

# Five-year spectrum outlook 2019–23

## The ACMA's spectrum management work program

SEPTEMBER 2019

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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 accommodating new and changed uses of spectrum while ensuring the continuation of existing uses of spectrum that are of value to the community.

2019 is a World Radiocommunication Conference (WRC) year. WRCs are scheduled every three to four years and are the most important forum for international harmonisation of spectrum use and planning.

Working with the Department of Communications and the Arts (DoCA) to ensure Australia's interests are best represented at the 2019 WRC (WRC-19) in October and November—and then commencing work on the identification and implementation of relevant outcomes in our domestic planning arrangements—will be key priorities for the ACMA in 2019–20.

Advances in new technologies are a key driver of changes in spectrum use, along with increasing recognition of the value of wireless, mobile and satellite services across the economy.

The ACMA continues to facilitate the use of 5G services by identifying appropriate spectrum bands and putting in place the consultation necessary to make sound decisions that will support the development of 5G and other evolving wireless technologies in Australia.

Managing spectrum efficiently and effectively for the benefit of all Australians is a key priority for the ACMA, as outlined in our corporate plan.<sup>1</sup> The ACMA needs an accurate understanding of changes in technology and market demand—for new and existing spectrum use—to inform the way we plan and make spectrum available. We rely heavily on spectrum users to keep us informed. Our performance in spectrum management is measured in our annual report.<sup>2</sup>

The ACMA has consulted annually with industry about its spectrum management priorities through its five-year spectrum outlook (FYSO) since 2009. Last year, we refreshed our approach to the FYSO by publishing a draft FYSO for consultation ahead of settling the final FYSO. We have continued this approach for 2019.

A draft FYSO 2019–23 was published in April 2019. An overview of submissions along with the ACMA's response to those submissions is available in a separate document—Addendum to FYSO 2019–23—Response to submissions. Where significant priority or other changes have been made, the topic is identified with a 'change' symbol.  Where significant new material has been inserted, this is identified with a 'new' symbol. 

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<sup>1</sup> ACMA, [Corporate plan 2019–20](#), August 2019.

<sup>2</sup> See [Australian Communications and Media Authority and Office of the eSafety Commissioner annual reports](#).

Please note that references to 2019–20 are references to the 2019–20 financial year.

**NEW** Reflecting some of this feedback, this year’s final FYSO includes the use of icons to allow readers to readily identify parts of the FYSO of particular interest to them. See ‘Key to icons’ below.

The FYSO is set out in three main parts:

- > At a glance—summarises the ACMA’s activities proposed for 2019–20
- > Part 1—provides an overview of the technology, market 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 2019–20 relating to spectrum planning, forward allocation, spectrum management improvements, licensing, pricing and compliance, and enforcement—recognising that these work streams sometimes include multi-year activities.

## **NEW** Key to icons

FYSO 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—2019–20 work program

The tables below provide a summary of the ACMA's proposed key spectrum management activities for the 2019–20 financial year.

The 'proposed timelines' column details:

- > timing for activities (these may be affected by the progression of other projects)
- > opportunities for consultation and engagement.

**CHANGE** Quarters refer to calendar year quarters, reflecting feedback in submissions. The following abbreviations are used throughout:

- > 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.

**Table 1: International engagement**

Project priorities	Proposed timelines
ITU-R Study Group 4 block meetings	Completed in Q3 2019 (19 June–4 July 2019)
25th meeting of the APT Wireless Group (AWG-25)	Completed in Q3 2019 (1–5 July 2019)
Fifth meeting of the APT Conference Preparatory Group (Asia Pacific) for WRC-19 (APG19-5)	Completed in Q3 2019 (31 July–6 August 2019)
ITU Radiocommunication Assembly 2019	Q4 2019 (21–25 October 2019)
World Radiocommunication Conference 2019 (WRC-19)	Q4 2019 (28 October–22 November 2019)
First Conference Preparatory Meeting for WRC-23	Q4 2019 (25–26 November 2019)

**Table 2: Planning—major band planning and replanning activities**

Planning stage	Project priorities	Proposed timelines
Monitoring	600 MHz (617–698 MHz) 1900–1920 MHz 3.3 GHz (3300–3400 MHz)	Continue to monitor domestic and international developments in these bands to identify usage trends

Planning stage	Project priorities	Proposed timelines
	4.5 GHz (4400–4500 MHz) 4.8 GHz (4800–4990 MHz) Bands being studied under WRC-19 agenda item 1.16 Bands being studied under WRC-19 agenda item 1.13	
Initial investigation	2 GHz (1980–2010 MHz and 2170–2200 MHz)	<b>CHANGE</b> Released in Q3 2019: discussion paper on planning issues  <b>CHANGE</b> Q1 2020: possible options paper, dependent on outcomes of discussion paper
	3700–4200 MHz	<b>CHANGE</b> Released in Q3 2019: discussion paper on planning issues  <b>NEW</b> Q1 2020: possible options paper, dependent on outcomes of discussion paper
Preliminary replanning	1800 MHz (1710–1785 MHz and 1805–1880 MHz) in remote areas	<b>CHANGE</b> Q4 2019: discussion paper on planning issues
	3400–3575 MHz	<b>NEW</b> Q4 2019: planning decision
	28 GHz (27.5–29.5 GHz)	Q3 2019: planning decision
Replanning	850 MHz expansion band (809–824 MHz and 854–869 MHz)	Band is being cleared progressively. The ACMA continues 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)	Consultation on configuration options for the band was conducted in Q2 2019. The ACMA is considering the submissions
	5.6 GHz (5600–5650 MHz)	Q4 2019: the ACMA plans to finalise the release of the 5.6 GHz band, including possible transitional arrangements for 3.6 GHz band (3575–3700 MHz) point-to-multipoint licensees
	26 GHz (24.25–27.5 GHz)	<b>NEW</b> Q3 2019: recommendation to minister

**Table 3: Planning—optimising established planning frameworks**

Planning area	Project priorities	Proposed timelines
Broadcasting analog and digital radio	Finalise outcome of the consultation on AM to FM conversion for Scottsdale, Tasmania	 Completed in Q3 2019
	Consult on AM to FM conversion proposals for Riverland, Murray Bridge, Spencer Gulf North and Port Lincoln, South Australia	 Q3 2019: consult and finalise
	Develop and consult on proposals for AM to FM conversions in Taree and Grafton, New South Wales	 Q4 2019: consult
	Develop and consult on the potential for replanning analog radio services in Perth following the clearance of Band II television in Bunbury	 Q2 2020
	Complete engineering and consult on digital radio channel plans for a number of regional radio licence areas	 Q1 2020
	 Consult on whether the Hobart RA3 community radio licence area should be deemed the same as the Hobart RA1 commercial radio licence area for the purpose of digital radio	Released in Q3 2019: consultation paper
	Consult on principles for determining whether specified community radio licence areas should be deemed to be the same as specified commercial radio licence areas for the purpose of digital radio	 Q1 2020
	 Consult on the future delivery of radio services in Australia	Q3 2019: publish submissions  Q4 2019: publish and consult on draft findings, and report to government
Satellite	Consider feasibility of inclusion of 10.7–11.7 GHz in <a href="#">Radiocommunications (Communication with Space Object) Class Licence 2015</a>	 Released in Q3 2019: discussion paper   Q4 2019: determination of next steps
	Finalise review of regulatory arrangements for earth stations in motion in Ku band	 Completed in Q3 2019

Planning area	Project priorities	Proposed timelines
	General review of licensing procedures for space-based communications systems	<b>CHANGE</b> Q4 2019/Q1 2019
	Review spectrum arrangements for small satellites	<b>CHANGE</b> Q4 2019
	<b>NEW</b> Consult on update for <a href="#">Radiocommunications (Foreign Space Objects) Determination 2014</a>	Q3/4 2019
	Consider applications for test and demonstration purposes in the 2 GHz band	Ongoing
	Manage filing and coordination of Australian satellite systems	Ongoing
Low interference potential devices (LIPD)	Completion of consideration of proposed update of the LIPD class licence to respond to industry requests	Completed in Q3 2019
Internet of Things	Facilitation of early access to the 928–935 MHz band for low-power wide-area IoT applications	Ongoing
Spectrum Licence Technical Framework review	Commence discussion with industry on a potential program of work for the review of spectrum licensing technical arrangements in relation to new technology developments	Q4 2019
Amateur service in the frequency band 5351.5–5366.5 kHz	Discussion paper on implementation issues	Q1 2020
<b>NEW</b> Spectrum sharing approaches	Discussion paper and tune-up event on spectrum sharing issues.	Released in Q3 2019: discussion paper  Completed in Q3 2019: tune-up event

**Table 4: Forward allocation work plan**

Project priorities	Proposed timelines—next steps
26 GHz	<b>NEW</b> Q3 2019: recommendation to minister
850/900 MHz	<b>NEW</b> Q2 2020: recommendation to minister
3400–3575 MHz	<b>CHANGE</b> Q4 2019 onwards: implementation of planning decisions
28 GHz	<b>NEW</b> Q3 2019: planning decision

**Table 5: Spectrum management practice improvements**

Project priorities	Proposed timelines
Five-year spectrum outlook/Annual work program	Q3 2019: publish final program Q2 2020: consult on draft work program for the next year
<b>NEW</b> Interference management	Q4 2019: finalise interference management principles
Pricing review implementation	<b>CHANGE</b> Q4 2019: consult on draft Spectrum Pricing Guidelines and potential new cost recovery proposals
<b>NEW</b> Improving transparency of the spectrum planning framework	Under consideration for 2019–20

**Table 6: Licensing and licensing systems**

Project priorities	Proposed timelines
<b>NEW</b> Amateur certificates of proficiency—update syllabi	Q4 2019: establish a Syllabus Review Panel
Consideration of changes to amateur licence conditions	<b>CHANGE</b> Q3/4 2019: amend amateur licence conditions
<b>NEW</b> Trial of mobile phone jammers at Goulburn Correctional Complex	Q4 2019: commence trial
Changes to VHF marine radio channels and their use	<b>CHANGE</b> Ongoing: work with industry, noting outcomes of WRC-19
400 MHz band	Final milestone period of the 400 MHz implementation project in 2019–20
<b>NEW</b> Review of prohibition declarations and exemption determinations	Q4 2019: consultation paper
Consult on any required changes to regulatory arrangements for counter-drone equipment	2019–20: consultation

Project priorities	Proposed timelines
<b>NEW</b> Explore the design of an area-wide apparatus licence	Completed in Q3 2019: consultation on framework for an area-wide apparatus licence  Q4 2019: implement framework for an area-wide apparatus licence
Review of non-assigned amateur and outpost licensing arrangements with a view to reform	Q4 2019: consultation
<b>NEW</b> Review of elements of existing apparatus licensing framework	2019–20: consideration in the context of any proposed legislative reform

**Table 7: Pricing**

Project priorities	Proposed timelines
Implementation of spectrum pricing review	<b>CHANGE</b> Q4 2019: publish ACMA approach to implementing the Spectrum Pricing Review  Q4 2019: consult on draft Spectrum Pricing Guidelines and potential new cost recovery proposals  Q2 2020: consult on draft approach to new spectrum pricing formula
Commercial broadcasting tax arrangements	Ongoing assessment of taxes throughout 2019–20
Preparation for review of <a href="#">Commercial Broadcasting (Tax) Act 2017</a>	<b>CHANGE</b> Q4 2019: announcement regarding review
400 MHz opportunity-cost pricing	Continued semi-regular monitoring of band use
Consultation on the adjusting of apparatus licence taxes for inflation and removing the freeze on taxes for fixed services in remote-density areas below 960 MHz	<b>CHANGE</b> Q4 2019: this may be combined with consultation on the Spectrum Pricing Review

**Table 8: Compliance and enforcement**

Project priorities	Proposed timelines
<b>NEW</b> Compliance audits focused on small cell deployments by mobile network operators	2019–20
Licensing integrity program maximising utility of licensed spectrum use by addressing unlicensed activity	2019–20
<b>NEW</b> Compliance audits focussing on suppliers of solar inverters	2019–20

**Table 9: Consultation plans**

This table summarises consultations flagged throughout the draft FYSO from July 2019 onwards. The list of consultations here is subject to change.

Issue	Proposed timelines
<b>NEW</b> Spectrum sharing approaches discussion paper	Released in Q3 2019
2 GHz (1980–2010 and 2170–2200 MHz) review	<b>CHANGE</b> Released in Q3 2019: discussion paper <b>CHANGE</b> Q1 2020: possible options paper
3700–4200 MHz review	<b>CHANGE</b> Released in Q3 2019: discussion paper <b>NEW</b> Q1 2020: possible options paper
Feasibility of inclusion of 10.7–11.7 GHz in <a href="#">Radiocommunications (Communication with Space Object) Class Licence 2015</a> —discussion paper	<b>CHANGE</b> Released in Q3 2019
<b>NEW</b> Consult on whether the Hobart RA3 community radio licence area should be deemed to be the same as the Hobart RA1 commercial radio licence area for the purpose of digital radio—consultation paper	Released in Q3 2019
1800 MHz (1710–1785 MHz and 1805–1880 MHz) in remote areas—discussion paper	<b>CHANGE</b> Q4 2019
AM to FM conversion consultations for Riverland, Murray Bridge, Spencer Gulf North and Port Lincoln	<b>CHANGE</b> Q3 2019
General review of space licensing procedures—consultation paper	<b>CHANGE</b> Q4 2019/Q1 2020

Issue	Proposed timelines
<b>NEW</b> Update on <a href="#">Radiocommunications (Foreign Space Objects) Determination 2014</a> —consultation paper	Q3/4 2019
Consultation on the adjusting of apparatus licence taxes for inflation and removing the freeze on taxes for fixed services in remote density areas below 960 MHz	<b>CHANGE</b> Q4 2019
Spectrum arrangements for small satellites—discussion paper	<b>CHANGE</b> Q4 2019
<b>NEW</b> Future delivery of radio services in Australia—consult on draft findings	Q4 2019
AM to FM conversion proposals in Taree and Grafton	<b>CHANGE</b> Q4 2019
<b>NEW</b> Review of prohibition declarations and exemption determinations—consultation paper	Q4 2019
Consultation on Spectrum Pricing Guidelines	<b>CHANGE</b> Q4 2019
Non-assigned amateur and outpost licensing arrangements	Q4 2019
Digital radio channel plans for a number of regional radio licence areas	<b>CHANGE</b> Q1 2020
Publish principles for determining whether specified community radio licence areas should be deemed to be the same as specified commercial radio licence areas for the purpose of digital radio	<b>CHANGE</b> Q1 2020
Amateur service in the frequency band 5351.5–5366.5 kHz—discussion paper on implementation issues	Q1 2020
Potential for replanning analog radio services in Perth, following the clearance of Band II television in Bunbury—consultation paper	<b>CHANGE</b> Q2 2020
<b>NEW</b> Draft approach to new spectrum pricing formula—consultation	Q2 2020
Five-year spectrum outlook/Annual work program—consultation on draft	Q2 2020
Any further required changes to regulatory arrangements for counter-drone equipment	2019–20

## **FYSO 2018–22 progress report**

The [FYSO 2018–22 annual progress report](#) outlines the extent to which the ACMA delivered the activities indicated in the most recent FYSO.

The ACMA is committed to giving regular updates on processes and explanations of changes to plans.

The report has nine tables that show the ACMA's 2018–19 work program for 1 July 2018 to 30 June 2019.

# Part 1—Five-year spectrum outlook

## Introduction

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

The ACMA takes account of a range of factors in planning its spectrum management work. We monitor developments in radiocommunications technology, including equipment availability, in spectrum use markets and in the broader policy environment, to inform our allocation of resources.

## Anticipated change drivers

Demand for new spectrum and for changes to existing arrangements continues to evolve quickly. The ACMA regularly reassesses its work priorities, as new opportunities arise, to maximise the overall public benefit derived from allocating and using spectrum.

International trends driving demand for spectrum include the appetite for wireless broadband, particularly in the context of 5G services, ongoing commercialisation of Internet of Things (IoT) applications, advances in broadcasting technology, rapid innovations in satellite technologies, and new approaches to spectrum sharing.

The three-to-four-yearly WRC meeting will be held in October–November this year where several important international harmonisation issues will be discussed. The ACMA will consider the outcomes of WRC-19 in developing the annual spectrum management work program for 2020–21 in the FYSO 2020–24.

As technology develops, it is able to use available spectrum more efficiently. Examples include more efficient radiocommunications transmission and encoding technologies, and improved antenna technology that provides greater options in the use of high frequency bands.

Demand for spectrum is often influenced by the state of competition in downstream markets and the desire to gain a competitive advantage over rivals. The ACMA intends to further develop its consideration of the impact of spectrum allocation on downstream markets, in particular the state of, and opportunities for, competition in those markets, in future FYSOs. The ACMA will seek input from stakeholders as part of ensuring competition is considered holistically in the planning and management of spectrum.

The ACMA's spectrum planning work program supports the evolution of technical frameworks that support more efficient technologies within an existing use.

The ACMA's response to these demand pressures for 2019–20 is outlined in more detail in the planning and allocation work stream activities in Part 2.

Part 1 (the five-year spectrum outlook) does not give timing commitments as experience shows the relative priority of work in future years is liable to change. The intention here is to alert stakeholders to the medium and longer-term pressures that are shaping our immediate work program and informing future work programs.



## Wireless broadband, including 5G

Demand for spectrum to support wireless broadband, including both mobile and fixed applications, continues to be a major driver for changes in highest-value spectrum use across bands.

Mobile broadband applications continue to be a significant source of demand. We anticipate further spectrum will be needed to support the growth in broadband applications and mobile data. In addition, regulatory arrangements for broadband need to remain current and support the latest technology developments.

The current FYSO, including the forward allocation work plan and reflecting the [\*Mobile broadband strategy—The ACMA's spectrum management strategy to address growth in mobile broadband capacity\*](#), outlines the ACMA's response to wireless broadband spectrum demand.

The ACMA recognises three broad categories of wireless broadband use and notes that deployments in practice may reflect combinations of these categories.

The first is that of wide-area subscriber networks, served by ubiquitous base stations operated by one or more mobile service providers—this category could be considered 'conventional' telecommunication carrier 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.

The ACMA continues to provide support for local area fixed wireless access (FWA). Services provided by Wireless ISPs (WISPs) are a good example of this type of use. Many of the bands that are suitable for FWA are subject to spectrum licensing in the relevant geographical areas. Spectrum licensing arrangements may not be ideal for small and medium enterprises (SME), and apparatus-licensed arrangements are often preferred. Part 2 discusses 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:

- > 5.6 GHz band (5600–5650 MHz) arrangements shared with weather radar
- > 26 GHz (24.25–27.5 GHz) and 28 GHz (27.5–29.5 GHz)
- > 3700–4200 MHz
- > a number of sub-6 GHz bands that may be candidates for new spectrum-sharing approaches.

The final 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 facility.

The rapid development of the next generation of wireless broadband technology, known as 5G, has emerged as a key driver of change to existing spectrum arrangements. This is due to:

- > the potential for re-farming additional spectrum bands to support its deployment
- > the characteristics of 5G (such as the need to accommodate broader channel bandwidths)
- > some of the bands into which 5G will be introduced challenge us to consider new ways to plan and license that spectrum.

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.

The definition of 5G and related spectrum harmonisation and technology specifications and standards have continued to mature. Work has progressed in the International Telecommunication Union Radiocommunication Sector (ITU-R) to define IMT-2020<sup>3</sup>, and spectrum harmonisation considerations relating to the WRC 2019. The 3rd Generation Partnership Project (3GPP) continues to develop 5G-related specifications in Release 15 and Release 16.

Key characteristics of 5G that distinguish it from previous developments continue to include:

- > support for very low latency and ultra-reliable communications
- > enhanced mobile broadband enabling data rates exceeding that of Long Term Evolution (LTE)/4G
- > an 'anytime, anywhere, anyone and anything' capability, which is anticipated to play a role in supporting multiple-device machine-to-machine communications and a wider deployment of IoT
- > use of frequency ranges in the previously little-used millimetre wave (mmWave) bands<sup>4</sup>
- > use of broader channel bandwidths than are currently used for wireless broadband services, particularly in the mid and high bands where channel bandwidths of hundreds of MHz are being contemplated.

From a spectrum management perspective, 5G will utilise spectrum across an unprecedentedly 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 mmWave bands.

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.

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<sup>3</sup> Report [ITU-R M.2410-0](#) Minimum requirements related to technical performance for IMT-2020 radio interface(s), completed in November 2017.

<sup>4</sup> 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.

This re-farming will require the ACMA, in conjunction with licensees and other potentially affected parties, to revise existing technical frameworks to ensure they are compatible with 5G by permitting implementation of the related technology advances.

Globally, 5G is seen as having potentially revolutionary economy-wide benefits, including in areas not traditionally associated with fixed and mobile wireless broadband. The ACMA contributes to the work of the government's working group to drive the deployment of 5G mobile technology in Australia.<sup>5</sup>

In April 2018, DoCA released the [Impacts of 5G on productivity and economic growth](#) research paper which conservatively estimated that 5G is likely to improve productivity across the economy. This could add an additional \$1,300 to \$2,000 in gross domestic product per person after the first decade of the rollout.

The ACMA acknowledges the importance of addressing the 5G spectrum needs and is committed to ensuring that Australia is well placed to take advantage of the opportunities offered by 5G. The ACMA continues to implement arrangements to support the rollout of 5G services in Australia, across a number of bands.

Each of the broad bands identified for wireless broadband (sub 1 GHz, 1–6 GHz, above 6 GHz) requires a specific approach by the ACMA. This is because different considerations apply, such as intrinsic features of the band—for example, propagation characteristics, as well as international harmonisation and standardisation, 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 850 MHz spectrum licences
- > implementing the existing planning decision to make additional spectrum available for mobile broadband in the 850 MHz expansion band (809–824 MHz and 854–869 MHz).

#### ***Mid-band spectrum***

The mid-band between 1 and 6 GHz is currently the focus of near-term 5G deployments, particularly around 3.4–3.7 GHz in Australia. In December 2018, the ACMA successfully allocated 125 MHz of spectrum in the 3.6 GHz band (3575–3700 MHz), in metropolitan and regional areas.

The ACMA also sees a major opportunity for efficiency gains through the defragmentation of the current 3400–3575 MHz frequency range. This will require both industry commitment and ACMA assistance to achieve. As well as the 1.5 GHz band (1427–1518 MHz), there are several other potential areas of investigation in the mid-bands. Some stakeholders have indicated interest in planning for private LTE networks in mid-band spectrum, such as 1.5 GHz.

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<sup>5</sup> See <https://www.communications.gov.au/departmental-news/5g-working-group-convenes>.

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 considering arrangements in the band. The ACMA is paying close attention to the global environment in this band and has released a discussion paper to commence a broad review of arrangements in the 3700–4200 MHz band, which is discussed in Part 2.

### **High-band spectrum**

The ACMA's consideration of high-band spectrum for wireless broadband is focused on the mmWave in the bands above 24 GHz. Part 2 describes the ACMA's proposed next steps in relation to the 26 and 28 GHz bands.

Higher in the spectrum, the ACMA has recently consulted<sup>6</sup> on changes to class-licensing arrangements to support additional spectrum in the 60 GHz range for wireless data communications systems (including those supporting 5G). An update to [Radiocommunications \(Low Interference Potential Devices\) Class Licence 2015](#) (the LIPD class licence) was recently released which varied and expanded existing 60 GHz arrangements. Further details can be found in Part 2 under 'Low interference potential devices' in 'Optimising established planning frameworks'.

Along with the ACMA's efforts to make further spectrum available for wireless broadband, there are continuing opportunities for spectrum users to enter into commercial arrangements to share infrastructure or spectrum in a way that will realise more efficient spectrum use.

Achieving more efficient configuration and use of bands that are already licensed for wireless broadband is a vital adjunct to the clearance and reallocation of new bands to address rising demand for wireless broadband. In part, this obligation must fall on existing licensees, as well as the regulator, to ensure that the market works to achieve defragmentation and reconfiguration of existing holdings to maximise the overall utility of bands.

In addition to the planning and allocation activities currently underway, the ACMA continues 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-19 agenda item 1.13'). These bands are generally less mature in terms of harmonisation, standardisation and international implementation of 5G.

However, the ACMA acknowledges that spectrum between 37–43.5 GHz is of significant interest for both terrestrial 5G and satellite broadband services—the United States (US), for example, has established arrangements supporting both services. The ACMA 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 37–43.5 GHz band is appropriate. The ACMA notes that the case for replanning of part of this band for satellite services may be appropriate regardless.

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<sup>6</sup> See <https://www.acma.gov.au/theACMA/class-licensing-updates-supporting-5g-and-other-technology-innovations>.



## Machine-to-machine communications and the Internet of Things (IoT)

The IoT potentially involves unprecedented numbers of wireless and wired interconnections of personal, consumer and industrial devices supporting a range of applications.

It 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, dedicated terrestrial IoT technologies have been developed and deployed that usually utilise class-licensed bands, and multiple satellite systems are also in use or in development to enable IoT in a range of dedicated satellite bands.

Devices providing industrial metering, switching and/or control (including smart infrastructure) are a subset of IoT communications technologies that have been of interest in recent years. They require very low data rates and/or very low duty cycles and operate in low-power wide-area (LPWA) networks.<sup>7</sup> An international market has emerged for LPWA networks and devices that operate in the 900 MHz band.

Separately, mobile network operators 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. A recent example is the inclusion of spectrum around 400 MHz in the [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#) in 2018.<sup>8</sup>



## Future delivery of broadcasting services

The ACMA's management of spectrum to support broadcasting services will need to consider the evolution of broadcasting services and their audiences.

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. 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, the ACMA has actively supported new technology trials, such as the DVB-T2 trials for television that commenced in Q2 2019. The ACMA continues its work in facilitating the progressive

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<sup>7</sup> For information on IoT technologies see the IoT Alliance Australia publication: IoT Alliance Australia, [Internet of Things Platform Selection Guideline](#), July 2018.

<sup>8</sup> See <https://www.acma.gov.au/Home/theACMA/changes-to-legislation-supporting-space-based-communications>.

migration of legacy AM services in solus markets to FM services. Similarly, the ACMA continues to progress the roll-out of digital radio into regional Australia.

The ACMA is investigating the future delivery of radio broadcasting services in Australia to facilitate a discussion with industry on the issues and opportunities with current and new delivery systems, and the impact on metropolitan, and regional and remote markets.

This will inform a comprehensive assessment of radio broadcasting delivery issues and develop a common understanding of those issues that will have benefits for the public and industry in the long term.



### **Satellite communications**

There is continuing growth and innovation in the provision of satellite-delivered telecommunications and in space science services. These changes are increasing pressure both internationally and domestically to ensure that regulatory arrangements support this change. This can result in both the establishment of new spectrum access arrangements and the refinement of existing ones.

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. This changed environment has also increased the opportunity for academic and scientific space missions, often of short duration.

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 recently been growth in satellite broadband high throughput systems (HTS) that increase the demand for spectrum arrangements to support ubiquitous earth stations for user terminals and for supporting gateway earth stations.

The current Australian spectrum management framework already provides for ubiquitous, uncoordinated earth stations suitable for broadband HTS (using 1.55 GHz total uplink/downlink spectrum in Ku band and 2.6 GHz in Ka band). Parts of the satellite industry have suggested that additional spectrum in both bands is required to support planned satellite systems and expected future growth in satellite broadband HTS requirements.

The ACMA is investigating possible changes in both the Ku band for additional downlink spectrum shared with terrestrial fixed links in 10.7–11.7 GHz and the Ka band in the context of the 28 GHz band review that considers spectrum in the uplink range of 27.5–29.5 GHz. The ACMA acknowledges that downlink spectrum

arrangements in the Ka band would need to be reviewed if changes are made in the uplink (28 GHz) band.

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 recent innovation has resulted from technology developments that enable moving earth stations (also referred to as 'earth stations in motion' (ESIMs) communicating with space stations in the fixed satellite service bands (FSS)<sup>9</sup>. The ACMA has, on two occasions<sup>10</sup>, established interim arrangements supporting ESIMs in parts of the Ka band prior to international regulatory arrangements being established. The ACMA also recently finalised the establishment of arrangements supporting ESIMs in Ku band.<sup>11</sup>



### **CHANGE** Government spectrum requirements

Government spectrum users primarily incorporate commonwealth and state agencies responsible for the provision of defence, national security, law enforcement, and emergency services, as well as scientific, meteorological and transport services.

Generally, government spectrum users operate within the same spectrum management framework as all other users. However, in recognising their unique needs and responsibilities, on some occasions government spectrum needs require specific consideration. The ACMA's interaction with the government spectrum community is extensive, typically on a business as usual, rather than major project, basis. Here we outline some of the medium-term drivers of change from this sector.

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. The ACMA also works with a range of commonwealth and state-based law enforcement and emergency services bodies to accommodate their critical, and often unique spectrum needs.

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

We continue to work with law enforcement agencies to assist with operation under the [Radiocommunications \(Prohibited Devices\) \(Use of Electronic Counter Measures for Bomb Disposal Activities\) Exemption Determination 2010](#) and are working with DoCA and the Department of Home Affairs towards putting in place similar measures to support countermeasures against remote piloted aircraft systems (RPAS, or drones).

The ACMA has been monitoring RPAS regulatory arrangements, both internationally and within the Civil Aviation Safety Authority (CASA), as a precursor to reviewing

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<sup>9</sup> 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.

<sup>10</sup> For example in advance of WRC-19 (see [Regulatory arrangements for GSO and NGSO ESIMS](#)) and WRC-15.

<sup>11</sup> See <https://www.acma.gov.au/theACMA/earth-stations-in-motion-in-ku-band>.

planning and licensing arrangements for RPAS command and control radiocommunications systems.

Currently, these systems are generally authorised under the LIPD class licence, however in the medium term the ACMA may look at 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).

The necessity of, and planning arrangements 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 certain classes of airspace—other consumer RPAS would continue to operate under the LIPD class licence.



### **New approaches to 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 uses (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.

In practice, DSA approaches have relied on a hierarchical access approach, where lower-tier users<sup>12</sup> dynamically give way to higher-tier users. Clarity on tier rights is important as it provides confidence to each user about the terms of spectrum access, which allows an assessment of whether the access is suitable to their needs.

Tiered sharing works best when the users are complementary in nature—for example, when one user's usage is intermittent (often the top-tier user) and the lower-tier user can accept that in some circumstances they will need to cease operations for some time. If this condition cannot be met, then enough spectrum is needed to ensure there is a high probability of enough clear, unused, spectrum being available to meet all user needs. Lower-tier users are unlikely to invest in expensive infrastructure without sufficiently reliable spectrum access.

DSA implementations to date have been limited, in part due to technological constraints, spectrum availability factors and user expectations. To date, regulatory

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<sup>12</sup> In this context, a lower-tier user is a user that has lower priority compared to another user under a DSA arrangement.

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) and Ofcom.

The ACMA will continue to monitor international regulatory and technical developments and investigate and implement new sharing opportunities, such as DSA arrangements when and where appropriate. The ACMA is also aware of related regulatory approaches to sharing, such as licensed shared access and is monitoring technological developments that could facilitate more intensive spectrum sharing.

To facilitate a discussion with industry to share ideas 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.



### **Class licensing and the spectrum commons**

Significant changes in demand for spectrum in class-licensed bands, including Wi-Fi, is monitored through the ACMA’s active environmental awareness and stakeholder feedback.

Class licensing is the approach used in Australia to implement less closely managed spectrum arrangements, including ‘spectrum commons’. The fundamental idea of a spectrum commons is that anyone can use commons spectrum, so long as they follow the set rules<sup>13</sup>—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 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.

In Australia, the LIPD class licence authorises most class-licensed devices, including Wi-Fi and Bluetooth services along with a range of other uses including certain spread spectrum and ultra-wideband transmitters.

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 individual devices from interference cannot be guaranteed. This relatively low level of interference protection means that these bands are not useful for all applications. 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 MHz–2483.5 MHz) and

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<sup>13</sup> See also M Cave and W Webb, *Spectrum Management*, Cambridge University Press, Cambridge, 2015, p. 5 and Chapter 8.

5 GHz (5725–5875 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) traffic<sup>14</sup> with Wi-Fi networks almost ubiquitous in homes and businesses along with many public spaces. There are regular questions about whether the class-licensed bands used for Wi-Fi are victims of their own success and are experiencing spectrum congestion due to their utilisation. These questions are hard to answer definitively. 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.

The ACMA will continue to review class licensing arrangements to assess whether regulatory settings can be changed to support the ongoing benefits derived from RLANs and Wi-Fi. Considerations will include whether more spectrum is required and if changes to existing arrangements are necessary. For example, the ACMA 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.

As described in this (see Part 2) and previous FYSOs, the ACMA regularly updates class licences to improve their operation and reflect changes in demand for access to class-licensed spectrum. The ACMA monitors and, if appropriate, responds to, developments in Wi-Fi and RLAN technology. The ACMA recently made spectrum available via class licensing in the 66–71 GHz frequency range expected to support wireless gigabit RLANs—for example, utilising IEEE 802.11ad.

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 commenced a notice of proposed rulemaking proposing rules in the 5925–7125 MHz band that would support Wi-Fi use.<sup>15</sup> This would create over another 1 GHz of spectrum available for Wi-Fi in this band. However, internationally both the microwave fixed link and satellite industry have expressed concerns about these proposals. The ACMA 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 will monitor both domestic and international factors that inform consideration of future changes to class licensing arrangements in Australia.



### **CHANGE** Amateur radio

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

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<sup>14</sup> Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2015-2020, 3 Feb. 2016, pp. 24–25, available at <http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.pdf>.

<sup>15</sup> See FCC preceding ET [18-295](https://docs.fcc.gov/public/attachments/DOC-354364A1.pdf) 'Unlicensed Use of the 6 GHz Band' and summary fact sheet at <https://docs.fcc.gov/public/attachments/DOC-354364A1.pdf>.

The ACMA's amateur-related work program is multidimensional. The ACMA supports the amateur service through planning arrangements which 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.

The ACMA's amateur-related work program for 2019–20 also includes management of licensing and the arrangements for the qualification of amateur operators.

# Part 2—Proposed 2019–20 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 2019–20 financial year. The planning information also reflects expected developments over a five-year timeframe.

Where elements of planning, allocation and activities to improve spectrum management span multiple years, we have identified the relevant timing information. Activities are grouped according to the ACMA's main spectrum management functions:

- > international engagement
- > planning
- > allocations
- > regulatory review and reform
- > licensing
- > pricing
- > compliance and enforcement.

The planned milestones, including those relating to 2019–20, are subject to change. The ACMA is continually monitoring factors that may impact spectrum management including any short-term changes in spectrum demand, technological developments, government priorities and available resourcing.

The ACMA is also working with DoCA to consider potential changes to spectrum management legislation. 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, the ACMA considers 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 through the four-yearly ITU-R WRC process
- > the least cost and least restrictive approach to achieve policy objectives.



# International engagement

The ACMA, DoCA, 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 RRs, the international treaty level document regarding use of the spectrum and satellite orbits.

The next WRC will be held from 28 October–22 November 2019 (WRC-19) in Sharm El-Sheikh, Egypt. WRC-19 will consider a large agenda concerning a range of new frequency allocation and procedural matters, including possible allocations for satellite services and identification of spectrum suitable for 5G services. DoCA will lead the Australian preparatory processes and 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 of significance to Australian spectrum management, including ITU-R study groups and working parties, and the APT Wireless Group (AWG). The ACMA manages Australian input and participation in these meetings in consultation with DoCA and industry.

The ACMA also undertakes 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.

## **CHANGE** International meetings 2018–19

ACMA staff headed delegations to several ITU-R meetings during 2018–19, including meetings of Task Group 5/1 and Study Groups 4 and 5 and their associated working parties, and regional AWG meetings. The ACMA also supported industry-led Australian delegations to ITU-R Study Groups 3, 6 and 7 and their associated working parties.

The ACMA supported DoCA by providing the Deputy Head of Delegation (and other delegates with subject matter expertise) to the fourth and fifth meetings of the APT Conference Preparatory Group (Asia Pacific) (APG19), with APG19-4 held from 7–12 January 2019 in Busan, Republic of Korea (South Korea) and APG19-5 held from 31 July–6 August 2019 in Tokyo, Japan. The APG19-4 meeting determined preliminary APT views in preparation for the second meeting of the Conference Preparatory Meeting (CPM) for WRC-19 (CPM 19-2). The APG19-5 meeting determined the final preliminary APT views in preparation for the WRC-19 in November 2019. The ACMA's Chris Hose has also taken on the role of acting Vice Chairman of the APG to assist the Asia Pacific region's preparation for the WRC.

The ACMA also provided staff and the Deputy Head of Delegation at CPM 19-2, which met from 18–28 February 2019 in Geneva, Switzerland, and finalised a consolidated report to WRC-19 on ITU-R preparatory studies undertaken since 2015. The CPM

report included possible solutions to address WRC-19 agenda items to be used in support of the work of WRC-19.

Developments in international band planning are being actively considered in the lead up to WRC-19, and these may have an impact on the ACMA's spectrum management activities for 2019–20.



## **New and ongoing activities planned for 2019–20**

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

In addition to WRC-19, the ACMA will provide input into development of Australian positions for key ITU and APT radiocommunication meetings during 2019–20, such as the:

- > APG19 for WRC-19, the fifth and final meeting (31 July to 6 August 2019) (APG19-5)—completed
- > ITU's Radiocommunication Assembly 2019 (21–25 October 2019)
- > first CPM for WRC-23 (25–26 November 2019).

DoCA will lead the delegation to these meetings with the ACMA closely involved in supporting Australian preparatory processes and providing technical expertise.

Supporting these meetings will require significant input from ACMA planning and engineering staff and will be a priority for the ACMA in 2019–20.

Australia participated in other recent ITU-R and APT forums, including the 25th meeting of the AWG (1–5 July 2019) and the meetings of ITU-R Working Parties 4A, 4B and 4C (19 June to 4 July 2019).

# Planning

Planning is informed by domestic and international trends in spectrum uses, developments in international spectrum harmonisation and technology standardisation, and evolution of communications technology.

The ACMA aims to optimise planning 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 to users 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, the ACMA 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.

Consulting where appropriate with existing and future users, the ACMA will then consider how best to accommodate additional uses or users within the available spectrum. In considering replanning options, the ACMA will seek 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. However, there can be no guarantee that all incumbent users will have an alternative arrangement following a necessary band clearance activity.

Planning activities are directed into two main streams:

- > major band planning and replanning activities to support the establishment of new spectrum uses
- > optimising established planning frameworks for existing spectrum use through updating technical coordination arrangements.



## 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 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 is dependent on when WRC changes come into effect (typically approximately one year after the WRC), it is expected that the ACMA will commence scoping this work after WRC-19 in Q1/2 2020.

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



## Major replanning progress achieved since FYSO 2018–22

- > 3.6 GHz band (3575–3700 MHz)—in December 2018, the ACMA successfully allocated 125 MHz of spectrum in the 3.6 GHz band in metropolitan and regional areas.
- > 5.6 GHz band (5600–5650 MHz)—in December 2018, the ACMA published Radiocommunication Assignment and Licensing Instruction (RALI) FX23 describing frequency coordination for fixed point-to-multipoint services including FWA in the 5.6 GHz band.
- > 900 MHz band (890–915 MHz and 935–960 MHz)—the ACMA has continued to engage with stakeholders to firm up implementation timeframes for the reconfiguration of the 900 MHz band to optimise the band’s planning arrangements for LTE services.
- > mmWave spectrum for 5G—the ACMA released two consultation papers in September 2018, which considered planning options for 5G in the 26 GHz band (24.25–27.5 GHz) and discussed the suitability of the 28 GHz band (27.5–29.5 GHz) for a broad range of users and service types, including 5G. A decision paper on the 26 GHz band was released in April 2019. In December 2018, the ACMA commenced consultation on proposed updates to class licensing arrangements which included additional spectrum in the 60 GHz range for data communication systems, including 5G.

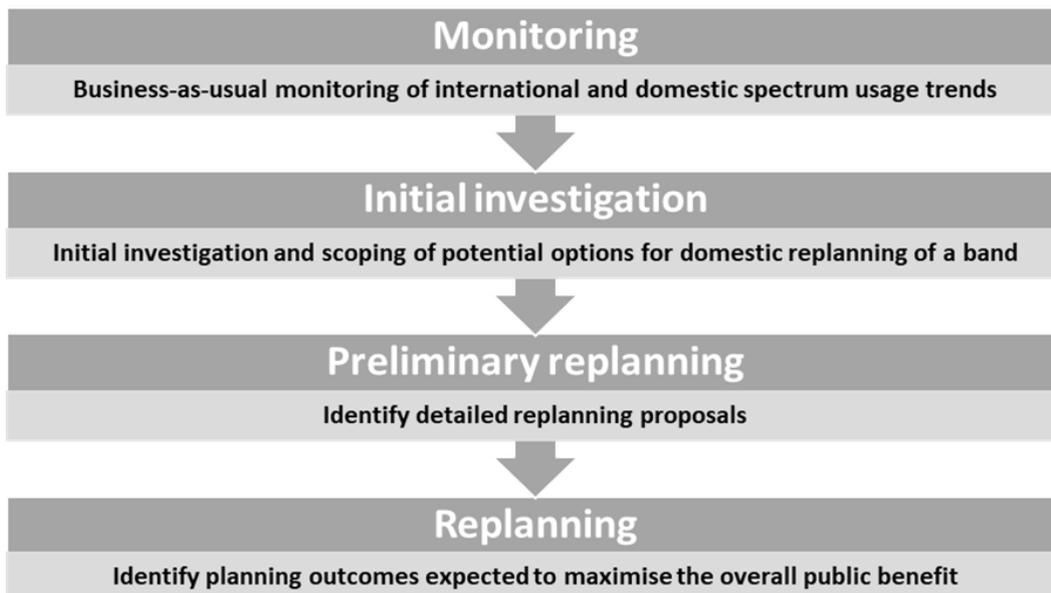
## Major band planning and replanning activities

This section provides an overview of the ACMA’s work in establishing new planning frameworks, including other major band re-farming and reallocation activities.

For allocation of spectrum resulting from major band replanning activities, see ‘The forward allocation work plan’ below.

Bands listed are categorised into the ACMA’s four planning stages, shown in Figure 1.

Figure 1: Four stages in spectrum management band planning



## Monitoring

In the *monitoring* stage, the ACMA maintains 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 the ACMA apprised of relevant developments and issues.

In general, the ACMA sees bands and issues included at the *monitoring* stage as representing potential work items beyond its immediate 12-month work program.



### 600 MHz (617–698<sup>16</sup> 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.

Monitoring of this band is consistent with the Australian Government's interest in considering the long-term availability of the television 'sixth channel' for non-broadcasting uses.<sup>17</sup>

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. There are no current government or industry plans for technical standards migration of television or the reconfiguration of television channels. The sixth channel could also support scenarios in which national broadcasting services were consolidated onto a single multiplex in each area, potentially freeing up an additional channel for broadcasting or other uses.

### **Recent developments**

The FCC incentive auction (closed on 30 March 2017) resulted in a repurposing of 84 MHz of spectrum—70 MHz for licensed use and another 14 MHz for wireless microphones and unlicensed use.<sup>18</sup>

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.

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<sup>16</sup> 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.

<sup>17</sup> See the former Minister for Communications Malcolm Turnbull's speech to RadComms 2014, available at [www.malcolmturnbull.com.au/media/radcomms-2014-spectrum-in-the-age-of-digital-innovation](http://www.malcolmturnbull.com.au/media/radcomms-2014-spectrum-in-the-age-of-digital-innovation).

<sup>18</sup> Information available on the [FCC website](#).

## Monitoring

ITU-R Working Party 5D is continuing the revision of Recommendation ITU-R M.1036-5 on frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the RRs.

### **Next steps**

The ACMA will continue to monitor international developments. In particular, the implementation of the results of the incentive auction process in the US will be of key interest.

The ACMA will continue to engage with industry and government as required on technological evolution of terrestrial digital television, including DVB-T2 and HEVC standards. Adoption of these technologies is likely to be a prerequisite for any future reallocation of broadcasting spectrum for non-broadcasting uses, though it is also key to the more efficient use of spectrum by the television industry itself. Both the government and the ACMA have emphasised the availability of 'sixth channel' spectrum for trialling the new standards.



### **NEW** 1900–1920 MHz

The 1900–1920 MHz band is allocated in the ARSP to the Fixed and Mobile services on a primary basis. There are arrangements in place for point-to-point and point-to-multipoint licensing in the band 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, use of it domestically for wireless broadband services has been low in metropolitan, regional and remote areas.

### **Next steps**

The ACMA will monitor developments in the 1900–1920 MHz band.



### **CHANGE** 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 via 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.

### **Recent developments**

ITU-R Working Party 5D had developed draft a revision of Recommendation ITU-R M.1036-5 on frequency arrangements for implementation of the terrestrial component of IMT in the bands identified for IMT in the RRs. The draft revision includes arrangements for 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 draft new report ITU-R M. [RADAR&IMT SHARING].

## Monitoring

The revisions to Recommendation ITU-R M.1036-5 and the draft new report are expected to be adopted by the ITU-R by the end of 2019. The AWG has a work plan to develop a recommendation or report on harmonised frequency arrangement(s) for the 3.3 GHz band. 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 being 3.3–4.2 GHz.

Due to the current availability of equipment, WISPs and other FWA operators have also expressed interest in accessing the band.

### 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 service worldwide. In Australia, the band is designated to be used principally for the purposes of defence and national security via 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.

The 4.5 GHz band was not identified for IMT at WRC-15 despite strong interest from China, Japan and Republic of Korea (South Korea).

Since then, there has been increasing interest in this band, particularly from ITU Region 3 countries. In June 2016, Japan's Ministry of Internal Affairs and Communications (MIC) named the 4.4–4.9 GHz band as a nationally suitable candidate band for 5G.<sup>19</sup> There is some interest from domestic fixed and mobile wireless broadband interests in pursuing this band for mobile broadband in Australia.

### Next steps

The ACMA will continue to monitor developments in this band.



### 4.8 GHz (4800–4990 MHz)

At WRC-15, the 4.8 GHz band was identified for IMT by several countries, including Uruguay, Cambodia, Laos and Vietnam. Notably, there was also strong interest from China and Japan in identifying the band for IMT. 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 the 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-

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<sup>19</sup> GSA—Global mobile Suppliers Association, [The case for new 5G spectrum](#), November 2016.

## Monitoring

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.<sup>20</sup>

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**

ITU-R Working Party 5D is continuing the revision of Recommendation ITU-R M.1036-5 on frequency arrangements for implementation of the terrestrial component of IMT in the bands identified for IMT in the RRs. The draft revision includes arrangements for 4.9 GHz band. Working Party 5D is also continuing studies called for in Resolution **223 (Rev. WRC-15)** on the coexistence conditions between IMT and aeronautical mobile services in the band, with work currently underway to develop sharing characteristics for IMT-2020 in this band.

Separately, the 4940–4990 MHz band is included in IEEE standard 802.11y Public Safety Wireless Local Area Network (WLAN) but 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. To help foster markets for public safety-grade 5G equipment in this band, the ACMA recently led an Australian proposal to update the relevant ITU-R band plan (Recommendation ITU-R M.1826) to include provisions for up to 50 MHz 5G channels bandwidths. This proposal was agreed at the May 2019 meeting of ITU-R Working Party 5A.

### **Next steps**

The ACMA will continue to monitor developments in this band.



### **Bands being studied under WRC-19 agenda item 1.16**

WRC-19 agenda item 1.16 considers issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands 5150–5350 MHz (to enable outdoor usage), 5350–5470 MHz, 5725–5850 MHz and

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<sup>20</sup> In accordance with ITU-R Resolution **646**.

## Monitoring

5850–5925 MHz, while ensuring the protection of incumbent services including their current and planned use.

There was initially strong interest from the US and the United Kingdom (UK) to investigate use of the 5350–5470 MHz band for RLANs but this appears to have eased. Europe has also indicated interest in investigating use of the 5725–5850 MHz band for RLANs. Arrangements already exist in Australia for RLANs in the 5150–5350 MHz band (low power indoor use only) and the 5725–5850 MHz band. The ACMA has 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.

Numerous countries around the world have identified or are considering identifying the 5850–5925 MHz band for Intelligent Transport Systems (ITS).

### **Recent developments**

ITU-R Working Party 5A is continuing work towards WRC-19 agenda item 1.16. Australia has submitted several contributions providing the regulatory background to the operation of WAS/RLANs and other input regarding the 5150–5250 MHz segment.

Working documents towards preliminary draft new reports are being developed on: proposed additional mitigation techniques to facilitate sharing between RLAN systems and incumbent services; technical characteristics and operational requirements of WAS/RLAN in the 5 GHz frequency range; use of aggregate RLAN measurements from airborne and terrestrial platforms to support studies under WRC-19 agenda item 1.16; and sharing and compatibility studies of WAS/RLAN in the 5 GHz frequency range.

In December 2018, the ACMA made the [Radiocommunications \(Intelligent Transport Systems\) Standard 2018](#) to support the use of complying wireless ITS technologies and devices in the frequency range 5855–5925 MHz.

### **Next steps**

The ACMA will continue to monitor and, where appropriate, engage with stakeholders via the usual international preparatory process to develop Australian positions on WRC-19 agenda item 1.16.



### **Bands being studied under WRC-19 agenda item 1.13**

WRC-19 agenda item 1.13 considers identification of frequency bands for the future development of 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.

The frequency bands to be considered under this agenda item are 24.25–27.5 GHz, 37–40.5 GHz, 42.5–43.5 GHz, 45.5–47 GHz, 47.2–50.2 GHz, 50.4–52.6 GHz, 66–76 GHz and 81–86 GHz, which have allocations to the mobile service in the RRs on a primary basis; and 31.8–33.4 GHz, 40.5–42.5 GHz and 47–47.2 GHz, which may require additional allocations to the mobile service on a primary basis.

There is strong interest in these bands domestically and internationally, particularly in ITU Region 3 countries, such as Republic of Korea (South Korea), Japan and China. In

## Monitoring

its opinion on spectrum related aspects for next-generation wireless systems (5G), released 9 November 2016, the RSPG stated that considerations of bands above 6 GHz for 5G should be limited to the bands listed in WRC-19 agenda item 1.13 in order to strengthen the global harmonisation opportunities, in particular, the bands 24.5–27.5 GHz, 31.8–33.4 GHz and 40.5–43.5 GHz. There are wide and varied ranges of incumbency and coexistence issues associated with each of these bands, which would need to be considered if the bands were to be investigated domestically for mobile broadband in the future.

### **Recent developments**

ITU-R Task Group 5/1 (TG 5/1) held its final meeting in August 2018 and concluded its work to address WRC-19 agenda item 1.13 under its Terms of Reference ([CA/226 \(Annex 9\)](#)). Australia has contributed to the meetings of TG 5/1 on the issue of IMT coexistence with FSS uplinks in the 24.25–27.5 GHz band (see documents [5-1/76](#), [5-1/117](#), [5-1/193](#) and [5-1/290](#)).

However, several other organisations internationally are considering frequency bands outside those listed for consideration in WRC-19 agenda item 1.13 for the next generation of IMT.

At APG19-5 (31 July–6 August 2019) a common view developed, expressing interest in the 24.25–27.5 GHz, 37–43.5 GHz and 66–71 GHz bands.

### **Next steps**

The ACMA will continue to engage with stakeholders via the usual international preparatory process to develop Australian positions on WRC-19 agenda item 1.13. Developments in Europe and other regions and countries (such as the US) will be monitored for possible early implementation bands for 5G. Early implementation in Australia will depend on factors such as the location, type and number of incumbent services in the band, whether adequate interference management (or sharing) frameworks can be developed, and whether the development of economies of scale are likely.

The 24.25–27.5 GHz band has been advanced to the *replanning* stage of the process for consideration of additional spectrum for mobile broadband services.

For 66–76 GHz, see related work on 66–71 GHz outlined on the LIPD class licence in the ‘Optimising established planning frameworks section’.

## Initial investigation

The *initial investigation* stage normally includes initial consideration of whether the new spectrum use 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 such as public industry meetings (such as spectrum tune-ups) and/or discussion papers where general feedback on issues is sought.

## Initial investigation



### **'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**

The ACMA recognises 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, the simultaneous review of the extended MSS L-band and the 1.5 GHz bands is considered to be appropriate.



CHANGE

### **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 while the future use of the band is under review.

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:

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

## Initial investigation

### Next steps

Contingent on outcomes of consultations on the [discussion paper](#), the ACMA may release an options paper in Q1 2020.

The ACMA remains 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, the ACMA considers 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.



### **NEW** 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 to this, carrier aggregation and emerging 5G technologies will allow operators to deploy services in bandwidths 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, the ACMA has moved it to the *initial investigation* stage. The ACMA will consider the relative priority of performing this work in the next update to the FYSO. Any review will necessarily take into account the interests of incumbent amateur services and the importance of the band for activities such as Earth-Moon-Earth operations.



### **CHANGE** 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.

## Initial investigation

The 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.

The ACMA is 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 July 2018, the US FCC released a Notice of Proposed Rulemaking that identifies the opportunity for satellite services to share the 3700–4200 MHz band for fixed and mobile wireless broadband services, including 5G.<sup>21</sup>

In 2018, Innovation, Science and Economic Development Canada (ISED) launched a preliminary consultation on changes to the 3700–4200 MHz band to accommodate wireless broadband use.<sup>22</sup> The outcomes of the consultation were announced June 2019. Submissions indicated that equipment for the 3300–3800 MHz band is expected to be available in 2019 while equipment for the 3300–4200 MHz band would likely be available in 2020. ISED also announced its decision to undertake further study and review of the 3700–4200 MHz band through a future formal consultation. This will consider the potential for implementing a spectrum access system or similar database approach in order to optimise use.<sup>23</sup>

In January 2019, the EC announced its decision to harmonise the 3400–3800 MHz frequency range as a pioneer band for 5G use within the European Union.<sup>24</sup> Many European countries either have or are in the process of investigating or allocating the band for 5G use. Germany and Lithuania are also developing plans to make the 3700–4200 MHz band available for localised 5G use rather than wide-area deployments.<sup>25</sup>

On 25 July 2019, Ofcom announced its decision to allow use of the 3800–4200 MHz band for wireless broadband through a shared local licensing arrangement<sup>26</sup> on a first-in-time coordinated basis. Low power small area licences and medium power rural area base station licences will be available. Ofcom also indicated that this is an interim approach to enable the quickest route for new users to access the band but flagged its intention to explore the potential for introducing DSA arrangements.

In February 2019, the New Zealand Minister of Broadcasting, Communications and Digital Media announced the 3410–3800 MHz band would be allocated for 5G. The spectrum will be auctioned in 2020 and ready for use in November 2022.<sup>27</sup>

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<sup>21</sup> [Order and notice of proposed rulemaking – FCC 18-91](#).

<sup>22</sup> [Consultation on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Consultation on Changes to the 3800 MHz Band](#), ISED.

<sup>23</sup> [Decision on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Decisions on Changes to the 3800 MHz Band](#), ISED, June 2019.

<sup>24</sup> [EC 5G decision announcement](#), 24 January 2019.

<sup>25</sup> [Spectrum for Terrestrial 5G Networks: Licensing Developments Worldwide](#), GSA, 14 May 2019.

<sup>26</sup> [Enabling wireless innovation through local licensing](#), Ofcom, 25 July 2019.

<sup>27</sup> [Preparing for 5G in New Zealand](#), Radio Spectrum Management, New Zealand.

## Initial investigation

In April 2019, the Japanese Ministry of Internal Affairs and Communications awarded spectrum in the 3600–4100 MHz band for 5G. Mobile operators must commence services within two years, and must each meet defined coverage targets.

Given the global developments on wireless broadband mentioned above, and domestic considerations arising from the known interests of incumbent and aspirant users of the band, it is timely to begin a discussion with industry on any implications for long-term arrangements for the entire 3700–4200 MHz band. The ACMA therefore released a discussion paper on [planning of the 3700–4200 MHz band](#) in Q3 2019 in order to understand current and possible future uses of the band.

### Next steps

The ACMA plans to consider submissions to the discussion paper in Q4 2019, with an aim to developing, if appropriate, an options paper for future use of the 3700–4200 MHz band in Q1 2020.

## Preliminary replanning



### 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).

The ACMA notes that an additional outcome of WRC-15 was Resolution **761 (WRC-15)**. This resolution invites 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.

Domestically, the impact on aeronautical telemetry services and fixed services, including the Digital Radio Concentrator System, will need to be considered in any re-planning 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. The ACMA released the discussion paper, [Future use of the 1.5 GHz and 3.6 GHz bands](#) in October 2016, with 72 submissions received from industry.

In June 2017, the ACMA 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 both the 1.5 GHz and 3.6 GHz bands to the

## Preliminary replanning

*preliminary replanning* stage of the ACMA's process for consideration of additional spectrum for mobile broadband services.

### **Recent developments**

ITU-R Working Party 5D has continued revision of Recommendation ITU-R M.1036-5 on frequency arrangements for implementation of the terrestrial component of IMT in the bands identified for IMT in the RRs. The draft revision includes arrangements for the frequency band 1.5 GHz.

Working Party 5D is also undertaking studies called for in Resolution **223 (Rev. WRC-15)**. Working Party 5D has completed these work items which will then go through approval and adoption processes, expected to be completed in 2019.

The AWG has a work plan to develop a report on frequency arrangements for the 1.5 GHz band. The current proposal is to finalise the work at AWG-26 in March/April 2020 but this may be reviewed depending on progress.

### **Next steps**

The ACMA 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.

See under 'The Forward allocation work plan' for more information.



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

In 2016, the ACMA 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**

The application window process has been finalised and prospective operators can now apply for licences on a first-in-time basis.

### **Next steps**

Now that demand for spectrum in the 1800 MHz band in remote areas is better understood, the ACMA will review the existing arrangements. This includes reassessing the need for a priority assignment model and could include allowing existing or prospective licensees to obtain larger contiguous channels. The ACMA will release a discussion paper in Q4 2019.

## Preliminary replanning



### 3400–3575 MHz band

The ACMA recognises that optimising spectrum and apparatus licence arrangements in the 3400–3575 MHz bands, 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.

#### **Next steps**

The ACMA consulted on [options for optimising arrangements in the 3400–3575 MHz band](#) in April 2019. See under 'The Forward allocation work plan' for more information.



### CHANGE 28 GHz (27.5–29.5 GHz)

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

#### **Recent developments**

The ACMA released a [discussion paper](#) in September 2018 to commence discussion 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. 24 [submissions](#) were received.

The ACMA released an [options paper](#) in April 2019 seeking feedback on possible planning arrangement for the 28 GHz band. 25 [submissions](#) were received.

#### **Next steps**

A decision on which planning arrangements will be implemented in the 28 GHz band is planned for Q3 2019. Depending on this decision, the ACMA will then commence work to implement the new arrangements. See under 'The Forward allocation work plan' for more information.

## Replanning

The *replanning* stage includes further development of detailed technical planning frameworks (including further consultation where necessary). Depending on the nature of the existing use of the band, this stage could potentially lead to re-farming or reallocation activities.

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

## Replanning



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

In November 2015, the ACMA released its [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 Vodafone Hutchison Australia.

#### **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 continue to work together to resolve the supporting spectrum arrangements in parallel with proof of concept trials. The ACMA is working with DoCA to provide advice on allocation options and manage the impact of this work on the allocation of other parts of that band for commercial wireless broadband services.

#### **Next steps**

The implementation plan contains milestones for the transition to long-term arrangements by incumbent services. The ACMA is considering a range of options for how and when the 850 MHz expansion band might be allocated. The ACMA intends to allocate it in combination with the 900 MHz band, pending further consideration of 900 MHz reconfiguration options (see below). See under ‘The Forward allocation work plan’ for more information.



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

In October 2017, the ACMA released a [consultation paper](#) setting out its 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. The ACMA also invited submissions about two related issues, namely 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.

## Replanning

### **Recent developments**

Reconfiguration options for the band remain under consideration, including the above-mentioned clearance and reallocation proposal. The ACMA released the [Reconfiguring the 900 MHz band](#) consultation paper in Q2 2019 concerning these options.

### **Next steps**

The ACMA is currently considering the submissions to the Q2 2019 [Reconfiguring the 900 MHz band](#) consultation paper. See under the Forward allocation work plan for more information.



## **5.6 GHz (5600–5650 MHz)**

### **Recent developments**

One of the outcomes from the [Future use of the 3.6 GHz band](#) process was that the ACMA committed to implementing point-to-multipoint apparatus licence arrangements in the 5.6 GHz band. The ACMA 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 the ACMA 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. The ACMA is still considering the most appropriate process and timing for release of the band in other areas.

### **Next steps**

Further information about the mechanism to release spectrum in these areas will be made available when options and arrangements have been developed. The ACMA is aiming to finalise this issue in Q4 2019.



## **CHANGE 26 GHz (24.25–27.5 GHz)**

WRC-19 agenda item 1.13 is to consider identification of frequency bands for IMT in the RR. This agenda item is widely acknowledged to be focusing on spectrum harmonisation requirements for 5G mobile broadband technologies. The 26 GHz band is one of a number of the bands under consideration as part of WRC-19 agenda item 1.13.

The ACMA hosted a spectrum tune-up in September 2017 to solicit further industry views on the use of 26 GHz and other mmWave bands by broadband services. The ACMA also invited formal submissions on the issues raised for discussion at the event.

## Replanning

The tune-up also floated some early ACMA thinking on potential technical planning scenarios and posed a number of [questions](#) for industry input—27 [responses](#) were received. A key question posed in the tune-up was the appropriateness of accelerating the band through the *initial investigation* stage to the *preliminary replanning* stage.

Following the tune-up and consideration of feedback, the ACMA decided to move the 26 GHz band to the *preliminary replanning* stage.

### **Recent developments**

In July 2018, the Electronic Communication Committee of CEPT released a decision titled [Harmonised technical conditions for Mobile/Fixed Communications Networks \(MFCN\) in the band 24.25–27.5 GHz](#). This decision addressed sharing and compatibility conditions to ensure coexistence with other spectrum users and included technical conditions to achieve this coexistence.

In September 2018, the ACMA released an [options paper](#) consisting of a range of potential options, both for *what* should be allocated, in terms of specific frequencies and areas, and *how* the band should be allocated, in terms of which licence types should be adopted to meet a range of potentially varying wireless broadband use cases. Nineteen [submissions](#) were received.

Using the information obtained from submissions to the options paper, the ACMA released a [decision paper](#) in April 2019 detailing decisions and preliminary views for the introduction of wireless broadband in the 26 GHz band.

In May 2019, the ACMA released a [consultation paper](#) outlining a draft reallocation recommendation to be made to the minister to reallocate the band by issuing spectrum licences.

### **Next steps**

The ACMA intends to continue engaging with stakeholders via the usual international preparatory process to develop Australian positions on WRC-19 agenda item 1.13, which includes the 26 GHz band. See also under the 'Monitoring' section above.

See under 'The Forward allocation work plan' for more information.

## 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, enabling sharing opportunities and other changes to improve the efficient use of the spectrum.

The ACMA's optimisation work across a range of different spectrum uses is outlined below.

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

The ACMA has an ongoing role in providing advice on spectrum arrangements, including advice on requests that involve departing from the ACMA's published policies and considering applications for trial demonstration of new technologies.

### Public Protection and Disaster Relief (PPDR) in the 4.9 GHz band

The ACMA recently worked within ITU-R Working Party 5A (responsible for recommendations and reports pertaining to PPDR communications, among other things) to include channelling arrangements for 5G New Radio in documents relevant to 4.9 GHz PPDR arrangements. The benefit of this is that it 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. DoCA is considering future PSMB arrangements, which are centred around a 4G capability using 4G frequencies, in consultation with states and territories. Looking forward, the pre-existence of the 4.9 GHz class licence might 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.



### **CHANGE** Broadcasting

Since the restack of television spectrum for the 700 MHz digital dividend, only limited further optimisation work has been necessary in the television broadcasting bands. In contrast, there are significant activities progressing in the radio broadcasting spectrum.

The ACMA has been working closely with the radio industry on two key initiatives for regional Australia—expansion of digital radio to regional areas, and the conversion to FM of the legacy commercial AM station in single licensee regional markets.

The ACMA is also investigating the future delivery of radio broadcasting services in Australia.

### **Digital radio and AM to FM conversion**

Over the next few years, the ACMA will continue to plan for regional digital radio, where licensees commit to rolling out and provide for the AM to 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.

### **Progress achieved**

- > In late 2018 we licensed a trial of DVB-T2 technology for Free TV Australia in Brisbane and the Gold Coast. This trial follows on from the successful trial in Sydney earlier in 2018.
- > We completed Australia-wide frequency allotment planning for DAB+ digital radio and published it on our website in June 2019.
- > In September 2018, the ACMA issued digital radio multiplex transmitter licences for the commercial and community broadcasters in Canberra, Darwin and Hobart. The ACMA declared the digital radio start-up day for Hobart as 1 April 2019 and for Darwin as 7 May 2019. Services under the Canberra licence commenced on 19 July 2019. The services in Canberra and Darwin succeeded the previous trial services.
- > In April 2019, we consulted on a new digital radio channel plan for Mandurah, Western Australia.
- > In 2018–2019 we facilitated AM to FM conversions for Bathurst, Bega, Burnie, Cooma, Devonport, Goulburn, Queenstown, Mandurah and Scottsdale.
- > Internal engineering work has been completed on a study into the potential for replanning Perth radio.
- > In July 2019 we consulted on whether the Hobart RA3 community radio licence area should be deemed to be the same as the Hobart RA1 commercial radio licence area for the purpose of digital radio.

### **Activities planned for 2019–20**

In 2019–20 we will:

- > review submissions on the consultation, and determine whether the Hobart RA3 community radio licence area should be deemed to be the same as the Hobart RA1 commercial radio licence area for the purpose of digital radio
- > consult on and finalise proposals for the AM to FM conversion for Riverland, Murray Bridge, Spencer Gulf North and Port Lincoln in South Australia
- > complete engineering for and consult on and finalise the digital radio channel plans for the licence areas where a commercial licensee has committed to starting up around 2020
- > further consult on whether variations to the digital radio channel plan in relation to Brisbane are appropriate to improve digital coverage
- > consult on the digital radio channel plan in relation to Gold Coast taking into account the completion of frequency allotment planning
- > 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 for the purpose of digital radio
- > consult on further AM to FM conversions in single licensee markets when engineering reports have been received from the licensees and approved by the ACMA. These areas include Nowra, Armidale, Gunnedah, Moree, Tamworth, Taree, Grafton, Parkes, Inverell, Lismore, Wangaratta, Albany, Horsham, Hamilton, Colac, Swan Hill and Lithgow.

### ***Potential for Perth analog radio broadcast planning initiative***

The clearance of Band II television in Bunbury, following digital switch-over, has provided new planning options. In 2019–20, we will consult on the potential to replan the Perth FM broadcast band.

### ***Consultation on the future delivery of radio services in Australia***

Radio broadcasting faces new opportunities and challenges due to technological evolution and changing listener preferences. As demand grows for IP-based services and platforms, the ACMA will need to manage available spectrum resources in an effective and efficient manner. This includes understanding the future roles of AM radio, FM radio, digital radio and radio delivered via IP in metropolitan areas, and regional and remote areas. It is timely to ask radio industry participants about emerging technology, its impact on their businesses and the choices it creates for the radio industry.

### **Progress achieved**

In April 2019 we published for consultation an issues paper, followed by an industry forum in June 2019, on the future delivery of radio services in Australia.

### **Activities planned for 2019–20**

In 2019–20, we will:

- > publish submissions in Q3 2019
- > review submissions in Q3/4 2019
- > communicate our findings and report to government in Q4 2019.



### **CHANGE 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.

### ***Progress achieved***

In 2018–19, the ACMA finalised consultation on several issues to support developments in satellite communications and in September 2018 varied the:

- > [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#)
- > [Radiocommunications \(Foreign Space Objects\) Determination 2014](#)
- > [Radiocommunications \(Australian Space Objects\) Determination 2014](#).

In January 2019 the ACMA consulted on frequency coordination requirements between apparatus-licensed fixed point-to-point links (in the 6 GHz (5925–6425 MHz) and 6.7 GHz (6425–7110 MHz) bands) and FSS earth stations communicating with geostationary orbit satellites. This work was completed in August 2019 with the finalisation of new RALI MS45.

In December 2018, the ACMA commenced consultation on an update to frequency coordination procedures for the earth station protection zones around Moree, Quirindi and Roma. This work was completed in August 2019 with the finalisation of an update to RALI MS44.

The review of arrangements for ubiquitous (uncoordinated) ESIMs in the FSS in those parts of the Ku band included in the [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#) was completed in July 2019. Business operating

procedure—Submission and processing of applications for space and space receive apparatus licences has been reviewed for clarity of requirements for Ku-band ESIM in the 11.7–12.75 GHz and 14–14.5 GHz bands.

### ***Activities planned for 2019–20***

While the ACMA intends to prioritise its support for Australia’s international engagement activities leading up to, and including, WRC-19, the following satellite planning activities are envisaged for 2019–20. However, domestically, our key spectrum planning priorities over the next year are to:

- > provide ongoing operational support for Australian-filed satellite networks
- > progressing work commenced in 2018–19 on:
  - > reviewing licensing procedures for space-based communications systems 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
  - > work supporting 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’***

The ACMA is continuing the work identified in the FYSO 2018–22 in support of ‘small satellites’.

The ACMA will target its work 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.

The ACMA expects to release a discussion paper by the end of Q4 2019. This work should continue into 2019–20 with the ACMA reviewing submissions received and developing a way forward.

### ***Updating regulatory arrangements for space-based communications systems***

The ACMA 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.

The ACMA has received requests to update the [Radiocommunications \(Foreign Space Objects\) Determination 2014](#) and will consider such an update in Q3/4 2019 dependent on priorities and progress of other projects. Other than consideration of inclusion 10.7–11.7 GHz in the [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#) (see below), the ACMA is not aware of any proposals for new satellite systems in Australia that could necessitate the need for updates to legislative instruments related to licensing of space-based communications systems.<sup>28</sup>

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<sup>28</sup> That is, the [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#), [Radiocommunications \(Foreign Space Objects\) Determination 2014](#), and the [Radiocommunications \(Australian Space Objects\) Determination 2014](#).

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

Consideration of future Ka band satellite usage, including expanding the frequency range supporting growing ubiquitous usage, is being undertaken as part of the ACMA review of the 28 GHz band. See above under 'Preliminary replanning'.

### ***General review of space licensing procedures***

The ACMA is continuing the work identified in the FYSO 2018–22 reviewing its administrative assessment procedures for apparatus licensing of space-based communications systems.

One of the key purposes of the review is to consider whether, in light of trends in space-based communications systems, licensing procedures are appropriate and commensurate with the risk of interference. A second key purpose is to consider possible updates to business operating procedures for licensing of space-based communications systems.<sup>29</sup> Given issues raised in previous consultations, the review will consider topics including whether there is a need to include additional measures for:

- > when the ITU satellite coordination process is not completed
- > where the satellite network has been recorded in the Master International Frequency Register (MIFR) in accordance with ITU Radio Regulation No. 11.41.

A consultation paper is expected to be released in Q4 2019/Q1 2020. The ACMA is aware several stakeholders interested in this work are involved in the WRC-19 process and will be mindful of this in timing any follow-up work after the release of the paper.

### ***Feasibility of inclusion of 10.7–11.7 GHz in the Communication with Space Object Class Licence***

The ACMA is continuing the work identified in the FYSO 2018–22 investigating the feasibility of including the 11 GHz band (10.7–11.7 GHz) for earth station receivers in the [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#).

The 11 GHz band is used for fixed point-to-point links and is one of the most heavily used microwave fixed point-to-point link bands in Australia, with over 15,300 links in operation. Earth stations currently operate in this frequency range on an individually coordinated basis.

The possible use of 'ubiquitous' user terminals under the class licence would require consideration of the impact on fixed links and investigation of any required technical restrictions on earth station receive use.

While uncoordinated earth station receiver use would not pose an interference risk to point-to-point links, a relevant consideration is under what conditions earth station receivers could operate on an uncoordinated basis with an acceptable probability of

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<sup>29</sup> [Business operating procedures](#), including those related to space licensing, are available on the ACMA website.

interference, given that the introduction of class-licensed earth station receivers should not lead to undue constraints on the future deployment and growth of fixed links.

The ACMA released a [discussion paper](#) considering the technical feasibility in July 2019. The ACMA expects to determine a way forward on this issue in Q4 2019.

#### ***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
- > assessment of 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 might result in the need for possible updates to those procedures. The ACMA will consider the need for possible updates, drawing on experience in the application of the procedures and input from the Australian satellite operators.

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.

The ACMA will not consider this matter until after WRC-19. A caveat is that it is possible that work on spectrum for small satellites could result in the need for an earlier update.



### **Low interference potential devices**

In December 2018, the ACMA 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***

The ACMA has concluded this review and varied the LIPD class licence in August 2019.

### ***Activities planned for 2019–20***

Organisations interested in any further updates to the LIPD class licence should contact the ACMA to discuss the requirements and timing of such updates.



### **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)<sup>30</sup>. While the spectrum allocation is included in the ARSP, the ACMA is yet to consider the technical feasibility and associated technical conditions that could support operation in Australia.

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. The ACMA 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 2019–20***

With a range of existing uses currently supported in the band, the ACMA intends to publish a discussion paper in Q1 2020 seeking industry views on implementation issues, including appropriate technical conditions and in which part of the band the amateur service could be supported.



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

The ACMA has 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, the ACMA released its [Frequency coordination requirements review work program](#) for 2018–19.

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<sup>30</sup> Refer ITU Radio Regulation 5.133B. Note some ITU Region 2 countries alternative limits of 20 or 25 watts apply.

This work program outlined updates to frequency coordination rules (as recorded in RALIs) and future work the ACMA also intends to consider subject to completion of other priorities.

The ACMA has been progressing this work program and has released several proposed updates for industry consultation covering:

- > [land mobile services: new small service area models](#), in September 2018
- > coordination zones and protection requirements for space research services at New Norcia and Tidbinbilla RALI MS 38 with earth station transmitters in the fixed-satellite service in frequencies between 27.5–30 GHz, as part of a consultation on [updates to several RALIs](#), in December 2018.

This work is expected to be completed in Q3 2019.

### ***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.

The ACMA is 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 2019–20***

In addition to progressing tasks already identified in the review work program the ACMA intends to seek industry comment on a draft updated frequency coordination review work program in Q4 2019.

Work on the broader review of the spectrum planning framework, which is flagged in the ‘Spectrum management practice improvements’ section below, is subject to further consideration of timelines and priorities.

### **Review of spectrum licence technical frameworks**

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 update of the technical framework for the 2.3 GHz band has already been raised in this context.

***Activities planned for 2019–20***

The ACMA intends to commence a discussion with industry in Q4 2019 on the scope of a program of work to determine the bands that may need to be examined.

***NEW*** **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.

***Activities planned for 2019–20***

The ACMA 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; 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.

# The 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. The ACMA emphasises 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. The ACMA will take account of feedback from industry about likely demand and their priorities for access to particular spectrum bands.

The ACMA has completed a number of allocation and re-issue processes in recent years, providing significant predictability regarding 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 and 2110–2170 MHz), 2.3 GHz (2302–2400 MHz), 3.4 GHz (3425–3442.5/3475–3492.5 MHz and 3442.5–3475/3542.5–3575 MHz) and 3.6 GHz (3575–3700 MHz). This has set the stage not only for improved services and greater choice for consumers, but also increases the 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 was published in the FYSO 2018–22, we updated the forward allocation plan in the draft FYSO 2019–23 and sought stakeholder feedback. Stakeholder feedback is summarised in the Addendum to FYSO 2019–23—Response to submissions.

## What we're proposing

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

**CHANGE** Table 10: Spectrum bands under consideration for potential future allocations

Band name	Spectrum parameters	Current use	Comments
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
900 MHz band	890–915 MHz and 935–960 MHz	3G, 4G	ACMA decision on way forward in October 2017 prompted comments regarding continued operations in this band. Based on those comments, the ACMA has reconsidered configuration options
1.5 GHz band	1427–1518 MHz	Fixed links, some point-to-multipoint, defence	Technology standardisation progressing  Lower level of near-term domestic interest, but available for allocation consideration, should demand change
3400–3575 MHz band	3400–3575 MHz	Fixed wireless, point-to-multipoint, 5G	Identify options for optimisation which could include spectrum licence conversion and other allocation processes
26 GHz band	24.25–27.5 GHz	Space research (ESA, CSIRO, NASA), FSS (NBN Co)	ACMA decision paper released in April 2019, and draft reallocation recommendation to the minister released in May 2019
28 GHz band	27.5–29.5 GHz	FSS, fixed links point-to-point, body scanners	ACMA options paper released in April 2019 for feedback



### 850 MHz expansion band

In late 2015, the ACMA finalised a review of the 803–960 MHz band, deciding 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 ACMA supports combining the 850 MHz expansion band reallocation with any reallocation of 900 MHz if possible.

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. Prior to expiration of the current spectrum licences in 2028, this can only be achieved via a voluntary (negotiated) downshift of the existing 850 MHz band spectrum licences, which are held by VHA 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. The ACMA is considering optimisation options for the 900 MHz and 850 MHz expansion bands.

The Australian Government has agreed to set aside 2 x 5 MHz of spectrum in the 850 MHz expansion band for a public safety mobile broadband (PSMB) capability. At the 12 December 2018 meeting of COAG, all jurisdictions agreed a Strategic Roadmap that sets out a plan to design, implement and operate PSMB and to continue to work together to resolve the supporting spectrum arrangements in parallel with proof of concept trials. In December 2018, the NSW Telco Authority on behalf of all jurisdictions issued a request for proposal from the telecommunications industry, to support a proof of concept for a trial of a national PSMB capability. The ACMA is working with DoCA to provide advice on allocation options and manage the impact of this work on allocation of other parts of the 850 MHz expansion band for commercial wireless broadband services.



#### **CHANGE 900 MHz**

In October 2017, the ACMA published its 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.

Continued engagement from mobile network operators operating in this band indicates a range of differing approaches to resolving configuration issues in the band. This requires resolution before there is any certainty on the method of licensing, and the amount of spectrum that can be allocated.

For the purposes of the forward allocation work plan, the ACMA remains keen to consider ways to optimise holdings in the band. Further consultation on configuration options for the 900 MHz band was conducted in Q2 2019 (see [Reconfiguring the 900 MHz band](#)). The ACMA's approach includes 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, conversion to longer term licence tenure, and enabling licensees to mitigate risks to consumer services. The ACMA is currently considering the submissions.

As part of these optimisation considerations, the ACMA also proposes the reallocation of the 850 MHz expansion band for wireless broadband (see above). The ACMA expects to decide its approach to reconfiguring the 900 MHz band and allocating the 850 MHz expansion band in Q4 2019.



### **CHANGE** 1.5 GHz

In June 2017, the ACMA 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. The ACMA is yet to decide on the quantum of spectrum that should 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 the draft FYSO 2019–23 confirmed a lower level of near-term domestic interest in the reallocation of this band, compared to other potential wireless broadband bands. Stakeholders have indicated broader interest in the band for private LTE networks.



### **CHANGE** 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 for the ACMA. This is expected to result in more efficient use of spectrum and a reduction in deployment costs.

The ACMA commenced consideration of this issue via the release of an [options paper](#) in April 2019. This paper also:

- > investigated planning options to make more of the band available for wireless broadband use
- > started the discussion on whether or not (and how) urban areas of NBN Co's public telecommunications service (PTS) apparatus licences in the band could be made available for use by other operators.

The ACMA plans to release in a planning decision paper on the outcomes of this process on how we intend to implement the optimisation of the band Q4 2019.



### **CHANGE** 26 GHz

The 26 GHz band remains a strong candidate for the next wireless broadband band to be allocated, following the allocation of the 3.6 GHz band in late 2018.

In September 2018 the ACMA 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.

The ACMA considered submissions to the options paper and 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 from 24.25–25.1 GHz, the ACMA has 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, the ACMA 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](#). The ACMA expects to make a recommendation to the minister regarding the allocation of spectrum licences in the 26 GHz band in Q3 2019.



## **CHANGE** 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.<sup>31</sup> In September 2018 the ACMA 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 (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, the ACMA is considering planning options in the 28 GHz band. An [options paper](#) presenting different band planning arrangements was released in Q2 2019. A planning decision is expected in Q3 2019.

## **CHANGE** Allocation priorities and sequencing

The [Radiocommunications Act 1992](#) establishes a set of mandatory processes for allocating spectrum. In the ACMA's 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

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<sup>31</sup> ACMA, [Future approach to the 3.6 GHz band](#), 2017.

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.

Following publication of the forward allocation plan in the draft FYSO 2019–23, the ACMA has considered stakeholder submissions and other relevant considerations for the identified bands.

Reflecting submitter support for defragmentation of the 3400–3575 MHz band, work on this band is progressing as a priority.

Noting the relatively lower level of interest in progressing the 1.5 GHz band and the scope of work being undertaken for other bands, work on the 1.5 GHz allocation (along with the adjacent L-band MSS extension band) will not be prioritised in 2019–20. The ACMA acknowledges that timely consideration of this band is of importance to the satellite industry.

### **Timing considerations**

This year's forward allocation plan reflects the addition of two new allocation processes since the publication of the FYSO 2018–22: the optimisation of the 3400–3575 MHz band (which may lead to allocation activities such as licence conversion and/or an auction of some spectrum), and consideration of the 28 GHz band (which may lead to changed allocations arrangements in that band).

The ACMA recognises 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. Submitters supported the separation of the 26 GHz and 850/900 MHz spectrum licence allocations due to regulatory and financial burden on potential bidders and the subsequent negative impact this could have on competition in downstream markets. Taking this feedback into account, the ACMA 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. A number of stakeholders have indicated they are interested in the planning arrangements in both bands. The ACMA 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.

In summary, the following timing and sequencing aims are consistent with many submissions to the draft FYSO 2019–23:

- > defragmentation of the 3400–3575 MHz band is a high priority
- > no concurrent auctions due to bidding capacity and competition concerns
- > low priority for a 1.5 GHz band allocation.

In keeping with the importance of addressing 5G spectrum needs as set out in the government's [Impacts of 5G on productivity and economic growth](#) research paper, the ACMA will prioritise release of the 26 GHz band (using a combination of apparatus and spectrum licensing arrangements to support innovative services). The ACMA consulted on options for reconfiguring the 900 MHz in Q2 2019, and is currently considering allocation methods. We note concerns raised about continued access to spectrum to support ongoing provision of consumer services. Accordingly, the allocation of the combined 850 MHz expansion band and 900 MHz band is now expected in Q4 2021.

The allocation of spectrum licences in the 26 GHz band is now the earliest expected major allocation, currently planned to occur in Q1 of 2021. This has been revised from the previous expectation of Q3/4 2020 due to industry's preference to have greater clarity about planned arrangements in the 28 GHz band to assist in informing considerations about participation in any 26 GHz allocation, and the need for government to carefully consider the details of the allocation arrangements for both spectrum and apparatus licences in both the 26 GHz and 28 GHz bands.

Table 11 below outlines the ACMA's current timing expectations in relation to 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, the ACMA cannot be definitive about these timing expectations.

**CHANGE** Table 11: Potential timing of allocations

Band	ACMA next steps	ACMA recommendation to minister where applicable	Proposed allocation timing	Notes
26 GHz—spectrum licences		Q3 2019	Q1 2021	
850/900 MHz	Q4 2019 ACMA decides approach for reconfiguring the 900 MHz band and allocating the 850 MHz expansion band	Q2 2020	Q4 2021	Auction 6 months after 26 GHz SL auction
1.5 GHz	TBC Options paper  TBC Planning decision			Lower priority
3400–3575 MHz band	Q4 2019 planning decision	TBC	TBC	
28 GHz band	Q3 2019 planning decision		Q1 2021: changed allocation arrangements implemented	Timing of availability of allocations to align with 26 GHz band ALs

Band	ACMA next steps	ACMA recommendation to minister where applicable	Proposed allocation timing	Notes
	Q4 2019 onwards (prepare licences and supporting frameworks)			where feasible and appropriate

# Spectrum management practice improvements

## Spectrum reform

Following his appointment as the Minister for Communications, Cyber Safety and the Arts in May 2019, including responsibility for administering the [Radiocommunications Act 1992](#), the Hon Paul Fletcher MP has indicated that he expects to pursue legislative reform where it will deliver tangible improvements to the current administration of spectrum and a more efficient regulatory framework.

It is expected that a legislative reform agenda will complement the findings and recommendations of the Spectrum Pricing Review that the government released in March 2018.

As this process continues, the ACMA will progress the following improvements to spectrum management identified in the draft FYSO 2019–23:

- > continuing to consult on and publish the FYSO as an important transparency measure
- > implementing the recommendations of the government's Spectrum Pricing Review (see the 'Pricing' section below)
- > continuing to consider industry feedback on its interference management principles and expecting to finalise them during 2019. The principles will inform the development of an interference management framework, which will provide updated procedural guidance for licensees making interference complaints to the ACMA
- > continuing to work closely with DoCA on proposals for legislative reform.



## New/ongoing activities planned for 2019–20

The ACMA is actively pursuing improvements to spectrum management that can be achieved in the shorter term.

The main areas of spectrum management improvement activity that are expected to be undertaken in 2019–20 are outlined below.

**Table 12: ACMA Spectrum management practice improvement activities 2019–20**

<b>Activity</b>	<b>Description</b>	<b>Timing</b>
<b>Explore design of an area-wide apparatus licence type</b>	<p>'Off the shelf' licence product that could be adapted to authorise operation of multiple devices within a defined spectrum space</p> <p>Assist in authorising new &amp; emerging technologies e.g. Internet of Things and in 26 GHz allocation</p>	Consultation commenced Q2 2019
<b>Updating amateur syllabi</b>	Establish a Syllabus Review Panel	Q4 2019
<b>Implement the Spectrum Pricing Review</b>	<p>Provide incentives for more efficient spectrum use</p> <p>Reform cost recovery approach</p>	Consultation to commence Q4 2019
<b>Further review of non-assigned amateur licensing and review of non-assigned outpost licensing arrangements with a view to reform</b>	Consider options for a range of licensing mechanisms and conditions for these non-assigned licences	Following review of submissions on amateur licence conditions in 2018–19, the ACMA will continue to consider the fitness for purpose of existing arrangements. The ACMA expects to consult further on these arrangements in Q4 2019
<b>Improving transparency of the spectrum planning framework</b>	Review the overall design and scope of the spectrum planning framework	Progressively review and consider improvement through 2019–20
<b>Review elements of the existing apparatus licensing framework with a view to streamlining existing arrangements</b>	Review of potential for reduced complexity	Consideration during 2019–20 (in the context of any proposed legislative reform)

Further details on each of these ACMA spectrum management practice improvement activities can be found elsewhere in the FYSO. Activities relating to amateur qualifications and licensing, area-wide apparatus licensing and the existing apparatus framework are expanded on in the 'Licensing and licensing systems' section below. Further details on the implementation of the Spectrum Pricing Review can be found in the 'Pricing' section below. Further details on improving the transparency of the spectrum planning framework can be found in the 'Optimising established planning frameworks' section above.

# Licensing and licensing systems

## Progress achieved

### Body scanners in airports

On 15 November 2018, the ACMA made the [Radiocommunications \(Body Scanning – Aviation Security\) Class Licence 2018](#), authorising the operation of applicable body scanners used for aviation security screening in airports in the frequency ranges 24.25–30 and 67–80 GHz. Following public consultation, and prior to making the class licence, the ACMA conferred closely with stakeholders regarding coexistence between relevant body scanners authorised by the class licence and 5G services.



### Mobile phone jammers in prisons

Following a successful trial by Corrective Services NSW at Lithgow Correctional Centre, and stakeholder consultation, the ACMA made the [Radiocommunications \(Use by Corrective Services NSW of PMTS Jamming Devices at Lithgow Correctional Centre\) Exemption Determination 2018](#) in August 2018, which will allow Corrective Services NSW to continue operating the mobile phone jammer at Lithgow Correctional Centre on an ongoing basis, subject to certain conditions and safeguards.



### Renewed arrangements for amateur certificates of proficiency

Following an approach to market, the ACMA selected the University of Tasmania, through its Australian Maritime College (AMC) to provide services and functions related to amateur radio operator qualifications. The previous Deed of Agreement with the Wireless Institute of Australia expired on 1 February 2019.

Under the new arrangements, the AMC performs statutory functions and provides administrative services through delegation of powers and a new Deed of Agreement with the ACMA.

Before initiating the procurement process, the ACMA released a [consultation paper](#) in June 2018 exploring future options for managing the services and functions then provided under the deed.



### Marine VHF channel arrangements

In 2018–19, the ACMA, with the assistance of key maritime stakeholders, undertook a review of the current regulatory arrangements governing the operation of the VHF marine radio in Australia. The review was triggered by updates to the ITU RRs at WRC-12 and WRC-15. Representations were made by maritime stakeholders that Australia's regulatory arrangements could be usefully updated to reflect emerging safety-of-life technologies and systems.

In May 2019, following the outcome of public consultation, the ACMA made the [Radiocommunications – Maritime Omnibus Variation 2019 \(No. 1\)](#) (the Maritime Variation Instrument) bringing in a raft of changes to the VHF maritime mobile band.

The changes include:

- > improvements to the integrity of the VHF maritime mobile band as it applies to all maritime stakeholders
- > implementing international obligations to enhance and protect safety-of-life and search and rescue services (SAR) in Australia, including:
  - > access to new safety of life technologies, such as Automatic Identification System (AIS) satellite, and the integrated functionality provided by VHF Data Exchange System (VDES) and Application Specific Messages (ASM)
  - > specifying channels in the relevant licensing instruments to provide greater protection to SAR functions by limiting use of Channel 06 for SAR operations
  - > a number of channels identified in Appendix 18 of the RRs that are not currently included in the relevant legislative instruments.

## New/ongoing activities planned for 2019–20



### Amateur certificates of proficiency

In Q4 2019 the ACMA will establish a Syllabus Review Panel for amateur radio, consistent with the arrangements under the new Deed of Agreement with the AMC. The Panel will ensure that the amateur radio syllabus for examinations continues to reflect the knowledge and skills necessary to operate an amateur station.



### Consideration of changes to amateur licence conditions

The ACMA issues apparatus licences to applicants who have achieved the required amateur qualifications. Operators of licensed amateur stations are subject to a range of licence conditions that are set out in the [Radiocommunications Act 1992](#), the [Radiocommunications Licence Conditions \(Amateur Licence\) Determination 2015](#) (Amateur LCD) and in individual licences.

The ACMA consulted on proposed changes to amateur licensing conditions in Q2 2019 following its review of submissions from the Wireless Institute of Australia and the Radio Amateur Society of Australia requesting changes to the conditions under which amateur licensees operate. The consultation process is closed and the ACMA is planning to amend the Amateur LCD in Q3/4 2019.



### Enabling trials of mobile phone jammers in prisons

An exemption is in place for Corrective Services NSW to conduct a trial of a mobile phone jammer at Goulburn Correctional Complex, which will test the operation of a jammer in a medium density location. The trial is expected to commence by the end of 2019.

The ACMA continues to facilitate trials of mobile phone jammers and has approached other States and Territories to gauge their interest in conducting trials in low density locations. The ACMA will consider any request from other jurisdictions on a case by case basis.



## Changes to VHF marine radio channels and their use

Following the 2018–19 consultation and the WRC-19, the ACMA will consider what additional changes should be made to the VHF marine radio channels and their use. The ACMA will continue to work with industry, noting the outcomes of relevant international deliberations arising from WRC-19.



## 400 MHz band

The ACMA is preparing for the final milestone period of the 400 MHz implementation project during 2019–20. This will complete the necessary transition of licences to appropriate segments of the 400 MHz band. The ACMA continues to work closely with state and territory governments, as well as industry participants and representative organisations that are yet to complete their transition requirements in the 400 MHz band.



## Review of prohibition declarations and exemption determinations

Under the [Radiocommunications Act 1992](#), 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 1992](#), in favour of a narrow range of persons.

During 2019–20, the ACMA will consider whether the prohibition framework is operating as intended, and whether the range of devices to which prohibition declarations apply remains appropriate. In parallel, the ACMA will consider the scope and applicability of exemption determinations. We will consult publicly via a discussion paper to be released in Q4 2019.



## Drone regulation

Unmanned Aircraft Systems, also known as RPAS, and commonly known as 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.

The ACMA has engaged with an inter-departmental contact network, which is considering management of drones from a range of policy perspectives. During 2019–20, the ACMA will continue to contribute to this network, and will continue to monitor the licensing requirements for drones with reference to international developments in spectrum management.

As drones are becoming increasingly widespread, so too are concerns about their use. The ACMA is currently working with aviation safety regulators, law enforcement and security agencies, and is monitoring international approaches to detecting and responding to incidents where drones could pose a risk to safety and security. In March 2019, the ACMA initiated consultation on proposed exemption arrangements

that would allow the Australian Federal Police to deploy drone jamming equipment over a two-year period. In 2019–20, the ACMA will consult on any required changes to regulatory arrangements for counter-drone equipment.

### **CHANGE** Exploring the design of an area-wide apparatus licence

The ACMA is exploring whether it will implement a new area-wide apparatus licence type. In the draft FYSO 2019–23, this licence type was originally referred to as the spectrum space apparatus licence. It is now known as the 'area-wide' licence type.

Currently, apparatus licence types are generally linked to a specific purpose—for example, a maritime licence is for maritime purposes. An area-wide licence 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 would provide analogous technical and operational flexibility to a spectrum licence. The area-wide licence would assist the ACMA in authorising new and emerging technologies in use-cases where spectrum licensing may be inappropriate.

The ACMA commenced consultation with stakeholders as part of its exploration of the design of the area-wide licence type in Q2 2019. Following consideration of submissions, and depending on the nature of those submissions, the ACMA expects to consider making the regulatory scaffolding to give effect to the new licence type in Q4 2019.



### **Review of non-assigned amateur and outpost licensing arrangements with a view to reform**

The ACMA is 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 do not include a specific frequency and instead operate 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.

The ACMA is 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 ACMA expects to consult on options for associated licensing arrangements in Q4 2019.

### **Review of elements of the existing apparatus licensing framework**

The apparatus licensing framework is made up of the regulatory instruments, technical planning documents and operational practices that determine how apparatus licences are used and how the apparatus licensing system functions. A recurring issue with the framework has been its complexity and difficulty for users to navigate and understand. The ACMA is investigating potential improvements to the apparatus licensing framework.

Potential areas of improvement include:

- > determining whether the existing types of apparatus licence are still appropriate, and considering reducing the number of types and licensing options where suitable
- > identifying the key spectrum management issues associated with these licence types, including any unnecessary regulatory barriers resulting from the licence types
- > identifying opportunities in the legislative and non-legislative instruments that make up the apparatus licensing framework to reduce complexity and increase transparency for users.

During 2019–20, the ACMA will give consideration to pursuing these improvements, to the extent they would not be overtaken by possible legislative reform. Changes to the licensing framework would be subject to public consultation.



# Pricing

## Progress achieved

### 3.6 GHz band

In May 2018, the ACMA consulted on a proposal for a spectrum licence tax and an early access price for the 3.6 GHz band. In June and July 2018, the ACMA made those respective changes to the spectrum licence tax and the apparatus licence tax.

### Apparatus licence taxes

In Q1 2019 adjustments were made to apparatus licence taxes to account for inflation, and to remove some redundant taxes relating to the early access pricing arrangements in the 700 MHz band and specific body scanner apparatus licence taxes. The early access pricing arrangements are no longer needed because spectrum licences in that band have commenced. The apparatus licence taxes associated with airport body scanners have been removed after the ACMA introduced class licensing arrangements in November 2018. The adjustments came into effect in April 2019.

### Commercial broadcasting taxes

In 2018–19, the ACMA commenced the ongoing 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.



## New/ongoing activities planned for 2019–20

### 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, the ACMA considers 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, and the ACMA intends to proceed in this way.

To implement the recommendations of Spectrum Pricing Review, the ACMA has initiated four substantive programs of work:

- > further identify bands to transition from administratively set charges to competitive market-based allocation in its annual work program (currently the FYSO) (recommendation 4). For more information on timing of these initiatives, please see the Forward Allocation Work Plan outlined in this FYSO.
- > develop and publish Spectrum Pricing Guidelines to provide better transparency and help licensees better understand how the ACMA approaches spectrum pricing (recommendation 1). The ACMA expects to consult on these guidelines in Q4 2019.
- > review how the ACMA administratively prices spectrum and the formula used to set many of the current apparatus licence taxes. There is potential to improve the ACMA's administrative pricing of spectrum to more closely reflect market value through approaches, such as opportunity-cost-based pricing (recommendations 7 and 8). The principles guiding this review will be part of the Spectrum Pricing Guidelines. It is proposed that draft guidelines and the ACMA's proposed approach

to implementing the Spectrum Pricing Review will be released for consultation in Q4 2019. In Q2 2020, the ACMA will then consult on the detail of reflecting these principles in a new formula.

- > simplify industry's spectrum management cost recovery arrangements to be consistent with the Australian Government Charging Framework and make them more transparent. The ACMA proposes to consult on potential new cost recovery proposals in Q4 2019.

The ACMA intends to consult on new approaches to pricing in Q4 2019 with a view to new arrangements being implemented over the course of 2020 and 2021.

### **Commercial broadcasting taxes**

The ACMA 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 2019 the ACMA provided all commercial broadcasters with estimates of their tax assessments for the financial year.

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. The ACMA expects to make announcements in Q4 2019.

### **Other pricing updates**

As part of the ACMA's opportunity-cost-based pricing work, the ACMA developed a monitoring framework for the 400 MHz band. This monitoring will continue on a semi-regular basis. It is expected that consultation on further price increases will only occur if there is evidence suggesting that demand is increasing and there is congestion in the band.

Feedback to the draft FYSO 2019–23 included discussion of potential changes to apparatus licence taxes and the flagging of information about reviews. Several submissions suggested that the ACMA should review spectrum pricing for particular services—such as satellite services in Ka and Ku bands, open narrowcasting services, scientific licensing for 5G services and scientific purposes and for services above 6 GHz which require large bandwidths and multiple sites.

In other consultation processes, such as the [Spectrum planning for the 28 GHz band](#) paper from September 2018, it was proposed by a stakeholder that the ACMA consider alternative pricing arrangements for fixed link services.

The ACMA's view is that implementation of the Spectrum Pricing Review across all spectrum pricing arrangements is the best way to address pricing concerns recently raised regarding specific industries and spectrum bands.

The ACMA will continue to consider changes to the apparatus licence tax regime to account for routine matters including adjusting taxes for inflation. The ACMA will also consult on a proposal to remove a 'freeze' on apparatus licence taxes relating to fixed services below 960 MHz in remote density areas. The ACMA considers it is now appropriate to consult on the proposal to remove the freeze as these taxes have remained unchanged since 2008. It is expected that the ACMA will consult on both proposals in Q4 2019. This consultation may be part of the consultation for the implementation of the Spectrum Pricing Review.



# Compliance and enforcement

CHANGE

## Compliance priorities

The ACMA's priority compliance area (PCA) program commenced in 2012–13 and has effectively guided our approach to compliance and enforcement. Centred on a risk-based methodology, this program aimed to systematically identify and address high-risk compliance issues by maximising the regulatory reach of the ACMA in a strategic and resource-efficient manner.

In April 2018, the ACMA consulted with industry through tune-ups held in Sydney and Melbourne on draft PCAs for 2018–19.

PCAs are set annually. In 2018–19, the ACMA PCA programs focused on:

- > interference management
- > spectrum review implementation
- > licensing integrity.

## Progress achieved

### Licensing integrity

The ACMA is focusing on issues relating to non-renewal of lapsed apparatus licences and compliance with licence conditions. This complements the work that has already been done relating to the importation of cheap two-way radios that come pre-programmed with frequencies that are not covered by a class licence, and not apparatus-licensed, operating in land mobile spectrum.

Spectrum monitoring in the 400 MHz and 5.6 GHz bands has been completed in western Victoria, South Australia and the Sunshine Coast in Queensland.

The 400 MHz monitoring program has been completed in Brisbane, Sydney and Melbourne. The results from this monitoring activity is being used to scope the next stage of the compliance priority program to target field-based compliance activities in the 2019–20 FYSO.

### Spectrum Review implementation

Practices and procedures are being developed to support the potential implementation of a civil penalties regime and the introduction of supply side controls including interim bans and product recalls under potential new legislative arrangements. The scope and timing of this work is related to the progress of draft legislation.

### Interference management

The ACMA continues to consider industry feedback on its interference management principles and expects to finalise them in Q4 2019. The principles will inform the development of an interference management framework, which will provide updated procedural guidance for licensees making interference complaints to the ACMA.

### Compliance themes

Each year the ACMA investigates a broad range of issues and complaints relating to spectrum use, interference, licensing and device supply. During the 2018–19 year, the following themes have emerged:

- > ACMA compliance staff executed three search warrants relating to the operation of a mobile phone jammer, a GPS jammer and citizen band radio.
- > Field staff conducted signal monitoring activities to identify unlicensed operation under the Licensing Integrity PCA. As a result, field staff are continuing to identify hand-held radios pre-programmed with unlicensed frequencies in the 400 MHz band.

Further reporting on the number of compliance and enforcement activities can be found in the [ACMA's 2018–19 annual report](#).



## **New/ongoing activities planned for 2019–20**

For the 2019–20 period, the ACMA is adopting a whole-of-agency approach to setting priorities to guide our compliance and enforcement activities. This new approach will replace the setting of annual priority compliance areas for radiocommunications that has guided our approach in recent years. There are three compliance priorities identified in relation to our spectrum functions.

With the expected increase in small cell deployments as 5G technology is implemented, the ACMA will conduct a program of compliance audits focused on small cell deployments by mobile network operators in 2019–20. The purpose of this audit program will be to test compliance with the Electromagnetic Energy (EME) exposure obligations placed on mobile network operators and provide a baseline of compliance data. This data will complement the EME base station audit program conducted in 2013–14 and other previous EME priority compliance area programs relating to Smart Meters, Mobile Handsets and Wi-Fi devices.

The ACMA will extend its Licensing Integrity priority compliance area program into 2019–20 with a Compliance Priority aimed at maximising the utility of licensed spectrum use by addressing various sources of unlicensed activity. This Compliance Priority will focus on services operating unlawfully in the 5.6 GHz band and the operation of non-compliant devices in the 400 MHz band.

The ACMA will audit suppliers of solar inverters for compliance with the requirements of the ACMA's electromagnetic compatibility arrangements in order to minimise the risk of interference to radiocommunications from non-compliant solar inverters.

The ACMA is seeking to ensure that compliant product is being supplied to the Australian market as solar rebate schemes are being reinvigorated.

As part of our ongoing priorities, the ACMA will also undertake activities that support communications network safety and reduce threats of disruption by operating well established regulatory and non-regulatory strategies targeting unauthorised cellular repeaters and prohibited devices (mobile phone and GPS jammers).

# Appendix A—Sunsetting instruments

## Radiocommunications-related instruments due to sunset in 2019–20

Table 13: Instruments due to sunset on 1 October 2019

Instrument	Enabling provision	Status
<a href="#">Broadcasting Services (Amalgamated Remote Television Licence Areas – Remote Central and Eastern Australia TV1 and Mt Isa TV1) Determination 2009</a>	<a href="#">Broadcasting Services Act 1992</a> —s 38B(14)	Instrument will be allowed to sunset
<a href="#">Broadcasting Services (Amalgamated Remote Television Licence Areas – Remote Central and Eastern Australia TV1 and Remote Central and Eastern Australia TV2) Determination 2009</a>	<a href="#">Broadcasting Services Act 1992</a> —s 38B(14)	Instrument will be allowed to sunset