

Five-year spectrum outlook 2020–24

The ACMA's spectrum management work program

SEPTEMBER 2020

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Foreword

Spectrum use continues to evolve rapidly in Australia. The Australian Communications and Media Authority (ACMA) is Australia's spectrum manager and is responsible for ensuring radiofrequency spectrum is managed in a way that maximises the overall public benefit derived from its use.

We are continually monitoring the environment to identify opportunities for improvements in spectrum management arrangements and accommodate new and changed uses of spectrum, while ensuring the continuation of existing uses that are of value to the community.

Managing spectrum efficiently and effectively for the benefit of all Australians is a key priority for the ACMA.¹ Input from spectrum users influences our understanding of how technology developments, international harmonisation efforts and market changes influence demand for new and existing uses of spectrum. This, in turn, informs our priorities for planning and making spectrum available.

2019 was a World Radiocommunication Conference (WRC) year. WRCs are scheduled every three to four years to update the treaty-level Radio Regulations and are the most important international forum for cooperation on the harmonisation of spectrum use. We have commenced work on the identification and implementation of relevant outcomes from the 2019 WRC (WRC-19) in our domestic planning arrangements—these will remain key priorities in 2020–21.

We are focusing on delivering and implementing the existing extensive work program, including implementing decisions in the 26 and 28 GHz bands (discussed below), concluding the planning phase of reviews of the 2 GHz and 3.7–4.2 GHz bands leading to implementation, the defragmentation of the 3.4 GHz band and the review of spectrum licence technical frameworks to ensure they are well suited for new technologies.

Informed by feedback to the draft five-year spectrum outlook (FYSO), we have also identified a number of new projects for commencement during 2020–21—including investigating 'wi-fi' development (such as in the 6 GHz band) and the 1880–1920 MHz band which may be a candidate for changes to support new technologies and possibly useful for local area wireless broadband applications such as private networks.

The ACMA has decided not to pursue reviews of the bands around 1.5 GHz ('extended L band mobile satellite service' and 1.5 GHz of interest to wireless broadband) and the 40, 46 and 47 GHz bands in the current year. While acknowledging some interest in investigating these bands during this FYSO period, on balance, the ACMA considered it prudent to prioritise the current new activities. The ACMA will further consider timing of these bands for the next FYSO period.

We are progressing the allocation of the 26 GHz and 28 GHz millimetre wave bands, via spectrum and apparatus licensing. Class licensing for satellite services is already available in parts of the 28 GHz band, and class licensing for part of the 26 GHz band for terrestrial uses is expected this year. Additional mid-band spectrum is expected to

¹ ACMA, 2019, accessed 23 April, <<https://www.acma.gov.au/publications/2019-08/report/corporate-plan-2019-20>>.

become available as a result of the work underway to restack and reconfigure the 3.4–3.5 GHz band. In low band spectrum, an allocation of the 850 MHz expansion band and 900 MHz band is anticipated for late in 2021.



In the past year, we have consulted with the radio broadcasting industry about the [future delivery of radio](#) in Australia. A key outcome of our engagement with the radio industry is a new framework for our priority-setting and decision-making in radio broadcast planning. We have identified four radio broadcasting planning priorities for AM–FM conversions, coverage enhancements, digital radio channel planning and supporting trials of new radio broadcasting technologies. This consultation on our annual work program will help inform the prioritisation of planning activities for the year.

We are continuing work 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.

The ACMA has consulted annually with industry about its spectrum management priorities through its FYSO since 2009. Since 2018, we have published a draft FYSO for consultation, ahead of settling the final FYSO.

A draft FYSO 2020–24 was published in April 2020. The ACMA’s response to submissions is available in a separate document—*Addendum to FYSO 2020–24—Response to submissions to draft FYSO 2020–24*.

Since the draft FYSO consultation closed, the Radiocommunications Legislation Amendment (Reform and Modernisation) Bill 2020 (the Bill) and accompanying tax-related bills were introduced into the Parliament in August 2020. The Bill gives effect to several of the recommendations in the Spectrum Review conducted in 2015. While it is premature for the FYSO to provide a detailed implementation plan, we will provide updated guidance to industry about implementation subsequent to the passage of the legislative reform package through the Parliament.

Where significant priority or other changes have been made to the FYSO 2020–24 since the draft FYSO, we have included a ‘change’ symbol: . Where significant new material has been inserted, this is identified with a ‘new’ symbol: .

In response to stakeholder feedback on the draft FYSO, the main decisions incorporated into the final FYSO 2020–24 are:

- > acknowledging further industry feedback on the impact of COVID-19
- > clarifying the purpose and meaning of the band-planning stages outlined in the planning section, in particular, better explaining the relationship between ‘major band-planning’ and the ‘optimising existing frameworks’ work programs
- > confirming the prioritisation of the 26 GHz and 28 GHz allocations ahead of the timing of the 850/900 MHz allocation
- > deciding not to progress work on the 1.5 GHz band and extended MSS L-band, or the 40, 46, 47 GHz bands in FY2020–21
- > changing the status of the 1880–1900 MHz frequency range as a whole to ‘initial investigation’, with a discussion paper for release in Q2 2021
- > including a new item to review arrangements in the Intelligent Transport Systems (ITS) class licence in the ‘optimising established planning frameworks’ section to address suggestions raised by the automotive manufacturing industry

- > including a new item to review 6 GHz for wi-fi/Low Impact Potential Devices (LIPD) and possible changes to existing 5 GHz LIPD uses
- > updating to reflect the recent ACMA spectrum-sharing decisions.

The FYSO is set out as follows:

- > At a glance—summarises the ACMA’s annual work program for 2020–21
- > Part 1—provides an overview of the technology, market competition, and policy drivers likely to shape the demand of spectrum over the next five years
- > Part 2—gives detailed information about the ACMA’s planned work priorities for 2020–21.

COVID-19—our response














The communications and media sectors are playing a critical role in enabling Australian consumers, businesses and governments to communicate during the COVID-19 pandemic. At a global level, the International Telecommunications Union (ITU) acknowledges the important role of information and communications technologies—of which spectrum is a key enabler—in helping to governments, businesses and individuals cope with the pandemic.²

The clear message we received from spectrum users during the pandemic and now formalised in many submissions to our FYSO consultation, is that the ACMA should continue its spectrum planning and allocation work program. While views differ on the priority given to particular band-planning and allocation arrangements, we are keen to ensure that spectrum management arrangements continue to support the Australian communications and media sectors in their response during this period and in future communications requirements

During the ongoing pandemic, we will continue to update our [regulatory response](#) and keep spectrum users and the public informed of changes.

² ITU, 2020, accessed 27 April 2020, <<https://www.itu.int/en/Pages/covid-19.aspx>>.

Key to icons

Icon	Subject area
	Wireless broadband
	Satellite
	Class licensing
	Internet of Things
	Radio and television broadcasting
	Amateur radio
	Point-to-multipoint
	Point-to-point
	Defence
	Aviation
	Maritime
	International interests and engagement
	Pricing

At a glance— 2020–21 work program

The tables below provide a summary of our key spectrum management activities for the 2020–21 financial year. 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 – 31 March
- > quarter 2 (Q2): 1 April – 30 June
- > quarter 3 (Q3): 1 July – 30 September
- > quarter 4 (Q4): 1 October – 31 December.

The ‘proposed timelines’ column has:






- > timing for activities (these may be affected by the progression of other projects)
- > details of opportunities for consultation and engagement. A summary of our planned spectrum consultations for 2020–21 is at Table 8.

Table 1: Planning—major band-planning activities CHANGE

Planning stage	Project priorities	Proposed timelines
Monitoring	600 MHz (617–698 MHz)	Continue to monitor domestic and international developments in these bands to identify usage trends
	3.3 GHz (3300–3400 MHz)	
Initial investigation	4.5 GHz (4400–4500 MHz)	CHANGE Not scheduled for 2020–21. Likely simultaneous review of the extended MSS L-band and the 1.5 GHz bands
	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	
	‘Extended MSS L-band’ (1518–1525 MHz and 1668–1675 MHz)	
	NEW 1880–1920 MHz	Q2 2021: Discussion paper
	2300–2302 MHz	CHANGE Not scheduled for 2020–21
	NEW 6 GHz (Radio Local Area Networks (RLANs))	Q4 2020: Discussion paper

Planning stage	Project priorities	Proposed timelines
Preliminary replanning	1.5 GHz (1427–1518 MHz)	CHANGE Not scheduled for 2020–21. Likely simultaneous review with the extended MSS L-band and the 1.5 GHz bands
	2 GHz (1980–2010 MHz and 2170–2200 MHz)	CHANGE Q4 2020: Options paper Q4 2020: Planning decision paper
	3700–4200 MHz	CHANGE Q4 2020: Options paper Q4 2020: Planning outcomes paper
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
	1800 MHz (1710–1785 MHz and 1805–1880 MHz) in remote areas	CHANGE Q4 2020: Discussion paper
	3400–3575 MHz	Q3–4 2020: Finalise restack of incumbent services CHANGE Q4 2020 – Q1 2021: Consultation on variation to 3.4 GHz technical framework to support urban excision and PMP apparatus licensing Q4 2020 – Q2 2021: If the Minister decides to designate spectrum, conduct activities to convert NBN Co's apparatus licences to spectrum licences
	5.6 GHz (5600–5650 MHz)	CHANGE Q4 2020: Announce outcomes of public consultation
	26 GHz (24.25–27.5 GHz)	CHANGE Q3 2020: Consultation Q4 2020: Finalise licensing arrangements for services in this band
	28 GHz (27.5–29.5 GHz)	CHANGE Q3 2020: Consultation Q4 2020: Finalise licensing arrangements for services in this band

Table 2: Planning—optimising established planning frameworks

Planning area	Project priorities	Proposed timelines
Broadcasting	Develop and consult on proposals for licence area plan (LAP) variations in Brisbane	 Q4 2020: Consult
	Develop and consult on a proposal to vary the Deniliquin LAP	 Q1 2021: Consult
	Develop and consult on proposals for variations in a number of licence areas in NSW ³ to enable AM–FM conversions	Q3 2020: Consult
	Consult on the digital radio channel plan (DRCP) for the Gold Coast, taking into account the completion of frequency allotment planning	Q3 2020: Consult
	Further consultation on whether variations to the DRCP for Brisbane are appropriate to improve digital coverage	Q3 2020: Consult
	Develop and consult on proposals for variations to the Remote Central and Eastern Australia Radio LAP	Q4 2020: Consult
	Consult on potential for replanning analog radio services in Perth, following the clearance of Band II television in Bunbury	Q4 2020: Consult
Satellite	Consider applications for test and demonstration purposes in the 2 GHz band	Ongoing
	Manage filing and coordination of Australian satellite systems	Ongoing
	 Spectrum arrangements for 'small satellites'	Q4 2020: Consult
Low interference potential devices (LIPD)	Monitor developments, including updates on low duty cycle 900 MHz changes and 26 GHz (as per planning decisions)	Ongoing—Q3 2020: update consultation
 Intelligent Transport Systems	Monitor the developments in C-ITS. Review ITS Class Licence to accommodate V2X technology and consider channelisation arrangements	Q2 2021
Amateur service in the frequency band 5351.5–5366.5 kHz	 Responses to consultation are being reviewed, with a final decision and way forward being determined	Decision Q4 2020

³ This may include 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.

Planning area	Project priorities	Proposed timelines
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 Q4 2020: Consult on draft updated frequency coordination review work
Spectrum licence technical frameworks	CHANGE Ongoing program of review of technical frameworks below 4 GHz	1800 MHz band: Q4 2020: Consultation on variation 2.3 GHz band: Q4 2020: Consultation on variation Other bands: Ongoing
Spectrum-sharing approaches	Ongoing consideration of new approaches to spectrum sharing	CHANGE Ongoing—will consider proposals as they are submitted

Table 3: Forward allocation work plan

Project priorities	Proposed timelines—next steps
26 and 28 GHz bands	Q3 2020: Consult on: <ul style="list-style-type: none"> > coordination and licensing arrangements for new fixed satellite service (FSS) gateway earth stations in the range 27–29.5 GHz and new licensing arrangements for FSS earth stations in the 29.5–30.0 GHz range > the technical framework, taxation and allocation arrangements for apparatus licences in the 26 and 28 GHz bands <p>Q4 2020: Some apparatus licences in 26 and in all of 28 GHz become available for issue</p> <p>CHANGE Q4 2020: Finalise the technical and allocation instruments for the allocation of spectrum licences. Advertise the auction and invite applications</p> <p>CHANGE Q1–2 2021 (noting Easter): Auction spectrum licences</p>
850/900 MHz	CHANGE Q3 2020: Review submissions to the consultation on draft reallocation recommendation
	NEW Q1–2 2021: If the Minister decides to reallocate spectrum, draft and consult on the allocation instruments

Project priorities	Proposed timelines—next steps
3400–3575 MHz	Q3–4 2020: Finalise restack of incumbent services Q4 2020 – Q2 2021: If the Minister decides to designate spectrum, conduct activities to convert NBN Co's apparatus licences to spectrum licences

Table 4: Licensing and licensing systems








Project priorities	Proposed timelines
Trial of mobile phone jammers at Goulburn Correctional Complex	Ongoing: Corrective Services NSW commenced a two-year trial on 13 December 2019 under the exemption determination
400 MHz band	2020–21: Finalising the 400 MHz implementation project
Review of prohibition declarations and exemption determinations	 Q1 2021: Consultation on next steps
RNSS repeater trials	 2020–21: Continue to work with stakeholders to develop long-term licensing solution
Review of non-assigned amateur and outpost licensing arrangements with a view to reform	 Q4 2020: Consult
Review of the accredited persons scheme	 Q4 2020: Consult with accredited persons on the efficiency and effectiveness of the scheme  Q1: 2021: Where appropriate, consultation on operational and/or regulatory changes to the scheme

Table 5: Pricing

Project priorities	Proposed timelines
Pricing review implementation	 Q4 2020: Publish response to submissions paper. This paper will outline the work program to implement the Spectrum Pricing Review over 2020 and 2021
Commercial broadcasting tax arrangements	Ongoing assessment of taxes throughout 2020–21
Review of Commercial Broadcasting (Tax) Act 2017	 Q4 2020: Release of the consultation paper Q1 2021: Report to the Minister

Project priorities	Proposed timelines
Ongoing maintenance of the current apparatus licence tax regime for matters like adjusting for inflation	2020–21
CHANGE The Minister has directed the ACMA about implementing new taxation arrangements so that industry can contribute to the funding of EME research, implementation of new EME levy arrangements	Q3 2020: Implementation, with: <ul style="list-style-type: none"> > consultation on changes to spectrum licence taxes > making of amendments
NEW Spectrum licence tax	Q2–3 2021: Consult on new spectrum licence taxes for the 26 GHz band and other related changes Q3 2021: Make new spectrum licence tax arrangements

Table 6: Compliance and enforcement

Project priorities	Proposed timelines
5G compliance program to check carrier's compliance with EME standards under their licence conditions and obligations under the Mobile Base Station Deployment Code	2020–21
Compliance activities to manage the risk of interference in two key areas: <ul style="list-style-type: none"> > unauthorised use of mobile phone repeaters > non-compliant activity in the construction/resources industry 	2020–21

Table 7: International engagement

Project priorities	Proposed timelines
ITU-R Study Group 4 block meetings	Q4 2020 (21 October – 6 November 2020)
ITU-R Study Group 5 block meetings	Q3 2020 (7–31 July) Q4 2020 (4–24 November 2020 includes working party 5D)
ITU-R Working party 5D meetings	Q2–3 2020 (23 June – 9 July)



Project priorities	Proposed timelines
	Q4 2020 (5–16 October and 17–19 November)
First meeting of the APT Conference Preparatory Group (Asia-Pacific) for WRC-23 (APG23-1)	 Q3 2020 (24–25 September)

Table 8: Consultation plans

This table summarises consultations flagged throughout the FYSO from July 2020 onwards. This list of consultations is subject to change.

Issue	Proposed timelines
Consult on proposals for variations in a number of licence areas in NSW to enable AM–FM conversions	Q3 2020
Annual update to the LIPD class licence	Q3 2020
Consult on the technical framework, taxation and allocation arrangements for the allocation of area-wide licences (AWLs) in the 26 and 28 GHz bands	Q3 2020
Consult on the DRCP for the Gold Coast, taking into account the completion of frequency allotment planning	Q3 2020
Further consultation on whether variations to the DRCP for Brisbane are appropriate to improve digital coverage	Q3 2020
 Consult on changes to spectrum licence taxes, following the Minister’s direction to the ACMA about implementing new taxation arrangements so that industry can contribute to the funding of EME research, implementation of new EME levy arrangements	Q3 2020

Issue	Proposed timelines
3400–3575 MHz	<p>CHANGE Q3–4 2020: Working group to develop arrangements for urban excise areas and PMP apparatus licensing</p> <p>Q4 2020 – Q1 2021: Consultation on variation to 3.4 GHz technical framework to support urban excision and PMP apparatus licensing</p> <p>Q1 2021: If the Minister decides to designate spectrum, consultation on the draft conversion plan to convert NBN Co’s apparatus licences to spectrum licences and marketing plan to allocate additional spectrum</p>
2 GHz options paper	CHANGE Q4 2020
3700–4200 MHz options paper	CHANGE Q4 2020
CHANGE 28 GHz	Q4 2020: Consult on an update to the CSO class licence for the possible inclusion of frequencies below 28.3 GHz and other implementation aspects flowing from the 28 GHz decision paper.
1800 MHz (1710–1785 MHz and 1805–1880 MHz) in remote areas	CHANGE Q4 2020
1800 MHz spectrum licence technical framework review consultation on variation	CHANGE Q4 2020
2.3 GHz spectrum licence technical framework review consultation on variation	CHANGE Q4 2020
Develop and consult on proposals for LAP variations in Brisbane	CHANGE Q4 2020
NEW Consult on spectrum arrangements for ‘small satellites’	Q4 2020
Review of non-assigned amateur and outpost licensing arrangements with a view to reform	CHANGE Q4 2020
Review of efficiency and effectiveness of accredited persons scheme	CHANGE Q4 2020
Consult on proposals for variations to the Remote Central and Eastern Australia Radio LAP	Q4 2020
NEW Discussion paper exploring possible 6 GHz local area network planning options	Q4 2020

Issue	Proposed timelines
Consultation paper on the potential for replanning analog radio services in Perth, following the clearance of Band II television in Bunbury	Q4 2020
Consultation paper for the review of Commercial Broadcasting (Tax) Act 2017	CHANGE Q4 2020
Implementation of the Spectrum Pricing Review	CHANGE Q4 2020 and 2021: Series of consultation papers on amending apparatus licence taxes. This may include other taxation adjustments for maintaining the regime (e.g. CPI changes)
Consult on a proposal to vary the Deniliquin LAP	Q1 2021
Consultation on next steps of review of prohibition declarations and exemption determinations	CHANGE Q1 2021
Consult on draft allocation instruments for 850/900 MHz	NEW Q1–2 2021 (if the Minister decides to reallocate spectrum)
Consultation on the draft FYSO/annual work program for 2021–2025	Q2 2021
NEW Consult on new spectrum licence taxes for the 26 GHz band and other related changes	Q2–3 2021

FYSO 2019–23 progress report

The ACMA publishes six-month and annual progress reports to update activities in the FYSO work program. On 27 July 2020, we published the [FYSO 2019–23 annual progress report](#).

Part 1—Five-year spectrum outlook

Part 1 takes a broad view of trends in markets, technology and spectrum uses that inform the ACMA's medium-term planning, allocation and reallocation activities.

We take account of a range of factors in planning our spectrum management work. We monitor developments in radiocommunications technology, including equipment availability, that influence how spectrum is used. We also consider the broader policy environment to inform the prioritisation of our spectrum work program.

Overview of current industry landscape

With over 158,000 radiocommunications licences on issue, 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 technology developments that create new use-cases and have potential to improve spectrum utilisation and efficiency, and international cooperation on the use of scarce spectrum and orbital resources.

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.

There is also ongoing innovation in radiocommunications technologies that support more efficient spectrum use. Examples include more efficient radiocommunications modulation and coding techniques, and improved antenna technology that provides greater options in the use of high frequency bands.

The ACMA; the Department of Infrastructure, Transport, Regional Development and Communications (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 International Telecommunication Union's (ITU) WRC, which reviews and revises the Radio Regulations, the international treaty-level document regarding use of the spectrum and satellite orbits.

The last WRC meeting was held in October and November 2019. Outcomes of WRC-19 will be an input into the ACMA's domestic spectrum management work, particularly a likely update to the Australian Radiofrequency Spectrum Plan. The next WRC will be held in 2023 (WRC-23) and will consider new frequency allocation and procedural matters across a range of services.

The ACMA's spectrum planning work program supports the evolution of technical frameworks that support 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 work program also identifies bands and frequencies where we are updating and optimising technical frameworks to support more efficient technologies and spectrum use.

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, quality of service as well as the geographic areas where an operator can offer services and entry into new markets. Accordingly, the state of 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, safeguard measures may be considered during the planning and allocation process for specific bands to prevent significant concentration and/or disparities in spectrum holdings between competitors in downstream markets. The ACMA seeks input from stakeholders as part of ensuring the consideration of competition is integrated in the planning and management of spectrum.

The actual utility of spectrum is also affected by the interference protection environment. That is why we have a strong continuing focus on compliance priorities directed towards 5G EME compliance and interference management, with a particular focus this year on mobile phone repeaters and interference in the construction and resources industry.

The ACMA's response to these demand pressures for 2020–21 is outlined in more detail in the planning and allocation work stream activities in Part 2.

In Part 1, where we alert stakeholders to the medium and longer-term pressures shaping and informing the overall demand environment for spectrum, we recognise that in the short term, the outlook is likely to be affected by significant uncertainty arising from the response to the COVID-19 pandemic.

Submitters to the draft FYSO reported disruption to their industry, customer base and revenue. We will continue to review and consider the impact of COVID-19 for the entire period covered by FYSO 2020–24 and adjust our priorities and policies where necessary.

Spectrum uses



Wireless (fixed and mobile) broadband, including 5G

The wireless broadband markets are well established, with operators deploying networks in both the mobile and fixed wireless markets.

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.

The fixed wireless market generally provides coverage in locations where it is price competitive against alternatives such as mobile broadband or satellite services. The market comprises a combination of national providers (for example, NBN Co, Optus and Uniti) and regional and specialist providers (for example, Countrytell, Beam Internet, Spirit Telecommunications and Dreamtilt).

S&P Global market intelligence estimates that fixed wireless broadband comprises 2.7 per cent of wireless broadband revenue (estimated revenues of \$142 million in 2019) share for the Australian market. S&P projected, prior to COVID-19, revenues to remain steady at this percentage over the next 10 years (estimated revenues of \$198 million in 2029).⁴

In contrast, the mobile broadband market has three operators accounting for over 70 per cent of the telecommunications services market.⁵ In the past year, 5G services have been planned or deployed in Australia by Optus, Telstra and TPG Telecom (formerly VHA).

IBIS World estimated industry revenues attributed to the mobile industry of \$23.9 billion in 2019.⁶ S&P considers that the key market growth area will be in rural Australia and 5G network deployments in key urban areas. It was expected, prior to COVID-19, that mobile subscription numbers would grow at a compound annual rate of 2.04 per cent from 2019 to 2029.⁷

Wireless mobile broadband operators responded to the impacts of COVID-19 through various measures, such as:

- > offering bonus data on mobile plans during April 2020⁸
- > Telstra bringing forward \$500 million of its capital expenditure program by six months.⁹

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

⁴ S&P Global market intelligence, Australian fiber set for long-term gains, *Kagan Research – S&P Global Market Intelligence platform*.

⁵ IBISWorld, Telecommunications Services in Australia, June 2019, p. 19.

⁶ \$37.6 billion multiplied by 63.6%. IBISWorld, Telecommunications Services in Australia, June 2019, p. 7.

⁷ S&P Global market intelligence, Australian fiber set for long-term gains, *Kagan Research – S&P Global Market Intelligence platform*.

⁸ WhistleOut, 2020, accessed 23 March 2020, <<https://www.whistleout.com.au/Broadband/Guides/every-telco-COVID-19-coronavirus-assistance-package>>.

⁹ Telstra, 2020, accessed 23 March 2020, <<https://exchange.telstra.com.au/getting-through-covid-19-together/>>.

CHANGE *Wireless broadband use-cases*

In planning for future spectrum demand, we recognise three 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: currently under review
- > 5.6 GHz band (5600–5650 MHz): arrangements in place shared with weather radar
- > 26 GHz (24.25–27.5 GHz): to be made available 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 (27.5–29.5 GHz): arrangements for apparatus licensing to be made available for FWA across the entire band.

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 sometime 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.

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. The ACMA’s work program includes a number of 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 and 6 GHz, some of which is already used for wireless broadband
- > 'high-band' spectrum, above 6 GHz, specifically the previously little-used millimetre wave (mmWave) bands.¹⁰

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 to allow 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—this work commenced in 2019–20 and will continue into 2020–21. Of course, this has to be balanced with the need to manage interference with other licensed services.

The ACMA acknowledges the importance of addressing 5G spectrum needs and is committed to ensuring that Australia is well placed to take advantage of the opportunities offered by 5G, consistent with the government's 5G strategy.¹¹ We continue to implement arrangements to support the rollout of 5G services in Australia, across a number of bands.

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 two 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).

¹⁰ 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.

¹¹ Department of Infrastructure, Transport, Regional Development and Communications, 2017, accessed 27 April 2020, <<https://www.communications.gov.au/departmental-news/5g-enabling-future-economy>>.

Mid-band spectrum

The mid-band between 1 and 6 GHz is currently the focus of near-term 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, as well as domestically, from large mobile network operators (MNOs) and FWA operators (such as WISPs), with several processes underway to consider arrangements in the band. The ACMA is paying close attention to the global environment in this band and has released an options paper to review planning arrangements in the 3700–4200 MHz band, which is discussed in Part 2.

In addition to the planning and allocation activities currently underway, 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 are developing arrangements for fixed and mobile wireless broadband in the 26 and 28 GHz bands, including licensing and allocation arrangements conducive for a wide range of uses/users (including private networks).

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

The ACMA acknowledges that the 40 GHz and 47 GHz bands are of significant interest for both terrestrial 5G and satellite broadband services—the US, 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, in determining 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.



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. SNS Telecom & IT¹²:

- > observes that the private LTE network submarket is well-established with operational deployments across multiple segments of the critical communications

¹² SNS Telecom & IT, *The Private LTE & 5G Network Ecosystem: 2020 – 2030 – Opportunities, Challenges, Strategies, Industry Verticals & Forecasts: Regional forecasts*, report, 20 October 2019, pp. 53, 96–99; and SNS Telecom & IT, *The Private LTE & 5G Network Ecosystem: 2020 – 2030 – Opportunities, Challenges, Strategies, Industry Verticals & Forecasts: Regional forecasts*, spreadsheet, 20 October 2019.

and industrial IoT industries, as well as enterprise buildings, campuses and public venues

- > expects private networks to continue their upward trajectory beyond 2020, with a spate of ongoing and planned network rollouts—from nationwide public safety broadband networks to various usage scenarios
- > identifies several key challenges including the smaller cell sizes when compared with legacy networks (for example, Land Mobile Radio (LMR) systems), funding uncertainties, competing technologies and evolving standards environment
- > made a pre-COVID-19 projection that private network revenues for the Asia–Pacific would reach \$12.2 billion in revenues by 2030.

Other industries where standalone networks have been used include manufacturing, transportation, airports, utilities, primary industries, and stadiums. Ericsson identifies the two main drivers for growth in private networks as the need for modernising land mobile radio systems (for example, taxis, trains, ambulances) and industry digitalisation.¹³

Presently, several network deployment models are in use by industry operators:

1. Using their own equipment and class-licensed spectrum to operate.
2. Using their own equipment and spectrum to run their own network (for example, public safety).
3. 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) communications¹⁴ and IoT.¹⁵

The IoT also involves unprecedented numbers of wireless and wired interconnections of personal, consumer and industrial devices supporting a range of applications. GlobalData forecasts that the number of IoT/M2M subscriptions associated with Australian mobile network operators will increase from 6.8 million in 2019 to 18.3 million in 2025.¹⁶

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 making—specific provisions for dedicated IoT service delivery and dedicated terrestrial IoT technologies have been developed and deployed that usually utilise class-licensed bands.

¹³ Ericsson, 2019, accessed 27 April 2020, <<https://www.ericsson.com/49d1d9/assets/local/mobility-report/documents/2019/ericsson-mobility-report-june-2019.pdf>>, p. 19.

¹⁴ 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.

¹⁵ 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.

¹⁶ GlobalData, Mobile broadband forecast: May 2020, subscriber only, accessed 12 August 2020.

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.¹⁷ An international market has emerged for LPWA networks and devices that operate in the 900 MHz band.

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—in some cases 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.

Table 9: Bands listed in the LIPD class licence that currently support IoT services

Frequency band (MHz)	Description
472.0125–472.1125	Telecommand or telemetry transmitters (max power 100 mW EIRP)
0.07–0.119	Telecommand or telemetry transmitters (max power 10 mW EIRP)
0.135–0.160	Telecommand or telemetry transmitters (max power 10 mW EIRP)
0.119–0.135	Telecommand or telemetry transmitters (max power 1.5 W EIRP)
0.160–0.190	Telecommand or telemetry transmitters (see details for limitations)
2400–2450	Telecommand or telemetry transmitters (max power 1 W EIRP)
5725–5795	Telecommand or telemetry transmitters (max power 1 W EIRP)
5815–5875	Telecommand or telemetry transmitters (max power 1 W EIRP)
5795–5815	Telecommand or telemetry transmitters (max power 2 W EIRP)
915–928	Frequency hopping transmitters (max power 1 W EIRP)
2400–2483.5	Frequency hopping transmitters (max power 500 mW EIRP)
2400–2483.5	Frequency hopping transmitters (max power 4 W EIRP)
5725–5850	Frequency hopping transmitters (max power 4 W EIRP)
915–928	Digital modulation transmitters (max power 1 W EIRP)
2400–2483.5	Digital modulation transmitters (max power 4 W EIRP)
5725–5850	Digital modulation transmitters (max power 4 W EIRP)
5150–5250	Radio local area network transmitters (max power 200 mW EIRP)
5250–5350	Radio local area network transmitters (max power 200 mW EIRP)

¹⁷ IoT Alliance Australia, 2018, accessed 27 April 2020, <http://www.iot.org.au/wp/wp-content/uploads/2016/12/loTAA_IoT-Platform-Selection-Guideline-V1.1-July-2018.pdf>.

Frequency band (MHz)	Description
5470–5600	Radio local area network transmitters (max power 1 W EIRP)
5650–5725	Radio local area network transmitters (max power 1 W EIRP)
59000–63000	Data communication transmitters outdoors (max power 150 W EIRP)
57000–71000	Data communication transmitters indoors (max power 20 W EIRP)

Broadcasting services

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

Commercial radio broadcasting

The commercial radio sector comprises an extensive infrastructure base of AM and FM transmitters servicing metropolitan, regional and remote communities. Recently, AM–FM conversions have been completed in 19 single-licensee markets.

Commercial digital radio is also delivered via a network of shared DAB+ digital radio multiplex transmitters in each capital city, as well as in Mandurah, Western Australia. DAB+ uses spectrum in VHF television Band III.

National broadcasting

The ABC and SBS operate an extensive high-power network of AM and FM transmitters, which covers metropolitan, regional and remote areas. SBS delivers most of its regional services through retransmissions licensed by third parties such as local councils.¹⁸ The ABC and SBS share DAB+ digital transmitters in all capital cities.

Compared with commercial radio, the national broadcasters' radio services face different coverage conditions and often have different coverage areas. While commercial and community services are restricted to their geographic licence areas in a way that national broadcasting services and radio streaming services are not, licence areas assist in delivering relevant local content and services to local communities. As they are restricted only by power, high-powered national AM services may serve much larger areas than commercial radio broadcasting services. The ABC's highest power regional AM services provide unique and critical wide-area coverage to regional listeners, including listeners in cars outside of populated areas.

Community radio broadcasting

The community radio sector is diverse, providing local, community and niche services mainly via FM to metropolitan and regional audiences. Indigenous broadcasting transmissions serve remote communities as well as many regional and urban areas. In the capital cities, there are wide-area community services, as well as more localised services covering sub-metropolitan regions of each city.

CHANGE Economic pressures

The television and radio broadcasting environment is under pressure. Ongoing technology developments and changing audience preferences are affecting future demand for spectrum. The environment for commercial TV and radio broadcasters has

¹⁸ Retransmission services do no more than retransmit programs that are transmitted by a national, commercial or community broadcasting service.

seen a marked decline of advertising revenues, which is likely to constrain the capacity for future network investment.

Free TV has reported a decline in industry revenue of 9.2 per cent over 2013–18 from \$3.88 billion to \$3.52 billion. Commercial television broadcasters have seen further declines under the COVID-19 pandemic. In the June 2020 half, TV advertising revenues were \$1.49 billion, a decrease of 22.1 per cent when compared to the same period ending June 2019.¹⁹ However, ThinkTV also reports that television outperformed the broader advertising market, recording a 13.7 per cent drop in the 12 months to June 30. In addition, content availability due to the shutdown of television production and suspension of major sporting events has had further impacts. Citing these factors, in March 2020, Nine Entertainment and Seven West Media each withdrew their profit guidance for the financial year.²⁰

The commercial radio industry experienced a drop of 20.4 per cent in metropolitan advertising revenue (\$643.046 million) for the 2019–20 financial year.²¹ In the quarter to June 2020, metropolitan radio advertising revenue was down 46.6 per cent on the same period last year.²² In response to these pressures from the COVID-19 pandemic, several radio networks announced cost-cutting measures.²³

In April 2020, in response to representations from a number of affected commercial broadcasters seeking relief from transmitter licence taxes due to the impacts of the COVID-19 pandemic, the government made rules that provided a 100 per cent rebate of the commercial broadcasting tax for the 12 months beginning 14 February 2020 and ending 13 February 2021.²⁴ This is discussed further in the *Pricing* section.

Spectrum demand

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.

In radio, the work we have done with the radio industry through the [Future delivery of radio](#) report, has provided an ongoing transition path for the industry to evolve in response to new technologies and changing audience preferences, with the prioritisation of frequency planning arrangements designed to support radio broadcasters in making the best choices about their future service delivery.

Our priorities outlined in the 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 this is feasible, coverage improvements for national, commercial and community

¹⁹ ThinkTV, Total TV market records \$3.4 billion in ad revenue for FY 2019–20, accessed 12 August 2020, <<https://thinktv.com.au/news/total-tv-market-records-3-4-billion-in-ad-revenue-for-fy-2019-20/>>.

²⁰ Source: ASX Announcements from Seven West and Nine Entertainment.

²¹ Commercial Radio Australia, Commercial radio ad revenue for FY2019/20, accessed 27 April 2020, <<http://www.commercialradio.com.au/content/mediareleases/2020/2020-07-15-commercial-radio-ad-revenue-for-fy2019#.XzNnxSqzY2w>>.

²² Commercial Radio Australia, Commercial radio ad revenue for FY2019/20, accessed 27 April 2020, <<http://www.commercialradio.com.au/content/mediareleases/2020/2020-07-15-commercial-radio-ad-revenue-for-fy2019#.XzNnxSqzY2w>> .

²³ Radio Today, 2020, accessed 27 April 2020, <<https://www.radiotoday.com.au/arn-coronavirus-response/>>.

²⁴ Federal Register of Legislation, 2020, accessed 27 April 2020, <<https://www.legislation.gov.au/Details/F2020L00426/Explanatory%20Statement/Text>>.

broadcasting where spectrum is available, and support for trials of new types of broadcasting technology.



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.

IBIS World estimates revenue for the industry at \$5.6 billion in 2020, growing annually at eight per cent over the past five years.²⁵ Globally though, some satellite operators are experiencing difficult financial conditions that may constrain future network expansion plans and demand for spectrum.

The Australian space industry is projected to grow at 7.4 per cent annually over the next five years.²⁶ The Australian Civil Space Strategy 2019–2028 sets a clear path to take the space sector into the next decade and beyond.

Key market segments in Australia include:

- > satellite communications (including broadband)
- > pay television (for example, Singtel Optus and Foxtel), otherwise known as direct to home (DTH) services
- > ground station infrastructure, which enables uplink, supports launch activities, satellite operation and tracking systems
- > global navigation satellite services (GNSS)
- > space technology and manufacturing of high-tech components, nanosatellites, components
- > other satellite services include space research.

Other new satellite business models, which are largely considered emerging (that is, currently not generating significant revenues) but do not have significant operations in Australia, include satellite servicing, platforms, space mining/resource utilisation, situational awareness, in-space research and manufacturing. Low-earth-orbit (LEO) satellites are also being trialled, with the intention of using thousands of small satellites to offer an alternative to fibre or towers in regional or rural areas. While trials have commenced, there are currently no commercial services in Australia.

The development of lower-cost, miniaturised space hardware (often referred to as nanosats, cubesats or smallsats) and reduced launch costs are supporting growth in the diversity and capability of services delivered by satellite. In some cases, smallsats are allowing commercial broadband business models and services requiring constellations of satellites in non-geostationary orbit that were once cost prohibitive to now be viable. Some proposed non-geostationary orbit broadband systems require the deployment of very large numbers—for example, hundreds or thousands of satellites. 2019–20 saw multiple launches of satellites supporting these constellations. This changed environment has also increased the opportunity for academic and scientific space missions, often of short duration.

²⁵ IBISWorld, Shoot for the stars: Industry revenue lifts off as rising demand creates space for new firms, *IBISWorld Industry Report J5545*, January 2020, p. 5.

²⁶ Department of Industry, Science, Energy and Resources, 2019, accessed 24 March 2020, <<https://www.industry.gov.au/data-and-publications/australian-civil-space-strategy-2019-2028>>, p. III.

Collectively, these environmental 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, for reasons of economy and equipment availability, short duration smallsat missions often utilise systems operating in bands not allocated for space services in the [Australian Radiofrequency Spectrum Plan 2017](#) (ARSP) and/or are not filed and coordinated internationally for interference management purposes. This creates practical challenges for national spectrum managers, such as the ACMA, 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.

Decisions by the ACMA in February 2020 have significantly increased this spectrum access. Combined, an additional 2.6 GHz of spectrum has been made available, expanding the amount of continuous spectrum available for ubiquitous earth stations to 2.05 GHz in the 10.7–12.75 GHz band, 2.5 GHz in the 17.7–20.2 GHz band and 1.7 GHz in the 28.3–30 GHz band. In parallel, we have also decreased licence taxes for space licences in the 10.7–11.7 GHz, 18.2–18.8 GHz and 19.3–19.7 GHz bands (shared with terrestrial fixed services) to the minimum amount.

One of the traditional strengths of satellite services is mobility. Recently, there has been increased interest in delivering broadband to moving earth stations from satellites. This innovation has resulted from technology developments that enable moving earth stations (also referred to as ‘earth stations in motion’ or ESIMs) communicating with space stations in the fixed satellite service (FSS) bands.²⁷ The ACMA has, on two occasions²⁸, established interim arrangements supporting ESIMs in parts of the Ka band prior to international regulatory arrangements being established. Arrangements supporting ESIMs have also been developed in the Ku band, which were expanded to include the 10.7–11.7 GHz band in February 2020.²⁹



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

²⁷ FSS earth stations (as the name suggests) are intended to be at fixed locations on land. Spectrum planning, coordination and regulatory arrangements for FSS are designed on the principle that earth stations are at a fixed location and as such, moving earth stations are not typically supported by existing FSS arrangements.

²⁸ ACMA, 2017, accessed 27 April 2020, <<https://www.acma.gov.au/publications/2017-10/report/regulatory-arrangements-gso-and-ngso-esims-response>>.

²⁹ ACMA, 2019, accessed 27 April 2020, <<https://www.acma.gov.au/consultations/2019-12/improved-spectrum-access-and-pricing-satellite-services-consultation-402019>>.

needs and responsibilities, on some occasions government spectrum needs require specific consideration and regulatory arrangements.

As at April 2019, 32 Australian Government departments and agencies across seven different portfolios hold spectrum and/or apparatus licences.³⁰ The three largest government spectrum users are the Department of Defence with 7,793 frequency assignments, Airservices Australia³¹ with 2,603, and the Bureau of Meteorology with 1,310.³² Government users' access to spectrum can broadly be categorised as either ordinary licensed access on equal footing with other non-government users, or access under purpose-specific planning arrangements.

As an example of the latter, 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 ARSP (colloquially termed 'Defence bands'). These footnoted bands are not to be confused with spectrum that Defence accesses under ordinary, non-Defence licences. For example, access to S-band frequencies to support aeronautical mobile telemetry is authorised under aeronautical apparatus licences.

Similarly, bands accessed by Airservices Australia for the provision of aeronautical communications, navigation and surveillance services, in particular VHF (108–137 MHz) and L-band (960–1215 MHz), are set aside through ARSP footnotes.

Airservices Australia is currently going through a program of modernising its communications and safety systems.³³ It identifies the emergence of a more dense airspace as pointing to the need to invest in and upgrade systems, part of which will rely on wireless technologies to communicate with aircraft.

Other key spectrum users are public safety agencies (PSAs). The Productivity Commission notes that greater use of mobile broadband could fundamentally change how PSAs deliver services.³⁴

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 also work with Commonwealth and state-based law enforcement and emergency services bodies to accommodate their critical, and often unique spectrum needs. We also continue to work with Defence to consider options to enable the ongoing operation of military Ka band satellite services in anticipation of the expiry of the Defence 20/30 GHz spectrum licence in April 2021.

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

³⁰ Department of Infrastructure, Transport, Regional Development and Communications, 2019, accessed 11 February 2020, <https://www.communications.gov.au/documents/australian-government-held-spectrum-report>, p. 7.

³¹ Airservices is responsible for the Aeronautical Radiofrequency Spectrum within Australia and its territories. Airservices is able to provide a frequency assignment service as a first step to obtaining a radio communication apparatus licence to operate a radio transmitter within the aeronautical bands.

³² Department of Infrastructure, Transport, Regional Development and Communications, 2019, accessed 11 February 2020, <https://www.communications.gov.au/documents/australian-government-held-spectrum-report>, p. 11.

³³ Air Services Australia, 2015, accessed 27 April 2020, <http://www.airservicesaustralia.com/wp-content/uploads/15-190BKT_ATM-services-five-year-plan-2015-2020_WEB.pdf>.

³⁴ Productivity Commission, 2015, accessed 27 April 2020, <<https://www.pc.gov.au/inquiries/completed/public-safety-mobile-broadband>>.

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](#) and are working with the Department and 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 working towards creating new RPAS-specific planning and apparatus licensing arrangements in bands allocated in the ITU's Radio Regulations (RRs) to the aeronautical mobile services in the 5 GHz band (specifically in the range 5030–5091 MHz). In doing this, we are working closely with international regulators.

The necessity of, and planning for, these licensing arrangements will be informed by CASA's consideration of availability and protection requirements for these communications. It is likely that apparatus 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.



CHANGE

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. As with all forms of resource sharing, spectrum sharing requires some degree of compromise between multiple spectrum-use services or applications and users (individual licensees) accessing the shared spectrum.

Traditionally, spectrum sharing has largely focused on static approaches that establish coexistence arrangements defined through fixed geographic and spectral boundaries. More recently, new technologies and techniques have been developed that make new approaches to spectrum sharing more viable. These include dynamic sharing approaches sometimes referred to collectively as dynamic spectrum access (DSA) or dynamic spectrum management. These techniques typically take advantage of time-based changes in spectrum use by spectrum users—that is, some spectrum users may not use all the spectrum, in all geographic areas, all the time.

DSA implementations to date have been limited, in part due to technological constraints, spectrum availability factors and user expectations. To date, regulatory frameworks have not been widely developed to facilitate DSA arrangements. More recently, however, several DSA frameworks have been proposed or trialled by

overseas spectrum regulators—for example, the Federal Communications Commission (FCC) in the US and Ofcom in the UK.

To share ideas with industry and develop a common understanding on the issues and opportunities with new sharing approaches, the ACMA hosted a spectrum ‘tune-up’ on this issue in August 2019 and released an associated discussion paper.

While there is momentum in some international jurisdictions, and we recognise general interest in the Australian market, we have not received any detailed sharing proposals for consideration. Therefore, the development of a formal, ongoing DSA regime has not been prioritised by the ACMA at this time. Additional evidence and information from industry to inform the possible development of ongoing domestic DSA regulatory arrangements is welcomed as progress is made. Importantly, this approach will help Australia to best benefit from international experience (for example, lessons learned from the US Citizens Broadband Radio Service (CBRS) rollout), and for domestic trials to be supported where possible. Both opportunities will help bridge the knowledge gap and inform future considerations.

We remain open to considering proposals as they are developed by the industry. If feasible, the ACMA is prepared to both facilitate discussions between affected/interested operators and assist with licensing arrangements to help enable such trials.

We note that some submissions to the sharing consultation floated the idea of more static geographic, rather than dynamic time-based sharing approaches, particularly access to spectrum-licensed bands in areas where services may not have been deployed. This idea was raised in the context of smaller commercial or private wireless broadband operators potentially servicing remote townships or private industrial (for example, mining) concerns.

Under current legislation, access to spectrum-licensed frequencies by third parties is only possible through agreement with the licensee. Access via such means is always an option, and the ACMA can play an intermediary role in discussions around prospective third-part access arrangements. However, unless agreement can be obtained, this access is not possible (except under very limited ‘special’ circumstances).

That said, the advent of area-wide licences (AWLs) is also expected to provide new opportunities for smaller, private wireless broadband operations, given that the size and scalability of these licences very much lend themselves to the deployment of such services. The initial focus of AWLs has been in the 26 and 28 GHz bands, however, we may consider their application in other frequency bands in future. Additionally, we will be exploring additional frequencies for wi-fi-like services in the bands around 6 GHz and continue to review and replan frequency bands for a range of applications and licence types.

So while non-traditional shared access to spectrum will continue to be one possible means of enabling smaller private wireless broadband network deployments, there is also a significant amount of work being done on more traditional static approaches to providing access that are expected to generate significant opportunities for these use-cases.



CHANGE

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 rules³⁵—in Australia, those rules are set out in class licences.

Class licences make available spectrum used by services which 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 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](#)
- > [aircraft and aeronautical mobile stations](#)
- > [body scanners](#)
- > [cellular mobile telecom devices](#)
- > [citizen band radio stations](#)
- > earth stations [communication with a space object](#)
- > [cordless communications devices](#)
- > [emergency locating devices](#)
- > [intelligent transport systems](#)
- > [low interference potential devices \(LIPD\)](#)
- > [maritime ship stations – 27 MHz and VHF](#)
- > equipment used by [overseas amateurs visiting Australia](#)
- > [public safety and emergency response](#) communications in the 4.9 GHz (4.94–4.99 GHz) frequency band
- > [radio-controlled models](#)
- > [radio navigation satellite service](#) 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. An update consultation is in Q3 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 usage, and, in some cases, network or system design considerations. In such bands, protection of

³⁵ M Cave and W Webb, *Spectrum Management*, Cambridge University Press, Cambridge, 2015, p. 5 and Chapter 8.

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. There is no greater example of this than 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 radio local area networks (RLANs)—especially wi-fi.

Wi-fi devices now carry approximately half of all global Internet Protocol (IP) traffic³⁶, with wi-fi networks almost ubiquitous in homes and businesses along with many public spaces. While there are anecdotal reports of congestion events (for example, poor or no wi-fi coverage), it is difficult to determine the cause, which could be spectrum interference, congestion or a range of other factors including infrastructure factors (for example, insufficient or poorly engineered access points).

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 usage limitations in some frequency ranges), should be reviewed.

There are global developments in making more spectrum available for wi-fi above the 5 GHz band already included in the LIPD class licence. For example, in the US, the FCC has made rules in the 5925–7125 MHz band that would support wi-fi use.³⁷ This would create another 1.2 GHz of spectrum available for wi-fi in this band, with a range of indoor and outdoor arrangements and different power levels permitted in different segments of that band. However, internationally, both the microwave fixed link and satellite industries have expressed concerns about these proposals. We will monitor the progress of this issue—particularly the matter of coexistence between possible wi-fi and similar uses of the band with other uses, such as satellite uplinks and fixed links.

The ACMA has identified a work item for this FYSO period to investigate possible changes to class-licensing arrangements in Australia in the existing 5 GHz band and the potential new 6–7 GHz band.



Amateur radio

CHANGE 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

³⁶ Cisco, 2016, accessed 27 April 2020, <<http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.pdf>>, pp. 24–25.

³⁷ FCC, 2020, accessed 27 April 2020, <<https://docs.fcc.gov/public/attachments/DOC-363490A1.pdf>>.

the [Radiocommunications Licence Conditions \(Amateur Licence\) Determination 2015](#), 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. For example, this year's work plan includes reviewing non-assigned amateur licensing arrangements and considering outcomes of WRC-15 in the 5351.5–5366.5 kHz band. Following recent consultation, we are reviewing responses and will release a decision on next steps in Q4 2020.

We will also consult on our review of non-assigned amateur licensing arrangements. The consultation will include information about our assessment of existing licensing options, whether they are fit-for-purpose and proposed reforms to streamline and reduce regulatory, administrative, and financial burdens on licensees and the ACMA.

Part 2—Proposed 2020–21 annual spectrum management work program

Part 2 provides information about the work streams and activities that the ACMA is proposing to focus on over the 2020–21 financial year. The planning information also reflects expected developments over a five-year time frame.

Where elements of planning, allocation, and activities to improve spectrum management span multiple years, we have identified the relevant timing information. Activities are grouped under the following headings to accord with the ACMA’s main spectrum management functions:

- > planning
- > forward allocation work plan
- > licensing and licensing systems
- > pricing
- > compliance and enforcement
- > international engagement.

The planned milestones, including those relating to 2020–21, 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.

We are also continuing to work with the Department of Infrastructure, Transport, Regional Development and Communications (the Department) on proposals for graduated legislative reform. As any changes to legislation are settled, the timing and nature of the ACMA’s responsibilities will become clearer and may affect other milestones.

Priorities and resources

There remains a continued demand for more activity from the ACMA than can be accommodated within our finite resources.

In responding to suggestions about revising our spectrum management priorities, we consider a range of relevant considerations, including:

- > maximising the efficient allocation and use of radiofrequency spectrum
- > changes in the development, availability, and take-up of radiofrequency technologies, both in Australia and internationally
- > spectrum management trends, including ITU-R WRC and Study Group processes
- > the least cost and least restrictive approach to achieve policy objectives.

Planning

CHANGE The ACMA aims to optimise spectrum planning, licensing and allocation arrangements in each band for the use or uses that maximise the overall public benefit. These arrangements aim 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 uses³⁸ 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-cases³⁹ 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.

Planning activities are informed by domestic and international trends in spectrum uses, developments in international spectrum harmonisation and technology standardisation, and evolution of communications technology. These activities are directed into two main streams:

- > major band-planning activities to support the establishment of new spectrum uses
- > optimising established planning frameworks for existing spectrum use/s to reflect changes in technology or other use factors.

³⁸ 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).

³⁹ Use-cases refer to a service product or business type within a service/application (for example, wide area mobile networks used by MNOs or local area services offered by WISPs.)

While useful to provide a structure for describing the ACMA's planning activities, these two work streams are not definitive, in that some activities may blur or overlap between the categories.



Implementing outcomes of WRC-19

The outcomes of WRC-19 will affect the ACMA's future planning arrangements. Australia's spectrum arrangements will be reviewed and updated to align with revision of the ITU's Radio Regulations (RRs) and their impact on global and regional spectrum allocations and regulatory requirements.

A key task in this work is making a new ARSP to ensure that Australian spectrum arrangements take account of changes arising from the ITU WRC-19.

While timing of such work depends on when WRC changes come into effect (typically approximately one year after the WRC), we will start scoping this work in Q3 2020.

Amendments to the RRs agreed at WRC are subject to parliamentary review through the Joint Standing Committee on Treaties. The Department administers this process of review.

We will continue to manage and provide technical expertise for Australian engagement in international spectrum management forums, through domestic and international consultative frameworks. This will include input into the development of Australian positions for key ITU and Asia-Pacific Telecommunity (APT) radiocommunication meetings, including meetings of APG23 as we start the new WRC-23 study cycle. The Department will lead the delegation to these meetings, with the ACMA supporting Australian preparatory processes and providing technical expertise from our planning and engineering staff.

The ACMA will also lead Australian engagement in other ITU-R and APT forums, including meetings of the AWG and ITU-R Study Groups 4 and 5 and their respective working parties.



Major band-planning activities

This section provides an overview of the ACMA's work in major spectrum planning activities to investigate and, where appropriate, support the establishment of new spectrum uses in bands.

For allocation of spectrum resulting from major band-planning activities, see the *Forward allocation work plan* section below.

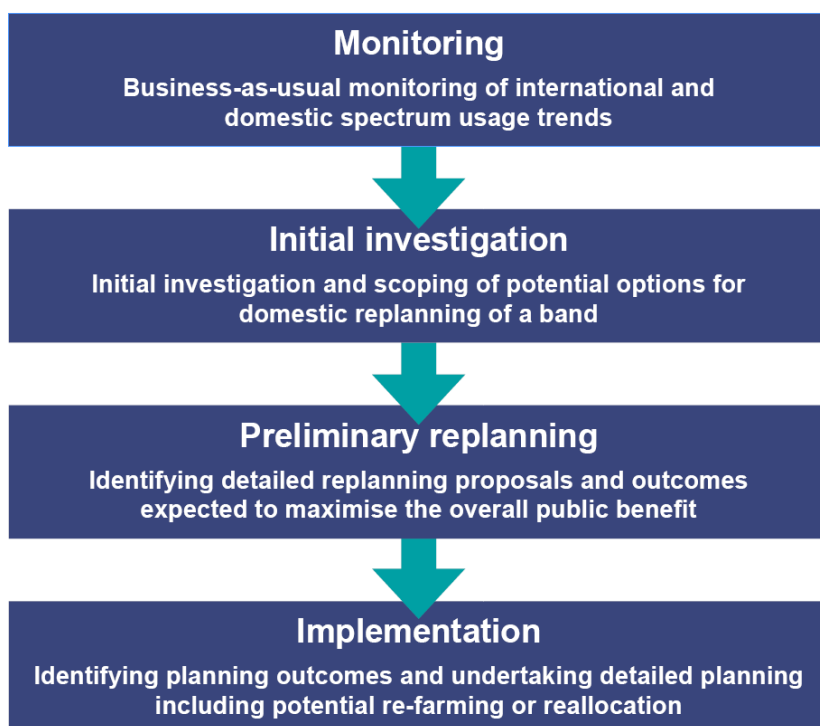
In order to provide transparency to all parties, our process in establishing new planning frameworks is built around considering bands at four distinct stages: *monitoring*, *initial investigation*, *preliminary replanning* and *implementation*. These are shown below in shown in Figure 1.

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.

Figure 1: Four stages in spectrum management band planning



Monitoring

The monitoring stage 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 apprised of relevant developments and issues.

In general, bands and issues included at the monitoring stage represent potential work items beyond our immediate 12-month work program. Importantly, not every band being monitored will subsequently be considered in detail.



600 MHz (617–698⁴⁰ 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, an 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.⁴¹ In December 2019, an operator in the US was the first to deploy a 5G service in the band.⁴²

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.⁴³

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](#), 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](#), but a final decision is still pending.

WRC-23 agenda item 1.5 will review spectrum use and spectrum 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.

Next steps

The ACMA will continue to monitor international developments.

⁴⁰ This lower boundary (617 MHz) is based on the bottom edge of the 2 x 35 MHz plan identified for the US 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 US 600 MHz band plan, noting that the top edge of the highest channel used for broadcasting in Australia ceases at 694 MHz.

⁴¹ FCC, 2017, accessed 27 April 2020, <<https://www.fcc.gov/about-fcc/fcc-initiatives/incentive-auctions#block-menu-block-4>>.

⁴² T-Mobile, 2019, accessed 27 April 2020, <<https://www.t-mobile.com/news/americas-first-nationwide-5g-network>>.

⁴³ Global mobile Suppliers Association, 2020, accessed 27 April 2020, <<https://gsacom.com/paper/5g-spectrum-report-february-2020/>>.

We will continue to engage with industry and government as required on the technology transition path for terrestrial digital television, which may include options to migrate to newer DVB-T2 and HEVC standards.



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 and is the subject of a WRC-23 agenda item regarding Region 1 and 2 use of this band.

Recent developments

Recommendation ITU-R M.1036 was recently amended to include frequency arrangements for the implementation of the terrestrial component of IMT in the 3.3 GHz band. Working Party 5D has also completed studies with incumbent radiolocation services in the 3100–3400 MHz band as called for in Resolution **223 (Rev. WRC-15)**. These are contained in new [Report ITU-R M.2481](#) *In-band and adjacent band coexistence and compatibility studies between IMT systems in 3 300-3 400 MHz and radiolocation systems in 3 100-3 400 MHz*. Technology standardisation within the 3GPP is also developing, with two bands defined by the 3GPP in July 2017—the first band being 3.3–3.8 GHz and the second 3.3–4.2 GHz.

WISPs and other FWA operators have also expressed interest in accessing the band. This is due to the availability of equipment internationally allowing them to tap into economies of scale.

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.

Over the past few years, there has been increasing interest in this band. Japan has made the 4400–4900 MHz band available for 5G.⁴⁴ China is also considering use of the band.⁴⁵ 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.

⁴⁴ 5G WorldPro, 2019, accessed 27 April 2020, <https://www.5gworldpro.com/5g-news/110-5g-auctions-around-the-world.html>>.

⁴⁵ Global mobile Suppliers Association, 2020, accessed 27 April 2020, <<https://gsacom.com/paper/5g-spectrum-report-february-2020/>>.



4.8 GHz (4800–4990 MHz)

The 4.8 GHz band is identified for IMT by several countries, including Uruguay, Cambodia, Laos and Vietnam. Japan has made the 4400–4900 MHz band available for 5G.⁴⁶ China has also made the 4.8 GHz band available for 5G.⁴⁷

This suggests that a viable ecosystem could develop for mobile broadband systems in this band. 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.⁴⁸

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](#) (the PSER class licence) outlines arrangements for the use of this band, which allows public safety agencies 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 public safety agencies 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.

⁴⁶ 5G WorldPro, 2019, accessed 27 April 2020, <https://www.5gworldpro.com/5g-news/110-5g-auctions-around-the-world.html>.

⁴⁷ Global mobile Suppliers Association, 2020, accessed 27 April 2020, <<https://gsacom.com/paper/5g-spectrum-report-february-2020/>>.

⁴⁸ In accordance with ITU-R Resolution 646.

Next steps

The ACMA will continue to monitor developments in this band.



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 four Australia-wide licences for TOB, as well as a single licence covering Western Australia.

Recent developments

The Electronic Communications Committee (ECC) is currently investigating the use of earth stations in motion (ESIMs) installed on aircraft operating with GSO and NGSO FSS systems in the 12.75–13.25 GHz band (earth-to-space).⁴⁹ In submissions to consultations throughout 2019–20, Intelsat expressed an interest in exploring potential arrangements for aeronautical ESIMs in the 13 GHz band.

Next steps

The ACMA will continue to monitor developments in this band.



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 US 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.

⁴⁹ European Communications Office, 2019, accessed 27 April 2020, <https://eccwp.cept.org/WI_Detail.aspx?wiid=667>.

Brazil has announced plans for the 37.6–40 GHz band and will consider the 37–37.6 GHz frequency range later in 2020.⁵⁰

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.



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.



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 US 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.⁵¹

⁵⁰ Global mobile Suppliers Association, 2020, accessed 27 April 2020, <<https://gsacom.com/paper/5g-spectrum-report-february-2020/>>.

⁵¹ *ibid.*

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.



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 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 1.2. Developments in Europe and other regions and countries (such as the US) 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 US) 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.



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

WRC-03 and WRC-07 allocated additional spectrum in the RRs to the mobile satellite service (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, radioastronomy and space research service allocations. In Australia, channel planning arrangements are in place to support use of the band by fixed service digital radio concentrator systems.

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 bands. Based on existing priorities and new issues raised in response to the draft FYSO 2020–24, the ACMA does not plan to progress this review in the 2020–21 timeframe but will reassess for the FYSO 2021–25.



CHANGE 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.

Several submissions to the FYSO proposed reviewing the arrangements in the 1880–1900 MHz range to better align with those in the 2.4 GHz and 5.8 GHz bands and to cater for the emergence of new technologies, such as Multefire.

Other submissions proposed re-examining the 1900–1920 MHz range for use by applications such as local area wireless broadband or extending current point-to-multipoint uses into metropolitan areas.

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 ACMA has changed the status to initial investigation for the frequency range as a whole. Consideration will begin in Q2 2021, including developing a timeframe for releasing an initial discussion paper.



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. Noting other priorities in the work program, we will reassess the priority in FYSO 2021–25. 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.



CHANGE 6 GHz Radio Local Area Networks (RLANs)

A significant number of submissions to the FYSO consultation indicated interest in recent international developments in the 6 GHz band (5925–7125 MHz). As a result, we have moved this topic 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 for study 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 US 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 intend to release a discussion paper in Q4 2020 as part of the initial investigation stage, looking at the state of both the 5 GHz and 6 GHz bands, and recent international developments in those bands. We will take a preliminary look at some potential new uses for the band in Australia, and gauge industry appetite for considering changes to accommodate such uses.

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.



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 Resolution **223 (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](#) in October 2016, and received 72 submissions from industry.

In June 2017, we released a [consultation package](#) including [Future use of the 1.5 GHz and 3.6 GHz bands—Summary of and response to 3.6 GHz submissions](#). This detailed our decision to progress both the 1.5 GHz 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 International Mobile Telecommunications and broadcasting-satellite service (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 broadcasting-satellite service (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 proposal is to finalise the work at the next AWG-26 in 2020, but this may be reviewed depending on progress.

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 Resolution **761 (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 bands is considered to be appropriate. Based on existing priorities and new issues raised in response to the draft FYSO 2020–24, the ACMA does not plan to progress this review in the 2020–21 timeframe but will reassess for the FYSO 2021–25.



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.

In Australia, policy arrangements are currently in place to support the following uses in various parts of the 2 GHz band:

- > TOB services—as detailed in [RALI FX21](#)
- > fixed point-to-point services that were licensed prior to the TOB band plan coming into effect
- > short-term technology demonstrations or other short-term applications.

Recent developments

To assist future consideration of the 2 GHz band, the ACMA released the discussion paper [Planning of the 2 GHz band](#) in August 2019 seeking industry views on what technologies should be supported and replanning considerations. Reflecting on international and domestic trends in the 2 GHz band, it appears one or a combination of the following four services could potentially make use of this spectrum in the future:

- > TOB
- > mobile-satellite services (with or without Ancillary Terrestrial Component/Complementary Ground Component rules), including satellite IoT
- > mobile broadband services
- > direct air-to-ground communications.

The ACMA will consult on an options paper for potential future uses of the 2 GHz band in Q4 2020.

Next steps

We will consider submissions to the options paper, with an aim to releasing an outcomes paper for future use of the 1980–2010 MHz and 2170–2200 MHz bands in Q4 2020

We remain open to case-by-case consideration of licence applications for test and demonstration purposes in the frequency ranges 1980–1985 MHz and 2170–2175 MHz (the guard band between TOB and frequency adjacent spectrum licensing and apparatus-licensed public mobile telecommunications services) on a short-term basis, subject to appropriate interference management and resolution conditions where these applications will not impact on existing services.

With TOB usage typically limited to capital city areas and regional areas for major events, we consider it is also possible to support licence applications for test and demonstration purposes in the wider 1980–2010 MHz and 2170–2200 MHz bands in remote-density and some low-density areas on a short-term basis, subject to appropriate interference management and resolution conditions.



3700–4200 MHz

The 3700–4200 MHz band is 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 are 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 February 2020, in the US, the FCC decided to auction⁵² the 3700–3980 MHz segment of the band for 5G (that is, WBB) use, preserving only the 4000–4200 MHz segment for FSS.

We plan to consult on an options paper for potential future uses of the 3700–4200 MHz band in Q4 2020.

Next steps

We will consider submissions to the options paper, with an aim to releasing an outcomes paper for future use of the 3700–4200 MHz band in Q4 2020.

Implementation

The *implementation* stage (previously named ‘replanning’) 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 an outcomes (decision) paper 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](#) decision paper, signalling an end to the review of this band and commencement of a long-term implementation plan to put those decisions into effect. One of the key decisions arising from the review was that 2 x 15 MHz of 4G-standardised spectrum will be made available 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 part of this process, in July 2016, a new RALI (FX 22) was put in place to facilitate the transition of single frequency fixed links (SFFLs) and studio-to-transmitter links (STLs) to the new arrangements. Further incremental updates will be made to this and other instructions as the implementation stage progresses.

As per the [Council of Australian Governments \(COAG\) communique of December 2018](#), all jurisdictions agreed a strategic roadmap that sets out a plan to design, implement and operate a public safety mobile broadband (PSMB) service and to

⁵² FCC, 2020, accessed 27 April 2020, <<https://www.fcc.gov/document/summary-chairman-pais-c-band-proposal>>.

continue to work together to resolve the supporting spectrum arrangements in parallel with proof-of-concept trials. The Australian Government has set aside 2 x 5 MHz of spectrum in 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](#) 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 October 2017, we released a consultation paper setting out our preferred reconfiguration option for the 900 MHz band to support transition from the current 2 x 8.2 or 8.4 MHz frequency arrangements to multiples of 2 x 5 MHz to more efficiently accommodate mobile broadband. We also invited submissions about two related issues—the appropriate treatment of the 2 x 1 MHz of spectrum immediately adjacent to and below the existing 850 MHz spectrum licences, and the duration of any spectrum licences issued in 900 MHz or the 850 MHz expansion band.

Recent developments

We released the [Reconfiguring the 900 MHz band](#) consultation paper in Q2 2019 examining reconfiguration options. Following consideration of submissions, we released a [decision paper](#) in December 2019, outlining that we remained of the 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.

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.

Next steps

If the Minister decides to reallocate spectrum, we will consult on the draft allocation instruments in Q1–2 2021.



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. To manage a potential surge in licence applications, a priority assignment model was adopted. An application window process was also adopted for the initial release of spectrum in the upper 2 x 30 MHz of the band to avoid conflicting assignments being made.

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 2020 to gather feedback on the future of the band. Following receipt of feedback on the future of the band, we expect to implement decisions using appropriate changes to RALIs in Q1 2021.



CHANGE

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.

Recent developments

We consulted on [options for optimising arrangements in the 3400–3575 MHz band](#) in April 2019. The outcomes of this review were announced in November 2019.

Next steps

We are in the process of implementing the outcomes of our review of the 3400–3575 MHz band.



5.6 GHz (5600–5650 MHz)

One of the outcomes from the [Future use of the 3.6 GHz band](#) process was our commitment to implementing point-to-multipoint apparatus licence arrangements in the 5.6 GHz band. We also implemented a policy that existing 3.6 GHz point-to-multipoint licensees, including FWA services affected by planning decisions made in the band, would, as far as possible, be given preference when assessing applications for apparatus licences in the 5.6 GHz band.

In December 2018, we published the RALI FX23. This RALI defines frequency coordination requirements for new point-to-multipoint apparatus licences in the 5.6 GHz band. Before a new point-to-multipoint licence is issued, prospective licensees should show they meet the defined protection criteria contained in RALI FX23.

The 5.6 GHz band is currently available for licensing in areas that will not affect the possible transition of 3.6 GHz band point-to-multipoint licences into the band. We are still considering the most appropriate process and timing for release of the band in other areas.

Recent developments

The ACMA consulted on opening the band for general access in Q2 2020.

Next steps

We are aiming to announce the outcomes of consultation in Q4 2020.



26 GHz (24.25–27.5 GHz)

In 2018, following a spectrum tune-up and consideration of feedback, we decided to move the 26 GHz band to the preliminary replanning stage.

Recent developments

In May 2019, we released a [consultation paper](#) outlining a draft reallocation recommendation to be made to the Minister to reallocate the band by issuing spectrum licences. Following consideration of stakeholder comments, we made a reallocation recommendation to the Minister. In October 2019, the Minister declared the 25.1–27.5 GHz frequency range for reallocation in 29 defined areas by spectrum licence.

In October/November 2019, the 26 GHz band was one of several mmWave bands considered for an IMT allocation at WRC-19 under agenda item 1.13. WRC-19 decided to provide an IMT allocation in the 26 GHz band, which is a significant milestone towards facilitating international harmonisation in the band for 5G wireless broadband technologies.

We recently concluded a Technical Liaison Group (TLG) comprising interested stakeholders to inform the development of technical arrangements for 26 GHz band spectrum licences and apparatus licensed wireless broadband services in the 26 GHz band.

In August 2020, we released a consultation package on licensing arrangements for AWLs in both the 26 GHz and 28 GHz bands. This includes our allocation policy, pricing structure and technical framework.

Next steps

Class licensing in the 26 GHz band will be facilitated through the annual update to the LIPD class licence, which is scheduled for consultation in Q3 2020.

We have commenced the process to allocate spectrum licences in the 25.1–27.5 GHz frequency range in 29 defined areas. We consulted on the draft technical and allocation instruments for the allocation of spectrum licences in 25.1–27.5 GHz frequency range in Q3 2020 and are working towards finalising these instruments in Q4 2020. We expect to advertise the auction in Q4 2020 and commence an auction in Q1–2 2021 (noting Easter). See the *Forward allocation work plan* section for more information.



CHANGE

28 GHz (27.5–29.5 GHz)

In October 2017, we announced the preliminary views and outcomes of our [3.6 GHz band review](#). As part of the outcomes, there were several mitigation measures identified for affected incumbent point-to-multipoint licensees. These included a commitment to investigate the possibility of developing arrangements for the licensees as part the 28 GHz band-planning activities.

Recent developments

We released a [discussion paper](#) in September 2018 on the suitability of the 28 GHz band for a broad range of uses and service types, including various applications of FSS and wireless broadband services. Twenty-four [submissions](#) were received.

We released an [options paper](#) in April 2019 seeking feedback on possible planning arrangement for the 28 GHz band. Twenty-five [submissions](#) were received.

Using the information obtained from submissions to the options paper, we released a [decision paper](#) in September 2019 detailing decisions and preliminary views for the introduction of wireless broadband in the 28 GHz band.

We recently concluded a Technical Liaison Group (TLG) comprising interested stakeholders to inform the development of technical arrangements for apparatus licensed wireless broadband services in the 28 GHz band. After the formal TLG, staff engaged in an FSS-specific consultation using the TLG distribution list and identified scenarios where AWLs could also be used to authorise FSS earth stations in the range 27–30 GHz range.

In August 2020 we released our consultation package on both the 26 GHz and the 28 GHz bands.

Next steps

We have implemented some of the new arrangements in the 28.3–29.5 GHz frequency range. This has included removing fixed point-to-point arrangements from RALI FX 3 and updating the Radiocommunications (Communication with Space Object) Class Licence 2015 (CSO class licence) to include the 28.3–29.5 GHz frequency range. See the *Satellite planning* section for more CSO class licence details.

We have commenced work on the development of class licence arrangements for satellite services between 27.5 GHz and 28.3 GHz. This work is expected to conclude by Q4 2020.

Work has also been undertaken to develop technical arrangements for fixed wireless broadband use of the 27.5–29.5 GHz band. This work was conducted under the same TLG process as for the 26 GHz band. Public consultation on relevant technical arrangements will occur in conjunction with consultation on associated allocation instruments

Optimising established planning frameworks

The optimisation of existing spectrum planning arrangements is also a significant planning priority for the ACMA. This is typically achieved through updates to elements of 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.

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 4.9 GHz emergency services class licence and could augment a future PSMB capability.

The pre-existence of the 4.9 GHz class licence 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 a first step in this process.



Broadcasting

Following the successful completion of the digital TV transition in 2014, the TV broadcast environment has been relatively stable. We continue to provide spectrum planning and licensing assistance to ad-hoc requests for optimisation of the existing TV transmission infrastructure.

We have facilitated technology trials of the new TV transmission technologies, including the DVB-T2 run by industry in Sydney and the Gold Coast between April 2018 and March/April 2019, and will continue to support similar industry trials in the future.

Our website provides visitors with information about TV reception and interference and we manage the [mySwitch](#) 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.

In 2019, we sought the views of industry on how the technological evolution and changing listener preferences were likely to impact the way radio is delivered into the future and how we can assist the industry in how it prioritises its planning work program.

Following industry feedback, we published our [report](#) on the future delivery of radio services in Australia. We found that live radio across different platforms is important to Australians, especially so during emergency situations such as the recent bushfires. We also determined that a mix of platforms is crucial to bringing radio to listeners.

The report sets out a new framework for our radio broadcast planning priority-setting and decision-making. This will provide greater certainty and transparency for industry and allow more efficient allocation of our broadcast planning resources.

We have set our current radio broadcasting planning priorities as:

- > 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 will inform how individual requests for planning and allocation activity are prioritised within any year.

Guided by the priority activities, we will continue to consult on a work program each year through our FYSO.

Over the next few years, we will continue to plan for regional digital radio, where licensees commit to rolling out and provide for the AM–FM conversions in certain regional licence areas.

While we can plan spectrum for digital radio services in regional Australia, the establishment of digital radio services in any given market is a commercial decision of the relevant incumbent radio broadcasting licensees. Similarly, where and when the ABC and SBS will roll out digital radio services are decisions for those broadcasters.

Recent developments

- > Finalised variations to LAPs to allow AM–FM conversion for Riverland, Murray Bridge, Spencer Gulf North and Port Lincoln in South Australia, and Armidale.
- > Varied LAPs in Kingaroy, Emerald, Bundaberg, Toowoomba/Warwick and Townsville.
- > Issued digital radio multiplex transmitter licence in Mandurah.
- > Declared 23 December 2019 to be the digital radio start-up day for Mandurah.
- > Determined that the Hobart RA3 community radio licence area should be deemed to be the same as the Hobart RA1 commercial radio licence area to allow access to digital radio.

Activities planned for 2020–21

We will:

- > Consult on proposals for LAP variations in Brisbane QLD, Remote Central and Eastern Australia Radio LAP, and Deniliquin NSW.
- > 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 is dependent on the relevant licensees making timely strategic business decisions on available implementation options.
- > Consult on the DRCP for the Gold Coast, taking into account the completion of frequency allotment planning.
- > Further consult on whether variations to the DRCP for Brisbane are appropriate to improve digital coverage.
- > Consult on the principles to determine whether specified community radio licence areas should be deemed to be the same as specified commercial radio licence areas to allow access to digital radio.
- > Consult on the potential to replan the Perth FM radio band, following the clearance of Band II television in Bunbury.
- > Engage further with industry on the ACMA’s findings in its report to the Minister on the future delivery of radio.



Satellite planning

The ACMA continues to engage internationally on the coordination, development and implementation of measures to enhance spectrum usage for satellite communications and space research services.

Recent developments

In 2019–20, we finalised consultation on several issues to support developments in satellite communications and in March 2020 varied the [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#). This followed a consultation process in December 2019 regarding the implementation of outcomes of the 10.7–11.7 GHz band (the 11 GHz band) and 27.5–29.5 GHz band (the 28 GHz band) reviews⁵³. The variation facilitated the use of the 10.7–11.7 GHz, 18.2–18.8 GHz and 19.3–19.7 GHz bands for ubiquitous earth receivers and the 28.3–28.5 GHz and 29.1–29.5 GHz bands for ubiquitous earth transmitters. The amount of tax applicable in the 10.7–11.7 GHz, 18.2–18.8 GHz and 19.3–19.7 GHz bands was also reduced to the minimum annual amount via an amendment to the [Radiocommunications \(Transmitter Licence Tax\) Determination 2015](#).

In August 2019, frequency coordination requirements between earth station transmitters operating in the frequency range 5850–7075 MHz and fixed point-to-point

⁵³ ACMA, 2019, accessed 27 April 2020, <<https://www.acma.gov.au/consultations/2019-12/improved-spectrum-access-and-pricing-satellite-services-consultation-402019>>.

links operating in the 6 GHz (5925–6425 MHz) and 6.7 GHz (6425–7110 MHz) fixed link bands were released.⁵⁴

Phase 1 of the review of licensing procedures for space-based communications was also completed, following the release of a discussion paper and draft new business operating procedures in November 2019.⁵⁵ with updated documents released in August 2020. The procedures were reviewed to consider whether existing procedures are commensurate with the risk of interference, including consideration of the status of a satellite network in the ITU satellite coordination process.

We also varied the [Radiocommunications \(Foreign Space Objects\) Determination 2014](#) to include Kepler Communications (Canada), SpaceX Services (US) and Swarm Technologies (US) in Schedule 1 of the Determination.

Activities planned for 2020–21

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

- > provide ongoing operational support for Australian-filed satellite networks
- > progress work commenced in 2019–20 on:
 - > the implementation of outcomes of the review of the 28 GHz band including expansion of FSS use to ubiquitous FSS operating in the 27.5–28.3 GHz band Australia-wide. How this is implemented is subject to further investigation of coexistence measures
 - > improvements to licensing procedures for space-based communications including consideration of the areas of improvement flagged in the November 2019 consultation
 - > the use of small satellites focusing on short-duration satellite missions for experimental purposes
 - > expansion of RALI MS 45 on frequency coordination requirements between apparatus-licensed fixed point-to-point links and FSS earth stations communicating with geostationary orbit satellites to include other frequency bands and requirements for earth station receivers.

Spectrum arrangements for ‘small satellites’

We are continuing the work identified in the FYSO 2019–23 in support of ‘small satellites’.

We are focusing on supporting short-duration satellite missions for experimental purposes, as well as seeking industry’s views on what changes can be made to the existing spectrum management framework to support the broader needs of smallsat users, while ensuring a continuing, stable regulatory environment for ‘traditional’ satellite users.

We plan to release a discussion paper in Q4 2020, review submissions and develop a way forward.

⁵⁴ ACMA, 2019, accessed 27 April 2020, <<https://www.acma.gov.au/publications/2019-08/publication/frequency-coordination-requirements-between-microwave-fixed-point-point-links-and-fss-earth-stations>>.

⁵⁵ ACMA, 2019, accessed 27 April 2020, <<https://www.acma.gov.au/consultations/2019-11/review-space-licensing-procedures-consultation-382019>>.

Updating regulatory arrangements for space-based communications systems

We will continue to monitor trends in the spectrum needs of space-based communications systems, as well as developments in emerging space-based technologies and applications.

Organisations planning new satellite communication systems and intending to use existing systems are encouraged to contact us to discuss whether such updates are required and if so, their timing. Any future work will depend on stakeholder feedback, priority compared to other projects in the ACMA's annual work program, and technical viability—for example, consideration of the potential impact on terrestrial services.

Ongoing review of space licensing procedures

We will continue to review our administrative assessment procedures for apparatus licensing of space-based communications systems. Future work will use feedback received to Phase 1 of the review of licensing procedures for space-based communications. A suggested scope for further work was outlined in this phase, which received broad support in submissions. The work will be appropriately timed, including in connection with the implementation of outcomes of WRC-19.

Filing and coordination of Australian satellite systems

In accordance with the [Australian procedures for the coordination and notification of satellite systems](#), the ACMA has an ongoing role in the filing and coordination of Australian satellite systems with the ITU. This includes:

- > assisting Australian satellite operators with ongoing satellite coordination negotiations with other administrations
- > assessing new notices related to progress of existing Australian satellite networks
- > filing of new Australian satellite networks
- > supporting international administration-level satellite coordination meetings with other administrations.

Updating procedures for submission of Australian satellite networks to the ITU

Australian procedures for the coordination and notification of satellite systems with the ITU were developed in 2012. Outcomes of WRC-19 will need to be considered for inclusion in possible updates to those procedures. With the continuing growth and innovation in the provision of satellite-delivered telecommunications and in space science services, we also consider it timely to review the procedures to ensure they are fit-for-purpose.

Any future update will consider whether providing better support to innovations such as the deployment of low-cost, miniaturised space hardware (often referred to as nanosats, cubesats or smallsats), changes in ITU requirements and general improvements, is required.

Our preliminary view is that there is benefit in focusing on targeted updates to key areas rather than undertaking an entire review (which is likely to be a lengthy task). For example, it is most likely that work on spectrum for small satellites will result in the need for a targeted update.

It is also possible that the outcome of the Communications portfolio five-yearly Portfolio Charging Review⁵⁶ will require a review of our satellite filing cost recovery process to ensure that practices are consistent with outcomes of that work.

We will consider timing of this work in the first half of 2021.



Low interference potential devices

In December 2018, we commenced consultation on proposed updates to the LIPD class licence. The proposed updates considered:

- > updating and expanding existing 60 GHz arrangements (57–66 GHz) for data communication systems, including 5G. Specifically:
 - > adding 66–71 GHz
 - > updating existing arrangements in 57–66 GHz regarding indoor and outdoor data communications systems
 - > adding new arrangements for ‘all transmitters’ in 57–64 GHz
 - > revising arrangements for underground transmitters in certain bands supporting fixed and mobile services between 70–520 MHz
 - > adding support for higher power radiodetermination transmitters, that is, radars (76–77 GHz)
 - > adding support for ground and wall penetration radar as an adjunct to current apparatus licence arrangements (30–12400 MHz)
 - > aligning existing arrangements for ultra-wideband devices with US and European arrangements for generic (indoor and handheld) devices (3100–3400 MHz and 8500–9000 MHz) and aircraft applications (6000–8500 MHz).

Progress achieved

We finished this review and varied the LIPD class licence in September 2019.

Activities planned for 2020–21

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 Q3 2020.



NEW Intelligent Transport Systems

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

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

⁵⁶ The ACMA component of the Portfolio Charging Review process will review all existing and potential charging activities, evaluate the performance of charging activities, identify opportunities to amend or discontinue specific charging activities and assess the effectiveness of stakeholder engagement strategies and opportunities for improvement. Like all current charges, ACMA satellite filing charges will be reviewed in that process.

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

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

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

Progress achieved

We made the Class Licence on 18 December 2017 and it came into effect on 5 January 2018.

Activities planned for 2020–21

Industry feedback to the FYSO 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 have included an item in the work plan to review the current arrangements commencing Q2 2021.



Amateur radio

WRC-15 introduced a secondary allocation for the amateur service in the frequency band 5351.5–5366.5 kHz with a maximum radiated power of 15 W (EIRP).⁵⁷ While the spectrum allocation is included in the ARSP, the technical feasibility and associated technical conditions that could support operation in Australia are yet to be considered.

In Australia, the band is currently used by some emergency service and law enforcement organisations for mobile operations. The Department of Defence also uses these frequencies in support of key capabilities. We consulted with local stakeholders on this potential allocation in the lead-up to WRC-15. Stakeholder views were varied, with opposition to the allocation from the Department of Defence, due to the potential for interference to its systems.

Activities planned for 2020–21

Earlier this year, we published a discussion paper seeking views on the feasibility and associated implementation issues of the potential allocation, including appropriate technical conditions and in which part of the band the amateur service could be supported. Responses are being reviewed and a decision on further action, if any, will be communicated in Q4 2020.

⁵⁷ Refer ITU Radio Regulation 5.133B. Note in some ITU Region 2 countries alternative limits of 20 or 25 watts apply.



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. This material is predominately recorded in RALIs. Consideration of spectrum-licensing technical frameworks and ensuring the continuing appropriateness of spectrum embargoes are additional elements of this work program.

In September 2018, following industry consultation, we released our [frequency coordination requirements review work program](#) for 2018–19. This work program outlined updates to frequency coordination rules (as recorded in RALIs).

Progress achieved

In July 2019, RALI FX01 was updated to include coordination arrangements between 400 MHz wideband fixed services and narrowband services. This was the subject of a [consultation process](#) in March 2019.

Coordination requirements for earth station protection zones were updated in August 2019, following the [December 2018 consultation](#) on changes to RALI MS 44.

Updates to several RALIs were provided for [comment from industry](#) in December 2018. In August 2019, RALI MS 33 and MS 34 were updated to support PTS operation in underground environments in the 1800 MHz and 2 GHz bands outside of spectrum licensing areas, and RALI MS 35 was updated to include additional radar sites for coordination between 2.5 GHz band (2.5–2.69 GHz) spectrum-licensed transmitters with radiodetermination stations operated by the Department of Defence in the 2700–2900 MHz band.

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 over 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 2020–21

In addition to progressing tasks already identified in the review work program, we intend to seek industry comment on a draft updated frequency coordination review work program in Q4 2020.



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 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.

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](#), with the review of the core condition relating to unwanted emissions. This work was completed in Q2 2020.

Activities planned for 2020–21

Work on the 2.3 GHz and 1.8 GHz bands started in Q1 2020. It is planned that the review of these bands will be completed in Q4 2020, following consultation in Q4 2020.

The bands 700 MHz, 800 MHz, 2.1 GHz and 2.6 GHz 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

The ACMA has commenced a discussion with stakeholders on how new approaches to sharing might improve the management of and access to spectrum.

Progress achieved

We held a tune-up event in August 2019 on new and emerging approaches to spectrum sharing. The tune-up was informed by a [discussion paper](#) released in early August. Topics covered included approaches to spectrum sharing and their applicability to the Australian environment, recent international developments and how and why similar arrangements might be adopted domestically, how sharing affects incumbent users and how shared access can be managed by industry operators and third parties. A follow-up paper setting out next steps was released in Q2 2020.

Activities planned for 2020–21

Ongoing consideration of new approaches to spectrum sharing

Future band-planning priorities

A majority of the band-planning activities for 2020–21 will be focused on prioritising, progressing and finalising the ongoing work for bands already identified in the initial investigation, preliminary replanning and implementation stages.

As discussed, the ACMA is aware there is interest in progressing work on the following bands:

- > 1.5 GHz: We consider there is benefit in considering the 1427–1518 MHz, 1518–1525 MHz and 1668–1675 MHz bands in one process. This is due to a potential coexistence issue at the common frequency boundary at 1518 MHz. Consequently, decisions made for one band could impact decisions made for the other.
- > 40 GHz and 47 GHz: These bands are of significant interest for both terrestrial 5G and satellite broadband services. They were recently identified for IMT at WRC-19 and the satellite industry have indicated an interest in using the bands for high-throughput satellite services. For the satellite industry, the bands are linked

because the 40 GHz band is used for space-to-earth link and the 47 GHz, along with 48.2–50.2 GHz and 50.4–52.4 GHz bands, are used for the associated earth-to-space link. Consequently, there may be benefit in considering these bands in one process. Due to proximity, consideration could also be given to the 46 GHz band.

CHANGE **Activities planned for 2020–21**

The ACMA will not progress consideration of the 1.5 GHz band or the 40 GHz, 47 GHz and 48.2–52.4 GHz bands during the 2020–2021 financial year. We will instead focus on prioritising, progressing, and finalising the ongoing work for bands already identified in the initial investigation, preliminary replanning and implementation stages.

Progression of these band will be reassessed as part of the FYSO 2021–25.

Forward allocation work plan

Purpose of the forward allocation work plan

Timely access to spectrum is of increasing importance to an innovative and dynamic economy. For incumbent and prospective spectrum users, this forward allocation work plan provides information for stakeholders about the planning status and possible timing and sequencing of major spectrum allocations, to better support:

- > strategic network planning by spectrum users
- > technology deployment planning
- > capital-raising.

Under current law, specific allocation processes depend on ACMA and, in some cases, Ministerial decisions made during the planning and allocation stages, 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 formal decisions.

Even once a formal 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. We will take account of feedback from industry about likely demand and their priorities for access to particular spectrum bands.

We have completed a number of allocation and re-issue processes in recent years, providing significant predictability about spectrum availability in a number of key bands including:

- > 700 MHz (703–748 MHz and 758–803 MHz)
- > 1800 MHz (1725–1785 MHz and 1820–1880 MHz)
- > 2.1 GHz apparatus PTS (1920–1980 MHz and 2110–2170 MHz)
- > 2.3 GHz (2302–2400 MHz)
- > 3.4 GHz (3425–3492.5 MHz and 3542.5–3575 MHz)
- > 3.6 GHz (3575–3700 MHz).

This has set the stage not only for service quality enhancements and greater service choice for consumers, but also for increased opportunities for licensees to undertake trading and contribute to defragmentation in some bands, allowing more efficient use of spectrum.

Following the proposed series of timing and sequencing options for allocations planned over the next few years that were published in the FYSO 2019–23, we updated the forward allocation plan in the draft FYSO 2020–24 and sought stakeholder feedback.

What we are proposing

The set of spectrum bands under consideration for potential future major allocations is outlined in Table 10.

Table 10: Spectrum bands under consideration for potential future allocations

CHANGE

Band name	Spectrum parameters	Current use	Comments
26 GHz band	24.25–27.5 GHz	n/a	We are establishing arrangements for class, apparatus and spectrum licensing in the 26 GHz band to facilitate a broad range of wireless broadband use-cases. We expect apparatus licences to be available from Q4 2020, with an auction of spectrum licences expected to commence in Q1–2 2021 (noting Easter).
28 GHz band	27.5–29.5 GHz	FSS, fixed point-to-multipoint, body scanner	We will consult on proposed arrangements in Q3–4 2020, including changes to the CSO class licence for frequencies below 28.3 GHz.
850 MHz expansion band	809–824 MHz and 854–869 MHz	Fixed links point-to-point, point-to-multipoint, land mobile	Decision to re-farm optimised for wireless broadband was made in November 2015. Clearance process extends to 2024. We consulted on a draft reallocation recommendation in Q2 2020. If the Minister decides to reallocate spectrum, we will consult on draft allocation instruments in Q1–2 2021.
900 MHz band	890–915 MHz and 935–960 MHz	3G, 4G	In December 2019, we released a decision paper recommending the best way to achieve reconfiguration of the 900 MHz band was to undertake a band clearance and price-based allocation in conjunction with an allocation of spectrum in the 850 MHz expansion band. We consulted on a draft reallocation recommendation in Q2 2020. If the Minister decides to reallocate spectrum, we will consult on draft allocation instruments in Q1–2 2021.

Band name	Spectrum parameters	Current use	Comments
3400–3575 MHz band	3400–3575 MHz	Fixed wireless, point-to-multipoint, 5G	We announced the outcomes of our review in November 2019. Work has commenced to restack incumbent services in the band. After this is achieved, and if the Minister decides to designate spectrum for spectrum licensing, work will start to convert NBN Co's apparatus licences to spectrum licences and allocate 25–42.5 MHz of additional spectrum for spectrum licences in regional areas. 75 MHz of spectrum may also be made available in urban areas excised from NBN Co's converted licences; however, this is pending the development of interference management criteria and an assessment of the appropriate licensing type to use.
3700–4200 MHz	3700–4200 MHz	Fixed links, satellite earth stations	The band has been flagged as a candidate for review with the possibility of some spectrum being suitable for allocation for wireless broadband.
1.5 GHz band	1427–1518 MHz	Fixed links, some point-to-multipoint, defence	The band has been flagged as a candidate for review with the possibility of some spectrum being suitable for allocation for wireless broadband.
2 GHz	1980–2010 MHz and 2170–2200 MHz	Television outside broadcast, fixed point-to-point links in remote areas	The band has been flagged as a candidate for review with the possibility of some spectrum being suitable for allocation for mobile satellite services.



26 GHz

In September 2018, we released an [options paper](#) outlining the various planning and configuration options for the 26 GHz band, and seeking views on the proposal that the band proceeds to allocation.

After considering submissions to the options paper, we released a [decision paper](#) in April 2019 detailing decisions and preliminary views for the introduction of wireless broadband in the 26 GHz band. That paper described proposed arrangements for spectrum, apparatus and class licensing in parts of the band.

In addition to class licensing 24.25–25.1 GHz, we proposed three distinct approaches in the 26 GHz band:

- > 25.1–27.5 GHz in defined areas (metropolitan and regional centres): spectrum licences allocated via auction
- > 25.1–27.5 GHz in all other areas: apparatus licences
- > 24.7–25.1 GHz Australia-wide: apparatus licences.

In May 2019, we released a [consultation paper](#) outlining a draft spectrum reallocation recommendation for the 26 GHz band. The paper sought views on the terms of a spectrum reallocation recommendation for the 26 GHz band that the ACMA proposed to give the Minister for Communications, Cyber Safety and the Arts under section 153F of the [Radiocommunications Act 1992](#). We made a recommendation to the Minister regarding the allocation of spectrum licences in the 26 GHz band in Q3 2019.

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.

We are now preparing to allocate the declared spectrum by auction, expected to commence in Q1 2021. Following consultation on the draft technical and allocation instruments in Q3 2020, the next step in the process is to finalise these instruments to support the allocation of spectrum licences.

We convened a Technical Liaison Group (TLG) comprising interested stakeholders to inform the development of technical arrangements for 26 GHz band spectrum licences and apparatus-licensed wireless broadband services in the 26 GHz band.

Following the TLG process, we consulted publicly on the technical framework, pricing and allocation policy for apparatus licences in the 26 GHz band in Q3 2020. We expect to make a final decision on these matters in Q4 2020.

We expect to open a window for applications for apparatus licences in parts of the 26 GHz band in Q4 2020.



28 GHz

The ACMA has previously committed to investigating the possibility of establishing new apparatus-licensed point-to-multipoint arrangements for wireless broadband in part of the 28 GHz band.⁵⁸ In September 2018, we released a [discussion paper](#), commencing a review of all potential uses of the band.

Currently, the 28 GHz band is used by the FSS for both apparatus-licensed, coordinated earth stations and, in part of the band, for ubiquitously deployed, uncoordinated, class-licensed earth stations (both fixed and mobile applications). Both FSS uses of the band are expected to continue and require ongoing regulatory support. In addition to FSS uses, part of the 28 GHz band is also currently planned for fixed point-to-point links.

There has been growing interest internationally and domestically in making more of the band available for ubiquitous earth station deployments. A number of satellite operators are considering or are in the process of launching satellite networks that can take advantage of this. In the US and other major markets, there have also been moves to make some or all of the band available for wide area wireless broadband use

⁵⁸ ACMA, 2017, accessed 27 April 2020, <<https://www.acma.gov.au/future-approach-36-ghz-band>>.

(both fixed and mobile applications). This international interest is part of broader momentum in support of mmWave bands for 5G wireless broadband services. This is expected to create a viable equipment ecosystem for both wide-area wireless broadband services as well as localised fixed and mobile wireless broadband services (typically deployed by WISPs, miners and other FWA operators).

Due to these competing interests, we considered planning options in the 28 GHz band. An [options paper](#) presenting different band-planning arrangements was released in Q2 2019. We considered submissions to the options paper and released a [paper](#) in September 2019 detailing decisions and preliminary views for the proposed services in the 28 GHz band.

To give effect to some of the decisions and preliminary views outlined in the decisions paper, we updated the CSO class licence to include the 28.3–29.5 GHz frequency range. We have started work on analysis of the technical considerations for a further update to the CSO class licence, for the possible inclusion of frequencies below 28.3 GHz and other implementation aspects flowing from the decisions paper. We will consult on proposed arrangements in Q4 2020.

We consulted in Q3 2020 on the technical framework, pricing, and allocation policy for apparatus licences in the 28 GHz band (concurrently with consultation on the 26 GHz band). Final decisions will follow the timetable for the 26 GHz band.



850 MHz expansion band

In late 2015, we finalised a review of the 803–960 MHz band and decided to reallocate 2 x 15 MHz in the 850 MHz expansion band for spectrum licences configured for wireless broadband.

The band is being cleared progressively, and is expected to be fully cleared by 2024, although a significant portion of the band will be available for use from mid-2021.

The 850 MHz expansion band has value as a substitute for wireless broadband licences in the 900 MHz band.

The addition of a 1 MHz guard band between the 850 MHz band base-transmit segment and the 900 MHz band base-receive segment is necessary to optimise the utility of the lower segment in the 900 MHz band for wireless broadband.

Before the current spectrum licences expire in 2028, this can only be achieved by a voluntary (negotiated) downshift of the existing 850 MHz band spectrum licences, which are held by TPG Telecom and Telstra.

The availability of the 1 MHz of spectrum immediately below the 850 MHz base-transmit segment to accommodate the downshift will be critical to these negotiations.

We have considered optimisation options for the 900 MHz and 850 MHz expansion bands and released a decision paper for the reconfiguration of the 900 MHz band and allocation of the 850 MHz expansion band in December 2019.

The paper recommended that the best way to achieve reconfiguration of the 900 MHz band was to undertake a band clearance and price-based allocation in conjunction with an allocation of spectrum in the 850 MHz expansion band.

The Australian Government has set aside 2 x 5 MHz of spectrum in the 850 MHz expansion band for national PSMB capability. We remain available to work with states and territories to support the planned proof-of-concept trial through the identification and authorisation of appropriate spectrum for the trial.

In Q2 2020, we consulted on a draft recommendation to reallocate spectrum in the 850/900 MHz band for spectrum licensing.



900 MHz

In October 2017, we published our planning decision on the 900 MHz band, and consulted on specific configuration arrangements for the band in [Reconfiguring the 890–915/935–960 MHz band: Way forward](#). Submitters to the 900 MHz reconfiguration consultations raised concerns about the spectrum available for reallocation, including the role of 900 MHz in 3G regional coverage, and mitigations for consumers migrating from 2G to 3G and 4G technologies.

Further consultation on configuration options for the 900 MHz band was conducted in Q2 2019 (see [Reconfiguring the 900 MHz band](#)). Our approach included a focus on optimising the band for 4G (and, in the longer term, 5G), providing flexibility for licensees to negotiate a downshift in the 850 MHz band, converting to longer-term licence tenure, and enabling licensees to mitigate risks to consumer services.

A key issue raised in the consultation concerned the risk to continuity of service provision to consumers if an operator was not successful in gaining access to spectrum.

In December 2019, we released a decisions paper for the reconfiguration of the 900 MHz band and allocation of the 850 MHz expansion band. In the paper, we indicated we remained of the 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.

To give effect to the decisions and preliminary views outlined in the decisions paper, work has begun on the reallocation of the 900 MHz band and the 850 MHz expansion band. We consulted on a draft reallocation recommendation for the Minister in Q2 2020.



3400–3575 MHz

Stakeholder engagement in the lead-up to the 3.6 GHz auction in 2018 identified optimising spectrum and apparatus licence arrangements in the adjacent 3400–3575 MHz band as an important priority. This was expected to result in more efficient use of spectrum and a reduction in deployment costs.

We released an [options paper](#) in April 2019 and announced the outcomes of this review in November 2019. This included:

- > restacking incumbent services to consolidated arrangements
- > if the Minister decides 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 decides 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.

We are in the process of implementing the outcomes of our review of the 3400–3575 MHz band. Initially, this involves restacking incumbent services in the band, which is expected to be completed on or before 30 November 2020. Once this is done, and if the Minister decides to designate spectrum for spectrum licensing, the process to convert NBN Co's apparatus licences to spectrum licences will start. Notionally, this will commence in Q3–4 2020 and finish in Q2 2021.

Work on the allocation process for the anticipated 25–42.5 MHz of remaining spectrum covered in any Ministerial designation 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 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.

CHANGE 3700–4200 MHz

The 3700–4200 MHz band is currently being reviewed, with a [discussion paper](#) released in 2019. That paper identified a number of trends that suggest there is the potential case for wireless broadband arrangements to be established in some of the band. This was followed by an [options paper](#) in July 2020, which presented changing arrangements in the band to accommodate wireless broadband and proposed replanning options. No outcomes have been decided on the future of the band, including if and how spectrum would be allocated for wireless broadband services.



1.5 GHz

In June 2017, we released a consultation package including [Future use of the 1.5 GHz and 3.6 GHz bands—Summary of and response to 3.6 GHz submissions](#). This detailed the ACMA's decision to progress the 1.5 GHz band to the preliminary replanning stage of the ACMA's process for consideration of additional spectrum for mobile broadband services.

Ongoing work in international spectrum harmonisation, technology standardisation and coexistence with other services will clarify the amount of spectrum that could be made available for allocation. This, and other considerations, would be determined in further replanning activities that would be undertaken, together with consideration of the upper adjacent band that is of interest for L-band MSS services.

Feedback to recent draft FYSOs indicated there was a lower level of near-term domestic interest in the reallocation of this band, compared to other potential wireless broadband bands. However, there is interest in using the band for private LTE as well as progressing a review of the adjacent MSS bands above 1518 MHz. Since a decision in one band affects the other, a simultaneous review of the extended MSS L-band and the 1.5 GHz bands would seem appropriate. The priority to place on such a review is considered in the *Future band-planning* section.

NEW 2 GHz

The 2 GHz band is currently being reviewed, following an options paper released in July 2020. That paper identified a number of trends that suggest there is the potential for mobile satellite arrangements to be established in some of the band. No decisions have been made on the future of the band, including if and how spectrum would be allocated for mobile satellite services.

Allocation priorities and sequencing

The Radiocommunications Act 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 commencement 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 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.

Timing considerations

We recognise that while there may be timing, administrative and potentially efficiency benefits in running an allocation of multiple bands concurrently, there may also 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 spacing of at least six 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.

The 26 GHz and 28 GHz bands are both included in international consideration of possible 5G wireless broadband spectrum, as well as currently or potentially supporting a range of other services. Both the planning, and the timing and sequencing of the allocation of licences in these bands needs to be considered together as much as possible. We will endeavour to ensure that the timing of allocation processes for both bands (whether price-based processes such as auctions, or administrative processes) will be coordinated to reflect the close connection between the bands.

Table 11 below outlines our current timing expectations for future allocations under current law. Please note that specific allocation processes depend on ACMA and, in some cases, Ministerial decisions made during the planning and allocation stages, as well as the outcomes of consultation processes, including the views of incumbent and prospective spectrum users. As a result, timing expectations cannot be definitive.

Table 11: Potential timing of allocations 

Band	ACMA next steps	ACMA recommendation to Minister where applicable	Proposed allocation timing	Notes
26 GHz spectrum licences	Finalise allocation instruments		Q4 2020	
	Auction of Spectrum licences		Q1–2 2021 (noting Easter)	
26 GHz apparatus licences	Consult on licensing arrangements, including pricing structure and technical framework		Q3 2020	
	Availability of apparatus licences		From Q4 2020	
28 GHz	Availability of apparatus licences		From Q4 2020	Timing of availability of allocations to align with 26 GHz band apparatus licences where feasible.
850/900 MHz	Consider submissions to consultation on draft recommendation to Minister	Q3 2020	Q4 2021	Auction at least six months after 26 GHz spectrum licence auction.
3400–3575 MHz	Implementing planning decision	<p>Not required.</p> <p>Under section 36 of the Act the Minister may, after consulting with the ACMA, choose to issue a notice designating specified frequencies and areas for the issue of spectrum licences.</p> <p>This may occur in Q4 2020 after restack is completed.</p>	<p>If the Minister decides to designate spectrum for spectrum licensing, the conversion of NBN Co's apparatus licences would commence in Q4 2020.</p> <p>The allocation of any additional frequencies and areas designated for spectrum licensing could occur in first half of 2023.</p>	

Band	ACMA next steps	ACMA recommendation to Minister where applicable	Proposed allocation timing	Notes
3700–4200 MHz	Q4 2020: options paper			No decisions yet made. Possible allocation.
1.5 GHz	TBC options paper TBC planning decision			No decisions made. Possible lower priority allocation.
2 GHz	Q4 2020: options paper			No decisions made.

Licensing and licensing systems

Recent developments

NEW Radiocommunications legislative reform

On 27 August 2020, the Radiocommunications Legislation Amendment (Reform and Modernisation) Bill 2020 was introduced into the Australian Parliament, together with the Radiocommunications (Transmitter Licence Tax) Amendment Bill 2020 and the Radiocommunications (Receiver Licence Tax) Amendment Bill 2020 (the Bills).

The Bills are part of the Australian Government's commitment to modernise the legislative framework for spectrum management, in response to the recommendations of the 2015 Spectrum Review.

Development of the Bills was led by the Department, with the ACMA providing advice and expert input through regular meetings of the Spectrum Reform Joint Steering Committee, written advice to the Department and contact between senior management of both organisations.

If passed, the Bills would make reforms such as:

- > extending the maximum spectrum licence duration from 15 to 20 years and the maximum apparatus licence duration from five to 20 years
- > aligning the allocation limit powers across spectrum and apparatus licensing
- > providing for Ministerial step-back from day-to-day operational licensing decisions, including spectrum licensing designations, spectrum re-allocations and parts of the spectrum licence renewal process
- > clarifying and enhancing transparency in processes for the renewal of spectrum licences
- > replacing criminal sanctions with civil penalties for certain offences, and introducing mid-tier enforcement powers such as remedial directions
- > introducing modern equipment rules that can work across supply chains.

The Bills would commence at a day to be set by proclamation, within six months of Assent.

The Bills provide the ACMA with new regulatory discretion in several key areas, including the ability to issue licences for up to 20 years and the ability to place 'renewal statements' on licences. If the Bills become law, the ACMA will need to develop regulatory policy positions on how it implements these changes. This may involve consultation and the development of new/replaced legislative instruments, as well as instruments that will be necessary to ensure that existing regulatory arrangements can continue to operate. The consideration of the Bills is a matter for the Parliament.

While it is premature for the FYSO 2020–24 to provide a detailed implementation plan, we intend to provide updated guidance to industry about implementation once the details of the legislative reform package are confirmed by Parliament.



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](#). 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](#).



Drone jamming exemption arrangements

In April 2019, the ACMA determined an exemption that allows the Australian Federal Police to deploy drone jamming equipment over a two-year period. In Q2 2020, the ACMA consulted on exemption arrangements to facilitate national rollout of counter-drone capability by all Australian police agencies.



CHANGE

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) 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.



CHANGE

Review of prohibition declarations and exemption determinations

Under the Radiocommunications Act, the ACMA has prohibited two 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 2020–21



CHANGE

Amateur certificates of proficiency

A Syllabus Review Panel (the Panel) was established in Q4 2019 under a Deed of Agreement between the ACMA and the University of Tasmania through its institute, the Australian Maritime College (AMC).

Due to the inability of the Panel to reach a consensus on minor changes required to align the syllabus with the Radiocommunications Licence Conditions (Amateur Licence) Determination 2015 (LCD), the Panel was disbanded. In Q3 2020, the ACMA will amend the Deed with the AMC to remove the requirement for changes to the syllabus to be approved by the Panel. Changes to the syllabus will now be managed directly through the ACMA's usual consultation processes with the amateur community.

In Q4 2020, we will use the recent public consultation process for changes to the foundation syllabus to advise the AMC on amendments to the syllabus. This will align the foundation syllabus with the amendments to the LCD, so that prospective foundation licensees are able to take advantage of the amended LCD.

We will undertake a broader consultation process in 2021 on more substantive changes to the syllabus.



Enabling trials of mobile phone jammers in prisons

We continue to facilitate trials of mobile phone jammers and have approached relevant authorities in the states and territories to gauge their interest in conducting trials. We will consider requests from other jurisdictions on a case-by-case basis.



CHANGE

RNSS repeater trials and long-term licensing arrangements

Over 2020–21, 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 over 2020–21, in light of the trials of the devices and further research.



400 MHz band

We are finalising the 400 MHz implementation project, which will complete the necessary transition of licences to appropriate segments of the 400 MHz band. We will continue to work closely with state and territory governments, as well as industry participants and representative organisations.



CHANGE

Review of prohibition declarations and exemption determinations

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



CHANGE

Drone regulation

Unmanned aircraft systems, also known as 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 2020–21, 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 that are used for commercial or military purposes are increasingly requiring access to dedicated aeronautical spectrum for CNPC. The ACMA continues to support trial licences to enable this access.



Area-wide apparatus licence

We consulted with stakeholders on the design of the area-wide apparatus licence (AWL) types in Q2–3 2019. In Q1 2020, following consideration of stakeholder feedback, the ACMA made the [Radiocommunications Legislation \(2020 Measures No. 1\) Instrument 2020](#) and the [Radiocommunications Licence Conditions \(Area-Wide Licence\) Determination 2020 \(AWL LCD\)](#), which together make up the regulatory framework for AWL types. We also released a [summary and response to the submissions](#) received.

An 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.

We have published our [approach to introducing AWLs into bands](#). We anticipate that we will issue AWLs from Q4 2020 in the 26 GHz and 28 GHz bands. These are the first bands to be considered for AWLs. Following the review of the 26 GHz and 28 GHz bands, consideration will be given, where appropriate, to developing and consulting on implementation arrangements for AWLs in other bands.



Review of non-assigned amateur and outpost licensing arrangements

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 operations 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 callsigns and—in the case of amateur licensees—appropriate qualifications. The review is also considering feedback received from stakeholders during consultation on proposed changes to amateur licence conditions in 2019. We expect to consult on potential changes to the non-assigned amateur and outpost licence frameworks in Q4 2020.

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 intend to commence this review in Q4 2020.

Review of efficiency and effectiveness of accredited persons scheme

To identify areas for improvement of the accredited persons scheme, including changes to operational practices and/or regulatory instruments, we intend to consult in Q4 2020.



Pricing

Recent developments

Apparatus licence taxes

In Q1 2020, we made adjustments to apparatus licence taxes to update them for inflation, including removing the freeze on taxes for fixed service below 960 MHz in remote density areas and extending the taxable frequency range for PMTS Class B licences in the 3.5 GHz band, to support the defrag process in the 3400 MHz to 3575 MHz range. In addition, new taxes for space licences were introduced to complement the use of the 10.7–11.7 GHz, 18.2–18.8 GHz and 19.3–19.7 GHz bands by uncoordinated, unprotected earth station receivers. As these services will not result in any spectrum denial, the taxes for these bands were amended to the minimum annual tax. Some minor consequential changes were also made to confirm that the low power discount applied to scientific assigned licence taxes. The adjustments came into effect in April 2020.

Commercial broadcasting taxes

In 2018–19, we commenced the assessment of the taxes due for apparatus licences associated with the transmitters used by commercial radio and television broadcasters in the broadcasting services bands. These assessments resulted from the media reform package passed by Parliament in 2017.

On 14 April, the Minister made the [Commercial Broadcasting \(Tax\) \(Transmitter Licence Tax Rebate\) Rules 2020](#) (the Rebate Rules). The Rebate Rules provide fee relief via rebates to commercial broadcasters throughout the rebate period of 14 February 2020 to 13 February 2021. The rebate will reduce broadcasting licensees' net transmitter licence tax liabilities to \$0 for the duration of the rebate period. The majority of broadcasters will receive a 100 per cent rebate of tax imposed during the rebate period. A small number of broadcasters that receive transitional support payments under the *Broadcasting Legislation Amendment (Broadcasting Reform) Act 2017* will receive a rebate of an amount equivalent to the difference between the amount of tax imposed and the transitional support payment amount the licensee receives in the same financial year.

Throughout the rebate period, we will continue to make assessments of commercial broadcasting taxes. However, because of the rebates, the majority of commercial broadcasters will not receive invoices for payment of taxes during the rebate period. For those commercial broadcasters receiving transition support payments, assessments will be made, and invoices sent for amounts up to the transitional support payment.

Activities planned for 2020–21

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, the ACMA is undertaking three substantive programs of work:

- > Further 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 reflect market value more closely 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 began consultation on the proposed draft guidelines and our proposed approach to implementing the Spectrum Pricing Review in March 2020. We expect to start implementing a work program to consider changes to apparatus licence taxes in Q4 2020. Part of this work program may include considering new spectrum management cost recovery arrangements. The work program will be implemented over the course of Q4 2020 and 2021.

Commercial broadcasting taxes

We will continue assessing commercial broadcast taxes on an ongoing basis, as apparatus licences associated with a commercial broadcast services pass their anniversary dates. To assist with planning of payments of tax assessments, early in Q3 2020, we will provide all commercial broadcasters with estimates of their tax assessments for the financial year, and information on how the rebate will apply for the rebate period.

After 30 June 2019, the ACMA must conduct a review of matters relating to the [Commercial Broadcasting \(Tax\) Act 2017](#). The scope of the review is being considered and we expect to make announcements in Q4 2020.

CHANGE **New EME levy arrangements.**

The Minister has directed the ACMA to implement new taxation arrangements so that industry can contribute to the funding of EME research. We consulted and made new spectrum licence tax arrangements in Q3 2020.

CHANGE **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 expect to consult on changes to the spectrum licence tax arrangements to include the 26 GHz band and other related changes in Q2 or Q3 2021.



Compliance and enforcement

Compliance priorities

Our compliance priorities 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. In 2019–20, we adopted a whole-of-agency approach to setting priorities to guide our compliance and enforcement activities.

Recent developments

Audit of small cell base stations

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 key components of this compliance program were:

- > audits to gauge carrier's compliance with their obligations under C564: Mobile Phone Base Station Deployment
- > records audits to ascertain carrier's compliance with the EME licence conditions and EME human exposure limits set by the ACMA, incorporating the ARPANSA standard
- > a spot measurement program to assess EME exposure levels near randomly selected small cell sites nationally.

The findings from the compliance records audits were published in July 2020 and the EME measurement program summary report was published in June 2020.

Licensing integrity

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. This complemented previous work relating to non-renewal of lapsed apparatus licences and the importation and operation of unlicensed, pre-programmed two-way radios operating in land mobile spectrum.

Spectrum monitoring and on-the-ground intelligence gathering to identify non-compliance in the 5.6 GHz band has been conducted in western Victoria, South Australia, northern New South Wales and the Sunshine Coast in Queensland. The findings from our work in the 5.6 GHz band were published in July 2020.

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 400MHz band were published in July 2020.

Solar inverter suppliers

We have been auditing suppliers of solar inverters for compliance with the labelling rules. This included:

- > confirming the products meet the requirements of our electromagnetic compatibility arrangements, to minimise the risk of interference
- > confirming compliance with EME emission requirements and technical performance limits for devices that contain radiocommunications and/or telecommunications capability (such as wi-fi capability).

The findings were published July 2020.

Activities planned for 2020–21

In 2020–21, there are two compliance priorities identified in relation to the ACMA's spectrum functions.

5G EME compliance

The planned 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 imminent, 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 will use records audits to ascertain carrier's 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 two 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 priorities in interference management.



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 preparation meetings, 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.

International meetings 2019–20

We supported the Department by providing the Deputy Head of Delegation (and other delegates with subject matter expertise) to the fifth meeting of the APT Conference Preparatory Group (Asia Pacific) (APG19-5) held from 31 July–6 August 2019 in Tokyo, Japan.

The ACMA provided staff and the Deputy Head of Delegation to the ITU-R Radiocommunications Assembly 2019 (RA-19), WRC-19 and the 1st Conference Preparatory Meeting for the WRC-23 cycle (CPM-23/1), which were held sequentially in Sharm-El-Sheikh, Egypt, across October and November 2019.

New and ongoing activities planned for 2020–21

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

We will provide input into development of Australian positions for key ITU and APT radiocommunication meetings, including ITU-R Study Group block meetings and the first meeting of the APT Conference Preparatory Group (Asia Pacific) for WRC-23 (APG23-1).

Appendix A—Sunsetting instruments

There are no radiocommunications-related instruments due to sunset in 2020–21.