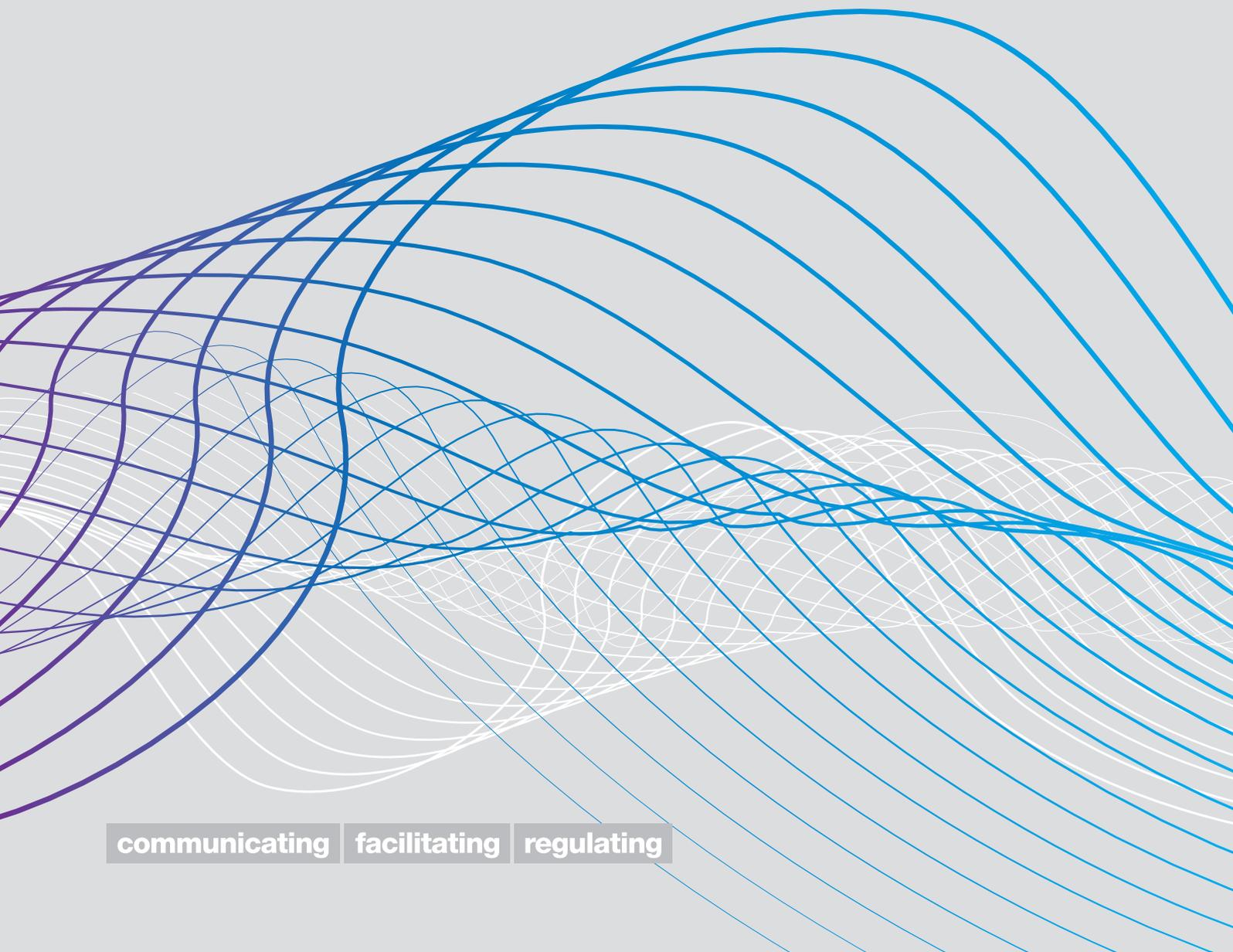


Five-year spectrum outlook 2017–21

The ACMA's spectrum management
work program

OCTOBER 2017



communicating | facilitating | regulating

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Foreword

The Australian Communications and Media Authority (the ACMA) has communicated its spectrum management priorities through its five-year spectrum outlook (FYSO) since 2008–09. This year we are continuing the process of aligning the FYSO with the Spectrum Review's recommendation for a spectrum work program.

There are two parts to this year's FYSO:

- > **Part 1** sets out three major pieces of new work that the ACMA is seeking your views on.
- > **Part 2** builds on changes made in the presentation of last year's FYSO for reporting on our spectrum work. It includes an overview of the spectrum environment, progress on last year's key projects and it identifies the activities to be undertaken by the ACMA during the 2017–18 financial year.

About Part 1

We are using Part 1 to consult with you on the approach to modifying the FYSO to reflect a work program that better aligns with the Spectrum Review recommendation and stakeholder feedback. We are also seeking your views on two major streams of work that will have significant implications for our future work programs—the price-based allocation of a number of spectrum bands and the implementation of new arrangements for spectrum management arising from the government's Spectrum Review published in May 2015.

> **Spectrum work program**

The ACMA is developing an approach to implementing the Spectrum Review's recommendation for a spectrum work program that builds on the FYSO, covers at least five financial years and is updated and published each financial year. A key difference from the current approach to producing the FYSO is that the Exposure Draft of the Radiocommunications Bill (the Bill) requires the ACMA to consult the minister, and invite and consider submissions prior to the preparation of the work program. We are planning to introduce this change for next year's spectrum work program.

We are proposing to structure the work program in line with our major streams of spectrum management work, highlighting what has changed and what is new. This year we are seeking your feedback on the features of a spectrum work program that would be of most value to you.

> **Forward allocation work plan**

This work plan is intended to provide incumbent and prospective spectrum users with indicative information about the timing and sequencing of the price-based allocation of licences in a number of spectrum bands. Whether individual bands proceed to reallocation and auction is contingent on future ACMA and ministerial decisions at the planning stage, other government policy considerations, market demand and industry priorities for access to spectrum. For these reasons, a forward allocation work plan needs to be scenario-based, and we are seeking

feedback from you about the value of these scenarios and relative prioritisation of the proposed allocations.

> **Spectrum Review implementation work plan**

The ACMA has a significant body of work occurring over the next few years to implement the Spectrum Review recommendations currently being drafted into legislation—in particular, the design of a new licensing system and work on the redesign of accreditation and equipment rules, new frequency assignment and spectrum planning frameworks. We are consulting on our work plan to implement the Spectrum Review reforms, indicating our approach to reform priorities and when we are intending to consult you on the design of the revised spectrum management arrangements.

A series of questions appears at the end of each of these sections to highlight areas you may wish address in your feedback.

About Part 2

Part 2 of this document outlines the activities the ACMA intends to undertake over the remainder of 2017–18. These activities and work streams are informed by stakeholder feedback we received in relation to last year's FYSO and through other consultation processes. They also reflect the issues we anticipate emerging over the next five years and the progress we have made in relation to our previous 12-month work plan.

Consultation process

This year's FYSO is a transitional document, enabling future spectrum work programs to better align with a financial year cycle. It covers the period until the end of this financial year and the consultation timeframe is designed to deliver next year's spectrum work program before the start of the 2018-19 financial year.

We are therefore requesting your feedback on our approach to the work streams in Part 1 and any other comments you would like to contribute by **18 December 2017**.

The feedback you provide will inform our development of the 2018–22 spectrum work program in the first half of 2018. We will consult with you about this work program and aim to publish a final version prior to the commencement of the 2018–19 financial year.

We look forward to your comments. Appendix 3 provides details for making a submission to the ACMA.

Part 1—Work plans for new major projects

Introduction

The ACMA is taking this opportunity to consult with you on:

- > developing a spectrum work program in response to the findings of the Spectrum Review and stakeholder feedback
- > implementing the new legislative and policy framework arising from the Spectrum Review reforms
- > allocating various spectrum bands in response to user demand.

The feedback you provide will be considered in our approach to these pieces of work and reflected in future spectrum work programs and our other work as appropriate.

Spectrum work program

Spectrum is a critical input to Australian communications and media industries as well as communications-reliant services. The pace of innovation is accelerating in the sector along with the value it returns to Australia's society and economy. This is increasing pressures to plan and manage our spectrum more efficiently—in terms of both responding to demands for new services and uses and in continuing to support existing spectrum users.

There are already predictions that 5G will catalyse a fourth industrial revolution, enabling significant advances in the Internet of Things (IoT) with applications like remote control of industrial, agricultural and medical processes, along with real-time machine-to-machine interactions to support automated vehicles and smart cities.

Innovations such as these, as well as developments in satellite communications, other mobile telecommunications and land mobile, mean spectrum needs to be planned, made available and managed more efficiently, to enable new communications services, while continuing to support existing spectrum uses.

In this context of significant disruption and change, an annually updated spectrum work program that focuses on what is new and has changed can serve as an important feedback loop for the exchange of timely information between the ACMA and the spectrum community. It can better inform the business decisions of spectrum users and ancillary service providers by outlining our planning, allocation and licensing priorities, as well as our work on equipment supply standards, international harmonisation and interference management. Importantly, feedback and information provided to us can assist in identifying developments with the potential to affect spectrum demand and/or lead to pressure points that require regulatory attention.

Our approach to developing a spectrum work program

Our approach is being informed by:

- > the findings of the Spectrum Review and the government's implementation of the review's recommendations through its legislative drafting process
- > stakeholder feedback provided as part of the most recent FYSO consultation as well as during government consultations on the drafting of new radiocommunications legislation.

Spectrum Review

The Spectrum Review recommended 'requiring the ACMA to provide to the minister an annual work program, prepared in consultation with stakeholders, including key priorities over a three- to five-year timeframe'.¹ It 'identified that there needed to be greater visibility of the ACMA's future work plan regarding allocation of spectrum, implementation and timing'.²

This recommendation is being given effect in legislation being drafted by the Department of Communications and the Arts (the department). In May 2017, the department commenced consultation on a partial Exposure Draft of the Radiocommunications Bill (the Bill).³ The Bill requires the ACMA to prepare and publish a spectrum work program at least once each financial year. Before publishing, the ACMA will need to consult with the minister and stakeholders. A progress report on the delivery of the work program activities is to be provided in the ACMA's annual report.

The work program is to cover the ACMA's spectrum management functions and powers within 'a five-year planning horizon' and include 'a detailed annual work program for the immediately forthcoming financial year.' The work program is to provide 'an early indication of new and changing priorities, significant spectrum planning and other proposed decisions and emerging issues'.⁴

These reforms position the spectrum work program as a focal point for the ACMA's engagement with the minister and stakeholders about its spectrum management activities, particularly in relation to the timing of allocation and licence issue processes, progress on implementing planning initiatives, relative prioritisation of industry requests for changes in regulatory arrangements, and ACMA responses to government policies and directions.

The consultative approach in preparing the spectrum work program should ensure the ACMA's prioritisation of spectrum work is transparent and that stakeholders are aware of and able to comment on those work priorities. In turn, this feedback should assist the ACMA in responding to the demands of an increasingly complex spectrum environment.

¹ Department of Communications and the Arts, Spectrum Review Report, May 2015, <https://www.communications.gov.au/publications/spectrum-review-report>.

² Department of Communications and the Arts, Spectrum Reform Legislative Proposals Consultation Paper, March 2016, <https://www.communications.gov.au/have-your-say/spectrum-reform-legislative-proposals-consultation>.

³ The ACMA provided supporting papers for release with the Bill, including one addressing the spectrum work program. These papers were contributed to assist with the department's consultation process. The ACMA noted that the material that it provided cannot and does not fetter the Authority's discretion in the making of future decisions about the matters discussed or any other matter.

⁴ Department of Communications and the Arts, Consultation on new Spectrum legislation, May 2017, <https://www.communications.gov.au/have-your-say/consultation-new-spectrum-legislation>.

Changes to this year's FYSO and work program

Stakeholders have provided useful guidance on developing a spectrum work program in submissions on last year's FYSO and in feedback on implementing the Spectrum Review recommendations. We are building on last year's FYSO to address much of this feedback.

The spectrum work program will continue to evolve in response to the government's reform agenda (including a possible ministerial policy statement on the work program) and ongoing stakeholder feedback. This year's version in Part 2 reflects the following changes:

(i) Strategic focus and coverage

Stakeholders have requested greater strategic focus, including better alignment of activities with spectrum management objectives. The benefits of broadening the coverage of spectrum management activities in the work program were also highlighted in submissions with suggestions to include the preparatory work for international engagement, and implementation of the Spectrum Review reforms and related transition activities. Stakeholders also suggested that the content of the work program provide a better balance of new demands for spectrum access with existing user demands for ongoing access to spectrum.

We have responded to this feedback by designing the work program in Part 2 around our major spectrum functions:

- > planning
- > licence allocation
- > spectrum pricing
- > managing interference
- > mandating equipment supply standards
- > international engagement
- > regulatory review, including responding to the government's Spectrum Review reforms.

These functions represent related streams of work directed at achieving an overall public benefit from the use of spectrum now and in the future. The *Spectrum environment* section of the work program is also more focused on developments likely to affect these streams of work over the next 12 months and in the medium term. This approach aims to:

- > Support a more strategic focus on the relationship between our spectrum management work streams based on our statutory objects and ACMA principles for spectrum management.
- > Clearly demonstrate why we are undertaking activities listed under these work streams, their relative benefits and priorities, and how they contribute to our broader objectives.

Feedback suggested updating rather than reiterating future work programs. We will review the need to retain information in future work programs that does not vary from year-to-year to more clearly focus on what has changed. Where relevant, links will be provided to background material.

(ii) More detail on ‘what’ and ‘when’

A number of stakeholder submissions requested clearer milestones and timings for priority activities, with a roadmap of what, when and how spectrum will be allocated. We are addressing this in Part 1, with our proposal for a forward allocation work plan over the next few years.

We are also building on the detail and scheduling information that was provided in last year’s FYSO. Table 5 in Part 2 includes milestones and estimated timings for key projects being progressed in 2017–18.

(iii) Report back on progress from previous year and stakeholder feedback

Stakeholders responded positively to last year’s report back on completed projects. They also requested a better account of their feedback. This year’s work program reports on the progress achieved during the year against our major work streams and references relevant stakeholder feedback.

(iv) Delivering our work program activities

There were also stakeholders who suggested that the spectrum work program address the ACMA’s capacity and capability in undertaking its spectrum management activities. We have listed the areas of the ACMA with responsibility for the activities we will be undertaking in our 2017–18 work program in Table 5. Business systems including the licensing system are also included to give greater transparency to the underlying processes that support the delivery of our work.

For example, the ACMA has enhanced its auction capabilities through the acquisition of the Enhanced Simultaneous Multi Round Ascending (EMSRA) auction format. This format is a contemporary evolution of the Simultaneous Multi Round Ascending (SMRA), which includes the ability to offer an assignment round, to reduce the risk that a bidder ends up with fragmented lots.

(v) Consultation periods

There were two preferences expressed by stakeholders for when a spectrum work program should be published. There was support for publishing the work program within a 90-day window prior to the commencement of the financial year, and also a suggestion to release a draft in June, followed by publication of the final in August.

The exposure draft bill anticipates the work program following a financial year cycle. We are therefore proposing to commence consultation on our next spectrum work program in the first half of 2018 and publish a final version prior to the commencement of financial year 2018–19.

Conclusion and next steps

An overarching goal of the spectrum reforms is to enable greater user involvement in managing Australia’s spectrum. We hope that the changes we have made to this year’s FYSO and our approach to future developments will make it easier for you to contribute to the programming of our spectrum work and better inform the planning of your own business activities.

There are a number of opportunities for you to let us know what you think. We welcome meetings with individual stakeholders, written submissions and views expressed in forums like the RadComms conference. Details for making a written submission are at Appendix 3.

Consultation questions

- 1. Will the proposed structure of the work program assist you in your business planning?**
- 2. Does the content provide adequate detail for you to engage with the ACMA's planned work in a meaningful way?**
- 3. Does the consultation process provide sufficient opportunity for you to contribute to the work program?**
- 4. Do you have a preference for how the ACMA should communicate changes during the period of a work program?**

2. The forward allocation work plan

The ACMA forward allocation work plan

Timely access to spectrum is of increasing importance to an innovative and dynamic communications sector. Over recent years, the ACMA has provided an increasing level of detailed information to the market about its spectrum planning priorities, including in the most recent [FYSO](#) and the [mobile broadband work plan](#). The ACMA sees value in providing additional information to the market about its plans for possible spectrum allocation work over the next five years.

This forward allocation work plan is intended to provide incumbent and prospective spectrum users with indicative information about the timing and sequencing of the possible allocation of a number of spectrum bands. There is no certainty that any band will move to allocation until a formal decision has been made to change arrangements in that band. 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 an allocation, the specific design of each allocation (for example, features such as the allocation timing, allocation methodology and lot configuration) are all dependent on a range of planning decisions yet to be made. The ACMA can be expected to take account of feedback from industry about likely demand and their priorities for access to particular spectrum bands. For detailed information about the planning and allocation status of specific bands, stakeholders should refer to the detailed planning status of bands outlined further below. Against this background and recognising the contingent nature of designing a forward allocation work plan, the ACMA has developed a series of indicative auction timing scenarios.

We are seeking feedback from you about the scenarios and relative prioritisation of our proposed allocation work.

Purpose of the allocation work program

For incumbent and prospective spectrum users, the ACMA sees that an allocation work plan will provide additional clarity and information for stakeholders around the planning status and possible allocation timing of particular spectrum bands, enabling:

- > strategic network planning by spectrum users
- > technology deployment planning
- > information to support capital-raising activities.

We are seeking your feedback on the allocation forward work plan in the context of your priorities and timing commitments, especially for the spectrum allocations programmed in the out-years.

Important caveats

A series of scenarios forms the basis of the allocation work plan, reflecting the indicative (rather than definitive) nature of the timing and sequencing of allocating various bands. As noted above, the inclusion of any particular band in this work plan is not intended to pre-empt formal decisions on a change of arrangements in that band. Rather, it simply provides information on the possible timing of an auction, *if* the necessary decisions are made to move the band towards a change of arrangements.

Specific allocations would depend on ACMA and ministerial decisions made during the planning stage, 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.

We have developed a series of allocation scenarios to illustrate potential timing and sequencing choices in possible allocations over the next few years.

Spectrum bands under consideration

Table 1 outlines the current set of spectrum bands being considered by the ACMA for future allocation. The bands identified are regarded as the most likely bands to proceed to a price-based allocation of new licences within the next four to five-year period as reflected in the ACMA's mobile broadband work plan at Appendix 1.

The ACMA has commenced an allocation process for a multi-band auction of unsold spectrum in four bands: 1800 MHz, 2 GHz, 2.3 GHz and 3.4 GHz.

Each of the remaining bands identified are at various stages in the planning process, with issues related to international spectrum harmonisation and technology standardisation still to be settled in a number of them, and potentially different levels of interest for particular bands likely to be expressed by individual operators.

We acknowledge that the priority and sequencing of the allocation of these bands may need to alter in coming years, particularly where there is the prospect of a change in the highest value use of a band occurring sooner, or later, than is apparent at present. In addition, there may be spectrum bands beyond those identified here, that are currently at the monitoring stage in the ACMA's planning program of work, which may need to be accelerated to an allocation, with consequential changes to the timing and sequencing of the bands identified in these scenarios.

Table 1: Spectrum bands currently being considered for allocation

Band name	Spectrum parameters	Current use	Comments
Multi-band residual lots	Residual/unsold spectrum in 1800 MHz, 2 GHz, 2.3 GHz and 3.4 GHz bands	Unused	Allocation has commenced.
3.6 GHz band	3575–3700 MHz	Point-to-point, FSS (satellite), Amateur, Regional WISPs	Likely first 5G band.
850 MHz band	809–824 MHz and 855–870 MHz	Fixed links, point-to-multipoint, land mobile	Decision to re-farm has been made already, but a lengthy clearance process foreshadowed.
900 MHz band	890–915 MHz and 935–960 MHz	2G mobile (GSM), 3G, 4G	2G shutdown imminent, large portion of the band un-utilised.
Millimetre wave band	24.25–27.5 GHz	Space research, FSS satellite (ESA, CSIRO, NASA), NBN	Second of the 5G bands. Broader interest to be determined.
1.5 GHz band	1427–1518 MHz	Point-to-point, some multipoint, Defence	Technology standardisation progressing. Lower level of near-term domestic interest.

In relation to the forthcoming band allocations, it is worth noting the status of relevant allocation decisions:

- > **3.6 GHz**—The ACMA consulted on planning options for the band from June-to-August of 2017. In October 2017, the ACMA finalised its review of arrangements in the 3.6 GHz band. The major outcome of this review is that the ACMA will commence processes to spectrum licence the 3.6 GHz band in metropolitan and regional Australia. Specifically, the ACMA has commenced consulting on a recommendation to the minister that the band be re-allocated for spectrum licensing in metropolitan and regional areas.

Following this consultation, if the ACMA makes a recommendation to the minister on reallocation, then decisions to be made include those by:

- > the minister in relation to reallocation and competition limits
- > the ACMA on lot configuration and allocation timing.

The ACMA has also announced a range of mitigation measures for affected incumbent 3.6 GHz band apparatus licensees. These include:

- > proposing an extended re-allocation period in regional areas
 - > a commitment to developing arrangements for site-based wireless broadband services in the 5.6 GHz
 - > a commitment to investigate the possibility of making arrangements for site-based fixed wireless broadband services in parts of the 28 GHz band in regional areas
 - > encouraging commercial negotiations, where possible, to support ongoing access to spectrum
 - > a commitment to working with industry to identify one or more earth station protection zones on the east coast of Australia.
- > **850 MHz**—In late 2015, the ACMA finalised a review of the 803–960 MHz band, deciding to reallocate 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.

As is the case for the 3.6 GHz band, above, the ACMA’s first formal step in any reallocation process will be to make every effort to provide potentially affected apparatus licensees with a copy of the draft reallocation recommendation proposed to be given to the minister, and invite those licensees to provide the ACMA with any comments on the draft recommendation.

If, subject to the necessary ACMA and ministerial planning decisions, the ACMA is able to reallocate the spectrum as spectrum licences much sooner than final clearance of the band in 2024, then the rights of the remaining incumbent services would be protected by the use of an extended reallocation period.

- > **900 MHz**—In early 2017, the ACMA released a consultation paper outlining reconfiguration options. A paper setting out how the ACMA intends to reconfigure the band was released in October 2017. This signals the ACMA’s intent to recommend that the 900 MHz band (890–915/935–960 MHz) be cleared of incumbent use by mid-2021 and reallocated by auction. It is expected that this auction will occur in 2019 and new 5 MHz-based spectrum licences issued in 2021.
- > **Combined 850 MHz/900 MHz**—Potential efficiency gains from a combined auction of the 850 MHz expansion and 900 MHz bands have been identified. However, the quantity of spectrum available for reallocation in the 850 MHz expansion band is subject to government considerations on the spectrum requirements for public safety mobile broadband (PSMB). The ACMA intends to soon commence the formal consultation process towards the 850 MHz and 900 MHz bands being auctioned at the same time, with the ultimate intent that new licences in both bands will be issued in mid-2021. The amount of spectrum available for auction in the 850 MHz expansion band will be subject to government decisions on PSMB and the ACMA is continuing discussions with the department on this matter.
- > **Millimetre wave spectrum**—A number of millimetre wave (mmWave) bands could be considered for allocation. International spectrum harmonisation and technology standardisation are in the relatively early stages of development but are progressing rapidly. Domestically, detailed planning work by the ACMA has yet to commence formally, but the ACMA sees potential opportunity for accelerating its consideration of at least one mmWave band, with the 26 GHz band (24.25–27.5 GHz) being a likely candidate. A decision on this is expected to be made in Q2 2017–18.

- > **1.5 GHz**—Use of the band has been identified for International Mobile Telecommunications (IMT). Ongoing work in relation to international spectrum harmonisation and technology standardisation will clarify the amount of spectrum that could be made available for allocation. Decisions are yet to be made by the ACMA on the timing of the band allocation and the quantum of spectrum available for allocation—both elements are influenced by international developments. For these reasons, this band is currently regarded as a lower priority for allocation.

Accelerating the allocation timeline

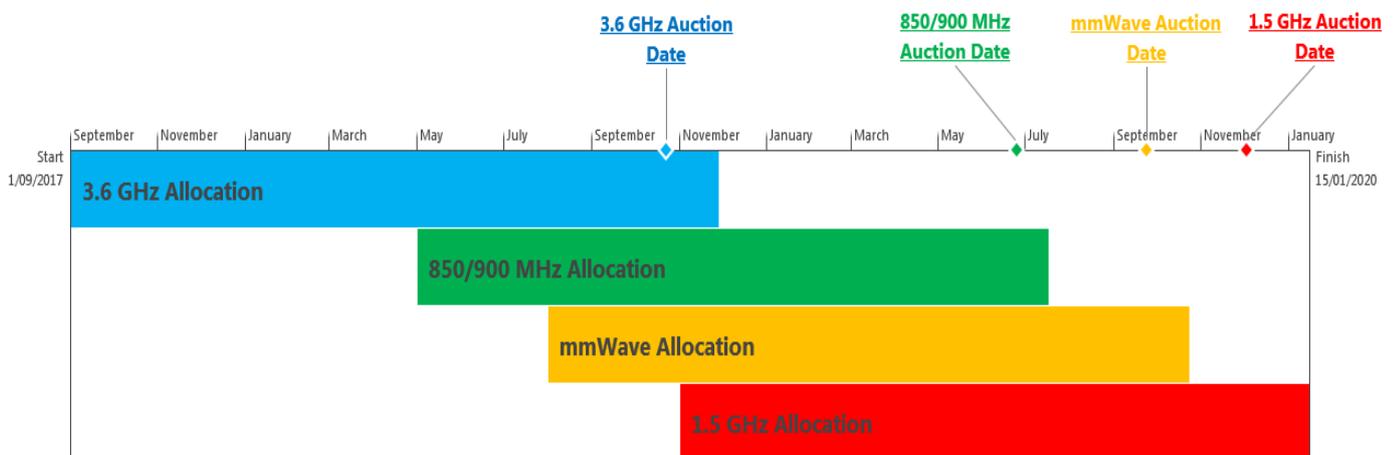
The *Radiocommunications Act 1992* establishes a set of mandatory processes for allocating spectrum. In the ACMA’s experience, this process from confirmation of the planning decision to the commencement of an auction takes approximately 12.5 months. Some of these mandatory processes will be streamlined in the new Radiocommunications Bill, which is expected to simplify some elements of the decision-making process. To date, the ACMA has been constrained by resources to conduct auctions serially. As there is little scope to further compress the ‘typical’ minimum 12.5-month period under existing legislation, we have explored instead how we might conduct more than one auction in parallel. In presenting the various allocation scenarios below, the ACMA assumes it will be able to run simultaneous but staggered auctions in future, to enable bands later in the allocation sequence to be brought to market far more quickly than would be possible with serial auctions.

The capacity to successfully run allocations according to the planned timetabling is subject in part to progress on international band harmonisation and technology standardisation, as well as the appetite and capacity of potential spectrum investors to participate in such potentially closely spaced processes and the ACMA’s continuing resourcing to support multiple, parallel (but staggered) planning and allocation processes.

The ACMA is keen to gauge stakeholder views on running multiple sequential auctions at closer intervals than have been practicable to date.

An illustration of the possible sequencing of allocations under a staggered allocation process is outlined in Figure 1 below.

Figure 1: Hypothetical timeline of a staggered allocation process



Allocation scenarios for comment

Noting the status of planning and allocation decisions for each of the bands under consideration, the ACMA has identified three allocation scenarios that respond to plausible views about market demand for existing and emerging uses of spectrum, progress on international harmonisation and technology standardisation and optionality to adjust planning priorities to advance or withdraw particular bands in the priority for allocation. The timing of allocations may straddle the Radiocommunications Act and the new Radiocommunications Bill.

(i) Scenario 1

Scenario 1 provides a view on allocation timing, where all the identified bands proceed to reallocation with no unanticipated planning or allocation process delays.

Under this scenario, allocation of the 3.6 GHz band is prioritised, followed by an allocation of a combined 850 MHz expansion/900 MHz band (see Table 2). This scenario represents the ACMA's preferred view on an optimal planning and allocation sequencing, if all bands proceed to reallocation.

Table 2: Scenario 1—3.6 GHz prioritised, with 850 MHz expansion/900 MHz next

	ACMA planning decision	Min. decision	Auction	Notes
3.6 GHz	Q2 2017/18	Q3 2017/18	Q2 2018/19	
850/900 MHz	Q2 2017/18	Q2 2018/19	Q4 2018/19	
mmWave (26 GHz)	Q4 2017/18	Q3 2018/19	Q1 2019/20	mmWave prioritised over 1.5 GHz <i>May be allocated under new Act</i>
1.5 GHz	Q2 2018/19	Q4 2018/19	Q2 2019/20	<i>May be allocated under new Act</i>

Note: the following abbreviations are used: Quarter 1 (Q1): 1 July – 30 September; Quarter 2 (Q2): 1 October – 31 December; Quarter 3 (Q3): 1 January – 31 March; Quarter 4 (Q4): 1 April – 30 June.

(ii) Scenario 2

In this scenario, the ACMA proceeds to allocate 3.6 GHz as outlined, with mmWave prioritised ahead of the allocation of the 850 MHz expansion/900 MHz bands (see Table 3). Recognising there may be differing views about the relative prioritisation of an allocation of mmWave spectrum over the 850 MHz expansion/900 MHz bands, this scenario explores the impact on allocation sequencing and timing of changing the order of the allocation of these two bands.

Table 3: Scenario 2—3.6 GHz prioritised, with mmWave next

	ACMA planning decision	Min. decision	Auction	Notes
3.6 GHz	Q2 2017/18	Q3 2017/18	Q2 2018/19	
mmWave (26 GHz)	Q4 2017/18	Q1 2018/19	Q1 2019/20	mmWave prioritised ahead of 900 MHz/850 MHz
850/900 MHz	Q2 2017/18	Q3 2018/19	Q1 2019/20	<i>May be allocated under new Act</i>
1.5 GHz	Q2 2018/19	Q4 2018/19	Q2 2019/20	<i>May be allocated under new Act</i>

Note: the following abbreviations are used: Quarter 1 (Q1): 1 July – 30 September; Quarter 2 (Q2): 1 October – 31 December; Quarter 3 (Q3): 1 January – 31 March; Quarter 4 (Q4): 1 April – 30 June.

(iii) Scenario 3

This scenario illustrates what could happen if one or more bands do not proceed to allocation via an auction. In this scenario (see Table 4), we have assumed for illustrative purposes that:

- > the 900 MHz band does not proceed to auction and is administratively reconfigured and allocated
- > the 850 MHz expansion band allocation is delayed, with an allocation conducted closer to the completion of band clearance.

Other band combinations could be substituted for these two bands to arrive at different allocation sequencing.

Table 4: Scenario 3—One band does not proceed to auction

	ACMA planning decision	Min. decision	Auction	Notes
3.6 GHz	Q2 2017/18	Q3 2017/18	Q2 2018/19	
mmWave (26 GHz)	Q4 2017/18	Q1 2018/19	Q1 2019/20	mmWave prioritised due to emphasis on 5G <i>May be allocated under new Act</i>
1.5 GHz	Q2 2018/19	Q3 2018/19	Q2 2019/20	<i>May be allocated under new Act</i>
850 MHz		Q1 2019/20	Q1 2020/21	ACMA decision already made

Note: the following abbreviations are used: Quarter 1 (Q1): 1 July – 30 September; Quarter 2 (Q2): 1 October – 31 December; Quarter 3 (Q3): 1 January – 31 March; Quarter 4 (Q4): 1 April – 30 June.

In addition to the three scenarios identified, there may be other planning and allocation scenarios that stakeholders consider warrant further attention by the ACMA.

Next steps

The ACMA expects to review and update the allocation scenarios in light of stakeholder feedback. We aim to include a forward allocation work plan as an integral part of the spectrum work program, with updates provided on an annual basis.

Consultation questions

- 5. Does the inclusion of a forward allocation work plan by the ACMA assist with the planning of your spectrum and network technology decisions?**
- 6. Do you have any comments on the scenarios? Are there other scenarios you believe warrant identification and particular attention at this time? Why?**
- 7. Is there interest in the ACMA running sequential staggered allocations over the next four-year period?**
- 8. Which bands would you like to see prioritised for allocation under the planning scenarios? Why?**

3. ACMA approach to implementation of the Spectrum Review

The reform context

With the [Exposure Draft of the Radiocommunications Bill 2017](#) (the Bill) released for public comment in May 2017, the ACMA has started preparations for implementing new spectrum management arrangements on commencement of the new Act.

In giving effect to the recommendations of the [Spectrum Review](#) in August 2015, the government announced it would replace the *Radiocommunications Act 1992* with new legislation that:

- > provides opportunities for greater user involvement in spectrum management
- > simplifies regulatory structures, streamlines operational processes and clarifies the role of government, including the role of the ACMA, in spectrum management.

The Bill would provide the ACMA with broad discretion on the detailed work of designing and implementing many aspects of the new arrangements falling to the ACMA. This is a significant task, with many regulatory design choices to be made by the ACMA in a policy context that will be affected by a number of ongoing processes, including:

- > the final form of the government's legislation, including transition provisions
- > the outcome of related reviews, including the spectrum pricing review
- > the development and content of ministerial policy statements.

We are progressing this work within the broad policy directions reflected in the Spectrum Review and the principles-based approach the government is taking to the drafting of the new legislative framework. We will also closely monitor and respond to developments as the Bill is finalised and as it is considered in parliament.

In commenting on the Exposure Draft of the Bill, stakeholders wanted additional information from the ACMA about how it intends using the discretion provided under the Bill to implement the reform directions of the government in new spectrum management arrangements.

The work we undertake during this initial design and development phase will provide the foundations for implementing the detail of the legislation on commencement, as well as optimising opportunities for reforms in the future.

While elements of the legislative scheme are still under development, there is sufficient guidance offered in the Spectrum Review recommendations and consultation material associated with the Exposure Draft Bill for the ACMA to identify reform directions and implementation paths. At a broad level, sources of potential reform in the new spectrum management arrangements derive from both changes to the legislative framework (for example, the introduction of a single licensing system), and from the broader discretions the ACMA will have under the bill to design and deliver new regulation, including co-designing elements of the new arrangements with spectrum users and the industry.

In this paper, we are seeking feedback from you about:

- > our intended approach to spectrum reform objectives and priorities
- > our work plan to implement the Spectrum Review reforms
- > opportunities for your involvement in designing the revised spectrum management arrangements.

Reform implementation objectives

At a broad level, the ACMA expects that spectrum management will remain directed at maximising or promoting the public interest in, and benefit derived from, how spectrum is used.

This suggests that spectrum should continue to be allocated, and encouraged to move to, its highest value use or uses—with ‘value’ including **both economic and social value**, and ‘use’ encompassing public and private, active and passive uses.

As currently drafted, the new Bill provides scope for significant change in the way the ACMA and industry achieve these objectives. The findings of the Spectrum Review express a preference for using market principles and mechanisms in achieving efficient allocation and use of spectrum. They also highlight the advantages of increasing spectrum user and other third-party involvement in spectrum management.

As it implements spectrum reforms, the ACMA has categorised its implementation objectives into two broad kinds, which serve to:

- > enhance market-based activity in spectrum management
- > improve the design and efficiency of regulatory arrangements.

(i) Enhancing market-based activity

In its implementation activities, the ACMA will be looking to design regulatory arrangements that enhance market-based activity, with a particular focus on:

- > **Greater industry-initiated licence trading**, which will assist market-led initiatives to move spectrum to its highest value use. Over time, this may reduce the need for the ACMA to become involved in processes such as re-farming. There are a number of specific reforms that can support this policy outcome, including through licence design and developing more technically flexible licences that do not unnecessarily limit the use of the licence. However, these reforms will need to be balanced against competing objectives such as technical efficiency in licence design. The ACMA intends to consult in more detail shortly on its licensing system design and licence reform proposals.
- > **Greater use of spectrum sharing**, which will allow for more efficient use to be made of spectrum. Although sharing spectrum has always been fundamental to spectrum management, advances in technology are likely to create more opportunities for licence design to incorporate or facilitate sharing arrangements, including some that could be managed by users or other third parties.

The ACMA notes that relatively exclusive, long-duration spectrum permissions, such as spectrum licences, have been a key means of promoting market involvement in spectrum management, and are expected to retain their utility into the future. Any approach to sharing cannot be one-size-fits-all but must take into account the nature of the uses, and the users, of particular bands.

- > **Increasing predictability** for spectrum users, which can be achieved by licence design reforms including optimising tenure through licence duration and increasing the predictability of end of term arrangements. Greater transparency of regulatory

approaches and the ACMA's decision-making processes will also assist with predictability and investor confidence.

- > **Pricing spectrum to reflect its market value** is key to ensuring spectrum is used efficiently. There is potential to improve the ACMA's administrative pricing of spectrum so that it more closely reflects the true market value through approaches such as opportunity-cost based pricing.

(ii) Better regulatory design and delivery

The ACMA will also direct its reforms towards improvements to regulatory design and delivery, under the following broad objectives:

- > **Increased use of market principles and mechanisms**, which can be applied across a range of spectrum management functions, for example, in designing the new licence issue system. Reforms are suggested to extend the use of auctions and improve ACMA auction capability to run auctions that are more efficient and ensure price reflects market value.
- > **Increased user and third-party management of spectrum**, which is expected to allow for spectrum management outcomes to be achieved more efficiently and at a lower cost. Building on the success of the accredited persons scheme for frequency assignment activities, the ACMA will look at which of its functions or activities can be done by others, and at creating the regulatory conditions to support contestability of those functions or activities. The ACMA recently consulted industry on its interference management principles, which provide a tangible example of greater industry opportunities to manage interference. In the longer term, under the Bill the ACMA can delegate its general licensing functions and powers to a third party. This is a form of private band management (PBM).
- > **Faster, more responsive and adaptive regulatory processes**, which can be implemented, for example, through adopting more outcomes-focused regulatory approaches in the area of equipment supply regulation.
- > **Streamlining, simplifying and allowing more user flexibility**, which may be achieved through the consolidation of licence categories under a single licence system, moving class licences to spectrum authorisations and, more generally, by the greater discretion the ACMA will have to design more outcome-focused regulation and processes.
- > **Enhanced transparency in ACMA decision-making**, which will be delivered through a combination of reforms, including the new spectrum work program, as well as regulatory arrangements that are easier to understand, and spectrum management and pricing processes that are more visible to stakeholders.

Implementation timing

The ACMA understands that there may be a 12–14 month period between the Bill receiving Royal Assent after passage through Parliament, and the commencement of the main provisions of the Bill (the commencement period).

The department's consultation paper on transition proposed a scenario to stimulate discussion. This scenario outlined a five-year transition period following commencement, during which apparatus licences would be replaced with Bill licences in defined groups in a staged process. This paper also discusses how spectrum licences issued under the 1992 Act could be integrated into the Bill framework.

In its approach to implementation, the ACMA anticipates that spectrum management reform will be delivered in three broad phases:

> Reforms delivered on commencement.

The ACMA will ensure that a reformed spectrum management system is ready to be implemented at the commencement of the Bill, and over the transition period.

This includes:

- > the development of the single licensing system to remove the hard barrier between apparatus and spectrum licences and provide for longer duration (up to 20 year) licences
- > modernised equipment regulation to more effectively manage risks to consumers that have developed with the growth of online supply chains
- > more flexible arrangements for interference management that will enable greater industry involvement in the diagnosis and resolution of interference events
- > an annually updated spectrum work program to provide greater certainty to spectrum users about the planning, allocation, licensing and compliance priorities of the regulator.

> Reforms achieved through the transition period immediately after commencement, in particular, the staged transition in defined 'windows' of over 160,000 licences to the new system.

> Reforms enabled by the Bill to be delivered over the life of the legislation and led by market and technology developments. After commencement, as markets and new technologies emerge and develop, the ACMA anticipates greater industry involvement in spectrum management through structural innovations enabled under the reform Bill, including:

- > opportunities for new private band-management models to emerge
- > greater trading of licences between spectrum users, enabled by a more flexible licensing framework
- > greater use of sharing arrangements, including enabling technology innovations such as dynamic spectrum access applications to be supported by the new flexible licensing arrangements.

Consultation

Greater market-led activity and greater user involvement in spectrum management are two of the key planks of reform. The ACMA will be adopting a 'co-design' approach to the new regulatory framework with industry and other stakeholders to ensure the new arrangements are responsive to their needs. The ACMA will be seeking to draw on the expertise and input from industry as it develops the overall approach to spectrum management.

Staged transition

The final form of the Transitionals and Consequential Bill being prepared by the department will guide the ACMA's approach to transition.

As outlined in the explanatory material to the Exposure Draft Bill, the ACMA is proposing to group all apparatus licences into one of several replacement windows. Grouping would be done by licence category, band, or a combination of category and band (for example, 'all PMTS licences in the 1800 MHz band will be replaced during window A').

The ACMA will consult stakeholders on principles to inform the grouping of licences, the prioritisation of the timing of the replacement of those groups and on the details of the proposed replacement licences. The ACMA intends to provide existing licensees with at least 12-months' notice of the move from the existing to the new licensing system.

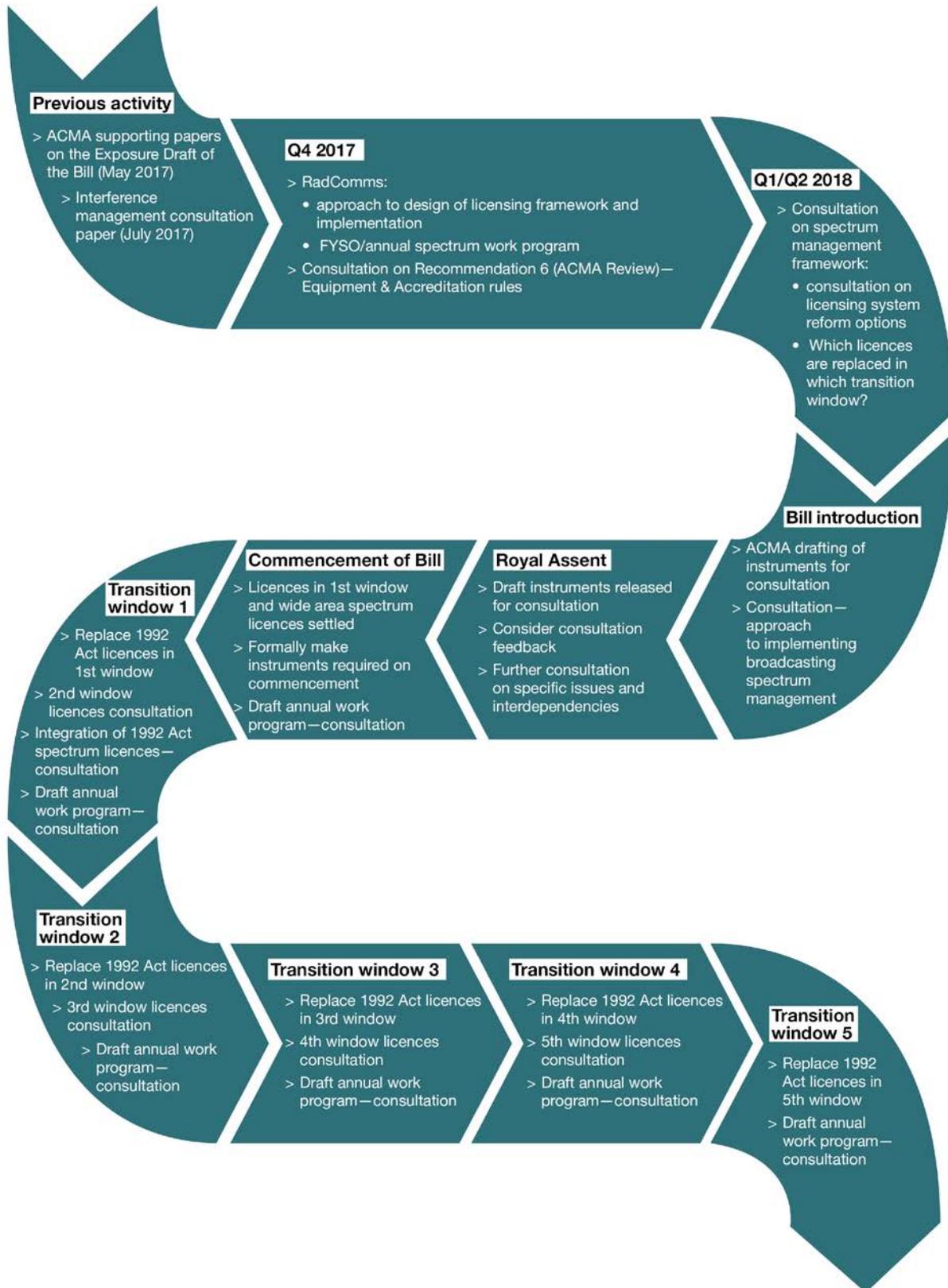
Below (Figure 2) is a high-level overview of the ACMA's spectrum review implementation engagement plan. It illustrates five replacement windows of one-year duration. However, different timeframes may be contemplated and the specific details of the transition windows will be the subject of consultation. The Figure is not intended to describe specific dates for legislative process milestones such as the introduction of the Radiocommunications Bill into Parliament.

Further detail will be provided on the ACMA's website as it become available.

Consultation questions

- 9. Do you agree that these reform objectives appropriately reflect the direction the ACMA should take in implementing the recommendations of the government's Spectrum Review?**
- 10. Are there any other reform objectives toward which the ACMA should direct its implementation activity?**
- 11. What more information do stakeholders require about the ACMA's implementation engagement plan, and when, in order to plan their engagement with ACMA consultation activities?**

Figure 2: Implementation engagement plan



Part 2—Five-year spectrum outlook and 2017–18 spectrum work program

Introduction

Part 2 has two sections.

The first section provides an overview of the market, technology and policy drivers affecting the spectrum environment over the next five years. It also highlights work the ACMA expects to undertake in the medium term to promote a spectrum management environment that enables both incumbent spectrum users and new entrants to identify and capitalise on their spectrum requirements.

The second section provides a more detailed proposal of activities to be undertaken over the course of this financial year. These activities are discussed in the context of progress on the key projects listed in last year's FYSO.

1. The five-year outlook

The following discussion outlines developments anticipated over the course of the next five years and an update on developments over the last 12 months with longer-term implications. It also indicates the work the ACMA is considering undertaking in responding to the spectrum environment within this timeframe.

Spectrum demand and new technologies

Spectrum for broadband

Demand for spectrum to support broadband continues to be a major driver for changes in highest-value spectrum use across a wide range of bands with mobile broadband continuing to be the dominant contributor. We anticipate further spectrum will be needed to support the growth in new broadband applications and mobile data in particular. The ACMA's [mobile broadband strategy](#) and work program (see the October 2017 update later in this paper) remain the basis for the ACMA's response to this issue. Possibilities for more efficient spectrum management through technologies like dynamic spectrum access (DSA) are also being monitored and investigated where appropriate.

5G

On 12 October 2017, the government released the directions paper, [5G—Enabling the future economy](#) and announced that a working group to drive the deployment of 5G mobile technology in Australia would be convened.⁵ The directions paper highlighted that the government will support 5G rollout in Australia, including by making spectrum available in a timely manner. Additionally, the paper noted the ACMA's work to date towards making spectrum available for 5G.

5G continues its rapid and high profile development as the next generation of wireless network technologies. While in some ways an evolutionary development of earlier wireless, predominantly mobile, broadband technologies such as 4G Long Term Evolution (LTE), 5G is acknowledged as having some revolutionary characteristics, including the expected use of frequency bands in the mmWave range.⁶ Beyond use of new technology and spectrum, 5G is being designed to deliver a wide range of services to meet existing and expected future products and commercial offerings.

The ACMA acknowledges the importance and immediacy of 5G spectrum matters, and is committed to ensuring that Australia is well placed to take advantage of the opportunities offered by 5G.

The ACMA is doing this by continuing to action its mobile broadband strategy and work program (an update on the MBB work plan is provided at Appendix 1) of which 5G is a key, but not the only, element of it.

The definition of 5G has been firming over the past 12 months, both in the International Telecommunication Union Radiocommunication Sector (ITU-R) in terms of defining IMT-2020⁷ and in 3GPP in work towards Release 15, which is focussing on

⁵ Sen. The Hon. Mitch Fifield, [Turnbull Government to convene 5G working group](#), Media Release, 12 October 2017.

⁶ Millimetre waves (or mmWaves) span 30 to 300 GHz (i.e. 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.

⁷ Refer to WP 5D Draft New Report [ITU-R M.\[IMT-2020.TECH PERF REQ\]](#) which is expected to be approved by ITU-R Study Group 5 at its next meeting in November 2017.

the enhanced mobile broadband aspect of 5G.⁸ Defining objectives of 5G that distinguish it from previous developments continue to include support for very low latency and ultra-reliable communications, and enhanced mobile broadband enabling data rates exceeding that of LTE/4G. In addition, integral to 5G is expected to be an ‘anytime, anywhere, anyone and anything’ capability, which is anticipated to play a role in supporting multiple device M2M communications and a wider deployment of the IoT.

From a spectrum perspective, 5G appears certain to use (though not exclusively) large contiguous bandwidths (hundreds of MHz or more) in bands not only traditionally used for mobile broadband (for example, bands below 6 GHz) but also in the previously unused mmWave bands.

Formal standards for 5G will probably be in place in mid- to late-2018, with standardised deployments to start perhaps a year or two after, with some pre-standard deployments expected prior to the finalisation of standards. In addition to the use of ‘new’ frequency bands, we expect that many of the spectrum bands already available for mobile broadband in Australia will be re-farmed over time by carriers for 5G technologies.

The ACMA has been active in several 5G related areas over the past 12 months:

- > *5G trials and demonstrations*—the number of trials and demonstrations by carriers and vendors of 5G technologies has increased markedly over the past year. The ACMA has supported these trials where co-existence with other users is achievable.
- > *Examination of the 3.6 GHz for broadband, including 5G*—the ACMA has concluded planning consideration of the 3575–3700 MHz band and is consulting on regulatory changes to support wide area wireless broadband services in metro and regional Australia. The ACMA expects that this decision will materially assist the roll out of 5G in Australia in a band that has gained momentum internationally for early 5G adoption.
- > *Participation in international spectrum harmonisation activities*—the ACMA has led Australian technical studies regarding the potential for coexistence between IMT/5G and satellite uplinks in the 26 GHz band. These studies have been submitted to the ITU-R in response to WRC-19 Agenda item 1.13 considering IMT in certain bands between 24.25 and 86 GHz.
- > *Initial consideration of potential mmWave 5G spectrum options, specifically the 26 GHz band (24.25–27.5 GHz)*—the ACMA has continued to monitor international developments in the mmWave bands, in particular the 26 GHz band, which has emerged as a global front runner for early mmWave 5G implementation.

On 5 September 2017, the ACMA hosted a tune-up with spectrum users to discuss spectrum for 5G broadband in mmWave bands in Australia. Feedback from this tune-up will be used as part of our initial consideration of these bands, along with responses (which were requested by 13 October 2017) to a list of follow-up questions published on our website. We are particularly interested in whether any bands, for example, the 26 GHz mmWave band, should be accelerated to the preliminary planning stage of the ACMA’s process for consideration of additional spectrum for mobile broadband services. If it is decided to accelerate consideration of this band, options could be identified in early 2018 with a planning decision occurring in mid-2018.

⁸ See [5G-NR workplan for eMBB](#).

The IoT low power spectrum uses

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 will make—specific provisions for dedicated IoT service delivery, and satellite services are already investing in services and hardware to enable IoT.

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

After completing its review of the 803–960 MHz band in 2015, the ACMA decided to make spectrum in the 928–935 MHz band available for these devices, with a view to providing early access to the band by LPWA technologies possible, subject to device coordination with incumbent fixed links.

Broadcasting spectrum

There continues to be unmet demand for additional broadcasting services. This is in large part due to regulatory arrangements of the Broadcasting Service Bands (BSBs). The other key factor is that the broadcasting services bands are largely exhausted in major metropolitan areas and many regional areas have very limited spectrum available, particularly across the FM radio and VHF/UHF television bands.

However, there are some distinctive features of broadcasting planning that affect how demand is managed. In particular:

- > future requirements for broadcasting spectrum are likely to depend on government decisions about the development of the sector
- > the minister is responsible for decisions to vary the BSB.

In relation to television, there has been minimal demand for television spectrum for additional television transmitters since the completion of the switchover to digital television, with the only demand being for retransmissions from remote communities, mining companies and caravan parks.

The future spectrum planning requirements for television broadcasting are uncertain. The main issue facing the television industry is the expected future obsolescence of the DVB-T⁹ transmission standard and the MPEG-2 video compression standard. While upgrading the original MPEG-2 compression standard to MPEG-4 is proceeding using existing broadcaster multiplexes, use of more modern standards, such as DVB-T2 transmission along with HEVC video compression will require separate, dedicated multiplexes. The introduction of DVB-T2 services using HEVC video compression could provide up to a five-fold increase in the number of services that can be carried in a television channel.¹⁰

Generally, television planning caters for ABC, SBS, three commercial services and one unallotted channel at most sites. The unallotted channel ('the sixth channel') is

⁹ Digital Video Broadcasting — Terrestrial is the DVB European-based consortium standard for the broadcast transmission of digital terrestrial television that was first published in 1997.

¹⁰ A five-fold increase would be relative to a DVB-T multiplex carrying MPEG-2 encoded services and assumes: carriage of a similar quality and mix of SD and HD services, HEVC encoding being up to four times as efficient as MPEG-2, and DVB-T2 transmission parameters that provide a payload capacity of up to 34 Mbit/s.

available in most areas for trials of more advanced standards. How this channel would be used in the longer term is unclear and there is currently no agreed industry position on potential standard migration paths.

Digital radio services make use of two VHF former television channels set aside for this purpose when digital television services were replanned to clear the 700 MHz band. In 2016, the ACMA undertook extensive studies on ways to facilitate the rollout of digital radio to regional licence areas. The key outcome of these studies was that, the implementation of digital radio services in all licence areas would be constrained because the potential demand would exceed the available supply of spectrum under certain conditions. Consequently, a number of compromises were identified as being required and these have been set out in the ACMA's planning principles for the expansion of digital radio to regional areas.

The key compromises were an initial limit on the maximum power level for any transmitter considered in the development of allotment plans and an uneven split of the available spectrum capacity between national and commercial/community broadcaster multiplexes, with the national broadcasters having access to two of the eight available frequency blocks. This is because national broadcasters are not constrained by licence areas and should be able to deploy single frequency networks over wider areas.

Demand for AM radio spectrum is low due to the high transmission costs as well as the increasing levels of man-made noise and an international trend for receivers not to incorporate AM tuners. Consequently, the ACMA is in the process of facilitating the conversion to FM of some commercial AM radio services operating in single-owner regional licence areas. Identifying suitable FM spectrum for these services is proving quite challenging in many areas and, in some cases, there may be competing claims over the same frequency. As a result, the planning for these conversions can be complex and time consuming.

Over the next few years, it is likely the main priorities in radio broadcasting will continue to include planning for digital radio rollout and further consideration of AM to FM conversion.

While the ACMA can facilitate the rollout of digital radio services in regional Australia, the establishment and format of digital radio services in any given market is a commercial decision of the relevant incumbent commercial radio broadcasting licensees. Similarly, where and when the ABC and SBS will roll-out digital radio services is a decision for those broadcasters. Each digital radio channel plan will reserve a frequency to enable the national broadcasters to provide digital radio services.

Satellite communications

With growth and innovation in the provision of satellite-delivered telecommunication services and satellite usage in space science services, there is increasing pressure both internationally and domestically to ensure that regulatory arrangements continually evolve to support this change.

Innovations such as the deployment of low- cost, miniaturised space hardware (often referred to as nanosats, cubesats or smallsats), the growth in the use of moving earth stations (also referred to as ‘earth stations in motion’) in the fixed satellite service¹¹ and the development of large constellations satellite systems services are challenging the suitability of existing arrangements.

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. Domestically, our key spectrum planning priorities over the next five years are to:

- > support the deployment of novel satellite systems (particularly small satellites)
- > protect radio astronomy facilities
- > consider and action if appropriate identification of possible additional bands for ubiquitous satellite use
- > develop arrangements to support earth stations in motion in the fixed satellite service.

Work is already underway to develop more flexible regulatory and licensing arrangements for fixed-satellite services using ubiquitous earth stations in motion (ESIMs) user terminals, in a variety of frequency ranges. Work so far has focussed on ESIMs in the Ka band, but the ACMA is aware of ESIMs interest in other bands— particularly the Ku band, which the ACMA intends to investigate following the conclusion of work on Ka band ESIMs.

The ACMA is also reviewing its space licensing procedures. One of the key purposes of the review is to consider whether in light of trends in spaced-based communications systems that licensing procedures are appropriate and commensurate with the risk of interference, and consider possible updates to business operating procedures for licensing of space-based communications systems.¹²

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. Further updates (beyond those already undertaken in 2017–18) to regulatory arrangements are likely to be necessary to support continued innovation in the sector. This future work will be depend on stakeholder feedback and its priority relative to other projects in the ACMA’s spectrum work program.

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 the timing of such updates.

¹¹ Earth stations in the fixed satellite service (as the name suggests) are intended to be at fixed locations on land. Spectrum planning, coordination and regulatory arrangements for the fixed satellite service 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 arrangements for the fixed satellite services.

¹² [Business operating procedures](#), including those related to space licensing are available on the ACMA website.

Specific satellite communications projects that we plan to work on over the medium term include:

> **Frequency coordination of earth stations and with other radiocommunications**

The ACMA intends to continue work in reviewing frequency coordination requirements between earth stations in the fixed satellite service and microwave fixed point-to-point links and expand that work to consider other frequency bands and other earth station coordination issues.

> **Arrangements in the 2 GHz band**

Following a review of the 2.5 GHz band¹³, the ACMA developed arrangements to support the introduction of television outside broadcast (TOB) in the frequency ranges 1980–2010 MHz and 2170–2200 MHz (the 2 GHz band) on an interim basis. The 2 GHz band is allocated to the mobile service and subject to a global International Mobile Telecommunications (IMT) identification via international footnote 388 of the ARSP. In Resolution 212 (Rev.WRC-15), it is noted that the 2 GHz band is available for both the terrestrial component of IMT and the satellite component of IMT.

Industry has been in discussions with the ACMA on trialling new technologies and possible future access to the 2 GHz band in the frequency ranges 1980–2010 MHz and 2170–2200 MHz, including for air-to-ground communications and traditional mobile-satellite use. This interest, along with consideration at the international level (under WRC-19 agenda item 9.1.1) and the identification for IMT in the band, has reinforced thinking that the long-term use of this band needs to be considered.

The ACMA will continue to monitor and, where appropriate, engage with stakeholders to develop an Australian position on WRC-19 agenda item 9.1.1 in anticipation of future domestic consultation on the long-term use of the 2 GHz band.

> **Consideration of extending L-band mobile-satellite services**

Responses by parts of the satellite industry to the previous FYSO and the ACMA's consultation on the future use of 1.5 GHz (1427–1518 MHz) and 3.6 GHz bands¹⁴ have identified the need for the ACMA to consider whether arrangements in adjacent spectrum should support extended L-band operations (1518–1525 MHz and 1668–1675 MHz) by the mobile-satellite service. This interest is occurring simultaneously to interest in broadband use of the lower 1.5 GHz (1427–1518 MHz) band.

Mobile satellite services (MSS) use above 1518 MHz and broadband use below 1518 GHz should ideally be considered at the same time in order to develop balanced and optimised compatibility arrangements between these potential uses of the spectrum.

Government uses—public safety mobile broadband (PSMB)

The ACMA understands that there are discussions currently underway between the Commonwealth, led by the Department of Communications and the Arts and the Attorney-General's Department, and state and territory governments on the potential use of spectrum for PSMB capability.

¹³ <http://www.acma.gov.au/theACMA/25-ghz-band-review>

¹⁴ IFC 25/2016—*Future use of 1.5 GHz and 3.6 GHz bands* available at: http://www.acma.gov.au/theACMA/future-use-of-the-1_5-ghz-and-3_6-ghz-bands.

International developments

The ACMA and 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 key international forum is the International Telecommunication Union's (ITU) World Radiocommunication Conference (WRC). The next WRC is scheduled for 28 October – 22 November 2019 (WRC-19). WRC-19 will be considering a large agenda regarding a range of new frequency allocation and procedural matters. This includes possible allocations for satellite services and identification of spectrum suitable for 5G services.

Following the government's Review of the ACMA, the department will lead the Australian delegation at future WRCs, including WRC-19. The ACMA is currently working with the department to transition the Head of Delegation role from the ACMA to the department. The ACMA will continue to be closely involved in developing technical contributions for WRC and other ITU-R meetings.

Over the next few years, the ACMA and the department will work together to manage the extensive industry and stakeholder consultation processes involved in preparing for WRC-19 and future WRCs. This work will be progressed through the Australian Preparatory Group for WRC-19, which is comprised of representatives from peak industry groups, government agencies and expert advisory groups.

At a regional level, Australia will continue to be involved in the Asia Pacific Telecommunity (APT). The APT's Conference Preparatory Group for WRC-19 (APG-19) is the key forum for developing regional positions for WRC-19. Australia will continue to attend APG-19 meetings with the aim of achieving a coordinated approach to radiocommunications issues in the region. Australia is also hosting the third meeting of APG-19, which will be held in Perth from 12–16 March 2018.

Updates to the Australian Radiofrequency Spectrum Plan (ARSP)

Where appropriate, decisions of ITU world radiocommunication conferences are reflected in revisions to the ARSP. Changes to the ARSP in response to such decisions are generally made following each WRC.

On 1 January 2017, a new version of the ARSP came into effect, reflecting changes from the ITU World Radiocommunication Conference 2015 (WRC-15) and domestic developments. The changes included:

- > additional flexibility for the type of devices that can be used to receive satellite transmissions
- > enabling radiocommunications services to operate in frequency bands not specified for those services where the ACMA is satisfied that harmful interference is unlikely
- > removal of broadcasting services from the frequency range 694–820 MHz, and upgrading other services in that band to primary
- > updating Australian Footnotes 106 and 106A to support the space vehicle tracking treaty between the Australian and United States governments.

Future updates to the ARSP are likely to be considered in light of outcomes of WRC-19.

2. The 2017–18 spectrum work plan

Key focus areas for 2017–18

The ACMA is proposing to focus on the following key projects over the current financial year. This is in addition to the ongoing activities we undertake on a routine basis outlined at the end of this section.

Activities are grouped according to our main spectrum management functions. Where relevant, comments received in the 22 submissions on last year's FSYO are reflected in our approaches to this work, as well as progress since the release of the last FYSO.

Please note that the following abbreviations are used:

- > Quarter 1 (Q1): 1 July – 30 September
- > Quarter 2 (Q2): 1 October – 31 December
- > Quarter 3 (Q3): 1 January – 31 March
- > Quarter 4 (Q4): 1 April – 30 June.

Table 5: Key projects for 2017–18 at a glance

Regulatory review and reform

Key projects	Activity	Milestones
Responsible branch—Spectrum Review Implementation		
<p>Spectrum review implementation</p> <p>1. Preparing for commencement of the new Radiocommunications Act</p>	<p>New licensing system Issues paper scoping the design issues for new licensing system and licence types.</p> <p>Spectrum work program Consultation on proposed approach to developing a spectrum work program updated annually.</p> <p>Pricing reform Subject to relevant proposals from the department’s spectrum pricing review being accepted, the ACMA expects to draft guidelines on how it approaches its spectrum pricing decisions and review the parameters of the administrative pricing formula. The ACMA expects to engage with stakeholders on these activities throughout the year.</p> <p>Equipment rules Undertake the first stage of consultation and design and development of reforms for new equipment rules.</p> <p>Accreditation rules Undertake first stage of consultation on design and development of reforms for new accreditation rules.</p>	<p>Release issues paper Q3</p> <p>Q2 consultation</p> <p>Q3 and Q4</p> <p>Release issues paper Q2</p> <p>Release issues paper Q3</p>

Key projects	Activity	Milestones
	<p>Interference management</p> <p>The ACMA intends finalising its interference management principles by Q3 2017–18. 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.</p>	Q1 consultation
<p>Spectrum review implementation</p> <p>2. Contributing to the department's reform process</p>	<p>The main areas of the reform process that the ACMA expects to contribute to include:</p> <ul style="list-style-type: none"> > the transition of licences under the new legislation > advice on taxing and charging mechanisms to support new pricing arrangements; > implementation of changes to broadcasting licensing and charging arrangements. 	Ongoing
Responsible branch—Various depending on the legislative instrument		
Sunsetting	<p>Progress achieved</p> <p>A number of legislative instruments related to spectrum management are due to be repealed (sunsetting) over the next few years under the <i>Legislative Instruments Act 2003</i>, unless action is taken to preserve them. Since the last FYSO, the ACMA has consulted on eight legislative instruments that were due to sunset last year.</p>	
Legislative instruments due to sunset on 1 April 2018 and 1 October 2018	The ACMA will review and consult on two legislative instruments related to our spectrum work due to sunset by 1 April 2018. A further three instruments due to sunset by 1 October 2018 have already been dealt with. Details of these instruments are outlined in Appendix 2.	See Appendix 2

Planning

Key projects	Activity	Milestones
Responsible branch—Spectrum Planning and Engineering		
Mobile broadband (see Appendix 1 for more details on the mobile broadband work plan)	<p>Feedback from FYSO Of the 22 submissions received on the 2016–20 FYSO, 18 commented on 5G and a wide range of views were expressed about the relative priorities of additional bands for mobile broadband (MBB). In response, the focus of our MBB work for 2017–18 reflects the interest from stakeholders in the 3.6 GHz band and the mmWave bands above 24 GHz for mobile and fixed broadband.</p> <p>Progress achieved</p> <ul style="list-style-type: none"> > Work program update—the 2017 update to the mobile broadband work plan is at Appendix 1. > 1.5 GHz and 3.6 GHz—a discussion paper was released in October 2016 on future uses of the 1.5 GHz and 3.6 GHz bands. Seventy-two submissions were received. In June 2017, the ACMA released its response to these submissions and its decision to progress 1.5 GHz and 3.6 GHz bands to the preliminary replanning stage with prioritisation of the 3.6 GHz band. This included identifying a range of possible re-planning options as well as a detailed explanation and reasoning for the ACMA’s currently preferred option. In October 2017, the ACMA announced the outcomes of the review of the 3.6 GHz band. Specifically the 3.6 GHz band has been moved to the <i>re-farming</i> stage of the ACMA’s process for considering additional spectrum for MBB services. > A 3.6 GHz band options paper—in June 2017, the ACMA released the <i>Future use of the 3.6 GHz band</i> consultation package. This included identifying a range of possible re-planning options as well as a detailed explanation and reasoning for the ACMA’s currently preferred option. A tune-up on 3.6 GHz was held during the consultation period for the options paper. Thirty-five submissions were received. 	

Key projects	Activity	Milestones
	<ul style="list-style-type: none"> > A 3.6 GHz band outcomes paper—in October 2017, the ACMA announced the outcomes of the review of the 3.6 GHz band. This included a summary of and response to submissions and an announcement that the 3.6 GHz band has been moved to the <i>re-farming</i> stage of the ACMA’s process for considering additional spectrum for MBB. > mmWave spectrum for 5G—industry tune-up held in September 2017. > International engagement—ongoing involvement and contribution to ITU-R on mobile broadband matters. 	
Commence re-farming activities in the 3.6 GHz band	<p>The ACMA will conduct relevant processes to allow the 3.6 GHz band to be made available for the issue of spectrum licences in metropolitan and regional Australia. This process commenced with the ACMA consulting with incumbent 3.6 GHz licensees on its proposal to make a recommendation to the minister that the band be re-allocated for spectrum licensing in metropolitan and regional areas.</p> <p>Contingent on outcomes of consultation on the draft re-allocation recommendation, the ACMA will form a technical liaison group and commence the process to develop the 3.6 GHz band spectrum licence technical framework</p>	<p>Q4 2018</p> <p>Q1 2018 (TLG)</p>
Continue review of the 1.5 GHz band between 1427 and 1518 MHz	The ACMA expects to recommence consideration of this band for domestic use for mobile broadband in the 2018–19 financial year. This will include a discussion paper, which will progress consideration of the band within the preliminary replanning stage.	Q1 2018–19
Assess mmWave spectrum bands above 24 GHz	<p>The ACMA is considering stakeholder feedback on whether at least one of the mmWave bands under current WRC consideration, the 26 GHz band, is a candidate for preliminary replanning for mobile broadband spectrum.</p> <p>In September 2017, the ACMA held a tune-up on spectrum for 5G broadband in mmWaves. After the tune-up, the ACMA requested comments by 13 October 2017 on questions about the use of</p>	Decision on proceeding to the preliminary replanning stage Q2 2017–18

Key projects	Activity	Milestones
	<p>mmWaves for 5G. Responses will inform the ACMA’s decision on whether to consider any of the mmWave bands for preliminary re-planning as part of the MBB work plan. A decision is expected by the end of 2017.</p> <p>Depending on that decision, we anticipate releasing an options paper for the bands identified in the first half of 2018, followed by a decision by Q1/Q2 2018–19.</p>	<p>(If decision is to proceed to the preliminary replanning stage: options paper Q3/Q4 2017–18, decision: Q2 2018–19)</p>
<p>Finalise reconfiguration of the 900 MHz band to enable transition from 2G to 4G services</p>	<p>As at October 2017, the ACMA has released a paper setting out the ACMA’s preferred reconfiguration option for the 900 MHz (890–915/935–960 MHz) band in order to transition from the current 2 x 8.2 or 8.4 MHz frequency arrangements to 2 x multiples of 5 MHz.</p>	<p>Reconfiguration option by Q2 2017–18</p>
<p>Responsible branches—Spectrum Planning and Engineering and Spectrum Management Policy</p>		
<p>Broadcasting</p>	<p>Feedback from FYSO</p> <p>A common theme from submissions was the free-to-air television industry’s need for ongoing access to spectrum. Free TV Australia also suggested that 600 MHz band be redefined as 614–694 MHz instead of 520–694 MHz as stated in the previous FYSO. Earlier this year, the United States communications regulator completed a 600 MHz band auction and this now clearly indicates that the 600 MHz band should be defined as 617–698 MHz (exclusive of upper and lower guard bands).</p> <p>The narrowcasting industry also expressed concerns about certainty of access to spectrum for low power open narrowcasting (LPON) services. The ACMA acknowledges these concerns and will endeavour to make its decision about extension of the determination of the LPON sub-band during</p>	

Key projects	Activity	Milestones
	<p>2018, well before the expiry of the current determination in 2020. This may be subject to transitional arrangements arising from the government's Spectrum Review.</p> <p>Progress achieved</p> <p>In December 2016, we published planning principles to be used by the ACMA and industry to plan the indicative allotment of digital radio frequencies on a region-by-region basis. We consulted on a draft digital radio channel plans for Canberra, Darwin and Hobart and also on a draft plan for the Gold Coast and a draft variation to the Brisbane plan. The proposals in the draft Gold Coast and Brisbane plans will be reconsidered once the indicative allotments for the region around south-east Queensland are settled.</p> <p>In February 2017, the ACMA provided an industry briefing on initial results for indicative digital radio frequency allotments for commercial licence areas between Rockhampton to Hobart. Stakeholder comment was sought on the notional transmitter networks assumed in the studies and on the interference levels between licence areas.</p> <p>In April 2017, the ACMA revised its approach to AM–FM conversion so that requests from commercial radio licensees in single regional licensee areas may now be considered.</p> <p>In March 2017, the ACMA approved Licence Area Plan variations permitting AM to FM conversion in Exmouth, Karratha, Paraburdoo, Port Hedland and Tom Price.</p> <p>In May 2017, the ACMA approved final digital radio channel plans for Canberra, Darwin and Hobart and declared the category 1 foundation digital radio multiplex transmitter licence for Canberra and Darwin.</p>	

Key projects	Activity	Milestones
Expansion of digital radio in regional Australia	<p>The ACMA will continue to prioritise the planning of digital radio and work with industry to expand digital radio services into regional Australia.</p> <p>In 2017–18 we will:</p> <ul style="list-style-type: none"> > call for applications from eligible joint venture companies in the Canberra and Darwin licence areas to apply for a digital radio multiplex transmitter licence > consider the issue of a digital radio multiplex transmitter licence to the Hobart joint venture company > complete the regional allotment planning for digital radio in Australia and then consult on and finalise the digital radio channel plans for the 15 licence areas identified by industry as the next phase of rollout. The timing for each plan will be aligned with the rollout plans of the broadcasters in each market > chair meetings of the Digital Radio Planning Committee for Regional Australia. 	<p>Invitations for Canberra and Darwin licence published Q2 2017–2018</p> <p>East coast allotment planning completed Q3 2017–18</p>
AM to FM conversions of regional commercial radio broadcasting licensees	<p>Industry consultants are undertaking the technical planning. Initial pilot studies are being conducted before working through the requests for conversions in the 27 licence areas where finding a suitable FM frequency will be more difficult. The ACMA is guiding and reviewing this work before deciding to reflect the proposal as a draft licence area plan variation.</p> <p>The ACMA will be consulting on further proposals for AM-FM conversion. It is anticipated AM-FM conversion will be proposed for Warrnambool and Mandurah in 2017 and finalised in 2018. The ACMA anticipates consulting on proposals for Bathurst, Lithgow and Tasmania (Devonport, Burnie, Scottsdale and Queenstown) will follow in 2018.</p>	<p>Warrnambool and Mandurah consultation in Q2 2017–18 and finalised in Q3 2017–18</p> <p>Consultation on Bathurst, Lithgow and Tasmania in Q3/Q4 2017–18</p>

Key projects	Activity	Milestones
Responsible branches—Spectrum Planning and Engineering		
Satellite planning	<p>Progress achieved</p> <p>In 2017, the ACMA commenced consultation on a number of issues to support developments in satellite communications, including releasing the following consultation papers:</p> <ul style="list-style-type: none"> > <i>Update to Foreign Space Objects Determination</i> (released 13 July, closed 18 August 2017) > <i>Regulatory arrangements for GSO and NGSO ESIMs</i> (released 5 July, closed 11 August 2017) > <i>Update of licensing procedures for space-based communications systems</i> (released 21 August, closed 15 September 2017). <p>In drafting the work program this year, we have provided more detail on our satellite work, with a focus on the activities below.</p>	
Review of regulatory arrangements for earth stations in motion (ESIM)	<p>The ACMA is proposing to provide additional capacity and opportunities for satellite-delivered telecommunication services by implementing¹⁵ arrangements that authorise geostationary (GSO) and non-geostationary (NGSO) space stations in the fixed-satellite service to communicate with earth stations in motion (ESIMs) for ubiquitous user terminals. ESIMs are earth stations that are in motion on land, sea or in the air.</p> <p>Issue for comment closed 11 August 2017.</p>	Business operating procedure publication Q2

¹⁵ IFC 11/2017—*Regulatory arrangements for GSO and NGSO ESIMs* available at: <http://www.acma.gov.au/theACMA/regulatory-arrangements-for-gso-and-ngso-esims>.

Key projects	Activity	Milestones
Updating regulatory arrangements for space based communications systems	As required, in response to requests from industry, the ACMA considers updates to the legislative instruments supporting regulatory arrangements for space based communications systems. ¹⁶ The ACMA is currently considering requests that could lead to consultations in 2018 on the Radiocommunications (Communication with Space Object) Class Licence 2015 and the Radiocommunications (Foreign Space Objects) Determination 2014 .	Consultations Q4
General review of space licensing procedures	In August 2017 , the ACMA updated business operating procedures for licensing space-based communication systems and sought comments on the licensing procedures to assist with framing a general review of satellite licensing procedures. The review is to consider whether licensing procedures are appropriate for managing the risk of interference, and consider possible updates to business operating procedures for licensing of space-based communications systems. ¹⁷	Proposed discussion paper on review of licensing procedures for consultation Q4
Review frequency coordination requirements between earth stations fixed satellite services and microwave fixed point-to-point links	As identified in the last FYSO, the ACMA is progressing the review of frequency coordination requirements between apparatus-licensed microwave fixed point-to-point links and earth stations in the fixed satellite services communicating with geostationary satellites in the 6 and 6.7 GHz fixed point-to-point bands.	Commence initial consultation Q4/Q1 2018–19, dependent on project prioritisation of other projects

¹⁶ Primarily these are the Radiocommunications (Communication with Space Object) Class Licence 2015, [Radiocommunications \(Foreign Space Objects\) Determination 2014](#), Radiocommunications (Australian Space Objects) Determination 2014.

¹⁷ [Business operating procedures](#), including those related to space licensing are available on the ACMA website.

Key projects	Activity	Milestones
Other planning work		
Implement efficiencies in the 400MHz band	<p>In January 2017, the ACMA completed implementation of the second and third milestones of the new arrangements in the 400 MHz band. This completed harmonisation of spectrum for government use and facilitates use of new and emerging technologies in the 450–470 MHz frequencies in regional Australia.</p> <p>The ACMA continues to work closely with state and territory governments as well as industry participants and representative organisations to transition all licensees in the 400 MHz band.</p>	Ongoing
Cooperative intelligent transport systems (C-ITS) in the 5.9 GHz	<p>The ACMA undertook consultation on a draft class licence for C-ITS in late 2016. Since that time, there has been ongoing discussion and debate within the transport industry on the preferred approach to authorisation of C-ITS in the 5.9 GHz band, with a way forward emerging in Q1 2017–18. Subject to further discussions with industry, the ACMA will be aiming to implement a class licence authorising the use of C-ITS in the 5850–5925 MHz band in 2017–18.</p>	Q3 2017–18
Low interference potential devices (LIPD)	<p>The ACMA is intending to consult on proposed update to the Radiocommunications (Low Interference Potential Devices) Class Licence 2015 (LIPD). Matters under consideration include proposals for medical body and implant devices and data communication transmitters.</p> <p>Organisations interested in further updates to the LIPD class licence should contact the ACMA to discuss the requirements and timing of such updates.</p>	<p>Public consultation Q2</p> <p>Future consultation as required</p>

Licence allocation

Key projects	Activity	Milestones
Responsible branch—Spectrum Management Policy		
Spectrum licence auctions	<p>Progress achieved A number of submissions from last year called for the ACMA to prioritise allocation of unsold lots in bands that are subject to spectrum licensing. Accordingly:</p> <ul style="list-style-type: none"> > in April 2017, the ACMA held an auction for the unsold lots in the 700 MHz band for more than \$1.5 billion, which completed the digital dividend process begun in the 1990s > in August 2017, the ACMA commenced consultation on draft instruments in preparation to auction the remaining unsold lots in the 1800 MHz, 2 GHz, 2.3 GHz and 3.4 GHz bands in late November 2017. 	
Auction remaining unsold lots in the 1800 MHz, 2 GHz, 2.3 GHz and 3.4 GHz bands	<p>Auction the remaining unsold lots in the 1800 MHz, 2 GHz, 2.3 GHz and 3.4 GHz bands in late November 2017.</p> <p>Further details about the ACMA’s proposed forward allocations work are set out under Part 1.</p>	Auction to be held Q2

Spectrum pricing

Key projects	Activity	Milestones
Responsible branch—Spectrum Review Implementation		
Spectrum pricing	<p>Progress achieved After releasing a consultation paper in November 2016 on managing spectrum in the 400 MHz band, the ACMA decided not to implement the third of the 15 per cent increases in the high-density areas of the 400 MHz band.</p> <p>The ACMA had previously noted an intention to review the taxes associated with the television outside broadcast services. In light of the government’s announcements concerning a broader review of broadcasting taxes, the ACMA did not undertake this review.</p> <p>Release in August 2017 of the consultation paper on taxes associated with the scientific assigned licences.</p>	
Review monitoring framework for opportunity cost pricing in high density areas of 400 MHz band	The ACMA is reviewing the relevant decision-making framework in light of stakeholder feedback. Further consultation on the opportunity cost pricing monitoring framework for high-density areas of the 400 MHz band is expected to occur in Q3 2017–18.	Further consultation on monitoring framework Q3
Review of taxes associated with the scientific assigned licences	The ACMA expects to make a decision about the proposals to reduce these taxes by 90 per cent in October/November 2017.	New pricing arrangements implemented Q2
Implement new broadcast spectrum pricing arrangements	Implement new commercial broadcast tax arrangements associated with broadcasters’ transmitters.	Milestones contingent on timing of legislation

Key projects	Activity	Milestones
Adjustments to licence taxes	Adjustments to apparatus licence taxes to account for changes in census data and inflation and clarifying the application of taxes for PMTS Class B services in External Territories. New spectrum licence taxes are expected to be proposed in 2018 to account for changes in the indirect cost of spectrum management and census data.	Consult Q2 and Q3 Implement changes Q3

Operational activities

Key projects	Activity	Milestones
Responsible branch—Operations, Services and Technologies		
Support for Gold Coast 2018 Commonwealth Games	The Gold Coast 2018 Commonwealth Games Corporation (GOLDOC) has entered into a contract with the ACMA to provide spectrum planning, frequency coordination, licensing, compliance testing and interference management services for the Games as well as ensuring transmitter licensing compliance around the Games precincts in the lead up to the Games.	Pre-games planning: March 2017 – 13 March 2018 Games operation period: 13 March – 30 April 2018 Games held: 3–16 April 2018
Audit mobile handset compliance—technical standards audit program	The audit of mobile handsets for compliance with technical standards is being undertaken as part of the ACMA's routine monitoring rather than in response to non-compliance issues.	Ongoing 2017–18
Equipment regulation	Amend the Radiocommunications (Compliance Labelling – Devices) Notice 2014 and the Radiocommunications (Compliance Labelling – Electromagnetic Radiation) Notice 2014 to provide for an exemption from the need to apply a label to members of two industry associations in relation to equipment within vehicles.	September 2017
Licence processing system	Work is continuing on developing an online portal to allow licensees to electronically manage their licence holdings including applying for new licences and renewing, transferring, varying or surrendering existing licences and updating details.	Ongoing 2017–18

International engagement

Key projects	Activity	Milestones
Responsible branch—Spectrum Planning and Engineering Branch		
World Radiocommunication Conference 2019	<p>Progress achieved ACMA staff headed delegations to a number of ITU Radiocommunication Sector (ITU-R) meetings during 2017, including meetings of ITU-R Study Groups 4 and 5 and their associated Working Parties, and Task Group 5/1. The ACMA also supported Australian delegations to ITU-R Study Groups 3, 6 and 7 and their associated Working Parties.</p> <p>ACMA staff headed delegations to APT Wireless Group meetings, and co-headed the delegation to the second meeting of the APT Conference Preparatory Group for WRC-19 (APG 19-2).</p>	
Hosting 4 th meeting of the ACMA's PG WRC-19, Canberra, December 2017	This meeting provides a forum for industry and government stakeholder input into the development of Australian positions leading to WRC-19.	December 2017
Hosting APG19-3, Perth Australia, 12–16 March 2018	Among other things, this meeting will update Asia-Pacific regional preliminary views on WRC-19 agenda items based on the outcomes of ongoing ITU-R technical meetings, APG19-2 and members' contributions to APG19-3.	March 2018
Other ITU-R and APT participation	Dates for other meetings of the APT and ITU in the first half of 2018 are still to be confirmed.	Ongoing

Other ongoing work for 2017–18

In addition to the key focus areas for 2017–18, the ACMA will be continuing to undertake its broader remit of ongoing spectrum work. These activities consist of managing our international relationships, administering the systems and processes for licensing transactions, interference complaints and routine planning work as well as monitoring, and providing engineering and technical support. Much of this work is driven by spectrum user demand and is associated with varying degrees of discretion.

Planning

- > Broadcast service planning—Licence Area Plans (LAPs), Television Licence Area Plans (TLAPs) and Digital Radio Channel Plans (DRCPs). The ACMA responds to requests to vary LAPs, TLAPs and DRCPs to enable changes to existing transmissions, provide new transmissions extending or improving coverage, or to include new services.
- > Review of frequency coordination requirements—the ACMA is progressing work identified in the previous FYSO in reviewing frequency coordination requirements between apparatus-licensed microwave fixed point-to-point links and earth stations in the fixed satellite services communicating with geostationary satellite in the 6 and 6.7 GHz fixed point-to-point bands.
- > Ongoing review of established spectrum planning, assignment and coordination frameworks.

Interference management

- > Investigate and respond to high-risk interference issues (for example, prohibited devices such as mobile phone jammers and unlicensed mobile phone repeaters).
- > Investigate and advise on widespread TV reception difficulties (if any).
- > Support radiofrequency spectrum management for major events.

Equipment regulation

- > Maintain device supply arrangements by making technical standards and labelling notices as appropriate and necessary.

Engineering and technical support

- > Technical support for enquiries on spectrum arrangements; for example, radiocommunications services, including wireless microphones, television outside broadcasting, devices authorised by the LIPD class licence, land mobile and microwave fixed point-to-point links.
- > Technical input to spectrum policy on requests, including consideration of applications for scientific apparatus licences.

Monitoring developments

- > Monitoring emerging spectrum related technologies; for example, overseas biomedical telemetry arrangements, development in use of ESIMs, trends in space-based communications, emerging space-based technologies, IoT and machine-to-machine (M2M) requirements.

Government spectrum planning and management

- > Maintain day-to-day planning, management and liaison to support access to spectrum by government agencies, such as Defence and public safety and security agencies. This includes licensing and regulatory support for specific requirements that are difficult to accommodate within existing legislative and regulatory frameworks.

Filing and coordination of Australian satellite systems

- > Manage domestic access to the radiofrequency spectrum.
- > Represent Australia's space spectrum management interests internationally, including filing and coordination of Australian satellite systems with the ITU.
- > Continue to support and enable significant space research projects such as the Square Kilometre Array (SKA).

Licence processing work

- > Manage the issue and renewal processes for radiocommunications licences.
- > Provide support to licensees for complex enquiries on licensing issues.
- > Provide support for enquiries on assigning and co-ordination issues.

Other international responsibilities

- > Managing space systems, in particular aspects of treaty-level arrangements with the European Space Agency (ESA) for a Cooperative Space Vehicle Tracking Program and the United States Government on Space Vehicle Tracking and Communications Facilities.
- > Assisting development of Australian contributions and positions for ITU-R Study Groups and Working Parties and other international committees, meetings and fora such as the Spectrum Regulators Forum.

Appendix 1

Mobile broadband work plan— October 2017 update

Introduction

To assist in providing clarity about its work related to mobile broadband capacity growth and greater certainty to all spectrum holders, the ACMA has articulated and adopted a transparent spectrum management planning process for the consideration of additional bands for mobile broadband, as stated in its [mobile broadband strategy](#) (Strategy 2). In doing this, the ACMA has divided its process of repurposing a band into three broad stages—initial investigation, preliminary replanning and re-farming.¹⁸ These stages are preceded by an initial ‘monitoring’ stage, where it is determined whether consideration of a particular band should progress further. Although the ACMA maintains a general awareness across all bands, those included in this stage are monitored closely. A more detailed explanation of each of these stages is available in the ACMA’s [mobile broadband strategy](#) paper.

As part of its mobile broadband strategy, the ACMA undertook to include an updated mobile broadband work program on an annual basis that would form part of the ACMA’s FYSO.

In planning for broadband services, the ACMA adopts a technology flexible approach. However, the fact remains that the demand for spectrum for mobile broadband services has been the major driver of changes in highest value use of spectrum over the past decade. Nonetheless, the mobile broadband strategy and the mobile broadband work program are largely applicable to both mobile and fixed broadband services.

The updated work program for mobile broadband spectrum planning projects is contained in Table 6. This table outlines where each of these projects is positioned within the overall process (the stages) and identifies those frequency bands that are at the *monitoring* stage. The table also provides a summary of the work undertaken to date and the likely next steps. A more detailed overview of the reasoning for the status of each band in Table 6 is provided in the proceeding sections.

¹⁸ Under the Act, the minister and the government have a policy-making role that is independent of the ACMA.

Table 6: Status of current broadband spectrum planning projects

Stage	Current mobile broadband spectrum planning projects	Activity to date	Next steps
Monitoring	600 MHz (520–694 MHz)	Internal monitoring of international developments in the 600 MHz band.	Continue to monitor international developments in the 600 MHz band including the implementation of the outcomes of the US incentive auctions.
	3.3 GHz (3300–3400 MHz)	Internal monitoring of international developments in the 3.3 GHz band.	Continue to monitor international developments. Consideration of engagement in international studies.
	3.8 GHz (3700–4200 MHz)	Internal monitoring of international developments in the 3.8 GHz band.	Continue to monitor international developments.
	4.4 GHz (4400–4500 MHz)	Internal monitoring of international developments in the 3.8 GHz band.	Continue to monitor international developments.
	4.9 GHz (4800–4990 MHz)	Internal monitoring of international developments in the 4.9 GHz band.	Continue to monitor international developments. Consideration of engagement in international studies.
	Bands being studied under WRC-19 agenda item 1.16: 5150–5350 MHz, 5350–5470 MHz, 5725–5850 MHz and 5850–5925 MHz	The Australian preparatory process for WRC-19 is well underway. ACMA staff have attended all meetings of Working Party 5A for the WRC-19 cycle.	Continue to monitor international developments. Consideration of engagement in international studies via the appropriate ARSG and agenda item coordination group on issues/bands of interest to Australia. ACMA attendance at ITU-R Working Party 5A meetings, as appropriate.

Stage	Current mobile broadband spectrum planning projects	Activity to date	Next steps
	<p>Bands being studied under WRC-19 agenda item 1.13¹⁹:</p> <p>31.8–33.4 GHz, 37–40.5 GHz, 40.5–42.5 GHz, 42.5–43.5 GHz, 45.5–47 GHz, 47–47.2 GHz, 47.2–50.2 GHz, 50.4–52.6 GHz, 66–76 GHz and 81–86 GHz</p>	<p>The Australian preparatory process for WRC-19 is well underway. ACMA staff have attended all meetings of ITU-R Task Group 5/1 with significant engagement through contributions on an FSS/IMT sharing study methodology.</p>	<p>Continue to monitor international developments. Continued engagement in international studies via ACMA PG TG 5/1 on issues/bands of most interest to Australia. ACMA attendance at ITU-R Task Group 5/1 meetings, as appropriate. Possible 5G bands for early implementation in Australia will be considered.</p>

¹⁹ Note: 24.25–27.5 GHz has been advanced to the initial investigation stage.

Stage	Current mobile broadband spectrum planning projects	Activity to date	Next steps
	<p>Bands being considered internationally for 5G: Bands announced for early implementation of 5G²⁰: <u>US</u>: 27.5–28.35 GHz, 37–40 GHz and 64–71 GHz</p> <p>Additional bands being considered internationally for 5G²¹: <u>US</u>: 24.25–24.45 GHz, 24.75–25.25 GHz, 31.8–33.4 GHz, 42–42.5 GHz, 47.2–50.2 GHz, 50.4–52.6 GHz, 71–76 GHz, 81–86 GHz as well as bands above 95 GHz</p> <p><u>Korea</u>: 24.25–29.5GHz, 31.8–33.4 GHz and 37–40.5 GHz</p> <p><u>Japan</u>: 26.5–29.5 GHz</p> <p><u>European Union</u>: 24.25–27.5 GHz and 40.5–43.5 GHz</p> <p><u>China</u>: 24.25–27.5 GHz and 37–43.5 GHz.</p>	<p>Monitoring of developments in these bands including identification of bands and development of arrangements for use.</p>	<p>Continue to monitor developments in these bands, including monitoring the finalisation of arrangements and the timing of the release of bands earmarked for early implementation.</p>

²⁰ Note: 37.0–40 GHz and 66–71 GHz are also being considered under WRC-19 agenda item 1.13.

²¹ Note: 24.25–27.5 GHz, 37.0–40.5 GHz, 47.2–50.2 GHz, 50.4–52.6 GHz and 66–71 GHz are also being considered under WRC-19 agenda item 1.13. 24.25–27.5 GHz has been advanced to the initial investigation stage.

Stage	Current mobile broadband spectrum planning projects	Activity to date	Next steps
Initial investigation	2 GHz (1980–2010/2170–2200 MHz)	Monitoring of international developments.	Consideration of engagement in international studies via the appropriate ARSG and agenda item coordination group on issues of most interest to Australia. ACMA attendance at ITU-R Working Party 5D and AWG meetings, as appropriate. Further work on this band will be considered in 2018.
	26 GHz mmWave band (24.25–27.5 GHz)	The Australian preparatory process for WRC-19 is well underway. ACMA staff have attended all meetings of ITU-R Task Group 5/1 with significant engagement through contributions on an FSS/IMT sharing study methodology. Internal analysis and Spectrum Tune-Up with public consultation. Monitoring of international developments.	Analyse contributions to consultation process and if appropriate proceed with the development of an options paper in the first half of 2018 for possible early implementation of this band for 5G in Australia. Continue to monitor international developments. Continued engagement in international studies via ACMA PG TG 5/1. ACMA attendance at ITU-R Task Group 5/1 meetings, as appropriate.
Preliminary replanning	1.5 GHz (1427–1518 MHz)	Release of discussion paper and analysis of submissions. Monitoring of international developments.	Release of an options paper is expected in the 2018–19 financial year. Consideration of engagement in international studies via the appropriate ARSG and agenda item coordination group on issues of most interest to Australia. ACMA attendance at ITU-R Working Party 5D and AWG meetings, as appropriate.

Stage	Current mobile broadband spectrum planning projects	Activity to date	Next steps
Re-farming	Spectrum available for the licensing of mobile broadband services	The ACMA is assessing options and possible timing for the allocation of any unsold lots in bands subject to spectrum licensing.	<p><i>Unsold spectrum licence lots:</i> unsold lots in 1800 MHz, 2.1 GHz, 2.3 GHz and 3.4 GHz bands will be put to market before the end of 2017.</p> <p><i>Apparatus licences:</i> first-in-time over-the-counter licence application processes usually apply.</p>
	850 MHz expansion band (809–824/854–869 MHz)	Band will be cleared from 2024. At this stage, the ACMA is intending to issue licences in 2021 (encumbered until 2024). Licences will be allocated via auction in 2019.	Implementation of reforms identified in decision paper has commenced (due for completion in 2024). This includes clearance of 850 MHz expansion band for 2024 release.
	900 MHz (890–915/935–960 MHz)	Band will be cleared with new spectrum licences (configured as multiples of 5 MHz lots) issued in 2021. Licences will be allocated via auction in 2019.	<p>Decision paper on option for reconfiguration into 5 MHz licence blocks has been released.</p> <p>Consultation with current licensees on reallocation of the band will commence soon.</p>

Stage	Current mobile broadband spectrum planning projects	Activity to date	Next steps
	3.6 GHz (3575–3700 MHz)	<p>Release of initial discussion paper, Option paper and analysis of submission.</p> <p>Engagement with stakeholders through spectrum tune-ups and other forums.</p> <p>Release of a paper detailing the outcomes of the review of the 3.6 GHz band.</p>	<p>Consultation on the ACMA’s proposal to make a recommendation to the minister that the band be re-allocated for spectrum licensing in metropolitan and regional areas.</p> <p>Subject to the outcome of the consultation, the ACMA will make a recommendation to the Minister. A decision from the Minister is expected in Q1 2017.</p> <p>Subject to a decision from the Minister, the ACMA will commence work to conduct an allocation of the 3.6 GHz in Q4 2018.</p> <p>Commence consultations to develop arrangements for site-based apparatus licence arrangements for wireless broadband services in the 5.6 GHz band.</p> <p>Investigate the possibility of developing arrangements for site-based apparatus licence arrangements for fixed wireless broadband services in part of the 28 GHz band in regional Australia.</p>

Monitoring

Table 7 below outlines the bands currently in the *monitoring* stage, as well as the status of the bands against some of the key considerations that have led to their inclusion at the *monitoring* stage. These considerations include (but are not always limited to):

- > *Domestic interest*—interest has been expressed from Australian proponents for consideration of the use of the band for mobile broadband services.
- > *International spectrum harmonisation (IMT/RLAN identification)*—the band is identified in Article 5 of the Radio Regulations for International Mobile Telecommunications (IMT) or the band is under consideration at WRC-19 for such an identification. Alternatively, the band is identified for use by RLANs.
- > *Technology standardisation (for example, 3GPP and IEEE)*—standardised arrangements for mobile broadband that have been or are being developed.
- > *Potential or evolving ecosystem*—an equipment ecosystem exists for devices to generate economies of scale for equipment and roaming benefits, alternatively there are indications that such an ecosystem could develop over time.
- > *Regional group interest*—there is interest in this band from regional organisations such as CEPT, CITELE and APT.
- > *Other relevant issues*—where applicable.

An additional set of bands has been added to the monitoring stage since the October 2016 update of the mobile broadband work program. These are the 3.8 GHz and 4.4 GHz bands. Note that the process for consideration of additional spectrum for mobile broadband services relates to the domestic re-planning process. For bands being considered within international fora such as the ITU, the ACMA will, where appropriate, engage with stakeholders via the international preparatory process to develop Australian positions on relevant issues.

Table 7: Frequency bands at the *monitoring* stage within the process for consideration of additional spectrum for mobile broadband services

Band	Domestic interest	International spectrum harmonisation (IMT/RLAN identification)	Technology standardisation (e.g. 3GPP, IEEE etc.)	Potential or evolving ecosystem	Regional group interest	Other relevant issues
600 MHz	Yes	Yes	Developing	Yes	No	The US and 13 other countries have identified for IMT
3.3 GHz	Yes	Yes	Yes	Yes	No	46 countries have identified for IMT
3.8 GHz	Yes	Partial harmonisation in the 3700-3800 MHz band	Partial but developing	Developing	Partial	
4.4 GHz	Yes	No	Developing	Developing	No	Trials conducted in Australia and other Region 3 countries
4.9 GHz	Yes	Yes	Yes (RLAN)	Yes	No	RLAN standards across part of the band
WRC-19 agenda item 1.16 bands ²²	Yes	Potential (WRC-19 agenda item)	Yes (RLAN)	Yes	Yes	Increased demand for RLAN spectrum RLAN standards across some of these bands
WRC-19 agenda item 1.13 bands ²³	Yes	Potential (WRC-19 agenda item)	Developing	Developing	Yes	Significant interest world-wide
Bands announced internationally for early implementation of 5G ²⁴	Not known at this stage	No	No	Yes	No	In the US, the FCC has announced these bands will be released for 5G in the US
Additional bands being considered internationally for 5G ²⁵	Not known at this stage	No	No	Yes	No	Korea and the US are considering additional bands for 5G outside the WRC process

²² 5150–5350 MHz, 5350–5470 MHz, 5725–5850 MHz and 5850–5925 MHz

²³ 31.8–33.4 GHz, 37–40.5 GHz, 40.5–42.5 GHz, 42.5–43.5 GHz, 45.5–47 GHz, 47–47.2 GHz, 47.2–50.2 GHz, 50.4–52.6 GHz, 66–76 GHz and 81–86 GHz (Note: While the 24.25–27.5 GHz band is being studied under WRC-19 agenda item 1.13, this band has been advanced to the initial investigation stage).

²⁴ 27.5–28.35 GHz, 37–40 GHz and 64–71 GHz (Note: 37.0–40 GHz and 66–71 GHz are also being considered under WRC-19 agenda item 1.13).

²⁵ US: 24.25–24.45 GHz, 24.75–25.25 GHz, 31.8–33.4 GHz, 42–42.5 GHz, 47.2–50.2 GHz, 50.4–52.6 GHz, 71–76 GHz, 81–86 GHz as well as bands above 95 GHz; Korea: 24.25–29.5GHz, 31.8–33.4 GHz and 37–40.5 GHz; Japan: 26.5–29.5 GHz; European Union: 24.25–27.5 GHz and 40.5–43.5 GHz; China: 24.25–27.5 GHz and 37–43.5 GHz.

600 MHz (520–694 MHz)

At WRC-15, all or part of the 600 MHz band was identified for IMT by the Bahamas, Barbados, Belize, Canada, Colombia, the US, Mexico, Micronesia, the Solomon Islands, Tuvalu, Vanuatu, Bangladesh, Maldives and New Zealand. The band is being allocated or considered for allocation in countries such as the US and Canada.

There is support from domestic mobile broadband interests in pursuing this band for mobile broadband in Australia. Mobile broadband interests have argued that the ACMA could take a more proactive interest in the band. This view is encouraged by the outcomes of WRC-15 and the results of the Federal Communications Commission (FCC) incentive auctions in the band.

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.

The 600 MHz band is currently used by digital television services in Australia and is available for some services under the [Radiocommunications \(Low Interference Potential Devices\) Class Licence 2015](#).

Consistent with the Australian Government's interest in considering the potential for long-term availability of the television 'sixth channel' for non-broadcasting uses and whether there is the possibility of a second digital dividend²⁶, this band will continue to be monitored by the ACMA, while noting Australia's current use of the band for terrestrial broadcasting of digital television.

Developments since October 2016

The FCC incentive auction began on 29 March 2016 with bidding in the auction closing on 30 March 2017. The auction resulted in a repurposing of 84 MHz of spectrum—70 MHz for licensed use and another 14 MHz for wireless microphones and unlicensed use.²⁷

ITU-R Working Party 5D are 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 Radio Regulations (RR). The draft revision includes arrangements for the frequency band 470–698 MHz. Working Party 5D is aiming to complete the development of frequency arrangement(s) in the frequency band 470-698 MHz at its January 2018 meeting and finalise the revision of the Recommendation for the November 2018 meeting of ITU-R Study Group 5.

The AWG finalised a report on frequency arrangements for IMT in the band 470–698 MHz at its September 2017 meeting. The arrangements mirror those put in place by the FCC and included in Release 15 of the LTE specification as Band 71 by 3GPP.

²⁶ Minister of Communications Malcolm Turnbull's speech to RadComms 2014, available at www.malcolmturnbull.com.au/media/radcomms-2014-spectrum-in-the-age-of-digital-innovation.

²⁷ Information available on the [FCC website](#).

Next steps

Given the outcome of WRC-15 and ongoing work internationally, the ACMA will continue to monitor international developments in the 600 MHz band. In particular, the implementation of the results of the incentive auction process in the US will be of key interest.

The ACMA will also engage with industry and the government regarding technological evolution of terrestrial digital television, including DVB-T2 and HEVC. Adoption of these technologies is likely to be a pre-requisite 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.

3.3 GHz (3300–3400 MHz)

At WRC-15, the 3300–3400 MHz band was identified for IMT by a number of countries including 33 African countries, Argentina, Colombia, Costa Rica, Ecuador, Mexico, Uruguay, Cambodia, India, Lao PDR, Pakistan, Philippines and Vietnam (noting a primary mobile allocation was also made in Papua New Guinea). Notably, there was also strong interest from China in identifying the band for IMT. This suggests that a viable ecosystem could develop for mobile broadband systems in this band, noting that this band is already a WiMAX profile band, which has been deployed in some countries.²⁸

There is some support from domestic mobile broadband interests in pursuing this band for mobile broadband in Australia. The 3300–3400 MHz band is currently allocated on a primary basis to the radiolocation service worldwide. In Australia, the radiolocation service in this band is designated to be used principally for the purposes of defence and national security via footnote AUS101A of the Spectrum Plan. The Department of Defence is normally consulted in considering non-defence use of this service.

Developments since February 2016

ITU-R Working Party 5D are 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 the frequency band 3300–3400 MHz. Working Party 5D also commenced studies as called for in Resolution **223 (Rev. WRC-15)**.

Working Party 5D is aiming to complete these work items by late 2018. The AWG also has a work plan to develop a recommendation or report on harmonised frequency arrangement(s) for the 3300–3400 MHz band.

Next steps

Given the outcomes of WRC-15, and the potential for economies of scale to develop for equipment, the ACMA will continue to monitor international developments in the 3.3 GHz band. Possible engagement (including through contributions) in international studies as outlined in Resolution **223 (Rev. WRC-15)** will be considered as part of the ACMA's international engagement processes.

Given the nature of incumbent use of the band, the ACMA is of the view that this band may be a candidate for consideration of dynamic spectrum-access type arrangements

²⁸ WiMAX networks in India, Medicine Industry News and Marketplace, June 19 2006, www.wimax-industry.com/ar/7c.htm.

as way of sharing and hence increasing the utility of the band. If the ACMA pursues this idea, it will engage further with relevant stakeholders.

3.8 GHz (3700–4200 MHz)

The use of the 3700–4200 MHz band has been the subject of debate internationally for a number of years, spanning back to the WRC-07 study cycle. In recent times, there has been increasing interest in spectrum in the lower and lower-adjacent parts of this band for 5G services, particularly given the large bandwidths potentially available in this range. In June 2016, Japan's Ministry of Internal Affairs and Communications (MIC) named the 3.6-4.2 GHz band as a nationally suitable candidate band for 5G.²⁹

This has resulted in increasing support from domestic mobile broadband interests in pursuing this band for mobile broadband. It is therefore timely to signify the ACMA's elevated interest in this spectrum for potential investigation for use by mobile broadband services in Australia. The 3.8 GHz band is allocated on a co-primary basis in Australia to the fixed, fixed-satellite (space-to-earth) and mobile services.

Developments since October 2016

In December 2016, the European Commission issued a Mandate to CEPT³⁰ to develop harmonised technical conditions for the use of the 3400–3800 MHz band for 5G. This followed the November 2016 RSPG report, which named the 3400–3800 MHz to be the primary band suitable for the introduction of 5G-based services in Europe even before 2020, given that it is already harmonised for mobile networks and offers wide channel bandwidth.

In August 2017, the Federal Communications Commission (FCC) in the US opened an inquiry into new expanding opportunities for next-generation services, particularly wireless broadband services in mid-band spectrum, in bands including the 3700–4200 MHz 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.

Next steps

Given the increasing interest in the 3.8 GHz band, and the potential for economies of scale to develop for equipment, the ACMA will continue to monitor international developments in this band.

4.5 GHz (4400–4500 MHz)

The 4400–4500 MHz band was considered for use for mobile broadband services in the lead up to WRC-15. However, the band was not identified for IMT at WRC-15 despite strong interest from China, Japan and Korea, in particular. Since that time, there has been increasing interest in this band, particularly from 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.³¹

There is some support from domestic mobile broadband interests in pursuing this band for mobile broadband in Australia. The 4400–4500 MHz band is currently allocated on a co-primary basis to fixed and mobile service worldwide. In Region 2 and in Australia, the band is used for aeronautical mobile telemetry for flight testing by aircraft stations.

²⁹ GSA – Global mobile Suppliers Association, [The case for new 5G spectrum](#), November 2016

³⁰ [ECC PT1 \(17\)055](#)- Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union.

³¹ GSA – Global mobile Suppliers Association, [The case for new 5G spectrum](#), November 2016.

In Australia, the band is designated to be used principally for the purposes of defence and national security via footnote AUS101 of the Spectrum Plan. The Department of Defence is normally consulted in considering non-defence use of this service.

Developments since October 2016

In October 2016, Vodafone and Nokia conducted the first live public 5G demonstration in Australia using the 4.5 GHz band.³² There have also been a number of 5G trials using the 4.5 GHz band in other Region 3 countries, including in China, Korea and Japan.³³

Next steps

The ACMA will continue to monitor international developments in this band.

4.9 GHz (4800–4990 MHz)

At WRC-15, the 4800–4990 MHz band was identified for IMT by a number of countries including Uruguay, Cambodia, Lao PDR 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.

There is some support from domestic mobile broadband interests in pursuing this band for mobile broadband in Australia. However, the ACMA is not aware of any significant interest in this band by regional bodies such as CEPT, CITELE or APT.

The 4800–4990 MHz band is currently allocated on a primary basis for the fixed and mobile services in Australia. The fixed and mobile services in this band are designated to be used principally for the purposes of defence and national security as defined in footnote AUS101A of the Spectrum Plan. The Department of Defence is normally consulted in considering non-defence use of these services.

The 4950–4990 MHz band is also allocated to the radio astronomy service on a primary basis under footnote 443 of the Spectrum Plan.

At WRC-03, the 4940–4990 MHz band was identified to support public safety services in Regions 2 and 3 for use by government agencies responsible for the provision of defence, national security, law enforcement and emergency services.³⁴

A number of countries, including Australia, have implemented arrangements in the 4940–4990 MHz band for this purpose. This is principally to support high-speed localised coverage around an incident or event. The [Radiocommunications \(Public Safety and Emergency Response\) Class Licence 2013](#) 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. The 4940–4990 MHz is also included in IEEE standard 802.11y Public Safety WLAN.

Developments since October 2016

ITU-R Working Party 5D are 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 the frequency band 4800–4990 MHz. Working Party 5D is also continuing studies called for in Resolution **223 (Rev. WRC-15)** on the coexistence conditions between IMT and aeronautical mobile service in the band, with work

³² Vodafone, [Vodafone and Nokia conduct Australia's first live public 5G trial](#), 12 October 2016.

³³ Ericsson, [Ericsson and SoftBank trial 5G in 4.5 GHz band](#), 31 August 2017.

³⁴ In accordance with ITU-R Resolution **646**.

currently underway to develop sharing characteristics for IMT-2020 in this band as part of this work item. Working Party 5D is aiming to complete these work items by late 2018.

The AWG has a work plan to develop a recommendation on frequency arrangements for the 4800–4990 MHz band. The current proposal is to finalise the work in late 2018.

Next steps

Given the outcomes of WRC-15, and the potential for economies of scale to develop for equipment, the ACMA will continue to monitor international developments in the 4.9 GHz band.

Possible engagement (including through contributions) in international studies as outlined in Resolution **223 (Rev. WRC-15)** will be considered as part of the ACMA's international engagement processes.

Given the nature of incumbent use of the band, the ACMA is of the view that this band may be a candidate for consideration of dynamic spectrum-access type arrangements as way of sharing and hence increasing the utility of the band. If the ACMA pursues this idea, it will engage further with relevant stakeholders.

Bands being studied under WRC-19 agenda item 1.16

WRC-19 agenda item 1.16 is to consider 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 5850–5925 MHz, while ensuring the protection of incumbent services including their current and planned use.

There is strong interest from the US and the United Kingdom (UK) to investigate use of the 5350–5470 MHz band for RLANs. Europe has 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 to align with US arrangements.³⁵ 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, including Australia, have or are considering identifying the 5850–5925 MHz band for Intelligent Transport Systems (ITS). The ACMA is facilitating trials in Australia, while considering the implementation of future arrangements for ITS.

Developments since February 2016

ITU-R Working Party 5A is continuing work towards WRC-19 agenda item 1.16. Australia has submitted a number of 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

³⁵ Including in an industry submission to a 2015 consultation on proposed changes to the low interference devices class licence (see [IFC 32/2015](#)) and to the *Five-year spectrum outlook 2016–20* (see [IFC 23/2016](#)).

- > 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
- > sharing and compatibility studies of WAS/RLAN in the 5 GHz frequency range.

Working Party 5A is aiming to finalise these reports by mid-2018.

Next steps

The ACMA intends 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. When appropriate, it will develop individual positions on each of the bands being studied and potentially contribute to international sharing and compatibility studies on issues/bands of most interest to Australia, as determined through the WRC-19 agenda item 1.16 coordination group. The ACMA also aims to have representatives attend ITU-R Working Party 5A meetings, as appropriate.

Bands being studied under WRC-19 agenda item 1.13³⁶

WRC-19 agenda item 1.13 is to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis. This agenda item is widely acknowledged to be focussing 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 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 on this issue domestically and internationally, particularly in Region 3 countries such as South Korea, Japan and China. In its [draft opinion on spectrum related aspects for next-generation wireless systems \(5G\)](#), released 14 June 2016, the Radio Spectrum Policy Group³⁷ (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 co-existence issues associated with each of these bands, which will need to be considered if the bands were to be investigated domestically for mobile broadband in the future.

Developments since October 2016

ITU-R Task Group 5/1 (TG 5/1) has continued its work to address WRC-19 agenda item 1.13 under its Terms of Reference ([CA/226 \(Annex 9\)](#)). Australia has been an active contributor 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 Document [5-1/76](#) and [5-1/117](#)).

However, a number of 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, which is discussed further below.

³⁶ Note: the 24.25–27.5 GHz band is in the initial investigation stage.

³⁷ The Radio Spectrum Policy Group (RSPG) is a high-level advisory group that assists the European Commission in the development of radio spectrum policy.

Next steps

The ACMA intends to continue monitoring and, where appropriate, engaging with stakeholders via the usual international preparatory process to develop Australian positions on WRC-19 agenda item 1.13. When appropriate, it will develop individual positions on each of the bands being studied and potentially contribute to international sharing and compatibility studies on issues/bands of most interest to Australia as determined through the WRC-19 agenda item 1.13 coordination group. The ACMA has had representatives attend all ITU-R Task Group 5/1 meetings so far and aims to continue to have representatives attend these meetings, as appropriate.

The ACMA will monitor developments in Europe and other regions/countries (such as the US) with regard to possible early implementation bands for 5G. The feasibility of 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. It is noted that the 24.25–27.5 GHz band has been advanced to the *initial investigation* stage of the process for consideration of additional spectrum for mobile broadband services.

Bands being considered internationally for 5G

In July 2016, the FCC in the US announced that the 27.5–28.35 GHz, 37–38.6 GHz, 38.6–40 GHz and 64–71 GHz bands would be made available for licensed, unlicensed and shared use for future IMT services.³⁸

The FCC also released a Further Notice of Proposed Rule Making considering the bands 24.25–24.45 GHz, 24.75–25.25 GHz, 31.8–33.4 GHz, 42–42.5 GHz, 47.2–50.2 GHz, 50.4–52.6 GHz, 71–76 GHz, 81–86 GHz, as well as bands above 95 GHz for future IMT services.³⁹

Korea is also continuing its support of investigations of the frequency ranges 24.25–29.5 GHz, 31.8–33.4 GHz and 37–40.5 GHz.⁴⁰

Given the status of these countries as technology-developing nations, and the advanced nature of their consideration of these frequency bands outside the scope of WRC-19 agenda item 1.13, it is appropriate to include these frequency bands to the *monitoring* stage of the process for the consideration of additional bands for mobile broadband.

Next steps

The ACMA will monitor international developments on all bands being considered or already identified internationally for 5G/IMT. However, it is noted that one of the elements of the ACMA's spectrum management strategy to address the growth in mobile broadband capacity is engagement in international deliberations to influence the development of domestically suitable internationally harmonised spectrum options.

As mentioned in the previous section, the ACMA will monitor international developments with regard to possible early implementation bands for 5G. The feasibility of early implementation in Australia will depend on factors such as the location, type and number of incumbent services in a band, whether adequate interference management (or sharing) frameworks can be developed, and whether the development of economies of scale are likely.

³⁸ Report and Order and Further Notice of Proposed Rulemaking, [FCC 16-89](#).

³⁹ Report and Order and Further Notice of Proposed Rulemaking, [FCC 16-89](#).

⁴⁰ Contribution to WRC-15, [Revision 1 to Document 102\(Add.24\)](#), Korea (Republic of).

Initial investigation

Bands that are in the *initial investigation* stage of the process for consideration of additional spectrum for mobile broadband services are the 2 GHz and the 26 GHz mmWave bands.

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

As an outcome of the review of the 2.5 GHz band⁴¹, the ACMA developed arrangements to support the introduction of television outside broadcast (TOB) in the frequency ranges 1980–2010 MHz and 2170–2200 MHz on an interim basis. In March 2012, the [Television Outside Broadcast \(1980–2110 MHz and 2170–2300 MHz\) Frequency Band Plan 2012](#) (TOB Band Plan) was made. The frequency ranges remain subject to Embargo 23⁴² to support TOB and future replanning activities.

Regulatory measures supporting the MSS in the 1980–2010 MHz and 2170–2200 MHz bands in Australia are included in the TVOB Band Plan. In Australia, there are currently no space or space receive apparatus licences issued⁴³ in this frequency range.

Representatives of satellite interests have indicated their concern regarding the potential for interference from mobile broadband services if they are deployed in the frequency bands 1980–2010 MHz and 2170–2200 MHz. Inmarsat and Omnispace have indicated that they have (or plan to deploy) new 2 GHz band MSS services in the near future. Specifically, Omnispace has expressed an interest in providing services in Australia. Satellite industry representatives have also suggested that services similar to those to be provided by Inmarsat's proposed satellite (Europasat) can be expected to be deployed in Australia as part of an international footprint in the future.

In addition, the ACMA is aware of interest in the band for possible aircraft to ground operations providing broadband connectivity to aircraft.

The frequency bands 1980–2010 MHz and 2170–2200 MHz are already allocated to the mobile service and subject to a global IMT identification via footnote 388 of the Spectrum Plan. In Resolution **212 (Rev. WRC-15)**, it is noted that these frequency bands are available for use for both the terrestrial component of IMT and the satellite component of IMT.

The ITU has defined IMT channel arrangements for the frequency bands 1980–2010 MHz and 2170–2200 MHz. These can be found in ITU-R Recommendation M.1036.⁴⁴ In order to include the new arrangements in ITU-R Recommendation M.1036, it was agreed in Resolution **212 (Rev. WRC-15)** to invite study on the possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile-satellite service) in the frequency bands 1980–2010 MHz and 2170–2200 MHz. These bands are directly adjacent to the existing 2.1 GHz band used for terrestrial mobile voice and broadband services. This work is being conducted as part of WRC-19 agenda item 9.1.1.

The ACMA notes that the work of the ITU on this issue is focusing on co-existence of terrestrial and satellite use of the band across international borders, but acknowledges

⁴¹ Refer to www.acma.gov.au/theACMA/25-ghz-band-review.

⁴² Available from the [ACMA website](#) and last revised September 2013.

⁴³ RRL extraction 23 June 2016.

⁴⁴ Available on the ITU-R website at www.itu.int/rec/R-REC-M.1036/en.

that this work may provide some useful information on how these bands could be shared between uses and users on a geographic basis domestically.

The ACMA has made the 1980–2010 MHz and 2170–2200 MHz bands available for use by TOB services on a temporary basis. RALI FX21 and Embargo 23 indicate that future use of these bands is under consideration as part of the work considering future spectrum requirements for mobile broadband. For these reasons, these bands are only available for use by TOB services while further investigation is undertaken on the long-term use of these bands.

Developments since February 2016

ITU-R Working Party 5D is continuing studies on technical and operational measures to ensure coexistence and compatibility between the terrestrial and satellite components of IMT in the frequency bands 1980–2010 MHz and 2170–2200 MHz in different countries, in response to WRC-19 agenda item 9.1 (issue 9.1.1).

Next steps

The frequency bands 1980–2010 MHz and 2170–2200 MHz will be retained at the *initial investigation* stage. Due to other priorities, further consideration of work on this band will be deferred until 2018.

The ACMA will also continue to monitor and, where appropriate, engage with stakeholders via the usual international preparatory process to develop Australian positions on international issues related to the frequency bands 1980–2010 MHz and 2170–2200 MHz, particularly in relation to work conducted as part of WRC-19 agenda item 9.1.1.

26 GHz mmWave (24.25–27.5 GHz)

WRC-19 agenda item 1.13 is to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis. This agenda item is widely acknowledged to be focussing on spectrum harmonisation requirements for 5G mobile broadband technologies. The 26 GHz band is one of the bands under consideration as part of WRC-19 agenda item 1.13.

The ACMA's *Five-year spectrum outlook 2016–20* (FYSO), released in October 2016, sought feedback on a number of issues surrounding mobile broadband use of bands above 24.25 GHz—referred to as mmWave bands. A number of submissions were received indicating support for progression of the bands as well as encouraging the ACMA to take account of work being undertaken in the ITU-R.

Developments since October 2016

The Electronic Communication Committee of CEPT (ECC) approved in November 2016 a comprehensive list of actions for CEPT regarding 5G named the CEPT roadmap for 5G. It has been updated during the 44th (28 February – 3 March 2017) and 45th (27–30 June 2017) ECC Plenary meetings to reflect the progress of ECC activities.

The Roadmap outlines the CEPT's actions for 5G, including signalling clearly the CEPT intention to harmonise the 26 GHz band (24.25–27.5 GHz) in Europe for 5G before WRC-19 through the adoption of a harmonisation decision and to promote it for worldwide harmonisation.

To further progress consideration of the mmWave bands, the ACMA hosted a spectrum tune-up on 5 September 2017, which included speakers from the ACMA and industry. The tune-up gave stakeholders the opportunity to provide further views and feedback on the use of various mmWave bands that are under consideration for

possible use by broadband services. To complement the contributions received during the tune-up, the ACMA also provided an opportunity for formal submissions on the issues raised for discussion at the event.

The ACMA proposed to use feedback obtained from the previous FYSO, during the tune-up, and the subsequent consultation process, as part of its initial investigation of the 26 GHz mmWave band. This will be used to inform a decision of whether to progress consideration of the 26 GHz mmWave band to the *preliminary re-planning* phase of the ACMA's mobile broadband strategy.

Next steps

The ACMA will analyse contributions to the consultation process and, if appropriate, proceed with the development of an options paper in the first half of 2018 for possible early implementation of this band for MBB (including 5G) in Australia.

As discussed in the section regarding other bands being studied under WRC-19 agenda item 1.13 in the monitoring section above, the ACMA intends to continue monitoring and, where appropriate, 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 mmWave band. When appropriate, it will develop individual positions on each of the bands being studied and contribute to international sharing and compatibility studies on issues/bands of most interest to Australia as determined through the WRC-19 agenda item 1.13 coordination group, which may include the 26 GHz mmWave band. The ACMA has had representatives attend all ITU-R Task Group 5/1 meetings so far and aims to continue to have representatives attend these meetings, as appropriate.

Preliminary replanning

Currently the 1.5 GHz band is the only band in the *preliminary replanning* stage of the process for consideration of additional spectrum for mobile broadband services.

1.5 GHz band (1427–1518 MHz)

At WRC-15, the entire 1427–1518 MHz band was harmonised for IMT within regions 2 and 3, while Region 1 identified 1427–1452 MHz and 1492–1518 MHz via regional footnotes. In 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 RCC 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 regions 1 and 3, taking into account IMT and BSS (sound) operational requirements.

Domestically, the ACMA has also identified that the impact on aeronautical telemetry services and fixed services, including the Digital Radio Concentrator System (DRCS), which will need to be considered in any re-farming considerations.

As referred to in Resolution **223 (Rev. WRC-15)**, some satellite industry representatives have also pointed out that compatibility with mobile satellite services (MSS) operating above 1518 MHz needs to be considered.

There is strong support domestically from mobile broadband representatives for progressing the re-farming of this band.

Developments since October 2016

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* stage of the ACMA's process for consideration of additional spectrum for MBB services.

Given international developments and strong domestic interest, the ACMA has decided that consideration of the 3.6 GHz band will be prioritised over the 1.5 GHz band.

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 1427–1518 MHz. Working Party 5D is also undertaking studies called for in Resolution **223 (Rev. WRC-15)**. Working Party 5D is aiming to complete these work items by late 2018.

The AWG has a work plan to develop a report on frequency arrangements for the 1427–1518 MHz band. The current proposal is to finalise the work at AWG-23 in March/April 2018.

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. This could involve the submission of contributions to the ITU and AWG as appropriate.

The ACMA expects to recommence consideration of this band for domestic use for mobile broadband in the 2018–19 financial year. This will include a discussion paper, which will progress consideration of the band within the *preliminary replanning* stage.

The ACMA is of the view that it is ideal to consider MSS use above 1518 MHz and broadband use below 1518 GHz in the same context, in order to develop balanced and optimised compatibility arrangements between these potential uses of the spectrum.

Re-farming

Bands that are currently in the *re-farming* stage of the process for consideration of additional spectrum for mobile broadband services are detailed below. In these cases, the band has been re-farmed or the decision has been made to re-farm the band to mobile broadband services, and final technical frameworks and re-allocation instruments have been or are being prepared.

Spectrum available for the licensing of mobile broadband services

There are numerous bands where the *re-farming* stage has occurred and spectrum is available for mobile broadband services. The following bands have spectrum available under spectrum licence arrangements:

- > *1800 MHz regional*—six 2 x 5 MHz lots available in various regional areas via spectrum licensing
- > *2.1 GHz metropolitan*—numerous 2 x 5 MHz lots available in the capital cities of Adelaide, Brisbane, Darwin, Hobart and Perth via spectrum licensing

- > 2.3 GHz—numerous lots available in regional and remote areas via spectrum licensing
- > 3.4 GHz—numerous lots available in metropolitan and major regional centres via spectrum licensing.

The following bands have spectrum available under apparatus licence arrangements:

- > 1800 MHz *remote*—available via site-based apparatus licensing
- > 2.1 GHz *regional/remote*—available via site-based apparatus licensing
- > 3.5 GHz—available via site-based apparatus licensing
- > 3.6 GHz *remote*—available via site-based apparatus licensing.

Developments since October 2016

In August 2017, the ACMA consulted on a [multiband residual lots auction package](#) for the 1800 MHz, 2.1 GHz, 2.3 GHz and 3.4 GHz spectrum licence bands. This consultation invited comment on the ACMA's proposal to use a simple clock auction (SCA) format to allocate the multiband residual lots over three stages, with each stage offering multiple lots simultaneously.

Next steps

The ACMA plans to commence the multiband residual lots auction before the end of 2017. This will put to market residual lots in the 1800 MHz, 2.1 GHz, 2.3 GHz and 3.4 GHz spectrum licence bands.

For bands subject to apparatus licensing, except those frequencies and areas subject to an embargo, first-in-time over-the-counter licence application processes usually apply.

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 onwards. This spectrum will come from the 850 MHz 'expansion band', which is lower adjacent to the current 850 MHz 3G band used by Telstra and VHA.

Developments since October 2016

The project is now in an *implementation* phase, which is largely geared towards the clearance/relocation of incumbent services operating in the 850 MHz expansion frequencies earmarked for mobile broadband. The implementation plan is contained in the decision paper and the ACMA has established an implementation team to ensure that the milestones of the plan are reached with minimal disruption.

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 and further incremental updates will be made to this and other instructions as the implementation phase progresses.

Next steps

The implementation plan set out in the decision paper contains various milestones for the transition to long-term arrangements by incumbent services. No decision has been made on how or when the 850 MHz expansion band will be allocated.

900 MHz (890–915 MHz and 935–960 MHz)

A reconfiguration of licensing in the 900 MHz ‘GSM’ band (890–915/935–960 MHz) into 5 MHz FDD blocks, as well as a related proposal to implement a 1 MHz downshift of the 850 MHz band (to maximise the utility of the adjacent 900 MHz GSM band), was originally proposed under the review of the 803–960 MHz band.

Developments since October 2016

A consultation process on options to implement the reconfiguration of the band commenced in December 2016. Upon consideration of responses to this process, the ACMA has determined that it will recommend that the band will be cleared by mid-2021, at which point new spectrum licences configured in multiples of 5 MHz lots will be issued. A paper setting out this intent was released in October 2017. The band will be put to auction, along with the 850 MHz expansion band (809–824/854–869 MHz) in 2019.

Next steps

The ACMA will soon write to licence holders to commence the formal consultation process towards reallocating the band.

3.6 GHz (3575–3700 MHz)

In November 2009, the ACMA released arrangements for fixed and mobile broadband services in the 3575–3700 MHz band in regional and remote Australia. At the time, the band was not released in capital cities (except Hobart) to preserve future planning options within these areas.

Since that time, the band was considered under WRC-15 agenda item 1.1, resulting in an IMT identification in the 3600–3700 MHz band in Canada, Colombia, Costa Rica and the US. In addition, ECC Decision 11(06)⁴⁵ identifies the band for fixed/mobile broadband applications within Europe. Such interest in the Americas and Europe suggests that a viable mobile broadband ecosystem could soon develop in the band.

At WRC-15, Australia also added its name to existing footnotes in the ITU Radio Regulations identifying the 3400–3600 MHz band for IMT. This band is now identified for IMT in regions 1 and 2 and numerous Region 3 countries.

In October 2016, the ACMA commenced its review of arrangements in the 3.6 GHz band. In October 2017, the ACMA finalised its review and announced the outcomes. The main outcome of the review was that the ACMA plans to commence the process to re-allocate the 3.6 GHz band for the issue of spectrum licences in metropolitan and regional Australia.

Developments since October 2016

The ECC approved in November 2016 a comprehensive list of actions for CEPT regarding 5G named the CEPT roadmap for 5G. It has been updated during the 44th (28 February – 3 March 2017) and 45th (27–30 June 2017) ECC Plenary meetings to reflect the progress of ECC activities. As identified in the CEPT roadmap, work has been initiated within ECC PT1 on harmonisation measures for 5G in a first set of bands, including the 3.4–3.8 GHz band.⁴⁶

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*

⁴⁵ Available on the European Communications office (ECO) website at www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC1106.PDF.

⁴⁶ <https://cept.org/ecc/topics/spectrum-for-wireless-broadband-5g>

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* stage of the ACMA's process for consideration of additional spectrum for MBB services.

On 23 June 2017, the ACMA released a [consultation package](#) announcing its decision to progress both the 1.5 GHz and 3.6 GHz bands to *preliminary replanning* stage with prioritisation of the 3.6 GHz band. The package also identified a range of possible re-planning options for the 3575–3700 MHz band (3.6 GHz band) in Australia. Consultation closed on 11 August 2017, with 35 submissions received from industry.

In October 2017, the ACMA announced the outcomes of the review of the 3.6 GHz band. This included moving the 3.6 GHz band to the *re-farming* stage of the ACMA's process for consideration of additional spectrum for MBB services.

Next steps

The ACMA is consulting on a recommendation to the Minister that he re-allocate the 3.6 GHz band for the issue of spectrum licences in metropolitan and regional areas.

Pending the outcomes of this consultation and any subsequent Ministerial decision made, the ACMA will progress work to allocate the 3.6 GHz band in Q4 2018. Other work to implement the outcomes of the review of the 3.6 GHz band, including the development of arrangements for site-based apparatus licence arrangements for wireless broadband services in the 5.6 GHz band and the investigation of the possible development of arrangements for site-based apparatus licence arrangements for fixed wireless broadband services in part of the 28 GHz band in regional areas, will also commence in the coming year.

Appendix 2

Sunseting instruments

Instruments due to sunset on 1 April 2018

	Instrument	Enabling legislation	Status
1.	Radiocommunications (Electromagnetic Compatibility) Standard 2008	<i>Radiocommunications Act 1992</i> — s 162(1)	Remake
2.	Radiocommunications Labelling (Electromagnetic Compatibility) Notice 2008	<i>Radiocommunications Act 1992</i> — s 182	Remake

Instruments due to sunset on 1 October 2018

	Instrument	Enabling legislation	Status
1.	Radiocommunications (Devices Used in the Inshore Boating Radio Services Band) Standard 2008	<i>Radiocommunications Act 1992</i> — s 162(1)	Authority approved and remade standard on 17 August 2017
2.	Radiocommunications (HF CB and Handphone Equipment) Standard 2008	<i>Radiocommunications Act 1992</i> — s 162(1)	Authority approved and remade standard on 17 August 2017
3.	Radiocommunications Advisory Guidelines (Co-ordinating the operation of transmitters in the 500 MHz Bands)	<i>Radiocommunications Act 1992</i> — s 262(1)	Revoked by Authority resolution on 6 March 2014

Invitation to comment

Making a submission

- > [Online submissions](#)—submissions can be made via the comment function or by uploading a document. The online consultation page provides details.
- > **Submissions by post**—please address submissions to Spectrum Review Implementation Branch, five-year spectrum outlook. Submissions can be sent to either one of the ACMA offices below:
 - > Sydney: PO Box Q500, Queen Victoria Building NSW 1230
 - > Canberra: PO Box 78, Belconnen ACT 2616
 - > Melbourne: PO Box 13112 Law Courts, Melbourne Vic 8010

The closing date for submissions is COB, Monday 18 December 2017.

Electronic submissions in Microsoft Word or Rich Text Format are preferred.

Enquiries

- > Consultation enquiries can be emailed to: spectrumworkprogram@acma.gov.au
- > Media enquiries can be directed to Emma Rossi on 02 9334 7719 or by email to media@acma.gov.au.

Effective consultation

The ACMA is working to enhance the effectiveness of its stakeholder consultation processes, which are an important source of evidence for its regulatory development activities. To assist stakeholders in formulating submissions to its formal, written consultation processes, it has developed [Effective consultation—a guide to making a submission](#). This guide provides information about the ACMA's formal written public consultation processes and practical guidance on how to make a submission.

Publication of submissions

In general, the ACMA publishes all submissions it receives. The ACMA prefers to receive submissions that are not claimed to be confidential. However, the ACMA accepts that a submitter may sometimes wish to provide information in confidence. In these circumstances, submitters are asked to identify the material over which confidentiality is claimed and provide a written explanation for the claim.

The ACMA will consider each confidentiality claim on a case-by-case basis. If the ACMA accepts a claim, it will not publish the confidential information unless authorised or required by law to do so.

Release of submissions where authorised or required by law

Any submissions provided to the ACMA may be released under the [Freedom of Information Act 1982](#) (unless an exemption applies) or shared with various other government agencies and certain other parties under Part 7A of the [Australian Communications and Media Authority Act 2005](#). The ACMA may also be required to release submissions for other reasons including for the purpose of parliamentary processes or where otherwise required by law (for example, under a court subpoena). While the ACMA seeks to consult submitters of confidential information before that information is provided to another party, the ACMA cannot guarantee that confidential information will not be released through these or other legal means.

Privacy

The [Privacy Act 1988](#) imposes obligations on the ACMA in relation to the collection, security, quality, access, use and disclosure of personal information. These obligations are detailed in the [Australian Privacy Principles](#).

The ACMA may only collect personal information if it is reasonably necessary for, or directly related to, one or more of its functions or activities.

The purposes for which personal information is being collected (such as the names and contact details of submitters) are to:

- > contribute to the transparency of the consultation process by clarifying, where appropriate, whose views are represented by a submission
- > enable the ACMA to contact submitters where follow-up is required or to notify them of related matters (except where submitters indicate they do not wish to be notified of such matters).

The ACMA will not use the personal information collected for any other purpose, unless the submitter has provided their consent or the ACMA is otherwise permitted to do so under the Privacy Act.

Submissions in response to this paper are voluntary. As mentioned above, the ACMA generally publishes all submissions it receives, including any personal information in the submissions. If a submitter has made a confidentiality claim over personal information that the ACMA has accepted, the submission will be published without that information. The ACMA will not release the personal information unless authorised or required by law to do so.

If a submitter wishes to make a submission anonymously or use a pseudonym, they are asked to contact the ACMA to see whether it is practicable to do so in light of the subject matter of the consultation. If it is practicable, the ACMA will notify the submitter of any procedures that need to be followed and whether there are any other consequences of making a submission in that way.

Further information on the Privacy Act and the ACMA's privacy policy is available at www.acma.gov.au/privacypolicy. The privacy policy contains details about how an individual may access personal information about them that is held by the ACMA, and seek the correction of such information. It also explains how an individual may complain about a breach of the Privacy Act and how the ACMA will deal with such a complaint.

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