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Improving the Management of Government Spectrum Holdings

Preliminary ACMA responses to the Final Report of the Independent Review of Government Spectrum Holdings

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Executive summary

This paper accompanies the public release of the Final Report of the Independent Review of Government Spectrum Holdings (IRGSH[1]) (the Final Report) and contains ACMA's initial response to the themes and recommendations identified.

The intention of the Review was to assist ACMA to better achieve an appropriate balance between government use of the radiofrequency spectrum and its use by the broader community.

ACMA acknowledges the importance of spectrum to many government organisations. ACMA also understands the importance to the community of the government services and activities that are provided or enabled by access to the spectrum. Because of increasing demand for access to spectrum, from both government and non-government users, ACMA has identified the need to review and improve spectrum management arrangements for government spectrum holdings. In doing so, ACMA is committed to meeting the spectrum requirements of government, including its specific obligation to provide adequate spectrum for defence, national security, law enforcement, emergency services and public and community use.

Balanced with this is ACMA's broader responsibility to ensure that the overall public benefit derived from use of the spectrum is maximised. The sheer size and importance of government spectrum holdings and the fact that in many cases these holdings are treated substantially different to other users mean that a review of such holdings was necessary. Such a review was made timely by the generally accepted fact that spectrum management as a whole is entering a critical phase, given increasing demand pressures and technological change.

The Review identifies 30 individual recommendations for further consideration, some of which are not in the sole remit of ACMA. Three of the major areas identified in the Review are:

- increased transparency in the use of spectrum by government bodies;
- the need for increased sharing of government spectrum; and
- increased use of market approaches to improve the management of government spectrum.

These recommendations are, to a large extent, consistent with ACMA's broader approach to spectrum management. The complexities occur, as always, in the development of detailed measures for implementation. ACMA will continue to work with stakeholders to consider the Review recommendations in further detail and take appropriate action as required.

[1] The overall IRGSH process is referred to as 'the Review' throughout this paper.

Paper structure

This paper is structured as follows:

- Chapter 1 *Introduction* provides background information about the challenges of spectrum management in Australia. Broader Australian spectrum management arrangements are outlined along with other bodies of work (such as ACMA's draft spectrum management principles) that have relevance to the management of government spectrum holdings and the Review. A brief background to the Review process is also provided.
- Chapter 2 *Response to core Review findings* provides a high-level summary of ACMA views on the recommendations contained in the Final Report. In particular, ACMA views and comments are provided on the major report themes of:
  - increased transparency in the use of spectrum by government bodies;
  - the need for increased sharing of government spectrum; and
  - increased use of market approaches to improve the management of government spectrum.
- Chapter 3 *Response to individual Review recommendations* gives more detailed comments on individual recommendations, including future work associated with each recommendation.
- Chapter 4 *Future work program* summarises ACMA's plan for further work on improving the management of government spectrum holdings and the relationship between Review recommendations and existing or planned projects.
- Chapter 5 *Conclusion* provides a summary of the outcomes of the Review and identifies the opportunity for public comment on the broad issues identified.

The purpose of this paper is to outline existing or planned bodies of work relevant to government spectrum management and to provide certain high level comments on its reform. This paper is not intended to provide detailed descriptions of the work being done by ACMA to address specific Final Report recommendations.

Consultation process

ACMA invites comments and feedback on the issues discussed in this paper. At the same time as releasing this paper, ACMA is also releasing: [2]

- a consultation document on spectrum management principles, which outlines the principles ACMA is proposing to use to guide its approach to a range of significant spectrum management initiatives it will be addressing in the next three to five years;
- a Five-year Spectrum Outlook 2009–2014, which outlines issues affecting spectrum requirements of key radiocommunications services over the next five years and ACMA's proposed actions to address these issues; and
- an initial consultation document on future arrangements for the 403–520 MHz band.

[2] The three consultation papers referred to are available on the ACMA website at <www.acma.gov.au>.

The spectrum management principles, once finalised, will form the framework for ACMA's response to the demand pressures identified in the Five-year Spectrum Outlook. Those two documents are intended to describe the framework ACMA will apply and to place in context ACMA's approach to significant spectrum management issues over the next three to five years. These issues include, among others, any spectrum released following the cessation of analog television services,[3] the availability of spectrum for wireless access services, expiring spectrum licenses, options for the 400 MHz band; as well as the review government spectrum holdings.

The release of these papers has been timed to precede ACMA's radiocommunications conference, RadComms08, which is to be held from 30 April to 2 May in Melbourne. This is to allow interested parties to familiarise themselves with the papers in order to facilitate discussion at the conference. In addition to the opportunities available during the conference, and the invitation to provide written submissions, ACMA is interested in hearing from parties who would like to discuss the issues raised in these papers. ACMA will consider the value of meetings, workshops and seminars based on the level of interest and availability of resources. There will also be an opportunity for representatives of the various radiocommunications sectors to engage with ACMA on the issues covered in these papers during the next meeting of ACMA's new advisory group, the Radiocommunications Consultative Committee.

The consultation strategy outlined here is in line with ACMA's new approach to consultation on spectrum matters, announced earlier this year.[4]

Comments and feedback

ACMA welcomes comments on the Final Report and this accompanying document. Comments may be forwarded by **close of business 18 July 2008** to:

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Any other enquiries may be directed to Chris Hose on (07) 3247 7103 or by email to christopher.hose@acma.gov.au.

Publication of submissions

In general, ACMA publishes all submissions it receives. However, ACMA will not publish submissions that it considers contain defamatory or irrelevant material.

[3] ACMA recognises that, under s. 31 of the Radiocommunications Act, the Minister makes decisions about the future requirements of broadcasting. These observations apply to ACMA's radiocommunications decisions; for example, about spectrum that may be removed from the broadcasting services bands following the cessation of analog television services.

[4] More detail can be found at: <http://www.acma.gov.au/WEB/STANDARD/pc=PC_310939>.

ACMA prefers to receive submissions which are not claimed to be confidential. However, 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 confidentiality claims.

ACMA will not automatically accept all claims of confidentiality. ACMA will consider each claim for confidentiality on a case-by-case basis. If ACMA accepts a confidentiality claim, it will not publish the confidential information unless required to do so by law.

When can ACMA be required by law to release information?

ACMA may be required to release submissions by law under the *Freedom of Information Act 1982* (Cth) or for other reasons including for the purpose of parliamentary processes or court subpoena. ACMA will seek to consult submitters of confidential information before that information is provided to another body or agency, but ACMA cannot guarantee that confidential information will not be released through these or other legal means.

Sharing of information

Under the *Australian Communications and Media Authority Act 2005*, ACMA is able to disclose submissions to the Minister, Department including authorised officials, Royal Commissions and certain Commonwealth authorities such as the Australian Competition and Consumer Commission and Australian Securities and Investment Commission.

If information is accepted by ACMA as confidential, ACMA will seek to consult with the submitter of the information where ACMA intends to share that information.

1 Introduction

The Independent Review of Government Spectrum Holdings (the Review) was commissioned by the Australian Communications and Media Authority (ACMA) in October 2006. This paper accompanies the public release of the Final Report of the Review (the Final Report) and contains ACMA's initial response to the themes and recommendations of the Final Report.

ACMA acknowledges the importance of spectrum to many government organisations. ACMA also understands the importance to the community of the government services and activities that are provided or enabled by access to the spectrum. Because of increasing demand for access to spectrum, from both government and non-government users, ACMA has identified the need to review and improve spectrum management arrangements for government spectrum holdings. In doing so, ACMA is committed to meeting the spectrum requirements of government, including its specific obligation to provide adequate spectrum for defence, national security, law enforcement, emergency services, public and community use.

As discussed in this chapter, increasing demands for radiofrequency spectrum made it timely for a comprehensive review of government spectrum holdings to be conducted. The radiofrequency spectrum is a finite and valuable resource that needs to be managed for the overall public benefit. ACMA is responsible for managing access to Australia's radiofrequency spectrum in accordance with the *Radiocommunications Act 1992* (the Act).

Use of the spectrum is now an integral and essential part of our technological society. Spectrum management is becoming increasingly challenging with the continual evolution of wireless technologies, and the rapidly growing and competing demand for spectrum from different users and services.

Importantly, this spectrum use is becoming less evident to many end-users, with radiocommunications devices integrated seamlessly into all manner of consumer devices. Spectrum is also essential for the information technology revolution that is a defining feature of modern life. An essential part of ACMA's responsibilities is to facilitate spectrum access for new technologies and users in a flexible and responsive manner while balancing the needs of existing spectrum users. The need for spectrum for these activities is often not immediately apparent, but is nonetheless essential.

As much as any other sector of the community that uses spectrum, government organisations have a strong and increasing requirement for access to spectrum in order to achieve their objectives. Increasingly, spectrum management challenges apply equally to both private and public sector use of the spectrum, with resulting erosion of the isolation between these spectrum user groups.

1.1 Legislative basis for Australian spectrum management

The Act provides the legislative basis for managing Australia's spectrum. The object of the Act provides high level guidance for ACMA's spectrum management activities, and gives an overview of the objectives of spectrum management in Australia.

SPECTRUM MANAGEMENT OBJECTIVES

The object of the Act (Section 3) provides broad guidance to ACMA in the execution of its spectrum management responsibilities. While it does not provide detailed guidance, an understanding of the Act's object is an essential starting point in any consideration of the Australian spectrum management environment. The object of the Act is reproduced below:

> **3 The object of this Act**
>
> The object of this Act is to provide for management of the radiofrequency spectrum in order to:
>
> (a) maximise, by ensuring the efficient allocation and use of the spectrum, the overall public benefit derived from using the radiofrequency spectrum;
>
> (b) make adequate provision of the spectrum:
>
> (i) for use by agencies involved in the defence or national security of Australia, law enforcement or the provision of emergency services; and
>
> (ii) for use by other public or community services;
>
> (c) provide a responsive and flexible approach to meeting the needs of users of the spectrum;
>
> (d) encourage the use of efficient radiocommunication technologies so that a wide range of services of an adequate quality can be provided;
>
> (e) provide an efficient, equitable and transparent system of charging for the use of spectrum, taking account of the value of both commercial and non-commercial use of spectrum;
>
> (f) support the communications policy objectives of the Commonwealth Government;
>
> (g) provide a regulatory environment that maximises opportunities for the Australian communications industry in domestic and international markets;
>
> (h) promote Australia's interests concerning international agreements, treaties and conventions relating to radiocommunications or the radiofrequency spectrum.

The first two elements of the Act's object can be considered to be complementary, because the overall public benefit cannot be maximised if there is insufficient spectrum available for public services. However, in practice there is often some contention in how to achieve these two objectives.

It is worthwhile noting that the 2002 Productivity Commission *Radiocommunications Inquiry Report* recommended that the primary object of the Act should be to maximise the overall public benefit derived from using radiofrequency spectrum. The Productivity Commission also recommended that the Act should require the spectrum regulator to have

regard to making adequate provision of the spectrum for use by public and community services in general.[5] However, the government of the time instead decided to amend the object to extend the references to the spectrum needs of defence, national security, law enforcement and emergency services.

In passing the Radiocommunications Act, it is clear that parliament recognised the importance of spectrum to government agencies in their execution of their mandated activities. However, the Act does not give specific guidance to ACMA on how to determine what amount of spectrum is adequate, or the manner in which spectrum is to be provided to government agencies.

In order to provide for a layer of further guidance relevant to the execution of its spectrum management responsibilities, ACMA has developed a draft series of spectrum management principles. While still in draft form, these principles are outlined in the next section, with the purpose of providing insight into ACMA's broader spectrum management objectives.

1.2 Spectrum management principles

ACMA has been developing principles intended to guide ACMA's management of spectrum within its existing legislative responsibilities and government policy settings. The spectrum management principles are intended to:

- promote consistency, predictability and transparency in ACMA decision-making;
- provide guidance for major planning and allocation decisions to be made over the next few years; and
- increase ACMA's ability to respond to challenges including the impact of new technologies and increasing demand for spectrum for advanced services.

A key theme of the principles is to optimise the use of market mechanisms with regulatory intervention to maximise public benefit.

The spectrum management principles are currently in draft form and are being released for public comment in a separate document. The draft principles are included in this document to explain the factors that, subject to the outcomes of that consultation process, ACMA proposes to take into account in making spectrum management decisions.

The Spectrum Management Principles consultation document also notes that ACMA will take account of the principles of good regulatory process outlined in the *Report of the Taskforce on Reducing the Regulatory Burden on Business*. One of the principles of good regulatory process is that an appropriate framework should be used to assess the range of feasible policy options. Subject to the statutory framework, ACMA will adopt a total welfare standard as its overarching framework for assessing the optimal approach to individual spectrum management issues. Consistent with this, in evaluating regulatory options ACMA will take into account effects on consumers, producers and other stakeholders in society, including the impact on the government sector.

The spectrum management principles are consistent with the principles of good regulatory process and the total welfare standard. They provide directions that will generally result in welfare being maximised and articulate ACMA's proposed standard approach to spectrum regulation.

[5] Productivity Commission (2002) *Radiocommunications Inquiry Report*, p.92.

PRINCIPLES

Principle 1—Allocate spectrum to the highest value use or uses

An important part of maximising the overall public benefit from use of the spectrum is seeking to allocate spectrum to its highest value use in any primary allocation.[6] At times it may be efficient to share spectrum, in which case multiple users may achieve the highest value use. The highest value use will sometimes be a commercial use and sometimes be a use by a government or community organisation. An assessment of highest value use needs to take account of the value to potential licensees, consumers and the wider Australian society.

When constructing arrangements for spectrum bands, ACMA will consider what is likely to be the highest value utilisation for the band and design arrangements accordingly (for example, the service types for the band, the licence system, entry barriers, restrictions on usage and the sharing arrangements). In doing so, ACMA will aim to construct arrangements that provide incentives and the flexibility for users to achieve the highest value use. If frequency coordination and interference protection requirements are low, ACMA will consider allowing multiple users to occupy the same spectrum space collectively, with minimal entry barriers.

The allocation method that ACMA employs in any circumstance will be the one that is judged most likely to result in allocation of the spectrum to the highest value use. Where scarcity does not exist, simple over-the-counter allocation is likely to be appropriate. For spectrum for which demand is likely to exceed supply, ACMA considers that in general the market is likely to be more effective than the regulator in achieving an efficient use. If a bidder's willingness to pay does not reflect the total value generated by their use of the spectrum, a simple price-based allocation may not work efficiently to allocate spectrum to its highest value use. In such cases, it may be appropriate to design the allocation mechanism to address risks of market failure.[7]

Principle 2—Enable and encourage users to move spectrum to its highest value use or uses

The highest value use of spectrum will change over time as technology develops and consumer and social preferences evolve, and as the competitive positions of licensed spectrum users change. Maximising the overall public benefit derived from the spectrum means that spectrum must be allowed to move to the highest value use following its initial allocation as quickly and easily as possible.

A change in use may be facilitated through trading or third-party authorisation, or may be a result of the same licensee employing their spectrum for a different use. Licence conditions and technical frameworks need to be as flexible as possible so as to allow quick and efficient changes in use. Allowing spectrum to move to the highest value use quickly and easily will ensure that the costs of transfer incurred by the regulator and licensee are minimal, and that the benefits of allocation to the highest value use are realised quickly without the delay and costs of regulatory intervention.

[6] The term 'primary allocation' is used to refer to spectrum allocations by the regulator (ACMA).

[7] There may be a significant risk of market failure in some allocation processes if, for example, some services generate substantial broader social value that is not reflected in the revenue earned by the services provider (externalities), or the governance or administrative arrangements of some potential bidders mean the costs of coordinating to bid effectively in a market allocation process are prohibitively high.

ACMA will apply administrative incentive prices to licences allocated over-the-counter to try to ensure that spectrum is used efficiently. Where there is excess demand ACMA will aim to set administrative incentive prices that reflect the opportunity cost as much possible in order to encourage spectrum to be used by the licensees who most value the spectrum.

Principle 3—Use the least cost and least restrictive approach to achieving policy objectives

Planning, licensing, allocation and compliance measures should aim to minimise the total cost of achieving spectrum management policy objectives, including the cost to government, licensees and the community. Good regulatory practice requires that all benefits and costs of regulations, including compliance costs, be rigorously assessed. The least cost and least restrictive approaches will reduce regulatory burdens and allow greatest freedom for spectrum users to optimise spectrum utilisation.

Principle 4—Balance certainty and flexibility

ACMA considers it is important to regulate the use of spectrum in a way that provides sufficient certainty for spectrum users. It is also important to provide the flexibility for users to adapt to changing technology and market conditions, and allow ACMA to change the rules and use of the spectrum where necessary to ensure the efficient allocation and use of spectrum.

To maximise the public benefit from use of the spectrum it is likely to be necessary to ensure:

1. licensees have sufficient certainty regarding their rights to use the spectrum to support investment in long-lived assets, and the flexibility to change the use the spectrum if appropriate;
2. adjacent licensees have sufficient certainty regarding the type and extent of interference they may expect; and
3. ACMA can, when it is expected to provide net benefit, change the technical or regulatory conditions governing the use of parts of the spectrum to facilitate a change in use.

At times these concerns will be in conflict. ACMA will seek to balance the need for certainty and flexibility in regulating use of the spectrum.

Principle 5—Balance the cost of interference and the benefits of greater spectrum utilisation

The value of the spectrum to society is likely to be maximised if the spectrum is used to its fullest but the level of interference is acceptable to all users. Minimising interference imposes direct costs on licensees complying with regulations. It may also impose costs on the Australian economy if spectrum is used less intensively than it would be when some level of interference is allowed. However, an interference environment that is too noisy for affected users may reduce the utility of the spectrum. There is a balance where public benefit is maximised. The optimal approach to interference management may change over time and may be different for different uses of the spectrum.

1.3 The need for a review of government spectrum holdings

Government is a major user of spectrum in Australia as it is in most other countries. The Department of Defence (Defence) is the dominant spectrum user among both the public and private sectors. Government use of the spectrum can be grouped into two broad categories:

- arrangements where government use is given unique status in Australian spectrum management arrangements, often via special footnotes in the Australian Radiofrequency Spectrum Plan (the Plan); and
- where government access to the spectrum is on the same basis as for all other users.

The first category of government spectrum use—where special arrangements exist for government purposes—is the most significant in terms of reviewing government spectrum holdings.

While one of the roles of the Review was to articulate the extent of government spectrum use, it is worthwhile summarising their scope here to provide context for the need for the Review.

As previously discussed, Defence is by far the largest spectrum user in Australia (government or non-government). Bands identified to be used principally for the purposes of defence[8] account for approximately 25 per cent of spectrum in the most congested and high-demand bands below 5 GHz.

In addition to Defence, other government users or uses such as law enforcement, public safety agencies, the aviation sector and federal, state and territory governments in general, have smaller but important holdings. In other cases, special consideration is granted to services that are predominantly used by government agencies, such as the science services where meteorological, radio astronomy and other scientific uses require access to the spectrum.

The increasing complexity of radiocommunications technologies and their inclusion in a wide range of diverse applications mean the related spectrum management issues are becoming more complex. This spectrum complexity relates equally to private and public sector use of the spectrum, with the isolation between these two spectrum user 'camps' disappearing in many cases. It is likely that removing unnecessary regulatory distinctions between government and non-government spectrum will become increasingly important to maximise the overall benefit derived from use of the spectrum.

The growing demand for spectrum from both the government and non-government sectors means that ACMA must develop a framework that assists in determining the value of alternative uses of the spectrum by these users.

It is not difficult to argue that some amount of spectrum is essential for government responsibilities, such as the defence of Australia, emergency service activities or the Bureau of Meteorology. However, it is often more difficult to determine what amount of spectrum is sufficient and under what arrangements it should be made available. To date, ACMA has typically sought to compare the often vastly different sets of requirements and objectives of

[8] These bands are generally those identified with either the AUS1 footnote in the Plan or those where the sole primary service allocation is identified with the AUS11 footnote.

government and non-government users, and to allocate spectrum in an attempt to maximise the overall public benefit derived from this use. Long-standing historical spectrum arrangements for government agencies have been largely isolated from many recent reforms to spectrum management.

The market-based reforms introduced by the Act clearly encourage ACMA to use economic mechanisms to 'provide an efficient, equitable and transparent system of charging for the use of spectrum, taking account of the value of both commercial and non-commercial use of spectrum' (see paragraph 3(e) of the Act). In managing the spectrum to this end, it is incumbent upon ACMA to apply the same charges and principles for spectrum access to government and non-government users as far as possible. However, in many cases it is difficult to quantify the marginal benefit generated by an increase or decrease in the quantity of spectrum available to a government agency.

It is within this context that ACMA identified the requirement for an independent examination of the complex relationship between public and private users of the radiofrequency spectrum.

The sheer size and importance of government spectrum holdings and the fact that in many cases these holdings are treated in a substantially different way to the holdings of other users meant that a review of such holdings was necessary. Such a review was made timely by the generally accepted fact that spectrum management as a whole is entering a critical phase, given increasing demand pressures and technological change.

1.4 Review Terms of Reference

The Terms of Reference for the Review are included at Attachment 1 to this paper. In developing the terms of reference for the review, ACMA faced the challenge of defining government spectrum users and holdings.

In summary, the Review Terms of Reference define 'government' as encompassing federal, state and territory government agencies and business enterprises. This definition was made because often different regulatory settings apply to these spectrum users than to private sector spectrum users. For example, most spectrum holdings of this group are identified by footnotes in the Plan or via spectrum embargoes. Local government, Telstra and national broadcaster[9] holdings were determined to be outside the scope of the Review.

For the purposes of the Review, holdings were defined as all mechanisms by which spectrum is made available for government use.

The scope of the Review was limited to government spectrum holdings below 31 GHz.

1.5 The Review process

Following an open tender process, SpectrumWise Radiocommunications Consulting was selected in October 2006 to conduct the Review. The two principal consultants on the Review Team (Geoff Luther and Barry Matson) were previous employees of an ACMA predecessor agency, the Australian Communications Authority (ACA). Both have extensive

[9] National broadcasters refers to national broadcasting services that are defined under section 13 of the *Broadcasting Services Act 1992* to mean services provided by the Australian Broadcasting Corporation and the Special Broadcasting Service Corporation; that is, the ABC and SBS.

policy experience, particularly in the field of spectrum management, directly related to the aims of the Review.

SpectrumWise released a public discussion paper in November 2006 to seek comment on the issues covered by the Review.[10] During the comment period, SpectrumWise met with several major government spectrum users and some private sector radiocommunications service providers. Twenty-three submissions, the majority from government agencies, were received in response to the discussion paper.[11]

After considering responses to the public discussion paper, and researching and analysing the issues covered by the terms of reference, SpectrumWise supplied its Final Report to ACMA in April 2007.

Although the Review was commissioned by ACMA, the Final Report makes a number of recommendations for higher level government action. ACMA will continue to work to improve the management of public sector spectrum. Where appropriate, ACMA will work with other relevant government departments to develop responses to the recommendations.

1.6 Other reviews

In 2002 the Productivity Commission undertook an inquiry into the Radiocommunications Act.[12] As part of that inquiry, the Productivity Commission made recommendations about the treatment of government spectrum holdings. The relationship between the recommendations in the Final Report and the Productivity Commission's recommendations on similar issues is noted in the discussion in Chapter 3.

The Review is one of a number of recent studies undertaken internationally to examine the relationship between private and public spectrum management. The leading example of such work is the Independent Audit of Spectrum Holdings conducted by Professor Martin Cave in 2005 for the United Kingdom Treasury (the Cave Audit).[13] Although market-based reforms to spectrum management have been widely introduced over the past decade, the Cave Audit was the first major report to recommend that new public sector spectrum needs should be met through the market in all but exceptional circumstances.

Another influential body of work on improving conventional spectrum management arrangements is the 2002 report completed for the Federal Communications Commission (FCC) in the United States by the Spectrum Policy Task Force.[14]

More information about both of these reports is outlined at Attachment 3.

[10] The discussion paper is available from the SpectrumWise website at <http://www.spectrumwise.net/Discussionpaper.pdf>.
[11] A list of submitters is included at Appendix 4 to the Final Report. Submissions are available from the SpectrumWise website at <http://www.spectrumwise.net/IRGSH.html>.
[12] The full Productivity Commission inquiry report is available at <http://www.pc.gov.au/inquiry/radiocomms/docs/finalreport>.
[13] The website of the UK's Independent Audit of Spectrum Holdings is at <http://www.spectrumaudit.org.uk/>.
[14] The FCC Spectrum Policy Task Force has its homepage at <http://www.fcc.gov/sptf/>.

2 Response to core Review findings

While the Final Report identifies 30 separate recommendations, three broad themes have been identified as core outcomes from the Review:

- the need for increased transparency of government spectrum use;
- the need for increased sharing of government spectrum; and
- the use of market approaches to improve the management of government spectrum.

This chapter provides preliminary consolidated ACMA views on these three themes. More detailed comments on each Final Report recommendation are provided in Chapter 3.

2.1 Increased transparency in government spectrum use

The Final Report notes that it is perhaps especially difficult to assess how efficiently spectrum is being used by government users. Many of the recommendations of the Final Report aim to achieve greater transparency in government spectrum use.[15] ACMA generally supports increased transparency of government spectrum use, and agrees that details of government use are often obscure and not readily available. Some government spectrum users may not face sufficient incentives to make the best possible use of the resource.

ACMA has previously undertaken detailed analysis and stocktakes of government spectrum use on a band-by-band or service-by-service basis. This has almost always been done on an ad hoc basis in response to specific planning activities. However, it is clear that spectrum management as a whole would be improved if this analysis was conducted on a regular basis.

ACMA announced in January 2008 that it would publish an annually updated five-year rolling spectrum outlook.[16] These reports will go part of the way to addressing the need for greater transparency in government spectrum holdings.[17] Some government spectrum users (such as Defence and the Bureau of Meteorology) have been approached to provide direct input into this spectrum demand survey. Broader government interests are also being considered in the overall service-based demand analysis. However, it is likely that more detailed consideration of government spectrum use on a band-by-band or user basis will be appropriate.

Greater visibility of government spectrum utilisation would also be useful in articulating to the broader community the true importance of the spectrum to government users. This applies not only to Defence as the major spectrum user in Australia, but also to government users whose dependence on spectrum for the provision of a range of important public activities is less well known; for example, the Bureau of Meteorology.

[15] Final Report, pp.11–12.
[16] ACMA media release 7/2008, available at <http://www.acma.gov.au/WEB/STANDARD/pc=PC_310939>.
[17] A draft of the first of these five-year rolling plans has been released, see http://www.acma.gov.au/WEB/STANDARD/pc=PC_311105.

Having noted the problems with the existing lack of transparency in some government spectrum use, it is worthwhile to acknowledge that there are both reasons for and benefits to existing approaches that do not require the disclosure (in some cases) of detailed spectrum use by government agencies.

Use of spectrum by Defence is often referred to as the prime example of 'hidden' spectrum use. While there are obvious and unavoidable reasons for some of this lack of transparency (such as security implications), the established licensing arrangements play a large role in obscuring the true extent of Defence spectrum use.

Although Defence has paid licensing fees for its use of spectrum for some time, the introduction of the Defence apparatus licence type formalised the requirement for Defence use of the spectrum to be authorised by ACMA. The Defence apparatus licence type is used to authorise defence stations either operating within bands designated to be used principally for the purposes of defence (AUS1 footnote); or in a sole primary service intended to be used principally for the purpose of defence (AUS11 footnote) under the Australian Radiofrequency Spectrum Plan. The Defence licence type provides limited information to ACMA as it may be used to authorise any number of stations operating at any number of undisclosed geographic locations.

The existing Defence apparatus licence type is administratively low-cost to ACMA and Defence, but provides limited visibility of detailed spectrum use. This creates challenges for ACMA and other potential users of the spectrum in determining whether sharing is viable. ACMA is of the view that the benefits of this licensing approach are significant (primarily due to the reduction in administrative burden) and that the limited visibility of Defence spectrum use can in part be addressed by research and publication on the use of the spectrum on a band-by-band basis by ACMA and Defence.

2.2 Increased sharing of spectrum traditionally identified exclusively for government use

The sharing of spectrum between compatible uses and users is a fundamental tenet of spectrum management. ACMA remains committed to maximising the utility of spectrum through increased sharing and notes the Final Report recommendation that it should more aggressively promote spectrum sharing.[18]

It is acknowledged that sharing of government spectrum (either between government users or between government and non-government users) has not been realised to the maximum possible extent. However, it is important to note that there has been, and continues to be, positive and productive cooperation and progress on this front. For example, the Department of Defence is working with ACMA to make the band 4940–4990 MHz available for public protection and disaster relief applications operated by other government organisations.

Increased spectrum-sharing often means a greater risk of interference between services. In some cases, this means that ACMA will work with users to determine tolerable levels of interference and the probability of significant interference between specific systems. In other cases, ACMA may establish licensing arrangements that allow users to directly resolve these issues.

Sharing of spectrum used by government agencies often presents unique challenges that test established spectrum-sharing approaches and wisdom. This is largely due to the fact that government users often utilise spectrum in substantially different ways to the broader community.

[18] Final Report Recommendation 6.2.

Apart from the fact that government spectrum use may support unique applications that are not a feature of the civilian environment (such as military weapon systems), it may also be extremely variable in terms of geography and time. For example, the spectrum requirements of police and emergency services at a location during a significant natural disaster are likely to be much greater than the usual requirements for spectrum in that area.

Accordingly, while on a basic level it may appear that in some cases spectrum is not utilised by a government user efficiently (that is, the spectrum remains unused in large areas for large period of time), the highest value use of such spectrum may be to ensure that it is available on an unpredictable and time-critical basis.

This does not imply that sharing is necessarily impossible or practically unworkable. Rather, it is the case that the unique needs of government should be acknowledged and addressed in establishing sharing arrangements. In many cases, sophisticated technologies are likely to play an increasingly important role in facilitating sharing of spectrum, particularly in response to the above issues of geography and time.

Cognitive radio is an example of a technology that senses and reacts in certain ways to the spectrum environment; it offers the promise of allowing spectrum managers to develop flexible and innovative arrangements that improve spectrum usage. However, the commercial deployment of full cognitive radio technology is unlikely in the short term and may not occur in the medium term.[19] In any event, it is quite possible that increasing demand for spectrum will mean that cognitive radio and other emerging technologies will only serve to mitigate, but not remove, spectrum congestion and sharing challenges.

2.3 The use of 'market approaches' to improve the management of government spectrum

The Final Report included a range of recommendations for improving pricing signals and other aspects of the regulatory regime, in order to increase incentives for government agencies to use spectrum efficiently. Among other things, it recommended expanding the use of market mechanisms for government spectrum holdings where practicable, including allocation by auction, more flexible use of spectrum pricing and encouragement of spectrum trading.

ACMA acknowledges the unique challenges and limitations associated with the use of market approaches in the management of certain government spectrum requirements. However, it agrees with the opinion articulated in the Final Report that these measures should be considered in detail and not dismissed outright.

ACMA agrees in principle with many of the findings of the Review in this area. ACMA intends to undertake a range of work to examine how best to improve government users' incentives to plan, purchase equipment and operate in a spectrum-efficient manner. This should play an important role in ensuring the efficient allocation of resources and maximising the overall public benefit derived from using the spectrum.

ACMA also recognises that government spectrum users are required to provide a range of important services, many of which can only be supplied using spectrum. Consistent with the statutory obligations outlined in the Act, ACMA remains committed to ensuring that government spectrum users have adequate access to spectrum.

[19]Research conducted for the UK regulator Ofcom concluded that full cognitive radios are unlikely to emerge until 2030. See <http://www.ofcom.org.uk/research/technology/research/emer_tech/cograd/> for more details.

Many of the Final Report recommendations in this area will require considerable work to determine the best way to encourage efficient use of the spectrum, while also considering the characteristics of particular spectrum users.

Some of the recommendations address issues that are beyond ACMA's decision-making remit. In cases where a decision cannot be taken by ACMA alone, it remains ACMA's responsibility to identify issues and make recommendations to government for its consideration. For example, recommendation 7.3 states that:

> Governments should not penalise agencies that make financial gains by improved spectrum use. Agencies should be allowed to retain gains from trading spectrum or reduced licence fees.[20]

In a number of areas, ACMA will need to work closely with other government stakeholders to assess the options, before consulting with industry and other external stakeholders on the appropriate approach to take. ACMA will undertake this work in the coming months with a view to consulting with external stakeholders on relevant matters during the 2008/09 financial year.

[20] Final Report, p.70.

3 Response to individual Review recommendations

This chapter provides preliminary responses or comments on the individual recommendations made in the Final Report. These recommendations are listed numerically.

In many cases, the responses listed are preliminary and will be subject to further ACMA consideration and stakeholder consultation, as appropriate. In cases where ACMA is not the relevant decision-making body on a recommendation or where other bodies have an interest, ACMA proposes to work with other government stakeholders to consider the issues raised and to consult with external stakeholders where appropriate.

Attachment 2 provides a table outlining the recommendations of the Final Report; this is grouped in the same way as is summarised in Chapter 2 of the Final Report. This table identifies the decision-maker(s) for each recommendation, the relevant stakeholders and a summary of how the recommendation will be addressed. More detailed consideration of individual recommendations is provided in the following section.

REVIEW RECOMMENDATION 4.1

At regular intervals of no more than three years, all Defence footnotes and band allocations should be reviewed with the aim of opening the reservations to other government or non-government usage as soon as possible. All cases where protection is maintained should be explained in the Defence Strategic Plan.

ACMA agrees with the recommendation that Defence footnotes should be regularly reviewed. It is standard practice for a review and update of the Australian Radiofrequency Spectrum Plan (including reviewing Australian footnotes) to occur after each World Radiocommunication Conference (WRC), which is held every three to four years. ACMA will continue this process.

Way forward

ACMA will continue to review all Australian footnotes as part of the overall update of the Plan after every WRC.

REVIEW RECOMMENDATION 4.2

That ACMA should review the measures it is taking to implement the protection given to meteorological use of the band 10.6 to 10.68 GHz by ITU footnote 482.

ITU footnote 482 is incorporated in the Australian Radiofrequency Spectrum Plan; as such, use of the band in Australia is subject to the restrictions given in the footnote. ACMA has licensed

the 10.6–10.68 GHz band for use predominantly by fixed point-to-point services according to the channel plan given in Radiofrequency Assignment and Licensing Instruction (RALI) FX3.[21]

The protection of passive remote sensors in the 10.6–10.68 GHz band operating in the Earth exploration-satellite service (EESS) was considered under Agenda Item 1.2 at WRC-07. Australia supported measures to increase the protection afforded to the EESS from interference from fixed and mobile services in the band. These measures, which will be incorporated in the next edition of the Radio Regulations,[22] urge administrations to, among other things, reduce the maximum transmitter power at the antenna port for point-to-point stations not utilising automatic transmit-power control (ATPC).

Way forward

Following mandatory consultation, ACMA will incorporate changes to the Radio Regulations in the 2009 edition of the Plan, including any changes for sharing the 10.6–10.68 GHz band. It is likely that ACMA will also incorporate the sharing criteria resolved at WRC-07, in a revision to RALI FX3 to protect stations in the Earth exploration-satellite service.

REVIEW RECOMMENDATION 4.3

That ACMA, in considering future allocations for wireless access, 3G telephony, and defence radar to the C band in the future should aim to protect licensed incumbents. The Fixed Satellite services on the 3400 to 3600 MHz extended C band, having only secondary status on the band, should be required to operate without protection from the primary services and should not inhibit new applications on the band.

A large portion of the band 3400–3600 MHz is subject to spectrum licensing and is already being used to provide wireless access services (WAS). ACMA has indicated that the band 3575–3710 MHz is considered a suitable candidate for WAS and could be made available in the medium term.[23] However, the presence of licensed incumbent services—in particular, the fixed and fixed-satellite services—means that there may be limited opportunity for Australia-wide networks in this band. If, after an extensive consultation process, ACMA decides to make all or part of the band 3575–3710 MHz available for WAS at some stage in the future, ACMA will carefully consider the impact on incompatible incumbent services.

Way forward

ACMA will continue to examine options for wireless access services in the band 3575–3710 MHz. Any arrangements that ACMA puts in place to facilitate such services will include consideration of licensed incumbent services in the band and consultation with current users.

REVIEW RECOMMENDATION 5.1

That local, state and federal government agencies using land mobile radio communications be urged to cooperate with ACMA in the development of a common LMR Strategic Plan, involving a transition to new paired bands on 360 to 400 MHz over a period of approximately five years.

[21] RALI FX3 (Microwave fixed services frequency coordination) is available from <http://www.acma.gov.au/WEB/STANDARD/pc=PC_2599>.
[22] The Radio Regulations are available at <http://www.itu.int/>.
[23] More information on ACMA WAS considerations is available from <http://www.acma.gov.au/WEB/STANDARD/pc=PC_100424>.

ACMA has commenced a project to review arrangements in the 400 MHz band (403–520 MHz).[24] In a related process, ACMA, Defence, and law enforcement and security agencies are in the early stages of discussions on the possibility of increased non-Defence use of the 380–400 MHz band. Both of these projects are relevant to the identification of harmonised spectrum to support government radiocommunications interoperability.

As major users of this spectrum, local, state and federal government agencies are expected to be heavily involved in these processes.

With regard to the specific recommendations made by the review for new paired bands in the frequency range 360–400 MHz, ACMA is in the process of consultation with relevant parties about expanded government agency use of the AUS1 band below 400 MHz. However, at this time it appears unlikely that the specific proposal identified in the Final Report will be the preferred option.

Way forward

ACMA will examine responses to the review of the 400 MHz band with a particular focus on identifying suitable arrangements for harmonised spectrum to support government radiocommunications interoperability.

REVIEW RECOMMENDATION 5.2

That ACMA should remove the AUS1 footnotes in the ARSP from 360–365, 370–375, 380–385 and 390–395 MHz, and require Defence to vacate this spectrum in a time frame that fits with the LMR Strategic Plan.

As noted above, non-Defence use of the band below 400 MHz is an issue of ongoing consultation, and a number of options are being considered. Any changes to the Plan will be implemented as appropriate, depending on the outcomes of this consultation.

REVIEW RECOMMENDATION 5.3

That ACMA should amend the ARSP to allocate 4940 to 4990 MHz to the Public Protection and Disaster Relief application, and restrict it to agencies operating there through consultation with Defence.

ACMA is aware of the potential of the 4940–4990 MHz band for public safety and disaster relief (PPDR) applications, and has been approached by a number of organisations seeking access to the band for such purposes. As indicated by the AUS11 footnote in the Plan on the Fixed and Mobile services in the band, it is usual practice for the Department of Defence to be consulted on non-defence use of these services in this band.

Any amendment to the Plan to support public safety/PPDR services will be the subject of consultation, and will depend upon the details of specific spectrum management arrangements developed in consultation with the Department of Defence and other interested parties.

Way forward

ACMA is currently developing a consultation paper to assist in developing appropriate spectrum management processes to support use of the band by public safety applications. ACMA's aim is to implement spectrum management arrangements in the band that will provide an appropriate

[24] The discussion paper on this band is being released in conjunction with this paper and will be available on the ACMA website: <http://www.acma.gov.au>.

degree of flexibility in spectrum usage, facilitate interoperability between public safety organisations, and minimise the administrative burden on both ACMA and users.

REVIEW RECOMMENDATION 5.4

ACMA should develop clear and transparent criteria for making decisions under Section 82 of the Radiocommunications Act about reissue of spectrum licences in the public interest.

In general, the Act provides that spectrum licences are to be re-allocated via market-based mechanisms. However, the Act allows ACMA to reissue an expiring spectrum licence to the same licensee in two circumstances:

- The licence is used in the provision of a service included in a class of service for which the Minister of the Department of Broadband, Communications and the Digital Economy (DBCDE) determines reissuing spectrum licences to the same licensees would be in the public interest; or
- ACMA is satisfied that special circumstances exist as a result it is in the public interest for that person to continue to hold the licence.

ACMA considers it is important to provide sufficient certainty to spectrum licensees about the reissue of their licences. It is expected that reissue of spectrum licences to the same licensee in public interest will mainly be by way of a Ministerial determination, if the Minister makes such a determination.

Way forward

As noted above, the treatment of expiring spectrum licences is a significant issue that ACMA will be working on in the coming months. ACMA understands that DBCDE is also in the process of letting a consultancy on issues concerning the reissue of spectrum licences.[25] ACMA will continue to work closely with DBCDE on this issue.

REVIEW RECOMMENDATION 5.5

ACMA should participate in the review of radio navigation aids when it is conducted by the Australian air traffic management authorities with a view to ensuring that no more spectrum than necessary spectrum is allocated for that purpose in Australia.

Where appropriate, ACMA is willing to participate in any review of spectrum matters pertaining to radio navigation aids used in Australia. ACMA is not in a position to comment on the air traffic management or safety considerations that determine spectrum requirements for aeronautical radionavigation. ACMA encourages the use of technologies such as Global Navigation Satellite Systems to replace ground-based navigation aids where possible. However, ACMA also recognises the need for ground-based augmentation and backup systems, as well as the long lead times associated with any changes to existing systems.

ACMA acknowledges the importance of global harmonisation of aeronautical frequency allocations. ACMA will continue to support international measures that aim to make more efficient use of the spectrum allocated to the aeronautical radionavigation service by sharing with other services.

[25] Further details were not available at the time of publication of this paper. It is expected that details of the consultancy will be available on the department's website at <http://www.dbcde.gov.au>.

Way forward

ACMA will pursue any opportunities to permit increased sharing of the aeronautical radionavigation service with other services. However, any changes to existing arrangements should consider international spectrum allocations and Australia's international civil aviation obligations.

REVIEW RECOMMENDATION 5.6

ACMA should promote Australian studies into Defence radar band sharing in the spectrum from 5 to 11 GHz through sponsoring appropriate studies by expert organisations, offering ARC [Australian Research Council] *grants, or using other methods that would focus attention of Australian scientists on this subject. Any credible results should be passed on to the ITU Working Party and pursued through proposals to amend the ITU Regulations.*

ACMA is not in a position to directly promote Australian studies of Defence radar band-sharing. Such studies would likely require the cooperation of the Department of Defence, and would be more appropriately sponsored by industry interested in using one of these bands under a different service allocation. However, ACMA is willing to facilitate communication of the results of such studies both at the domestic and international level.

Way forward

ACMA will bring to the attention of the ITU any relevant studies conducted by Australia on the issue of Defence radar band-sharing in the spectrum from 5–11 GHz.

REVIEW RECOMMENDATION 5.7

ACMA should participate with AirServices in ICAO deliberations on the size of the global MLS spectrum allocation, and foster Australian support for any subsequent reasonable proposals at the WRC. After the international allocation is determined, ACMA should participate with AirServices in the MLS frequency planning for Australian airports.

At WRC-07, the designation of 5030–5091 MHz as the core band for the Microwave Landing System (MLS) was confirmed with precedence for this system given by Radio Regulation No. **5.444** being reduced from the previous 5030–5150 MHz. The band 5091–5150 MHz was also allocated to the aeronautical mobile service at WRC-07 on a co-primary basis with the existing allocation for aeronautical radionavigation.

The band 5091–5150 MHz remains available for operation of the MLS. Should this band be required for MLS in Australia, protection from the aeronautical mobile service could be provided by adequate separation between others uses and MLS receivers according to ITU recommendations. ACMA will participate in any MLS frequency planning by AirServices Australia.

Way forward

ACMA will continue to monitor spectrum requirements for MLS and work with stakeholders to ensure that sufficient spectrum is available for the various aeronautical systems that may require access to bands previously reserved for MLS.

REVIEW RECOMMENDATION 6.1

That ACMA request the Australian WRC Preparation Committee to support the WRC '07 future agenda item to identify bands where significant regulatory simplification could take place with a view to promoting spectrum flexibility and paving the way for market allocations.

Australia supported considerations at WRC-07 on Resolution **951** (under Agenda Item 7.1) on improvements to the international spectrum management framework. The outcome of WRC-07 on this issue, supported by Australia, was the creation of Agenda Item 1.2 for WRC-11. Agenda Item 1.2 resolves that WRC-11 takes into account 'the ITU-R studies carried out in accordance with Resolution **951** (Rev.WRC-07) to take appropriate action with a view to enhancing the international regulatory framework'.

Way forward

ACMA will work with Australian radiocommunications industry, government participants and other national administrations over the next WRC cycle to evaluate various options, concepts and regulatory solutions that seek to promote flexibility and responsiveness in the international spectrum management framework.

REVIEW RECOMMENDATION 6.2

That ACMA take a more aggressive stance in promoting spectrum sharing, including amongst government spectrum users, where this can be achieved without significantly increasing the risk of interference.

ACMA agrees with the views of the Review that increasing demand for spectrum will require a greater emphasis on spectrum-sharing. However, greater spectrum-sharing results in an increased risk of interference to users who may have formerly enjoyed largely exclusive use.

ACMA sees the main challenges to spectrum-sharing as determining the acceptable level (and probability) of interference for any given sharing scenario. This may be achieved through the cooperation of existing users who are willing to accept an increased risk of interference or through ACMA seeking to increase incentives to share spectrum where appropriate. ACMA is committed to working with stakeholders to identify opportunities to increase sharing and the overall productivity of spectrum holdings.

Way forward

ACMA is pursuing various options for greater spectrum sharing, particularly for sharing between the Department of Defence and other government agencies. The extent to which ACMA's efforts to promote spectrum sharing are successful will depend to a great degree on the cooperation and participation of existing stakeholders. ACMA will continue to explore regulatory arrangements designed to encourage more efficient allocation and use of the radiofrequency spectrum.

REVIEW RECOMMENDATION 6.3

That agencies that agree to share spectrum with other users be afforded licence fee relief.

ACMA agrees with the Review Team that greater incentives for users to share spectrum may be desirable.[26] At present, licence holders are free to enter into third-party arrangements and negotiate payment for sharing spectrum as part of those arrangements. In addition, if a licence holder reduces its bandwidth in order to share; for example, by reducing the bandwidth from

[26] Final Report, p.61.

25 kHz to 12.5 kHz, its tax is proportionally reduced. However, the fee schedule does not take into account sharing in other ways, such as by time or reductions in coverage area, unless transmitter power crosses a threshold. It is also possible that some other aspects of the apparatus licence regime may hinder the development of sharing agreements.

Importantly, quantifying the level of spectrum-sharing in such a way that can be transparently and reliably used to influence licence fees is likely to be challenging in some cases, and to require significant work to determine an appropriate methodology.

Way forward

In considering what steps should be taken to increase spectrum users' incentives to share, ACMA will review aspects of the licensing framework, including whether it is desirable to reduce licence fees in recognition of sharing arrangements.

REVIEW RECOMMENDATION 7.1

That ACMA continue to expand the use of market mechanisms in spectrum management, including in relation to government spectrum holdings where practicable. This should include allocation by auction, more flexible use of spectrum pricing, and encouragement of spectrum trading.

ACMA agrees with the Review Team that expanding the use of market mechanisms for government spectrum holdings where practicable and appropriate will help to create appropriate incentives for efficient use of the spectrum.

ACMA agrees with the Review Team that increased transparency in the value of government spectrum will help parties to reach informed decisions about the most efficient way to deliver the services in question. In the foreseeable future it is likely that a substantial proportion of government spectrum holdings will continue to be administratively allocated and priced. As discussed below, ACMA's administrative incentive prices should reflect, to the extent possible, the available information about the likely value of the spectrum.

The Review Team noted the practical difficulties that may face government agencies who participate in a spectrum auction, given that they may not be able to pass on costs to consumers and may need to secure funding through annual budget processes. ACMA also notes that government agencies are frequently required to participate in competitive processes for other (non-spectrum) inputs, and plan in advance for significant capital expenditure items. The Productivity Commission made the following recommendation in its report in 2002 (Recommendation 10.2):

> A system of explicit budgetary support should replace the current system of granting exemptions and concessions from spectrum charges to targeted spectrum users. These users should be funded to the full value of their current spectrum use, that is, the value of licence fees and the cost recovery charges levied by the Australian Communications Authority.[27]

[27] The full Productivity Commission inquiry report is available at <http://www.pc.gov.au/inquiry/radiocomms/docs/finalreport>.

Way forward

ACMA will work with relevant government agencies to assess how market mechanisms can increase incentives for government spectrum holders to use their spectrum efficiently. Where there is excess demand for the spectrum concerned, ACMA will consider whether government spectrum users should have to acquire any rights to additional spectrum holdings in the market.

REVIEW RECOMMENDATION 7.2

ACMA should regularly review licence fees for accessing spectrum with the aim of improving incentives for efficient spectrum use.

ACMA agrees that an important aim of the licence fees for administratively allocated spectrum is to provide information and incentives that encourage the efficient allocation and use of the spectrum. This is particularly important where there are competing demands for spectrum. In these circumstances, government users should consider the value of spectrum when assessing how to deliver the services in question and what equipment to invest in and maintain. In some circumstances, this may include taking into account the value of spectrum to other users, including non-government users.

Way forward

ACMA regularly reviews the administrative incentive pricing formula used to determine the annual apparatus licence taxes paid by both government and non-government spectrum holders.

In the coming months, ACMA will consider approaches to assessing the relative value of parts of spectrum for the purpose of setting prices for administratively allocated spectrum. This may include seeking to identify where the opportunity cost of spectrum is likely to be significantly higher than current fees. This work will contribute to ACMA's reviews of the annual apparatus licence taxes. ACMA will consult with other government agencies and external stakeholders as appropriate.

REVIEW RECOMMENDATION 7.3

Governments should not penalise agencies that make financial gains by improved spectrum use. Agencies should be allowed to retain gains made from trading spectrum or reduced licence fees.

ACMA is not in a position to comment on the specific funding arrangements of other government agencies. ACMA is of the view that, so far as possible, government agencies should be encouraged to participate in the market for spectrum in the same manner in which they participate in other markets.

Way forward

ACMA will work with relevant government departments in the coming months to consider whether agencies should be allowed to retain gains made from trading spectrum or reduced licence fees.

REVIEW RECOMMENDATION 7.4

ACMA should work closely with Defence and other agencies with spectrum-intensive and spectrum-critical projects to ensure that spectrum implications of major projects are considered as early as possible. Regular meetings between ACMA and Defence (and other agencies as appropriate) should be held to consider how best to find spectrum for major procurement projects.

ACMA and the spectrum management area of Defence have collectively identified the early consideration of spectrum issues associated with Defence procurement as an essential element in improving spectrum use by Defence. While such consideration is primarily an internal Defence matter, ACMA has a role in assisting Defence spectrum management in educating procurers (and users) of Defence equipment on spectrum management issues. Similar relationships exist with a range of other government spectrum users.

From the ACMA perspective, there has been some significant success in improving the spectrum awareness of Defence and other government agency procurement processes. An important example of such work is the Australian Defence Spectrum Strategic Plan developed by the Department of Defence in 2004. ACMA would support efforts by Defence to regularly review and update this document. However, there are likely to be further opportunities to improve the consistency of spectrum management consideration in Defence procurement and that of government in general.

Way forward

ACMA will continue to work with Defence and other government agencies to educate relevant parties involved in procurement processes to highlight the increasing pressure on spectrum access, and the need to improve spectrum utilisation and consistency with Australian regulatory arrangements.

REVIEW RECOMMENDATION 7.5

ACMA should regularly review the apparatus licence fee formula with the particular aim of improving the efficiency of spectrum use. It should publish as much information as possible about the elements of the fee-setting formula in order to improve the formula's transparency to clients.

See the discussion in response to recommendation 7.2 above.

REVIEW RECOMMENDATION 7.6

ACMA should continue with the process of converting wide area apparatus licences to spectrum licences, including with respect to Defence and AirServices spectrum. ACMA should explore the possibility of including a licence condition on such licences requiring the licensees to allow other parties to use the spectrum when this can be shown to not create an unmanageable risk of interference.

ACMA broadly agrees that wide area apparatus licences should be converted to spectrum licences where appropriate. However, it is unclear how a licence condition requiring licensees to share spectrum could be implemented or enforced.

As discussed earlier in relation to the general themes of the Final Report, ACMA is committed to maximising the potential of spectrum by promoting spectrum-sharing. ACMA will use available incentives to encourage government users to share spectrum wherever practical, and is also considering mechanisms to improve incentives. However, ACMA would need to carefully consider the concept of applying a licence condition requiring licensees to allow other parties to utilise the spectrum.

Way forward

ACMA will consider opportunities for spectrum licensing where it is believed that it would be in the public interest to do so.

REVIEW RECOMMENDATION 7.7

ACMA together with the Department of Communications, Information Technology and the Arts should consider whether the current sharp distinction between apparatus licences and spectrum licences is still warranted.

The Australian Communications Authority (ACA), one of ACMA's predecessor organisations, argued in its submission to the Productivity Commission Radiocommunications Inquiry that the distinction in the Act between spectrum and apparatus licence types no longer serves a useful purpose. However, as noted by the Review Team, the Productivity Commission found that a single licence type would have significant net disadvantages compared with the current licence types.

ACMA is of the view that all three licence systems (class, spectrum and apparatus) currently available under the Act play an important role in the regulatory regime, and that improvements can best be made addressing the issues of each licence type directly. However, while the Act affords ACMA flexibility in how it implements licence types, legislative amendments may be necessary to permit greater flexibility within each of the three licence systems. One example is ACMA's proposal to allow class licences to be issued in spectrum designated for spectrum licensing under section 36 of the Act.[28]

Way forward

ACMA has developed draft spectrum management principles that are intended to assist in the development and implementation of spectrum management arrangements under the current licensing regime. When reviewing specific arrangements, ACMA will explore the broad range of options possible within existing licence types. ACMA will continue to argue for legislative change that will improve the effectiveness of the current licensing system in meeting ACMA's spectrum management objectives.

REVIEW RECOMMENDATION 7.8

ACMA establish a set of criteria to apply to applications for renewal in the public interest as soon as possible, and put these to the Minister for endorsement.

See the discussion in response to Recommendation 5.4 above.

REVIEW RECOMMENDATION 7.9

That consideration be given to providing compensation, on a case by case basis, to government agencies forced to relocate facilities or equipment due to changes in spectrum management requirements. Such compensation could be provided from the proceeds from the use of the freed-up spectrum by other users.

As noted in the Final Report, the issue of compensation is complex. In the past, ACMA has, as a rule, not paid compensation, but has sought to provide sufficient time for incumbent licensees to relocate in the event of a change in spectrum allocation.

[28] This issue was addressed in a 2006 ACMA discussion paper available at <http://www.acma.gov.au/WEB/STANDARD/pc=PC_100494#radcom>.

As noted by the Productivity Commission Report in 2002 (Finding 6.8):

> Apparatus licences are short-term permits to access a public resource that may need to be cancelled periodically, or not renewed, to make way for higher value uses. Therefore, it is not appropriate to provide compensation to apparatus licensees whose licences are cancelled or not renewed.[29]

Way forward

ACMA continues to believe that providing compensation may create a number of problems. ACMA will work with other government departments to carefully consider the issues surrounding compensation on a case by case basis.

REVIEW RECOMMENDATION 7.10

That an amendment be sought to the Radiocommunications Act to implement the Productivity Commission's recommendation on publication of data on prices and volumes of traded spectrum.

ACMA agrees that information about the prices and volumes of traded spectrum may assist the operation of the secondary market. It is possible that more information about the secondary market may even assist bidders participating in allocations in the primary market (for example, auctions conducted by ACMA).

ACMA does publish some data on the volume of spectrum and apparatus licences traded in each calendar year. At present, the published information includes some transfers of ownership that may result from corporate restructuring or simply updating of the contact details of the licensee.

It is not straightforward to collect or publish information on the price at which spectrum trades. In many cases, there may not be a clearly defined price agreed as part of the trade—spectrum may be traded as part of a business or part of the consideration paid may be specified in non-cash terms.

Way forward

ACMA is currently reviewing the operation of the secondary market and any barriers to trading. As part of that work, ACMA will consider the usefulness of, and impediments to, publishing price information.

The report will also consider whether there are likely to be net benefits from improving the quality of data provided on the volume of trades (taking into account expected implementation costs). This may include providing more disaggregated data on the volume of licences traded and enabling third-party transactions to be distinguished from transfers in which there is no change in ownership. ACMA will consult on the findings of that review as appropriate. This is likely to occur during the 2008/09 financial year.

REVIEW RECOMMENDATION 7.11

That, where the capabilities and safeguards are in place and the guidelines clear, ACMA should cede greater responsibility for managing particular bands to government agencies.

The recommendation of the Review that government agencies should have management responsibilities for the bands in which they operate may in some ways be at odds with other recommendations of the Review that suggest ACMA should have greater involvement in

[29] The full Productivity Commission inquiry report is available at <http://www.pc.gov.au/inquiry/radiocomms/docs/finalreport>.

government use of spectrum (for example, Recommendation 6.2 that ACMA should take a more aggressive stance in promoting spectrum-sharing.)

ACMA will continue to look for opportunities and mechanisms that will allow government agencies to take greater responsibility for their spectrum holdings where appropriate.

Spectrum licensing has been identified as the most appropriate method of licensing for some frequency ranges. ACMA has issued spectrum licences to Defence for the 20/30 GHz ('Ka-band') satellite spectrum. The Defence apparatus licence type also enables Defence to effectively manage its use of the spectrum across a number of frequency ranges.

In increasing spectrum users' control of any particular band, through spectrum licensing or any other arrangements, ACMA must be satisfied that such an approach will have the desirable outcomes of encouraging efficient use of the spectrum and ensuring that the band is used for the maximum public benefit.

Way forward

ACMA will remain ultimately responsible for managing the spectrum. However, ACMA will investigate the potential to create management arrangements that enable agencies to make more efficient use of their spectrum holdings. ACMA would need to be assured that any devolution of spectrum management responsibilities is transparent, facilitates sharing wherever possible and is likely to maximise the public benefit derived from use of that spectrum.

REVIEW RECOMMENDATION 7.12

That the Government should establish a committee similar to the UK Spectrum Strategy Committee, with representation from major government spectrum users, central agencies and the State and Territory governments, to provide advice to ACMA on government priorities for spectrum allocation. Responsibility for decision making, however, should remain with ACMA.

ACMA believes that the idea of a high-level government body providing advice on government priorities for spectrum allocation, similar to the UK Spectrum Strategy Committee (UKSSC), is worthy of consideration by government.

There have been, and will continue to be, spectrum-related matters with whole-of-government ramifications where a high-level government-mandated body providing guidance could prove useful. In these cases, ACMA is often not properly equipped to make a value judgment between the relative importance of the various government spectrum uses (for example, between competing Defence and police requirements). Some spectrum management decision-making processes may benefit from a body that has the breadth of responsibility to make judgments on such matters.

A body with the scope proposed in this recommendation would need to be created by government rather than by ACMA.

Way forward

ACMA will work with DBCDE to advance the argument for a high-level government committee whose purpose would be to advise ACMA on government spectrum management issues, particularly where contention exists between government spectrum uses.

If the need arises, ACMA will consider establishing a lower-level committee with appropriate membership.

REVIEW RECOMMENDATION 7.13

That ACMA regularly update the stock take of government spectrum holdings, in consultation with major government spectrum users.

ACMA agrees that a comprehensive understanding and identification of government spectrum holdings is an important element in the management of government spectrum requirements. In the past, while ACMA (and the ACA before it) has developed detailed information on government spectrum use, this has largely been in an ad hoc nature to address specific spectrum planning issues. A comprehensive, publicly available summary of government spectrum use on a band or user basis has not been available.

Part of the challenge to developing a clear understanding of the use of Defence spectrum holdings arises from use of the Defence Apparatus Licence type. While it provides significant flexibility to the Department of Defence in use of certain bands, and a low administrative burden on both ACMA and Defence, it does not provide detailed usage information of the band.

ACMA continues to believe that the Defence Apparatus Licence type used for authorising Defence use of the certain AUS1 and sole primary AUS11 remains appropriate, and that more detailed licensing arrangements are not necessary.

The Review stocktake of government spectrum holdings provides a solid foundation for the articulation of government spectrum holdings. However, constant updating and elaboration of this information would provide a clearer picture of use, which will help users (both government and non-government) to identify potential for sharing. As mentioned previously, the Australian Defence Spectrum Strategic Plan is a good example of the work stakeholders can undertake on their own to improve broader understanding of their spectrum requirements.

Way forward

Where resources allow, ACMA will work with government spectrum holders to initially develop and then maintain a consolidated articulation of government spectrum holdings. Depending on the circumstance, this may be most appropriate on a band-by-band or user-by-user basis. ACMA encourages the Department of Defence to update and maintain the Australian Defence Spectrum Strategic Plan at regular intervals.

REVIEW RECOMMENDATION 7.14

That ACMA should ensure that, as far as practicable, the opportunity cost of using spectrum in facilities located in major cities is reflected in the charges for the use of that spectrum, especially where siting of those facilities in regional areas is feasible.

ACMA agrees with the Review Team that where there is excess demand for spectrum used by government users in major cities it is appropriate to ensure that fees paid take into account the opportunity cost of the spectrum used.

If fees were set on this basis, the value of the spectrum would be transparent and spectrum users would compare this with the costs associated with relocation out of urban centres. They would be expected to respond by relocating if the value of the spectrum in the major centres in an alternative use exceeds their willingness to pay for that spectrum.

Way forward

See the response to recommendation 7.2 above.

REVIEW RECOMMENDATION 7.15

That before undertaking significant re-farming of spectrum, ACMA should analyse the likely net benefits from that re-farming.

ACMA agrees that whenever significant re-farming of spectrum is being considered it should analyse whether, based on the available information, the benefits of re-farming are expected to exceed the costs. Significant re-farming should only be undertaken if it is reasonable to conclude that there is likely to be a net benefit to society as a whole; that is, total welfare (or public benefits) must be expected to increase. ACMA has decided to adopt a total welfare standard as its framework for assessing costs and benefits of policy options. Therefore, ACMA will take into account the impact of the alternative approaches on affected parties.[30]

Consistent with ACMA's draft spectrum management principles, an assessment of the impact of re-farming will need to consider the expected impact on producers and consumers in relevant markets, and the broader social impacts that may result.

Way forward

Before undertaking significant re-farming of spectrum, ACMA will assess whether it is expected to increase total welfare. This sort of analysis may require a considerable commitment of resources. Greater resources will be committed to this analysis when the expected costs and benefits may be substantial. Qualitative assessments will be supported with quantitative analysis to the extent possible and appropriate.

REVIEW RECOMMENDATION 7.16

That before making major decisions affecting spectrum use, ACMA should, as far as possible, identify the opportunity cost of that spectrum.

ACMA agrees with the Review Team that it should seek to assess opportunity cost of spectrum, or the value of that spectrum in an alternative use, before making major decisions that will have a significant effect on spectrum use.

Way forward

See the response to recommendation 7.2.

REVIEW RECOMMENDATION 7.17

That the Government consider the use of conditional or two sided auctions as a method of improving transparency of spectrum values and encouraging efficient spectrum use.

ACMA notes the recommendation to consider using conditional or two-sided auctions. It is possible that these types of auctions could help to reveal incumbent spectrum users' 'reserve prices' and ensure that re-farming only occurs when a new user values the spectrum more highly than the incumbent.

However, it is not yet clear in what circumstances conditional or two-sided auctions are likely to be the best way to allocate spectrum. Nor is it clear whether it would be possible to use these sorts of auctions within the current legislative framework.

[30] More detail on the total welfare standard can be found in ACMA's Spectrum Management Principles paper, which is available on ACMA's website: <www.acma.gov.au>.

To our knowledge, to date no jurisdiction has sought to implement the methodology proposed by Kwerel and Williams (2002). Considerable further work is required to fully evaluate the auction approaches proposed in that paper.

Way forward

As part of its ongoing work program, ACMA will consider the circumstances in which conditional or two-sided auctions would be optimal, and what, if any, changes to the legislative framework would be required to apply these auction formats. ACMA will consult on the findings of that review as appropriate. This is likely to occur during the 2008/09 financial year.

4 Future work program

The Review identified a wide range of recommendations, many of which have major implications for the spectrum management community and will require substantive work by ACMA and others to consider and address in detail. In some cases, ACMA has already commenced work on projects that either directly or indirectly relate to the Review recommendations or has previously identified a need to undertake such work.

This chapter provides a brief overview of ACMA's forward work program relevant to the Review by referencing existing or identified ACMA projects. These bodies of work will provide opportunities for further stakeholder consultation and involvement as individual recommendations or groups of recommendations are addressed in greater detail.

It is important to acknowledge that some recommendations are already underway independently of the Review and are well progressed. In addition, it is crucial to remember that some recommendations are not in the remit (or sole remit) of ACMA and will depend on the involvement of broader government.

4.1 Relationship with other ACMA bodies of work

A brief summary of ACMA bodies of work (either underway or identified) relevant to the above future work program is provided below. However, it should be noted that all are subject to resource and priority considerations.

Spectrum management principles

ACMA is developing principles that it proposes to use to guide its approach to spectrum management. The draft principles are set out in Chapter 1 and are also the subject of a separate consultation paper being released simultaneously with this paper. Included is a consideration of the *total welfare standard* ACMA will use as its overarching framework for assessing the best approach to individual spectrum management issues.

This project covers overall spectrum management approaches, including those relevant to the management of government spectrum holdings, and is therefore relevant to all Review recommendations. In particular, it will guide ACMA's consideration of the increased use of market mechanisms in the management of government spectrum and therefore Recommendation 7.1.

Five-year Spectrum Outlook

The draft of ACMA's Five-year Spectrum Outlook is being released simultaneously with this paper. Its purpose is to provide greater insight and transparency for industry about the pressures on spectrum and the direction of ACMA's spectrum planning work in the short and medium term. It is also intended to facilitate meaningful discussions with stakeholders about emerging pressures for change to spectrum access arrangements.

This project is important to the core report theme of increased transparency of government spectrum use. It allows for greater detail on government agencies' spectrum use to be readily accessible by broader users.

Information papers on government spectrum usage

As a result of the core Review theme of increasing the transparency of government spectrum use, ACMA intends to develop a series of information papers to more clearly articulate government spectrum use, particularly in those bands or uses where information is currently scarce or otherwise not readily available.

This project will be relevant to Recommendation 7.13.

Investigation of mechanisms to increase the application of market approaches

ACMA will consider options for the increased use of market mechanisms in the management of government spectrum holdings.

In some ways, this work will be relevant (directly or indirectly) to many of the Review recommendations, but it will be of particular relevance to—or may be relevant subject to further consideration of the Review—to Recommendations 7.1, 7.2, 7.3, 7.6, 7.8, 7.10, 7.16 and 7.17.

Spectrum licence expiry/renewal

ACMA has begun identifying and addressing issues associated with the expiry of a number of spectrum licences in coming years. As discussed in the preliminary response to Recommendation 5.4, it is understood that DBCDE is also in the process of investigating issues related to the expiry of spectrum licences.

This work is relevant—or may be relevant subject to further consideration of the Review—to Recommendations 5.4 and 7.8.

Licence fee reviews and opportunity cost

ACMA reviews radiocommunications licence fees on an ongoing basis. The need for an increased awareness of opportunity cost factors has been identified as an important element in future licence fee review processes and is being investigated in a related project.

This work is relevant—or may be relevant subject to further consideration of the Review—to Recommendations 6.3, 7.2, 7.5, 7.14 and 7.16.

Revision of the Australian Radiofrequency Spectrum Plan

ACMA has begun an update of the Australian Radiofrequency Spectrum Plan, consistent with WRC-07 outcomes. Public consultation will occur during the second half of 2008, with the revised Plan expected to come into force on 1 January 2009.

This project is relevant—or may be relevant subject to further consideration of the Review—to Recommendations 4.1, 4.2, 5.1, 5.2 and 5.3.

Engagement with broader government on Review recommendations

ACMA will engage with government decision-makers on the range of issues relevant to the management of government spectrum holdings. This work will seek to address the range of issues identified in the Review that are entirely or partially outside the remit of ACMA, or in which broader government engagement is prudent.

To some extent, this work will be relevant (directly or indirectly) to many of the Review recommendations, but it will be of particular relevance to—or may be relevant subject to further consideration of the Review—to Recommendations 5.1, 7.3, 7.12, and 7.17.

Development of a Government Spectrum Management Strategic Plan

ACMA will develop a strategic plan for the management of government spectrum holdings, in order to develop a coherent approach to ACMA's future work on the issue. Importantly, this plan will be consistent with the spectrum management principles already being developed by ACMA.

This project will have direct or indirect relevance to all Review recommendations.

Review of the 400 MHz band

ACMA has begun a review of arrangements in the 400 MHz band (403–520 MHz). Comments are sought on this specific issue in a discussion paper that will be released in conjunction with this paper. In a related process, ACMA, Defence, and law enforcement and security agencies are in the early stages of discussions on the possibility of increased non-Defence use of the 380–400 MHz band. Both of these projects are relevant to the identification of harmonised spectrum to support government radiocommunications interoperability.

These projects are relevant—or may be relevant subject to further consideration of the Review—to Recommendations 5.1 and 5.2.

Development of access arrangement for public safety agencies in 4940–4990 MHz

ACMA has begun work on developing access arrangements to support public safety agency use of the 4940–4990 MHz band.

This work is relevant to Recommendation 5.3.

Replacement of ACMA's spectrum management business support systems

ACMA has begun a project to replace its spectrum management business support systems as part of a broader strategy of renewing its core business systems.

This project is relevant to the general ongoing relationship between ACMA and government users in terms of licensing and coordination of stations. It is also important to the core Review theme of increased transparency of government spectrum use by allowing for greater detail of this spectrum use to be readily accessible to other users.

Review of the management arrangements for government spectrum holdings

ACMA has identified a number of activities that would help to improve the management of government spectrum holdings. As identified above, some of these activities have already started and some cannot be undertaken until others are finalised.

Contingent on the above, ACMA is planning a work program to examine the suitability of the current licensing system for both government and non-government spectrum holdings. This program will assess the current licensing system against the spectrum management principles to develop a range of options for licensing devices and systems in different circumstances.

This program is relevant to Recommendation 7.7.

5 Conclusion

The Review has served a useful purpose in the process of improving the management of government spectrum holdings by confirming a number of already identified issues and raising previously unidentified issues and ideas for further consideration. The work of the Review serves as a further impetus for ACMA to continue its process of spectrum management reform into the future, particularly in the field of government spectrum holdings.

ACMA understands and acknowledges the importance of spectrum to many government bodies, and the significance of these services and activities to the nation. Accordingly, while ACMA is committed to reviewing the spectrum management arrangements for government spectrum holdings, it is equally committed to maintaining the provision of adequate spectrum, under appropriate arrangements, to meet the needs for government.

Although ACMA will not be implementing any changes to spectrum management arrangements flagged in the Review or ACMA's preliminary response without further consultation, ACMA would welcome any public comment on the broad issues identified in this paper. Any comments are to be provided to ACMA by 18 July 2008.

Attachment 1: Review Terms of Reference

1. Identify the major Government spectrum holdings below 31 GHz.

For the purposes of the Review:

- Government means the Australian Government and the governments of the States and mainland Territories, including the business enterprises of those governments. Spectrum holdings of local governments, governments of offshore territories, Telstra or National Broadcasters are not within the scope of the Review
- Holdings include all mechanisms by which spectrum is formally reserved, allocated, licensed or otherwise identified or made available for Government use. Holdings may be set out in statutory instruments such as spectrum plans and frequency band plans, in administrative instruments such as Radiocommunications Assignment and Licensing Instructions (RALIs) or by radiocommunications licences;

2. Describe both actual and potential uses of major Government spectrum holdings through:

- An audit of current use by Government of major spectrum holdings;
- A survey of expected use by Government of major spectrum holdings; and,
- An examination of both existing and potential demand for non-government use of major spectrum holdings.

3. Identify major spectrum holdings for which existing or potential demand indicates that the overall public benefit could be maximised by:

- Making all or part of the holding available for non-government use, including
- proposals for the clearance or reallocation of spectrum; or
- Identifying increased sharing opportunities and arrangements in current government spectrum holdings; or
- Devolving management of major Government spectrum holdings to other government agencies, including the processes and approaches that could be used to achieve devolved management arrangements.

4. Develop a strategic approach to the re-allocation of Government spectrum holdings to non-government uses that takes the following factors into account:

- Current and expected operational requirements;
- Budget and other financial constraints;

- The likely effect in Australia of development in technology and international regulatory arrangements; and
- The legislative requirements of the Act.

5. Review the medium and long term effectiveness of existing regulatory arrangements to maximise the efficient use of the spectrum in relation to major Government spectrum holdings.

6. Identify regulatory mechanisms and approaches that will assist ACMA to maximise the overall public benefit from major Government spectrum holdings, including mechanisms and approaches that will assist ACMA consideration of proposals by Government for new spectrum holdings.

7. Examine the opportunity cost of major Government spectrum holdings in order to identify opportunities for improved charging arrangements and other incentive mechanisms. For the purpose of the Review:

Opportunity cost evaluations should take into account alternative uses for a spectrum holding. For example, the band 230–240 MHz is held by the Department of Defence but could also be used for Digital Audio Broadcasting (DAB). This indicates that the opportunity cost of this holding may be significant. In contrast, the 20.2–21.2 GHz and 30–31 GHz bands are generally only used for defence purposes. This indicates that the opportunity cost of this holding may be low.

Attachment 2: Table of Review recommendations

Table A1: Recommendations resulting from Key Findings

#	Recommendation	Appropriate decision-maker(s)[31]	Stakeholders[32]	Way forward
4.2	That ACMA should review the measures that it is taking to implement the protection given to meteorological use of the band 10.6 to 10.68 GHz by ITU footnote 482.	• ACMA	• Earth sensing community (including the Bureau of Meteorology) • Fixed Service Point to Point Operators	Following mandatory consultation, ACMA will incorporate changes to the Radio Regulations in the 2009 edition of the Plan, including any changes for sharing the 10.6–10.68 GHz band. It is likely that ACMA will also incorporate the sharing criteria resolved at WRC-07, in a revision to RALI FX3 to protect stations in the Earth exploration-satellite service.
5.1	That local, state and federal government agencies using land mobile radio [LMR] communications be urged to cooperate with ACMA in the development of a common LMR Strategic Plan involving a transition to new paired bands on 360 to 400 MHz over a period of approximately five years.	• ACMA • Government(s)	• Defence • Government (primarily federal/ state/territory) agencies	ACMA will examine responses to the review of the 400 MHz band with a particular focus on identifying suitable arrangements for harmonised spectrum to support government radiocommunications interoperability.

[31] It is noted that in those cases where ACMA is not the ultimate decision-maker, ACMA will have a major role in initiating any action on the recommendation.
[32] This is not intended as an exhaustive list but flags those stakeholders most directly involved or impacted by the recommendation.

5.2	That ACMA should remove the AUS1 footnotes in the ARSP from 360–365, 370–375, 380–385 and 390–395 MHz, and require Defence to vacate this spectrum in a time frame that fits with the LMR Strategic Plan.	• ACMA	• Defence • Government (primarily state/territory) agencies	Non-Defence use of the band below 400 MHz is an issue of ongoing consultation; a number of options are being considered. Any changes to the Plan will be implemented as appropriate depending on the outcomes of this consultation.
5.3	That ACMA should amend the ARSP to allocate 4940 to 4990 MHz to the Public Protection and Disaster Relief application and restrict it to agencies operating there through consultation with Defence.	• ACMA	• Defence • Public safety agencies	ACMA is currently developing a consultation paper to assist in developing appropriate spectrum management processes to support use of the band by public safety applications. ACMA's aim is to implement spectrum management arrangements in the band that will provide an appropriate degree of flexibility in spectrum usage, facilitate interoperability between public safety organisations, and minimise the administrative burden on both ACMA and users.
7.12	That the Government should establish a committee similar to the UK Spectrum Strategy Committee, with representation from major government spectrum users, central agencies and the State and Territory governments, to provide advice to ACMA on government priorities for spectrum allocation. Responsibility for decision making, however, should remain with ACMA.	• Federal government	• Government spectrum users • ACMA • Broader spectrum user community	ACMA will work with DBCDE to advance the argument for a high-level government committee whose purpose would be to advise ACMA on government spectrum management issues, particularly where contention exists between government spectrum uses. If the need arises, ACMA will consider establishing a lower-level committee with appropriate membership.

Table A2: Recommendations for improving the market approach

#	Recommendation	Appropriate decision-maker(s)	Stakeholders	Way forward
5.4	ACMA should develop clear and transparent criteria for making decisions under Section 82 of the Radiocommunications Act about re-issue of spectrum licences in the public interest.	• ACMA	• Existing and potential spectrum licensees	As noted above, the treatment of expiring spectrum licences is a significant issue that ACMA will be working on in the coming months. ACMA understands that DBCDE is also in the process of letting a consultancy on issues concerning the reissue of spectrum licences.[33] ACMA will continue to work closely with DBCDE on this issue.
6.1	That ACMA request the Australian WRC Preparation Committee to support the WRC-07 future agenda item to identify bands where significant regulatory simplification could take place, with a view to promoting spectrum flexibility and paving the way for market allocations.	• ACMA	• Radio-communications Consultative Committee (RCC)—Preparatory Group (PG) for WRC-11	ACMA will work with Australian radiocommunications industry, government participants and other national administrations over the next WRC cycle to evaluate various options, concepts and regulatory solutions that seek to promote flexibility and responsiveness in the international spectrum management framework.
7.1	That ACMA continue to expand the use of market mechanisms in spectrum management, including in relation to government spectrum holdings where practicable. This should include allocation by auction, more flexible use of spectrum pricing and encouragement of	• ACMA • Spectrum licensing—Minister (following recommendation from ACMA)	• Government spectrum users	ACMA will work with relevant government agencies to assess how market mechanisms can increase incentives for government spectrum holders to use their spectrum efficiently. Where there is excess demand for the spectrum concerned, ACMA will consider

[33] Further details were not available at the time of publication of this paper. It is expected that details of the consultancy will be available on the department's website at <http://www.dbcde.gov.au>.

	spectrum trading.			whether government spectrum users should have to acquire any rights to additional spectrum holdings in the market.
7.2	ACMA should regularly review licence fees for accessing spectrum, with the aim of improving incentives for efficient spectrum use.	• ACMA	• All radio-communications licensees • Federal government	ACMA regularly reviews the administrative incentive pricing formula used to determine the annual apparatus licence taxes paid by both government and non-government spectrum holders. In the coming months, ACMA will consider approaches to assessing the relative value of parts of spectrum for the purpose of setting prices for administratively allocated spectrum. This may include seeking to identify where the opportunity cost of spectrum is likely to be significantly higher than current fees. This work will contribute to ACMA's reviews of the annual apparatus licence taxes. ACMA will consult with other government agencies and external stakeholders as appropriate.
7.3	Governments should not penalise agencies that make financial gains by improved spectrum use. Agencies should be allowed to retain gains made from trading spectrum or reduced licence fees.	• Government (federal, state and territory)	• Government spectrum users • Broader spectrum user community	ACMA will work with relevant government departments in the coming months to consider whether agencies should be allowed to retain gains made from trading spectrum or reduced licence fees.
7.6	ACMA should continue with the process of converting wide area apparatus licences to spectrum licences, including with respect to Defence and AirServices spectrum. ACMA	• Minister (following recommendation from ACMA)	• Defence • AirServices Australia	ACMA will consider opportunities for spectrum licensing where it is believed that it would be in the public interest to do so.

	should explore the possibility of including a licence condition on such licences, requiring the licensees to allow other parties to use the spectrum when this can be shown to not create an unmanageable risk of interference.			
7.8	ACMA establish a set of criteria to apply to applications for renewal in the public interest as soon as possible, and put these to the Minister for endorsement.	• Minister	• Existing and potential spectrum licensees	See the discussion in response to Recommendation 5.4 above.
7.10	That an amendment be sought to the Radiocommunications Act to implement the Productivity Commission's recommendation on publication of data on prices and volumes of traded spectrum.	• Federal government	• Existing and potential spectrum and apparatus licensees	ACMA is currently reviewing the operation of the secondary market and any barriers to trading. As part of that work, ACMA will consider the usefulness of, and impediments to, publishing price information. The report will also consider whether there are likely to be net benefits from improving the quality of data provided on the volume of trades (taking into account expected implementation costs). This may include providing more disaggregated data on the volume of licences traded and enabling third-party transactions to be distinguished from transfers in which there is no change in ownership. ACMA will consult on the findings of that review as appropriate. This is likely to occur during the 2008/09 financial year.
7.16	That, before making major decisions affecting spectrum use, ACMA should, as far as	• ACMA	• All spectrum users	See the response to recommendation 7.2.

	possible, identify the opportunity cost of that spectrum.			
7.17	That the Government consider the use of conditional or two sided auctions as a method of improving transparency of spectrum values and encouraging efficient spectrum use.	• Federal government	• All radio-communications licensees	As part of its ongoing work program, ACMA will consider the circumstances in which conditional or two-sided auctions would be optimal, and what, if any, changes to the legislative framework would be required to apply these auction formats. ACMA will consult on the findings of that review as appropriate. This is likely to occur during the 2008/09 financial year.

Table A3: Recommendations for improving the command and control approach

#	Recommendation	Appropriate decision-maker(s)	Stakeholders	Way forward
4.1	At regular intervals of no more than three years, all Defence footnotes and band allocations should be reviewed, with the aim of opening the reservations to other government or non-government usage as soon as possible. All cases where protection is maintained should be explained in the Defence Strategic Plan.	• ACMA	• Defence • Government spectrum users • Broader spectrum user community	ACMA will continue to review all Australian footnotes as part of the overall update of the Plan after every WRC.
4.3	That ACMA, in considering future allocations for wireless access, 3G telephony, and defence radar to the C band in the future should aim to protect licensed incumbents. The Fixed Satellite services on the 3400 to 3600 MHz extended C band, having only secondary status on the band, should be required to operate without protection from the primary services and should not inhibit new applications on the band.	• ACMA	• Defence • Satellite Earth station operators • WAS operators	ACMA will continue to examine options for wireless access services in the band 3575–3710 MHz. Any arrangements that ACMA puts in place to facilitate such services will include consideration of licensed incumbent services in the band and consultation with current users.
5.5	ACMA should participate in the review of radio navigation aids when it is conducted by the Australian air traffic management authorities with a view to ensuring that no more spectrum than necessary is allocated for that purpose in Australia.	• ACMA	• AirServices Australia • Defence	ACMA will pursue any opportunities to permit increased sharing of the aeronautical radionavigation service with other services. However, any changes to existing arrangements should consider international spectrum allocations and Australia's international civil aviation obligations.
5.6	ACMA should promote Australian studies into	• ACMA	• Defence	ACMA will bring to the attention of the ITU any

	Defence radar band sharing in the spectrum from 5 to 11 GHz through sponsoring appropriate studies by expert organisations, offering ARC [Australian Research Council] grants, or using other methods that would focus attention of Australian scientists on this subject. Any credible results should be passed on to the ITU Working Party and pursued through proposals to amend the ITU Regulations.			relevant studies conducted by Australia on the issue of Defence radar band-sharing in the spectrum from 5–11 GHz.
5.7	ACMA should participate with AirServices in ICAO deliberations on the size of the global MLS spectrum allocation and foster Australian support for any subsequent reasonable proposals at the WRC. After the international allocation is determined, ACMA should participate with AirServices in the MLS frequency planning for Australian airports.	• ACMA	• AirServices Australia	ACMA will continue to monitor spectrum requirements for MLS and work with stakeholders to ensure that sufficient spectrum is available for the various aeronautical systems that may require access to bands previously reserved for MLS.
6.2	That ACMA take a more aggressive stance in promoting spectrum sharing, including among government spectrum users, where this can be achieved without significantly increasing the risk of interference.	• ACMA	• All spectrum users	ACMA is pursuing various options for greater spectrum sharing, particularly for sharing between the Department of Defence and other government agencies. The extent to which ACMA's efforts to promote spectrum sharing are successful will depend to a great degree on the cooperation and participation of existing stakeholders. ACMA will continue to explore regulatory arrangements designed to encourage more efficient allocation and use of the radiofrequency spectrum.

6.3	That agencies that agree to share spectrum with other users be afforded licence fee relief.	• ACMA	• Government spectrum users	In considering what steps should be taken to increase spectrum users' incentives to share, ACMA will review aspects of the licensing framework, including whether it is desirable to reduce licence fees in recognition of sharing arrangements.
7.4	ACMA should work closely with Defence and other agencies with spectrum-intensive and spectrum-critical projects to ensure that spectrum implications of major projects are considered as early as possible. Regular meetings between ACMA and Defence (and other agencies as appropriate) should be held to consider how best to find spectrum for major procurement projects.	• ACMA	• Defence	ACMA will continue to work with Defence and other government agencies to educate relevant parties involved in procurement processes to highlight the increasing pressure on spectrum access, and the need to improve spectrum utilisation and consistency with Australian regulatory arrangements.
7.5	ACMA should regularly review the apparatus licence fee formula with the particular aim of improving the efficiency of spectrum use. It should publish as much information as possible about the elements of the fee-setting formula in order to improve the formula's transparency to clients.	• ACMA	• Apparatus licensees	See the discussion in response to recommendation 7.2 above.
7.7	ACMA together with the Department of Communications, Information Technology and the Arts should consider whether the current sharp distinction between apparatus licences and spectrum licences is still warranted.	• Federal government	• All radio-communications licensees	ACMA has developed draft spectrum management principles that are intended to assist in the development and implementation of spectrum management arrangements under the current licensing regime. When reviewing specific arrangements, ACMA will explore the

				broad range of options possible within existing licence types. ACMA will continue to argue for legislative change that will improve the effectiveness of the current licensing system in meeting ACMA's spectrum management objectives.
7.9	That consideration be given to providing compensation, on a case by case basis, to government agencies forced to relocate facilities or equipment due to changes in spectrum management requirements. Such compensation could be provided from the proceeds from the use of the freed-up spectrum by other users.	• Federal government	• All radio-communications licensees	ACMA continues to believe that providing compensation may create a number of problems. ACMA will work with other government departments to carefully consider the issues surrounding compensation on a case by case basis.
7.11	That, where the capabilities and safeguards are in place and the guidelines clear, ACMA should cede greater responsibility for managing particular bands to government agencies.	• ACMA	• Government users	ACMA will remain ultimately responsible for managing the spectrum. However, ACMA will investigate the potential to create management arrangements that enable agencies to make more efficient use of their spectrum holdings. ACMA would need to be assured that any devolution of spectrum management responsibilities is transparent, facilitates sharing wherever possible and is likely to maximise the public benefit derived from use of that spectrum.
7.13	That ACMA regularly update the stock take of government spectrum holdings, in consultation with major government spectrum users.	• ACMA	• All spectrum users	Where resources allow, ACMA will work with government spectrum holders to initially develop and then maintain a consolidated articulation of government spectrum holdings.

				Depending on the circumstance, this may be most appropriate on a band-by-band or user-by-user basis. ACMA encourages the Department of Defence to update and maintain the Australian Defence Spectrum Strategic Plan at regular intervals.
7.14	That ACMA should ensure that, as far as practicable, the opportunity cost of using spectrum in facilities located in major cities is reflected in the charges for the use of that spectrum, especially where siting of those facilities in regional areas is feasible.	• ACMA	• All spectrum users	See the response to recommendation 7.2 above.
7.15	That before undertaking significant re-farming of spectrum, ACMA should analyse the likely net benefits from that re-farming.	• ACMA	• All spectrum users (particularly those affected by potential spectrum re-farming)	Before undertaking significant re-farming of spectrum, ACMA will assess whether it is expected to increase total welfare. This sort of analysis may require a considerable commitment of resources. Greater resources will be committed to this analysis when the expected costs and benefits may be substantial. Qualitative assessments will be supported with quantitative analysis to the extent possible and appropriate.

Attachment 3: International observations—the UK and the US

The United States

In the US, the National Telecommunications and Information Administration (NTIA) manages US federal government spectrum and the FCC manages remaining spectrum. The report completed for the Federal Communications Commission (FCC) by the Spectrum Policy Task Force in 2002 has been very influential.[34] However, the report's recommendations have limited relevance in Australia due to the differences in the way spectrum is managed in the US and the structure of US public safety agencies.

The key recommendations of the Spectrum Policy Task Force relevant to government spectrum use in Australia relate primarily to public safety use. The Task Force recommended that some spectrum should continue to be dedicated on a command-and-control basis for public safety use; however, the Task Force also recognised that there is considerable potential for the introduction of market-oriented policies that would allow for more efficient use of spectrum to meet both public safety and commercial spectrum needs.

In June 2003, US President George W. Bush established the Federal Government Spectrum Task Force to produce recommendations for improving the management of spectrum and the efficiency of government spectrum use. This Task Force was led by the US Department of Commerce, which, through the NTIA, is responsible for the regulation of government spectrum use in the US. The Task Force made a number of recommendations to improve spectrum management in its report of June 2004. However, these recommendations relate mainly to improving planning processes and encouraging innovation rather than the introduction of market-based reforms.[35]

The United Kingdom

RECOMMENDATIONS OF THE CAVE AUDIT

In 2005, the Independent Audit of Spectrum Holdings was conducted for the United Kingdom Treasury by Professor Martin Cave (the Cave Audit).[36] The Cave Audit made a number of recommendations for the management of spectrum in the UK.

[34] The FCC Spectrum Policy Task Force has its homepage at <http://www.fcc.gov/sptf/>.
[35] Further information about the spectrum management reform issues being examined by the NTIA is available at <http://www.ntia.doc.gov/osmhome/spectrumreform/index.html>.
[36] The website of the UK's Independent Audit of Spectrum Holdings is at <http://www.spectrumaudit.org.uk/>.

Although a large proportion of are relevant to the Australian situation, many are specific to the UK spectrum management framework.

The recommendations of the Cave Audit can be summarised in six key points:

1. New spectrum requirements should be met through the market in all but exceptional circumstances.
2. Pricing mechanisms should be used to ensure that the value of spectrum is reflected in the fees paid by public sector users.
3. Band-sharing should be pursued as far as possible, with fee reductions available to reflect the value of sharing permitted.
4. Pricing and sharing of specific bands (particularly Defence and aeronautical radar bands).
5. Improved coordination and management of government spectrum use.
6. Regular review of the spectrum management system and public sector requirements for spectrum.

Many of the recommendations of the Final Report are broadly similar to the recommendations of the Cave Audit but are framed in the context of the current Australian spectrum management paradigm.

UK GOVERNMENT RESPONSE AND ACTION PLAN

The British Government accepted the key theme of the Cave Audit—that market mechanisms should be introduced into spectrum management in the public sector. In its response to the 55 recommendations of the Cave Audit, the Cabinet Official Committee on UK Spectrum Strategy (UKSSC), in consultation with the Office of Communications (Ofcom), published an implementation plan in 2006 to set out key milestones in progressing the Audit's recommendations. [37] Progress against the implementation plan will be reported every two years. The government published the first of these 'Forward Look' documents in March 2007.[38]

Ofcom conducted a public consultation process in 2007 on proposals to reform the management of public sector spectrum holdings based on the recommendations of the Cave Audit. [39] Ofcom will conduct a consultation process later in 2008 on measures to enable public bodies to trade their spectrum holdings.

RELEVANCE OF THE CAVE AUDIT IN THE AUSTRALIAN CONTEXT

Many of the recommendations of the Cave Audit for the management of public sector spectrum in the UK have already been implemented to some degree in Australia. For example, government agencies in Australia pay the same fees for access to land mobile spectrum in the 400 MHz band as do private sector users. Additionally, in Australia, use of spectrum by the Department of Defence is licensed by ACMA.

It should also be recognised that the Cave Audit was commissioned by the UK Treasury and that the UKSSC is jointly chaired by the Department for Business, Enterprise & Regulatory Reform (BERR) and the Ministry of Defence (MOD). The

[37] The UK government's response to the Cave Audit is available at <http://www.spectrumaudit.org.uk/pdf/governmentresponse.pdf>.
[38] <http://www.spectrumaudit.org.uk/pdf/Forward_Look_2007.pdf>.
[39] <http://www.ofcom.org.uk/consult/condocs/sfrps/>.

high-level recognition of the importance of spectrum by government has enabled the UK to take a strategic approach to the management of public sector spectrum.

The participation of the MOD, and its publicly positive attitude towards market reform, is a key factor enabling improvements to public sector spectrum management in the UK. The MOD, which holds about one-third of the spectrum below 15 GHz in the UK (a similar proportion is held by the Department of Defence in Australia), has said that it will commence consultation by May 2008 on its plans to release a significant portion of its spectrum holdings.[40]

[40] According to Ofcom, <http://www.ofcom.org.uk/consult/condocs/sfrps/statement/>.