variations in a number of licence areas in NSW and VIC[[40]](#footnote-41) to enable AM–FM conversions | Q3 2021 and ongoing: consult |
| Following extension of Part 3 of the *Broadcasting Services Act 1992* (BSA) to Norfolk Island, license various incumbent broadcasting services in accordance with the provisions of the BSA and Radiocommunications Act | Q3 2021 |
| Develop and consult on proposals for variations to the Remote Central and Eastern Australia Radio LAP | Q4 2021: consult |
| Develop and consult on proposals for variations to the Remote Western Australia Radio LAP | Q1 2022: consult |
| Following extension of Part 3 of the BSA to Norfolk Island, prepare or vary a licence area plan to include Norfolk Island | Q2 2022: consult |
| Consult on the digital radio channel plan (DRCP) for the licence areas where the incumbent broadcasters have committed to rollout digital radio in 2021 or 2022 | Timing will be driven by the demand from broadcasters |
| Consult on potential for replanning analog radio services in Perth, following the clearance of Band II television in Bunbury | TBA based on consultation in Q1 2021 |
| Satellite | Consider applications for test and demonstration purposes in the 2 GHz band | Ongoing |
| Manage filing and coordination of Australian satellite systems | Ongoing |
| Low interference potential devices (LIPD) | Monitor developments  Regular update to the LIPD class licence | Ongoing – Q1 2022: consultation on regular update to the LIPD class licence |
| Intelligent Transport  Systems | Monitor the developments in cooperative ITS. Review ITS class licence to accommodate V2X technology and consider channelisation arrangements | Ongoing |
| Spectrum planning, assignment and coordination requirements | Ongoing review of the spectrum planning technical framework to ensure its currency and consistency with current technologies and operational practices | Ongoing |
| Spectrum licence technical frameworks | Ongoing program of review of technical frameworks below 4 GHz | 1800 MHz band –Q3 2021: implementation of consultation outcomes  2.1 GHz band – Q3 2021: commence review and form a technical liaison group  Other bands: ongoing |
| Spectrum-sharing approaches | Ongoing consideration of new approaches to spectrum sharing | Ongoing – will consider proposals as they are submitted |



## Broadcasting

We continue to provide spectrum planning and licensing assistance for ad-hoc requests for optimisation of the existing TV transmission infrastructure, as well as facilitate technology trials of new TV transmission technologies.

In November 2020, the government released a Media Reform Green Paper, setting out a potential plan for reforms to support the media industry and enhance the range and quality of services and content available. Submissions to the Green Paper close in May 2021. Subject to the outcomes of this consultation, we may need to undertake detailed planning studies to support any potential restack of the spectrum identified in the Green Paper.

We provide information about TV reception and interference on our website and manage the [mySwitch](https://myswitch.digitalready.gov.au/) website, a public TV coverage data portal with address-specific information about the TV coverage and access to Viewer Access Satellite Television (VAST). We also provide interference diagnostic services where external interference is the cause.

For radio spectrum planning, we are progressing with the priorities outlined in our 2020 report to the minister on the [future delivery of radio](https://www.acma.gov.au/publications/2020-03/report/future-delivery-radio) services in Australia.

Our current radio broadcasting planning priorities are:

converting commercial, national and community services from AM to FM where FM spectrum is available

enhancing coverage of national, commercial and community broadcasting services where spectrum is readily available

making DRCPs for regional DAB+ where a commercial licensee or national broadcaster has committed to a rollout

supporting trials of new broadcasting technology.

These broad categories of activity are informing how individual requests for planning and allocation activity are prioritised within any year.

### Recent developments

We have:

finalised variations to LAPs to allow AM–FM conversion for Nowra, Taree and Grafton in NSW

varied the Brisbane LAP

made a digital radio channel plan for Gold Coast RA1

declared a category 1 digital radio multiplex transmitter for Gold Coast RA1 is a foundation licence

invited applications for the Gold Coast RA1 digital radio multiplex transmitter licence.

### Activities planned for 2021–22

We will:

* consult on proposals for LAP variations in the Remote Central and Eastern Australia Radio LAP, the Remote Western Australian Radio LAP and the Deniliquin (NSW) LAP

consult on the variations to LAPs to enable AM–FM conversions in single-licensee markets where engineering reports have been received from the licensees and approved by the ACMA. This includes a subset of the following areas: Grafton, Taree, Inverell, Moree, Gunnedah, Tamworth, Lismore, Mudgee, Young and Parkes. We are consulting with the licensees to determine indicative timelines and relative priorities. Proceeding with these variations depends on the relevant licensees making timely strategic business decisions on available implementation options

further consult on whether variations to the DRCP for Brisbane are appropriate to improve digital coverage

consult on the potential to replan the Perth FM radio band

license various incumbent broadcasting services and prepare or vary a LAP to include Norfolk Island, following the extension of services to Norfolk Island under Part 3 of the BSA

engage further with industry on the ACMA’s findings in its report to the minister on the future delivery of radio.

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## Satellite planning

We continue to engage internationally on the coordination, development and implementation of measures to enhance spectrum use for satellite communications and space research services.

### Recent developments

Since 1 July 2020, on behalf of Australia satellite operators, the ACMA has filed 5 new satellite systems with the ITU and submitted modifications to 2 in accordance with [Australian procedures for the coordination and notification of satellite systems](https://www.acma.gov.au/publications/2012-01/guide/australian-procedures-coordination-notification-satellite-systems).[[41]](#footnote-42) We have reviewed 658 ITU publications on new or modified satellite systems for compatibility with Australian services and requested further coordination with 239 foreign satellite networks. We have assessed 327 radiocommunications licence applications for space-based communications systems for consistency with ITU and Australian regulatory arrangements for space systems.[[42]](#footnote-43)

In January 2021, we completed a review of the [2 GHz (1980–2010/2170/2300 MHz) band](https://www.acma.gov.au/consultations/2020-07/replanning-options-2-ghz-band-consultation-232020) and have decided to replan the 2 GHz band for mobile-satellite services.

In December 2020, we commenced [consultation](https://www.acma.gov.au/consultations/2020-12/update-foreign-space-objects-determination-and-australian-space-objects-determination-consultation-412020) on proposed updates to the Foreign Space Objects Determination to include the following as owners, controllers or operators of foreign space objects: Astrocast SA (incorporated in Switzerland), Fleet Space Technologies Pty Ltd (incorporated in Australia), Hiber B.V. (incorporated in The Netherlands), Kinéis SAS (incorporated in France), O3b Limited (incorporated in Jersey) and Viasat, Inc. (incorporated in the United States).

### Activities planned for 2021–22

Our key spectrum planning priorities over the next year are to:

* provide ongoing operational support for Australian-filed satellite networks, including:
* assisting Australian satellite operators with ongoing satellite coordination negotiations with other administrations
* assessing new notices related to the progress of existing Australian satellite networks
* filing of new networks
* supporting international administration-level satellite coordination meetings with other administrations.
* continue to monitor trends in the spectrum needs of space-based communications systems, developments in emerging space-based technologies and applications with a view to:
* updating regulatory arrangements for space-based communication systems as required
* considering whether changes are required to licensing procedures for space-based communications to support development
* encouraging organisations planning new satellite communication systems or intending to change existing systems to contact us to discuss whether such updates are required, and if so, their timing, as any future work will depend on priority compared to other projects in the detailed annual work program.
* commence review of [Australian procedures for the coordination and notification of satellite systems](https://www.acma.gov.au/publications/2012-01/guide/australian-procedures-coordination-notification-satellite-systems) in consideration of outcomes of WRC-19
* progress work in the implementation of 2 GHz planning outcomes
* support the development of the Australian space industry through participation in the Australian Space Agency forums as a member of the Space Coordination Committee
* assess new radiocommunication licence applications for space-based communications systems for consistency with Australian and ITU RRs
* provide support and information to assist the growing interest from organisations considering developing experimental satellite systems with short-duration missions
* develop frequency coordination between earth station and terrestrial services, as appropriate
* continue work in implementing outcomes of the review of the 28 GHz band, including consideration of extension of FSS use to ubiquitous FSS operating in the 27.5–28.3 GHz band.



## Low interference potential devices

In September 2020, we commenced consultation on proposed updates to the LIPD class licence. The proposed updates considered:

* including new arrangements for telecommand or telemetry transmitters in the 169.4–169.4875 MHz, 169.5875–169.8125 MHz and 169.4875–169.5875 MHz bands
* including new arrangements for fixed telecommand or telemetry transmitters in the 928–935 MHz band
* updating the standards referenced for radiofrequency identification transmitters in the 920–926 MHz band
* including new arrangements for data communications transmitters in the 24.25–25.1 GHz band
* including new arrangements for radiodetermination transmitters in the 10–10.55 GHz band.

### Recent developments

We finished this review and varied the LIPD class licence in December 2020.

### Activities planned for 2021–22

The LIPD class licence is updated regularly. We are currently monitoring developments and plan to consult on the next update of the LIPD class licence in Q1 2022.



## Intelligent Transport Systems

In December 2017, after consultation with the automotive industry, the ACMA made a class licence authorising the operation of intelligent transport systems (ITS) in Australia.

ITS are a range of wireless technologies designed to enable vehicle-to-vehicle, vehicle-to-person or vehicle-to-structure communications.

The arrangements support the use of complying wireless technologies and devices in the frequency range 5855–5925 MHz (the 5.9 GHz band).

At the time, following advice from and in consultation with industry, we reflected the current European standard for cooperative ITS (C-ITS) in the arrangements in the class licence, and indicated further standards could be incorporated if appropriate.

The arrangements are contained in the Radiocommunications (Intelligent Transport Systems) Class Licence 2017.

### Recent developments

Industry feedback has indicated interest in changes to the ITS class licence to accommodate V2X technology and potentially implementation of channelisation arrangements. We will continue to monitor the developments in C-ITS and expect to commence a review of the current arrangements in Q2 2021.

### Activities planned for 2021–22

This work is expected to continue into the second half of 2021 and into 2022.

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## Ongoing review of spectrum planning, assignment and coordination requirements

We have an ongoing program of review of the spectrum planning technical framework to ensure its currency and consistency with current technologies and operational practices.

This work is primarily focused on frequency coordination requirements for apparatus-licensed services, which is predominately recorded in RALIs. Consideration of spectrum-licensing technical frameworks and ensuring spectrum embargoes continue to be appropriate are additional elements of this work program.

### Recent developments

As part of the implementation of the outcomes of the 803–960 MHz review, RALIs FX 16, FX 17, FX 22 and LM 08 were updated in July 2020.

In October 2020, RALI MS 46 was created and RALI MS 38 was updated to reflect the arrangements for area-wide apparatus licences in the 26 GHz (24.7–27.5 GHz) and 28 GHz (27.5–30 GHz) bands.

We are also considering a broader review of the spectrum planning framework. The framework is complex, made up of a large array of interlinking technical and policy documents. The content and interrelationships can be difficult to understand and interpret, even for experienced practitioners, with information on any one service or part of the spectrum contained in multiple documents. A number of broad areas for review have become apparent, including improving the transparency and clarity of the framework overall**.**

### Activities planned for 2021–22

We intend to seek industry comment on a draft updated [frequency coordination requirements review work program](https://www.acma.gov.au/frequency-coordination-requirements-review-work-program-2018-19) in the first half of 2021. This will determine our work program for 2021–22.



## Review of spectrum licence technical frameworks

In November 2019, we consulted with spectrum licensees about a review of current arrangements in bands that are already licensed for wireless broadband. This was to ensure existing allocations are efficient and can cater for new technology developments such as 5G. The consultation identified interest in reviewing all technical frameworks below 4 GHz.

### Recent developments

Based on feedback received from spectrum licensees, the ACMA has prioritised bands for review and developed an associated workplan.

The [3.4 GHz band was the first band to be considered](https://www.acma.gov.au/consultations/2020-02/review-unwanted-emission-limits-34-ghz-spectrum-licences-consultation-062020), with the review of the core condition relating to unwanted emissions. This work was completed in Q2 2020.

### Activities planned for 2021–22

Work on the 2.3 GHz and 1.8 GHz bands started in Q1 2020. It is planned that the review of the 2.3 GHz band will be completed in Q1 2021, following consultation in Q4 2020. It is planned that the review of the 1.8 GHz band will be completed in Q3 2021, following consultation in Q2 2021. The ACMA will commence a review of the 2.1 GHz band in Q3 2021 as work on the 1800 MHz review nears completion.

The 700 MHz, 800 MHz, and 2.6 GHz bands have been identified in the work program. The 2.6 GHz band has been prioritised as the next band for consideration, with other bands to follow.

## Spectrum-sharing approaches

Spectrum sharing in its traditional form is a core component of managing access to spectrum – all users ‘share’ the spectrum through either coordinated access (by working around other users on a time, frequency and/or spatial separation basis) or uncoordinated access, where interference potential is understood and accepted and/or mitigated by technology (for example, under the LIPD class licence).

### Recent developments

Recently, attention has turned to ‘non-traditional’ sharing arrangements, most notably dynamic spectrum access (DSA) regimes being looked at or implemented internationally. A consultation process was held in 2019–20 to seek views on both the appetite for making arrangements for DSA and potential implementation methodologies. No specific arrangements or trials were proposed and as there wasn’t a strong domestic appetite for these measures, it was decided that it was not yet the right time to actively pursue DSA arrangements in Australia.

### Activities planned for 2021–22

The ACMA welcomes proposals for potential trials of dynamic spectrum access (DSA) technologies and approaches.

## Spectrum management advice and considering out-of-policy requests

We have an ongoing role to provide advice on spectrum arrangements, including advice on requests that involve departing from our published policies and considering applications for trial demonstration of new technologies.

### Public protection and disaster relief (PPDR) in the 4.9 GHz band

We have previously worked within ITU-R Working Party 5A (responsible for recommendations and reports on PPDR communications, among other things) to include channelling arrangements for 5G New Radio in documents relevant to 4.9 GHz PPDR arrangements. This may help pave the way for public safety-grade 5G equipment that could operate under the Radiocommunications (Public Safety and Emergency Response) Class Licence 2013 (4.9 GHz class licence) and could augment a future PSMB capability.

The pre-existence of both the 4.9 GHz class licence and inclusion of the band in relevant 3GPP standards could potentially represent a path from progression from 4G to 5G-based PSMB systems in the longer term if suitable equipment and protocols are established. The work within Working Party 5A was an ACMA-led first step in this process – the necessary regulatory preconditions are in place for the public safety community and industry to plan and implement a 5G rollout in the band, if desired.

# Licensing and licensing systems

Licensing choices can influence likely users – for example, spectrum licences issued over wide areas may be allocated by auction, but these options may not be suited to some use-cases and hence users. In addition, in order to promote efficient use of the spectrum, the interference management framework is often optimised for an expected use even if such use is not mandatory. For example, while spectrum licences may be ‘technology flexible’ in that they do not explicitly preclude any use, they are designed and optimised with a likely technology in mind, in order to maximise the efficiency of these licences for their expected use consistent with coexistence requirements of other spectrum uses/users.

Table 4 summarises the proposed licensing activities for 2021–22.

1. Licensing and licensing systems

| **Project priorities** | **Proposed timelines** |
| --- | --- |
| Radiocommunications legislative reform | Ongoing |
| Trial of mobile phone jammers in prisons | Ongoing: Corrective Services NSW commenced a 2-year trial on 13 December 2019 |
| Drone regulation | Ongoing: continue monitoring licensing requirements |
| RNSS repeater trials | 2021–22: facilitate and monitor trials, and progress development of long-term licensing solution |
| Review of prohibition declarations and exemption determinations | Q4 2021: consultation on next steps |
| Area-wide apparatus licence | Ongoing: consideration of, where appropriate, use of AWLs in other bands |
| Review of non-assigned amateur and outpost licensing arrangements | 2021–22: implement ACMA’s preferred option following Q1 2021 consultation |
| Options for higher power amateur operation | Q2 2022: consultation |
| Review of scientific assigned and non-assigned apparatus licensing arrangements | Q1 2022: consultation |
| Review of the accredited persons scheme | 2021–22: finalise review including any process or regulatory improvements as indicated by the outcomes of the review |

## Radiocommunications legislative reform

On 17 December 2020, the [*Radiocommunications Legislation Amendment (Reform and Modernisation) Act 2020*](https://www.legislation.gov.au/Details/C2020A00151) (the Modernisation Act) received Royal Assent, together with the [*Radiocommunications (Transmitter Licence Tax) Amendment Act 2020*](https://www.legislation.gov.au/Details/C2020A00153) and the [*Radiocommunications (Receiver Licence Tax) Amendment Act 2020*](https://www.legislation.gov.au/Details/C2020A00152). The substantive provisions of the Acts come into force on 17 June 2021.

The Acts are part of the Australian Government’s response to the recommendations of the 2015 Spectrum Review. The Modernisation Act amends the Radiocommunications Act to:

add flexibility to the licensing framework, which will allow quicker release of spectrum so that changes in spectrum demand can be met faster

provide more certainty about key licence conditions that underpin investment certainty, such as licence duration and licence renewal terms

provide a more graduated set of compliance and enforcement powers to enable proportionate responses by the ACMA to address non-compliance

enable the ACMA to develop equipment rules that will regulate devices across modern supply chains, including recognition of online supply arrangements

allow for more external involvement in spectrum management by allowing the ACMA to accredit people and organisations to make decisions under spectrum management arrangements.

The ACMA is primarily responsible for developing and implementing the new spectrum management arrangements. In FYSO 2020–24, we undertook to provide updated guidance to industry about implementation subsequent to the passage of the legislative reform package through the Parliament.

On 24 February 2021, we released an [Update to FYSO 2020–24](https://www.acma.gov.au/publications/2020-09/plan/five-year-spectrum-outlook-2020-24). The update sets out the consultations we have planned for key decisions that need to be made before the Modernisation Act begins. These include:

[information paper](https://www.acma.gov.au/radcomms-licensing-and-allocation-reform) on our approach to the new licensing and allocation powers (published March 2021)

[consultation paper](https://www.acma.gov.au/consultations/2021-03/accredited-persons-scheme-consultation-082021) on draft accreditation rules (published March 2021)

[consultation paper](https://www.acma.gov.au/consultations/2021-03/radiocommunications-equipment-rules-consultation-072021) on draft equipment rules (published March 2021)

[consultation](https://www.acma.gov.au/consultations/2021-03/proposed-changes-class-licences-consultation-062021) on machinery changes to class licences consequential to the replacement of standards with equipment rules (published March 2021)

consultation on the ACMA’s approach to the use of the exemptions power under the new section 302 of the Radiocommunications Act.

We expect to further consult on specific implementation and use of the enhanced powers provided by the Modernisation Act on a case-by-case basis, consistent with current consultation practices.

We will report on the status of these activities in the FYSO 2020–24 annual progress report.

Key amendments to licensing and allocation arrangements introduced by the Modernisation Act include:

increasing the maximum licence term of spectrum and apparatus licences to 20 years

requiring that some licences include renewal and public interest statements, and allowing other licences to include these statements

streamlining the spectrum re-allocation process by enhancing the ACMA’s ability to independently allocate spectrum licences, including making unencumbered spectrum available for spectrum licensing

allowing the ACMA to set allocation limits for price-based allocations of spectrum and apparatus licences, on advice from the Australian Competition and Consumer Commission (ACCC)

introducing bidder credits as a potential tool in spectrum allocation processes.

In March 2021, we released an [information paper](https://www.acma.gov.au/radcomms-licensing-and-allocation-reform) on our approach to the new licensing and allocation powers. In establishing licensing and allocation arrangements, we will continue to consult with industry to inform the design of planning, licensing and allocation arrangements that meet the needs of spectrum users.

### Activities planned for 2021–22

Under amendments contained in the Modernisation Act, the ACMA must determine a work program for our spectrum management functions and powers each financial year. The work program must be for a period of not less than 5 financial years and is expected to include a detailed annual work program for the upcoming financial year. We are also required to report on the work program in our annual report.

As the Modernisation Act commences on 17 June 2021, FYSO 2021–26 is the first work program under the new arrangements. To align with the requirements of the Modernisation Act, we have made minor structural changes to this draft FYSO.

In additional, we are seeking input on ideas to reduce the complexity and enhance transparency in future FYSOs, and also invite feedback on the usefulness of our existing progress reports. This will guide us in framing the new annual progress report and considering the usefulness of retaining the standalone 6-month progress report.

The reforms will introduce ministerial policy statements (MPS), providing for the minister to specify relevant government policies to apply to any of the ACMA’s spectrum management functions and powers. Unlike a ministerial direction, the ACMA is not bound to comply with an MPS, but must consider any relevant MPS. If any MPS are in force in 2021–22, we must include in the annual report a summary of how we have had regard to them in the exercise of our functions and powers.



## Mobile phone jammers in prisons

Corrective Services NSW began a trial of mobile phone jamming at the Goulburn Correctional Centre, as authorised by [Radiocommunications (Testing and Field Trial by Corrective Services NSW of PMTS Jamming Devices at Goulburn Correctional Complex) Exemption Determination 2016](https://www.legislation.gov.au/Details/F2016L01286). This trial enables the examination of the risks of using a mobile phone jammer at a prison located closer to where large numbers of people live.

Corrective Services NSW is also operating a mobile phone jammer at the Lithgow Correctional Centre on an ongoing basis, subject to certain conditions and safeguards. The use and operation of this mobile phone jammer is authorised by the ACMA’s [Radiocommunications (Use by Corrective Services NSW of PMTS Jamming Devices at Lithgow Correctional Centre) Exemption Determination 2018](https://www.legislation.gov.au/Details/F2018L01185).

### Activities planned for 2021–22

We continue to facilitate trials of mobile phone jammers and will consider requests from other jurisdictions on a case-by-case basis.



## Drone regulation

In Q2 2020, we consulted on, and subsequently made, radiocommunications exemption arrangements to facilitate national rollout of counter-drone capability by all Australian police agencies.

### Activities planned for 2021–22

Unmanned aircraft systems, also known as remotely piloted aircraft systems (RPAS) or drones, have become increasingly popular with hobbyists and commercial users. Drones rely on radiocommunications for remote piloting and other uses, such as video and sensing.

We have engaged with an inter-departmental working group, which is considering management of drones from a range of policy perspectives. During 2021–22, we will continue to contribute to this network, and continue to monitor the licensing requirements for drones with reference to international developments in spectrum management. We are also working with aviation stakeholders to monitor spectrum and licensing requirements internationally and domestically (see also *Spectrum for government requirements* section).

As drones are becoming increasingly widespread, so too are concerns about their use. We are currently working with aviation safety regulators, law enforcement and security agencies, and are monitoring international approaches to detecting and responding to incidents where drones could pose a risk to safety and security.

On the spectrum front, most commonly available drones use spectrum authorised under the LIPD class licence for both payload and non-payload (control and telemetry – this is termed ‘control and non-payload communications’, or CNPC) communications. While this is expected over time to transfer more and more to mobile (including 5G) networks, larger drones used for commercial or military purposes are increasingly requiring access to dedicated aeronautical spectrum for CNPC. We continue to support trial licences to enable this access.

In response to industry submissions to the draft FYSO 2020–24, the ACMA intends to explore use of the 5030–5091 MHz band for line-of-sight (LoS) RPAS CNPC operations in controlled airspace.

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## RNSS repeater trials

We have collaborated with a range of emergency services and road transport stakeholders on proposals to facilitate trials and small-scale deployments of radionavigation-satellite service (RNSS, which encompasses a number of ubiquitous systems including GPS and GLONASS, a global navigation satellite system) repeaters in road tunnels. Loss of RNSS coverage in complex road tunnels can inconvenience motorists and compromise the ability of emergency service organisations to detect and deploy assets in response to emergencies.

In Q2–3 2020, we consulted on, and subsequently approved, arrangements that would remove regulatory barriers to using RNSS repeaters, and on proposals to authorise trials using scientific licences.

### Activities planned for 2021–22

Over 2021–22, we will continue to work with stakeholders in deploying trials of RNSS repeaters in road tunnels, using scientific licensing arrangements.

We will use feedback and data from the trials to inform a longer-term licensing solution for the devices.

Many stakeholders requested that the ACMA consider whether RNSS repeaters and similar devices could be deployed in locations other than road tunnels. We will consider this as we progress long-term licensing arrangements.

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## Review of prohibition declarations and exemption determinations

Under the Radiocommunications Act, the ACMA has prohibited 2 kinds of devices: mobile phone jammers (public mobile telecommunications service jamming devices) and radionavigation-satellite service jammers, which include GPS jamming devices. The ACMA may determine exemptions from the prohibition determinations, and from other parts of the Radiocommunications Act, for a narrow range of users.

In Q2 2020, we released an issues paper seeking comments from stakeholders about the operation of the prohibitions declarations, and the appropriateness of our approach to exemption determinations.

### Activities planned for 2021–22

We will consider submissions and liaise with key stakeholders and current users and agencies affected by current exemption determinations. Any substantive changes to the scope of operation of the prohibition and exemption framework will be carefully considered.

The Modernisation Act has given the ACMA new exemption powers, which are intended to facilitate access to prohibited devices (under the Modernisation Act ‘prohibition declarations’ will be replaced by interim and permanent bans) by a wider range of users. These exemptions are intended to facilitate industry and innovation outcomes, associated with, for example, manufacturing of equipment subject to permanent bans.

We will implement the new exemption powers within the context of the broader review of the framework.

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## Area-wide apparatus licences

An area-wide apparatus licence (AWL) may be used to authorise a variety of different services and could allow the licensee to operate multiple radiocommunications devices at a specified frequency or frequencies in a specified geographic area, subject to any conditions on the licence that the ACMA considers appropriate. Such an area-wide apparatus licence provides analogous technical and operational flexibility to a spectrum licence. The AWL type may assist us to authorise new and emerging technologies in use-cases where spectrum licensing may be inappropriate.

In October 2020, we invited applications for round 1 area-wide licences in the 24.7–25.1 GHz and the 27.5–30 GHz frequency range. In December 2020, we announced the successful applicants – 70 licenses are being issued to 15 companies.

Following the review of the 26 GHz and 28 GHz bands, we will consider, where appropriate, use of AWLs in other bands.

### Activities planned for 2021–22

We will invite applications for round 2 area-wide licences in the 26 GHz band outside designated areas after the spectrum licence auction.

We will also invite applications for area-wide licences for unallocated round 1 spectrum in Q2 2021, after we have completed issuing the round 1 licences.



## Review of non-assigned amateur and outpost licensing arrangements, and higher power amateur operation

In Q1 2021, we released our review of non-assigned amateur and outpost licensing arrangements for public consultation.

We are considering the best licensing mechanisms and conditions for non-assigned amateur and outpost licences. Non-assigned licences are apparatus licences that authorise the operation of a radiocommunications device, but instead of including a specific frequency, authorise operation within a general part of the spectrum identified for similar activities as specified in the relevant licence condition determination. Non-assigned licences are currently issued as part of the amateur, maritime, scientific and outpost licence types.

We are keen to ensure that any transaction costs faced by licensees and the ACMA are minimal, and that opportunities for appropriate self-regulation are realised, while recognising the continuing need for call signs and – in the case of amateur licensees – appropriate qualifications.

We are aware that many amateurs continue to be interested in operating their stations at higher power limits.

We are supportive of further investigating the licensing and technical framework, and potentially new accreditation arrangements, that could facilitate higher-power limits.

### Activities planned for 2021–22

We will consider the submissions to the consultation and update the amateur and outpost community on our next steps.

We also intend to develop options for higher-power amateur licensing. Pending implementation of the outcomes associated with the review of licensing arrangements, we will consult with the amateur community on any regulatory proposals arising from that review in Q2 2022.

## Review of scientific assigned and non-assigned apparatus licensing arrangements

The broad objective of the review is to ensure that suitable, low-cost licensing arrangements are available for spectrum users to trial and assess new and innovative radiocommunications technologies. We will also update guidelines and other relevant material where appropriate.

### Activities planned for 2021–22

We expect to release a consultation package in Q1 2022.

## Review of efficiency and effectiveness of accredited persons scheme

The review aims to identify areas for improvement of the accredited persons scheme, including changes to operational practices and/or regulatory instruments. In March 2021, we released a [consultation package](https://www.acma.gov.au/consultations/2021-03/accredited-persons-scheme-consultation-082021) on the accredited persons scheme, including draft legislative instruments, which give effect to provisions in the Modernisation Actrelating to the scheme in Q1 2021.

### Activities planned for 2021–22

We will finalise the accredited persons review, including any process or regulatory improvements as indicated by the outcomes of the review.

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# Pricing

In 2021–22, we will focus on:

implementing the outcomes of the pricing review

the review of the commercial broadcasting tax arrangements

implementing new cost recovery initiatives.

This work will complement the pricing implications for the band and licensing reviews. Table 5 summarises the proposed pricing activities for 2021–22.

1. Pricing

| **Project priorities** | **Proposed timelines** |
| --- | --- |
| Pricing review implementation exploring the consistency of pricing approach across geographic areas and bands | Q3 2021: consultation |
| Pricing review implementation exploring the consistency of pricing approach across services using similar spectrum | Q3 2021: consultation |
| Pricing review implementation considering the new technologies and trials | To be generally aligned with the review of scientific licensing arrangements in 2022 |
| Commercial broadcasting tax arrangements | Ongoing assessment of taxes throughout 2021–22 |
| Preparations for the outcomes of the review of the [*Commercial Broadcasting (Tax) Act 2017*](https://www.legislation.gov.au/Details/C2017A00110) | 2021–22 |
| Ongoing maintenance of the current apparatus licence tax regime for matters like adjusting for inflation. | Q4 2021 |
| Ongoing licensing or band reviews that also have pricing implications will be undertaken throughout the year | 2021–22 |
| Cost recovery initiatives | Q2–3 2021: consult on new spectrum licence taxes for the Defence bands, 26 GHz band, 850/900 MHz and 3.4 GHz and other related changes  Q3 2021: Make new spectrum licence tax arrangements |

## Implementation of the government’s Spectrum Pricing Review

Some of the recommendations of the government’s Spectrum Pricing Review anticipated a new legislative framework and a single licensing framework. However, we consider that much of the policy intent of the recommendations can also be implemented under existing legislation, and later transitioned to new legislative arrangements if required.

To implement the recommendations of Spectrum Pricing Review, we are undertaking 3 substantive programs of work:

Identify bands to transition from administratively-set charges to competitive market-based allocation in our annual work program (recommendation 4). For more information on timing of these initiatives, see the *Forward allocation work plan* section.

Develop and publish spectrum-pricing guidelines to provide better transparency and help licensees easily understand how we approach spectrum pricing (recommendation 1).

Review how we administratively price spectrum and the formula used to set many of the current apparatus licence taxes. There is potential to improve the administrative pricing of spectrum to more closely reflect market value through approaches such as opportunity-cost-based pricing (recommendations 7 and 8) and cost recovery initiatives. The principles guiding this review will be part of the spectrum pricing guidelines.

We consulted on the proposed draft guidelines and our proposed approach to implementing the Spectrum Pricing Review in March 2020. In December 2020, we published our Response to Submissions paper for the implementation of the Spectrum Pricing Review. This paper outlined the pricing guidelines, a proposed work plan to implement the recommendations and the first round of proposals for changes to apparatus licence taxes. We received feedback on the paper in February 2021 and are currently considering submissions to the first round of proposed changes.

The first round of proposed changes to apparatus licence taxes includes:

A reduction in taxes based on the tax formula for services above 5 GHz, ranging between 25% and 90% depending on the frequency range and the service. This is likely to benefit fixed service providers, the space industry and companies looking to provide innovative services in higher frequency ranges.

Introducing a ‘systems price’ for earth stations with multiple antennas, with prices commensurate with the spectrum denial of those systems. This will benefit the space sector.

Introduction of an additional price discount to encourage more use of the land-mobile ‘micro’ service model. This will benefit the land mobile sector.

We expect to consider amending apparatus licence taxes to take into account the first round of proposed changes in Q2 2021.

It is expected that this ongoing work plan will be implemented over 2021. We expect to publish a series of short papers/presentations considering matters like the consistency of our pricing approach across different bands, geographic areas, and services. In considering the feedback from the first round of proposed changes that touched on many of these issues, we expect to publish material in late Q2 or early Q3 2021. This will inform the consultation processes to propose new apparatus licence taxes in the second half of 2021.

As also noted in the Response to Submissions paper, in the first half of 2021, we anticipate providing a new apparatus licence fee calculator and an updated apparatus licence fee schedule that includes a longer history of price changes so stakeholders can see the evolution of prices.

For the revision of the timeline for the review of the scientific licensing arrangements, we expect to consider whether there are any short-term changes to the pricing arrangements that may be appropriate in Q3 2021.

## Activities planned for 2021–22

### Implementation of the Spectrum Pricing Review

In addition to considering the first round of proposed changes to apparatus licence taxes (outlined above), our work program includes the following work streams:

***Consistency of pricing approach across geographic areas and bands***

We are considering how to best develop new location weightings for services below 5 GHz, including new approaches to representing differences in value in spectrum across geographic locations and reviewing frequency bands. This is effectively the review of the tax formula recommended by recommendation 7 of the Spectrum Pricing Review. Major features of the review include:

identifying the best approach to reviewing density areas and/or alternatives to density areas

identifying an approach to reviewing the frequency ranges

considering approaches to monitoring bands and keeping taxes up to date.

***Consistency of pricing approach across services using similar spectrum***

Given the disparity between commercial broadcasting taxes and the apparatus licence taxes for narrowcasting licences, and that narrowcasters are facing some of the same commercial pressures as commercial broadcasters, we are considering potential changes to narrowcasting taxes. We will also explore the apparatus licence taxation arrangements for narrowcasting in light of the proposals and recommendations of the commercial broadcasting tax review currently being conducted.

Under this theme, we may also consider reviewing differences in tax rates that were raised by submitters. For example, some submitters noted the difference in pricing arrangements for MSS, TOB services and point-to-multipoint in the current tax regime.

***New technologies and trials***

We are considering pricing initiatives for scientific licensing and will align this with our consideration of licensing issues associated with scientific licensing.

### Commercial broadcasting tax

We will continue assessing commercial broadcast tax on an ongoing basis, as apparatus licences associated with commercial broadcasting services pass their anniversary dates. To assist with planning of payments of tax assessments, early in Q3 2021, we will provide all commercial broadcasters with estimates of their tax assessments for the financial year.

The *Commercial Broadcasting (Tax) Act 2017* (CBTA) commenced on 1 July 2017 and gives effect to the commercial broadcasting tax (CBT) arrangements. As required by the BSA, the ACMA must review and report to the minister on whether the CBTA should be repealed or amended.[[43]](#footnote-44) In December 2020, we [consulted](https://www.acma.gov.au/sites/default/files/2020-12/Commercial-broadcast-tax-review_Consultation-paper.docx) on a number of proposals concerning the review, most notably that we consider that the CBTA should not be repealed, but there is scope for amending the pricing methodology and some of the administrative arrangements.

The ACMA expects to provide its report to the minister on the commercial broadcasting tax arrangements by the end of March 2021. Once the minister has considered the report, we expect that the government will consult with the commercial broadcasting sector on implementing any changes to the spectrum pricing arrangements. We expect to work closely with the government in preparing for any changes to these arrangements as an outcome of the review. We will also be working closely with the commercial broadcasting sector to implement any transitional arrangements once changes to the spectrum pricing arrangements have been made.

### Cost recovery initiatives

We will implement any outcomes of the implementing new cost recovery arrangements.

We also plan to consult on changes to the spectrum licence tax arrangements to include the Defence bands, 26 GHz band, the 850/900 MHz band and the 3.4 GHz bands in Q2 and Q3 2021. We expect to make the appropriate changes to spectrum licence tax changes in Q3 2021.

### Other pricing updates

We will continue to consider changes to the apparatus licence tax regime, including adjusting taxes for inflation. We are also seeking feedback as part of the implementation of the Spectrum Pricing Review on alternatives to adjusting taxes for inflation.

We are also conducting a number of licensing and band reviews. If these reviews have implications for the pricing of spectrum, we will also undertake this work.



# Compliance priorities

The utility of spectrum is also affected by the interference protection environment. The risk of causing harmful interference to the radiocommunications spectrum is managed through both our planning and allocations work, and our compliance programs.

Each year, as part of these compliance programs, we set whole-of-agency compliance priorities that aim to systematically identify and address high-risk compliance issues or issues of greatest concern to the community or industry, by maximising our regulatory reach in a strategic and resource-efficient manner.

We undertook consultation on our priorities for 2021–22 in February 2021. The consultation period closed in March 2021 and we will consider the feedback received in setting the new compliance priorities for 2021–22.

## Previous compliance priorities

With small cell deployments expected to increase as 5G technology is implemented, we undertook a program of compliance audits in 2019–20 to test carrier compliance with their obligations under the Mobile Phone Base Station Deployment Code and the EME exposure rules. The findings from the [compliance records audits](https://www.acma.gov.au/publications/2020-07/report/small-cells-eme-licence-conditions-audit) undertaken are published on the ACMA’s website.

In 2019–20, our licensing integrity compliance program focused on services operating unlawfully in the 5.6 GHz band and the operation of non-compliant devices in the 400 MHz band. A 400 MHz monitoring program was conducted in Adelaide, Perth, Brisbane, Sydney and Melbourne, and results are being used to inform future compliance activities. The findings from our work in the [400 MHz band](https://www.acma.gov.au/publications/2020-07/report/compliance-priority-2019-20-licensing-integrity-400-mhz-band) were published in July 2020.

In 2019–20, we audited [suppliers of solar inverters](https://www.acma.gov.au/publications/2020-07/report/interference-and-licensing-compliance-solar-inverters-report) for compliance with the labelling rules. The findings were published July 2020.

In 2020–21, there were 2 compliance priorities identified in relation to the ACMA’s spectrum functions – [5G EME compliance, and interference](https://www.acma.gov.au/compliance-priorities).

### 5G EME compliance

The deployment of 5G technology has raised considerable community interest in the new technology and heightened concern about potential harmful effects from EME emissions. With a more expansive 5G rollout underway, we are prioritising compliance activity to check compliance with EME standards and deployment code obligations, as well as the provision of accurate information for the public on mobile phone base stations.

This program complements and continues the small cell base station audit program conducted in 2019–20. Similarly, it uses records audits to ascertain carriers’ compliance with the mobile base station deployment consultation requirements and EME licence conditions, as well as an EME measurement program.

### Interference

A core activity for the ACMA is to manage the allocation and use of the radiocommunications spectrum to minimise interference between one use of spectrum and another. In recent years, complaints of interference have declined as a result of advances in technology and improved methods to diagnose and resolve interference.

We have identified 2 areas often associated with complaints and risk of interference for particular focus under the ‘interference’ compliance priority:

* Unlicensed mobile phone repeaters – advances in the use of licensed mobile phone repeaters have reduced the incidence of interference complaints. However, unlicensed mobile phone repeaters (often purchased online) continue to result in interference of mobile networks and have been identified as a source of poor performance in mobile networks, with significant inconvenience to network operators and the public.

Construction and resources industry – we have identified the construction and resources industries as a potential area of increased non-compliant activity leading to interference. Non-compliant activities in these sectors can pose major risks to activities that rely on effective radiocommunications to mitigate OH&S risks.

These specific compliance priority areas will combine with the ACMA’s ongoing work in interference management.

## Activities planned for 2021–22

Our compliance priorities are developed through consultation and guide our activities for the coming year. Our compliance priorities for 2021–22 will be determined by Q3 2021.



# International engagement

The ACMA, the Department, Australian industry and government stakeholders participate in international radiocommunications forums to promote and protect Australian interests in spectrum management, including spectrum harmonisation and international frequency coordination.

The peak international forum is the ITU’s WRC, which reviews and revises the RRs, the international treaty level document regarding use of the spectrum and satellite orbits.

The next WRC will be held in 2023 (WRC-23) and will consider a large agenda concerning new frequency allocation and procedural matters across a range of services. The Department will lead the Australian preparatory processes and the Australian delegation to this meeting, including Asia–Pacific region and international meetings in preparation for WRC-23, with the ACMA providing technical expertise.

Other forums within the ITU and regionally within the Asia–Pacific Telecommunity (APT) consider issues with a technical focus that are also of significance to Australian spectrum management. These forums include ITU-R study groups and working parties, and the APT Wireless Group (AWG). We manage Australian input and participation in these forums in consultation with the Department and industry. ITU-R study groups and working parties also undertake studies relevant to WRC agenda items. We work in consultation with the Department to manage engagement in these processes.

We also undertake informal bilateral and multilateral engagement with peer regulators from around the world. This engagement is invaluable in coordinating international activities and sharing information from other spectrum managers on issues of common interest.

In 2020–21, we led (or expect to lead) delegations to the ITU and APT meetings shown in Table 6.

1. International engagement in 2020–21

| Meeting | Dates |
| --- | --- |
| ITU-R Working Party 5D | 23 June – 9 July 2020 |
| ITU-R Study Group 5 and Working Parties 5A-C | 20–31 July 2020 |
| APT Wireless Group Meeting 26 (AWG-26) | 14–18 September 2020 |
| ITU-R Working Party 5D | 5–16 October 2020 |
| ITU-R Study Group 4 and Working Parties 4A-C | 21 October – 6 November 2020 |
| ITU-R Study Group 5 and Working Parties 5A-D | 4–23 November 2020 |
| ITU-R Study Group 4 and Working Parties 4A-C | 15 February – 4 March 2021 |
| APT Wireless Group Meeting 27 (AWG-27) | 22–30 March 2021 |
| ITU-R Working Party 5D | 1–15 March 2021 |
| ITU-R Working Parties 5A-C | 28 April – 21 May 2021 |
| ITU-R Working Party 5D | 7–18 June 2021 |

We also supported the Department by providing the Deputy Head of Delegation (and other delegates) with subject matter expertise for the virtual meetings of the APT Conference Preparatory Group (Asia–Pacific) (APG) APG23-1, held from 24–25 September 2020 and APG23-2, held from 19–23 April 2021.

## Activities planned for 2021–22

Table 7 summarises the anticipated international engagement activities for the first half of 2021–22. The international engagement timetable for Q1–2 2022 is not yet available.

1. International engagement in Q3–4 2021

|  |  |
| --- | --- |
| **Meeting** | **Date** |
| ITU-R Working Parties 4A-C | 5–21 July 2021 |
| ITU-R Working Party 5D | 23–27 August 2021 |
| ITU-R Working Party 5D | 4–15 October 2021 |
| ITU-R Study Group 4 and Working Parties 4A-C | 6–22 October 2021 |
| ITU-R Study Group 5 and Working Parties 5A-C | 15–30 November 2021 |

We will continue to manage and provide technical expertise for Australian engagement in international spectrum management forums through domestic and international consultative frameworks.

# Upcoming consultations

Table 8 summarises consultations flagged throughout the FYSO. Consultation plans are subject to change.

1. Consultation plans

| **Consultation** | **Proposed timelines** |
| --- | --- |
| Changes to the spectrum licence tax arrangements to include the Defence bands, 26 GHz band, the 850/900 MHz band and the 3.4 GHz band | Q2–Q3 2021 |
| 1880–1920 MHz | Q3 2021 |
| 2 GHz (1980–2010 MHz and 2170–2200 MHz) – on updates to the 7.2 GHz band in RALI FX3 to better accommodate current digital technology use in this band, to provide more efficient use of the 7.2 GHz band by Television Outside Broadcast (TOB) operators, including those that will need to transition out of the 2 GHz band | Q3 2021 |
| 3400–3575 MHz: variation to 3.4 GHz technical framework to support urban excise | Q3 2021 |
| Proposal to vary the Deniliquin Licence Area Plan (LAP) | Q3 2021 |
| Proposal to vary a number of licence areas in NSW and Vic.[[44]](#footnote-45) to enable AM–FM conversions | Q3 2021 |
| Pricing review implementation exploring the consistency of pricing approach across geographic areas and bands | Q3 2021 |
| Pricing review implementation exploring the consistency of pricing approach across services using similar spectrum | Q3 2021 |
| 3400–3575 MHz: wireless broadband apparatus licence arrangements (this work will be combined with 3700–4200 MHz implementation activities) | Q3–Q4 2021 |
| 1800 MHz (1710–1785 MHz and 1805–1880 MHz) in remote areas | Q4 2021 |
| 2 GHz (1980–2010 MHz and 2170–2200 MHz): updates to the TOB band plan to include TOB transition arrangements | Q4 2021 |
| Proposals for variations to the Remote Central and Eastern Australia Radio LAP | Q4 2021 |
| Review of prohibition declarations and exemption determinations – next steps | Q4 2021 |
| Ongoing maintenance of the current apparatus licence tax regime for matters like adjusting for inflation. | Q4 2021 |
| Review of scientific (assigned and non-assigned) apparatus licensing arrangements | Q1 2022 |
| Regular periodic update to low interference potential devices (LIPD) class licence | Q1 2022 |
| Proposal to vary the Remote Western Australia Radio LAP | Q1 2022 |
| Following extension of Part 3 of the BSA to Norfolk Island, prepare or vary a licence area plan to include Norfolk Island | Q2 2022 |
| 1.5 GHz | Q2 2022 |
| Extended mobile satellite service (MSS) L-band | Q2 2022 |
| Options for higher power amateur operation | Q2 2022 |
| Digital radio channel plan (DRCP) for the licence areas where the incumbent broadcasters have committed to roll-out of digital radio in 2021 or 2022 | Timing will be driven by demand from broadcasters |

Invitation to comment

We invite comments on the draft FYSO 2021–26 and on the following specific questions:

1. Do you have any feedback on the ACMA’s approach to the five-year spectrum outlook?
2. Are there other technology developments or sources of spectrum demand that the ACMA should be aware of in considering spectrum management over the next 5 years?
3. Do you have any feedback on the ACMA’s plans for monitoring, initial investigation, preliminary replanning or implementation of bands?
4. Do you have any comments about the ACMA’s approach to forward allocations?
5. Do you have any other comments on Part 2?
6. How do you use the FYSO (for example, read once a year or regularly refer back to)?
7. Do you find the 6-month and annual progress reports useful?

**Making a submission**

* [Online submissions](http://www.acma.gov.au/theACMA/Consultations/Consultations) can be made via the comment function or by uploading a document. Submissions in Microsoft Word or Rich Text Format are preferred.
* Submissions by post can be sent to:

The Manager

Spectrum Management Outlook and Strategy Section

Spectrum Allocations Branch

Australian Communications and Media Authority

PO Box Q500

Queen Victoria Building NSW 1230

**The closing date for submissions is COB Wednesday 28 April**

Consultation enquiries can be emailed to [spectrumworkprogram@acma.gov.au](mailto:spectrumworkprogram@acma.gov.au).

***Publication of submissions***

The ACMA publishes 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***

[*Privacy and consultation*](https://www.acma.gov.au/theACMA/About/Corporate/Accountability/privacy-and-consultations) provides information about the ACMA’s collection of personal information during consultation and how we handle that information.

Information on the *Privacy Act 1988* and the ACMA’s privacy policy (including how to access or correct personal information, how to make a privacy complaint and how we will deal with the complaint) is available at [acma.gov.au/privacypolicy](http://www.acma.gov.au/privacypolicy).

# Appendix A – Sunsetting instruments

There are no radiocommunications-related instruments due to sunset in 2021–22.

1. Australian Communications and Media Authority (ACMA) and Office of the eSafety Commissioner, [*ACMA and eSafety annual report 2019–20*](https://www.acma.gov.au/publications/2020-10/report/australian-communications-and-media-authority-and-office-esafety-commissioner-annual-reports-2019-20), ACMA, Australian Government, p. 11, accessed 9 March 2021. [↑](#footnote-ref-2)
2. Australian Competition and Consumer Commission (ACCC), [NBN wholesale market indicators reports,](https://www.accc.gov.au/regulated-infrastructure/communications/national-broadband-network-nbn/nbn-wholesale-market-indicators-report/previous-reports) 2017–20, accessed 9 March 2021. [↑](#footnote-ref-3)
3. Service provider annual reports. [↑](#footnote-ref-4)
4. See for example Telstra, [Our top 6 predictions for the major tech trends of 2021](https://exchange.telstra.com.au/our-top-5-predictions-for-the-major-tech-trends-of-2021/), 2021, accessed 9 March 2021. [↑](#footnote-ref-5)
5. Globaldata, The future of work, 17 July 2020. [↑](#footnote-ref-6)
6. P Fletcher, [*2021 will be the ‘Year of 5G’*](https://minister.infrastructure.gov.au/fletcher/media-release/2021-will-be-year-5g) [media release], Australian Government, 4 November 2020, accessed 9 February 2021. [↑](#footnote-ref-7)
7. Department of Infrastructure, Transport, Regional Development and Communications, [Australian Government response to the House of Representatives Standing Committee on Communications and the Arts, 'The Next Gen Future': Inquiry into the deployment, adoption and application of 5G in Australia](https://www.infrastructure.gov.au/department/ips/government_responses/government-response-next-gen-future.aspx), Australian Government, 2020, accessed 9 March 2021. [↑](#footnote-ref-8)
8. Department of Infrastructure, Transport, Regional Development and Communications, [5G—Enabling the future economy](https://www.communications.gov.au/departmental-news/5g-enabling-future-economy), Australian Government, 2017, accessed 27 April 2020. [↑](#footnote-ref-9)
9. Australian Space Agency, [Advancing Space: Civil Space Strategy 2019-2028](https://www.industry.gov.au/data-and-publications/australian-civil-space-strategy-2019-2028), 2019, accessed 9 March 2021. [↑](#footnote-ref-10)
10. Australian Space Agency, [Advancing Space: Communications Technologies and Services Roadmap 2021-2030](https://www.industry.gov.au/sites/default/files/2020-12/communications-services-and-technologies-roadmap.pdf), 2020, accessed 9 March 2021. [↑](#footnote-ref-11)
11. Reynolds, L, [Morrison Government invests in a new sovereign controlled satellite capability](https://www.minister.defence.gov.au/minister/lreynolds/media-releases/morrison-government-invests-new-sovereign-controlled-satellite) [media release], Australian Government, 13 July 2020, accessed 9 March 2021. [↑](#footnote-ref-12)
12. Ofcom, [Statement: Supporting innovation in the 100-200 GHz range](https://www.ofcom.org.uk/consultations-and-statements/category-2/supporting-innovation-100-200-ghz), 2020, accessed 16 March 2021. [↑](#footnote-ref-13)
13. mmWaves span 30 GHz to 300 GHz (that is, a wavelength of 1 cm to 1 mm). However, in the current 5G context, mmWave bands in consideration span from around 24 GHz up to 86 GHz. [↑](#footnote-ref-14)
14. S Antipolis, [ETSI launches DECT-2020 new radio interface for IoT](https://www.etsi.org/newsroom/press-releases/1839-2020-10-etsi-launches-dect-2020-new-radio-interface-for-iot) [media release], ETSI, 20 October 2020, accessed 9 March 2021. [↑](#footnote-ref-15)
15. <https://www.multefire.org/> [↑](#footnote-ref-16)
16. UIC, [Future railway mobile communication system](https://uic.org/rail-system/frmcs), accessed 9 March 2021. [↑](#footnote-ref-17)
17. M2M communications are used for automated data transmission and measurement between mechanical or electronic devices using wired and wireless networks. Much of the M2M information is delivered in the form of sparse data, which can come from sensors and other non-IT devices. [↑](#footnote-ref-18)
18. The interconnection of many devices and objects utilising internet protocols, with or without the active involvement of individuals. This may include laptops, routers, tablets and smartphones, which are integral to operating, reading and analysing the state of IoT devices. [↑](#footnote-ref-19)
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22. Resolution 32 (WRC-19) Regulatory procedures for frequency assignments to non-geostationary-satellite networks or systems identified as short-duration mission not subject to the application of Section II of Article 9. [↑](#footnote-ref-23)
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25. Uses refer to the general types of use such as a service (for example, the mobile service) and more specific applications within a service (for example, mobile broadband within the mobile service). [↑](#footnote-ref-26)
26. Global mobile Suppliers Association, [Mid-band Spectrum – March 2021 – Member Report](https://gsacom.com/paper/mid-band-spectrum-march-2021-member-report/), March 2021, accessed 9 March 2021. [↑](#footnote-ref-27)
27. 5G WorldPro, [5G Auctions around the world](https://www.5gworldpro.com/blog/2019/08/04/110-5g-auctions-around-the-world/), 2019, accessed 18 March 2021. [↑](#footnote-ref-28)
28. Global mobile Suppliers Association, [5G Spectrum Report: February 2020](https://gsacom.com/paper/5g-spectrum-report-february-2020/), February 2020, accessed 27 April 2020. [↑](#footnote-ref-29)
29. In accordance with ITU-R Resolution 646. [↑](#footnote-ref-30)
30. CEPT, [Mandate to CEPT to develop least restrictive harmonised technical conditions suitable for next-generation (5G) terrestrial wireless systems for priority frequency bands above 24 GHz](https://ec.europa.eu/digital-single-market/en/news/radio-spectrum-cept-mandates), accessed 18 March 2021. [↑](#footnote-ref-31)
31. FCC, [Auction 103 – Upper 37 GHz, 39 GHz, and 47 GHz](https://auctiondata.fcc.gov/public/projects/auction103), accessed 18 March 2021. [↑](#footnote-ref-32)
32. This lower boundary (617 MHz) is based on the bottom edge of the 2 x 35 MHz plan identified for the United States 600 MHz band. The size of any guard band between the bottom of possible 600 MHz arrangements and the upper edge of ongoing broadcasting would need to be considered as part of any review of the band. The upper boundary aligns with the top edge of the United States 600 MHz band plan, noting that the top edge of the highest channel used for broadcasting in Australia ceases at 694 MHz. [↑](#footnote-ref-33)
33. Federal Communications Commission, [Broadcast Incentive Auction and Post-Auction Transition](https://www.fcc.gov/about-fcc/fcc-initiatives/incentive-auctions#block-menu-block-4), May 2017, accessed 27 April 2020. [↑](#footnote-ref-34)
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36. S Antipolis, [ETSI launches DECT-2020 new radio interface for IoT](https://www.etsi.org/newsroom/press-releases/1839-2020-10-etsi-launches-dect-2020-new-radio-interface-for-iot) [media release], ETSI, 20 October 2020, accessed 9 March 2021. [↑](#footnote-ref-37)
37. UIC, [Future railway mobile communication system](https://uic.org/rail-system/frmcs), accessed 9 March 2021. [↑](#footnote-ref-38)
38. Federal Communications Commission, [First Phase of Record-Breaking 5G Spectrum Auction Concludes](https://www.fcc.gov/document/first-phase-record-breaking-5g-spectrum-auction-concludes), January 2021, accessed 2 February 2021. [↑](#footnote-ref-39)
39. As per the 2 GHz outcomes paper, our preliminary view, given demand is likely to exceed supply (as expressed in responses to the 2 GHz options paper), is that the most appropriate mechanism to resolve competing demand is a price-based allocation mechanism via auction. With price-based allocations under section 106 of the *Radiocommunications Act 1992* limited to the allocation of transmitter licences (in this case, space apparatus licences in 2170–2195 MHz), the ACMA would only issue the associated space receive apparatus licences in the paired band 1980–2005 MHz to those successful in the priced-based allocation process. [↑](#footnote-ref-40)
40. This may include a subset of the following areas: Inverell, Moree, Gunnedah, Tamworth, Lismore, Mudgee, Young, Parkes and Wangaratta. We are consulting with the licensees to determine indicative timelines and relative priorities. Proceeding with these variations depends on the relevant licensees making timely strategic business decisions on available implementation options. [↑](#footnote-ref-41)
41. ITU, [Information "As Received](https://www.itu.int/ITU-R/space/asreceived/Publication/AsReceived)", accessed 16 March 2021. [↑](#footnote-ref-42)
42. Note these assessments are undertaken before a complete licence application is submitted to the ACMA. As such, the number of assessments may differ from licensing statistics for that period. Refer ACMA procedures for [earth and earth receive licensing, and registering earth stations](https://www.acma.gov.au/procedure-earth-and-earth-receive-licensing-and-registering-earth-stations) and procedures for [space and space receive licensing](https://www.acma.gov.au/procedures-space-and-space-receive-licensing). [↑](#footnote-ref-43)
43. Under section 216AA(6) of the BSA, a report must be given to the minister before 1 July 2021. The minister requested that the ACMA provide our report by 30 March 2021. The review must also consider any matters that the minister notifies the ACMA to consider. The minister did not notify the ACMA of any additional matters to consider. [↑](#footnote-ref-44)
44. This may include a subset of the following areas: Inverell, Moree, Gunnedah, Tamworth, Lismore, Mudgee, Young, Parkes and Wangaratta. We are consulting with the licensees to determine indicative timelines and relative priorities. Proceeding with these variations depends on the relevant licensees making timely strategic business decisions on available implementation options. [↑](#footnote-ref-45)