

Switching Channels and Changing Laws: Managing the Radiofrequency Spectrum

Valeska Bloch reviews the regulation and management of spectrum in Australia, before outlining some fast approaching policy questions that will emerge from the digital dividend, the expiry of current spectrum licences and the National Broadband Network.

Introduction

As a finite, though non-depletable natural resource, the radiofrequency spectrum is both highly valuable and highly regulated. From the inception of the first radio services, spectrum 'scarcity' has been central to the spectrum allocation framework adopted by governments. However, the co-existing influences of digital technology (supplanting analogue) and deregulatory ideology sparked in the 1980s, have reshaped the way spectrum is used and valued.

digital switchover and the expiry of spectrum licences will afford an opportunity to re-evaluate radiocommunications regulation.

Broadband ubiquity is now demanding a more efficient and effective use of spectrum as spectrum-intensive technologies such as HDTV and IP based applications and wireless access services (**WAS**) are delivered.¹ Broadband also generates a secondary demand for spectrum by providing a platform and a market for media-rich and bandwidth-intensive services. The need for mobility and accessibility (particularly in sparsely-populated Australia) is increasingly requiring (or at the very least raising the expectation) that mobile and other wireless access services that utilise the radiofrequency spectrum match the speeds and capabilities available over fibre networks. The challenge for spectrum management lies in the ability to meet this demand whilst adhering to the objects of the *Radiocommunications Act 1992* (Cth) (the **RA** or the **Act**) and the Spectrum Principles.² This includes balancing the needs of both new and incumbent service providers and users.³

The demand for spectrum from the broadcasting and telco sectors has arguably come to a tipping point in 2009, which has been a transformative year for communications both globally and locally. In Australia alone, 2009 has seen the acceleration of preparations for the switchover to digital television, the launch of digital radio and the announcement and commencement of a plan to build a national fibre-to-the-premises broadband network (**NBN**). Each of these projects has been driven by a demand for accessibility, mobility and high-speed media-rich services, all of which can be delivered by next generation networks. On a more technical level, this demand for services translates to a demand for radiofrequency spectrum.

This recent spike in demand has coincided with the potential release of valuable spectrum over the next five years. Two upcoming develop-

ments in spectrum management in particular – the digital switchover and the expiry of spectrum licences – have afforded the Minister for Broadcasting Communications and the Digital Economy and ACMA the opportunity to re-evaluate radiocommunications regulation. The NBN will also provide an impetus for spectrum management reconsideration. This paper sets out the current regulatory and economic framework for spectrum management and examines these transformative developments, all of which will provide both challenges and opportunities for stakeholders in the media and communications sector as they vie for prime spectrum.

Regulatory framework

Spectrum management regulatory framework

Spectrum management is the process by which spectrum is allocated and spectrum access rights are licensed⁴ and it occurs via a hierarchy of planning powers. At its highest level, spectrum management involves management by the International Telecommunication Union (**ITU**), which coordinates the international allocation and registration of spectrum in order to minimise spectrum interference between countries.⁵ As a signatory to the Constitution and Convention of the ITU, Australia has agreed to comply with the ITU's Radio Regulations, which include the table of frequency allocations.⁶

There are, and always have been, competing theories as to how spectrum should be managed.

Spectrum planning at a national level therefore operates within the framework set by the ITU. The ACMA manages Australia's radiofrequency spectrum in accordance with the RA, section 9 of the *Australian Communications and Media Authority Act 2005* (the **ACMA Act**) and the Spectrum Principles.

At the next level, spectrum management is conducted by ACMA via the formulation of: the Australian Radiofrequency Spectrum Plan (**ARSP**) (which generally follows the assignment of spectrum developed by the ITU); band plans (which prescribe usage and channelling arrangements in relation to a frequency band or bands); and licensing plans and policy which are administered through instruments called Radiocommunications Assignment Licensing Instructions.⁷

Licensing framework

There are, and always have been, competing theories as to how spectrum should be managed. Nonetheless, it is generally agreed that the

1 WAS include WiFi, WiMAX, 3G and 4G mobile telephony, Long Term Evolution (**LTE**) technologies and Mobile TV.

2 The Spectrum Principles (published by ACMA in May 2009) provide guidance for ACMA in its spectrum management functions.

3 ACMA, 'Release of the 3.6 GHz band for wireless access services (WAS)', *Spectrum Planning Discussion Paper SPP 02/09*, (2009) 1.

4 Ben Freyens, 'The Economics of Spectrum Management: A Review', (paper commissioned by ACMA), (2007).

5 International Telecommunications Union, *Radiocommunication Sector* (2009) <<http://www.itu.int.net/about/itu-r.aspx>> at 23 July 2009.

6 ACMA, *ITU Regulations* (2009) <http://www.acma.gov.au/WEB/STANDARD.PC/pc=PC_552> at 23 July 2009.

7 Ian Hayne, 'Spectrum Property Rights and Practical Auction Design: the Australian Experience' (Paper submitted for the Communications Research Forum 1997, Old Parliament House, 2-3 October 1997), 5.

The typical approach to managing the scarcity is twofold: encourage efficient spectrum usage and 'ration' the demand for it.

mechanisms contained in the planning hierarchy are necessary to provide a minimum level of protection from interference and to meet the spectrum needs of defence, emergency and other essential services. The primary area of controversy lies in the methods used to license or authorise access to spectrum.

Historically, spectrum management was undertaken by government administrative processes and the licensing regime granted exclusive access to spectrum.⁸ In Australia, licences were short-term, non-tradeable, highly prescriptive, and usually issued administratively on a 'first-in' basis.⁹ This central planning approach came under pressure as a result of rapid technological changes and the development of new uses for spectrum.¹⁰ Critics of the traditional approach have proposed alternatives ranging from full privatisation or exclusive property rights to unlicensed sharing through the creation of 'spectrum commons'.¹¹

Australia was one of the first countries to liberalise its licensing approach by adopting a hybrid model. The RA introduced market-based reforms and used property rights to increase efficiency of spectrum use. It also deviated from traditional device-based licensing by introducing class licences and technology-neutral spectrum licences to meet the needs of new technologies.¹²

Under the Act, all users of 'radiocommunications devices' in Australia must be licensed.¹³ There are 3 licence regimes available in Australia to authorise the operation of radiocommunications: (1) class licences; (2) apparatus licences; and (3) spectrum licences. In addition, the broadcasting and datacasting licensing regimes are also directly linked to the licensing of spectrum. The licence category chosen in relation to a segment of spectrum depends on individual circumstances and generally takes place in the context of a public consultation.

(a) Class licences (spectrum commons)

Class licensing is sometimes referred to as the 'spectrum commons' or 'public park' approach. This approach suggests that rather than providing exclusive access to spectrum, frequency bands can be shared by users adhering to codes of conduct or technical standards.¹⁴ In Australia, class licences permit users to operate devices in a designated segment of spectrum on an uncoordinated, shared basis, with no requirement for individual licences, device approval, or fees. However, users must operate devices in accordance with specified parameters that typically relate to frequency bands, radiated power limits and out-of-band emission levels.¹⁵

Although class licensing offers flexibility and efficiency, reducing barriers to entry for smaller operators and new applications, the use of devices within class licensed bands is limited in other ways. The lack

of protection from interference and the disruptive effects of overuse of class-licensed spectrum, mean that class licences are not viable for many purposes, particularly in areas of high spectrum usage. As a consequence, class licensing is generally used where there is a low potential for interference, for example, devices which use low power such as mobile phone handsets, cordless phones, remote controls and WiFi.

(b) Apparatus licences (command and control)

Apparatus licences, which adopt the traditional form of licensing, authorise the operation of individual devices. As they are issued individually and are coordinated with other spectrum users and devices, a degree of protection from interference and quality of service is assured. Apparatus licences are generally issued 'over-the-counter,' for a fee, on a 'first-in' basis, although they have been auctioned where there is excess licence demand. Licences can be issued for up to 5 years, although most have terms of 1 year.¹⁶ Apparatus licences have a presumption of renewal, unless renewal would be inconsistent with ACMA's plans.¹⁷ Licences may also be traded or leased.¹⁸ Apparatus licences tend to be used for space systems, in particular for providing an uplink or downlink to/from satellite. However, they are also used for broadcasting which is largely a terrestrial service.

(c) Spectrum licences (private spectrum)

Spectrum licences are technology-neutral in that they grant exclusive rights to a segment of spectrum in a specified geographic area, rather

As a result of switch-off significant amounts of spectrum will become available. This is known as the 'digital dividend'.

than in relation to a particular device. Spectrum licences offer greater flexibility than apparatus licences by allowing licensees to utilise the licensed frequency bands in any way they see fit, provided that they comply with the licence conditions and the technical parameters set out by ACMA (usually relating to interference and emissions). Spectrum licences are granted for a fixed period of up to 15 years,¹⁹ but are non-renewable. They are generally issued by way of a price-based allocation, usually an auction. They can be sub-divided, combined and traded.²⁰ Spectrum licences are currently used for a variety of uses, including land mobile, 2G and 3G technologies.

The economics of spectrum management

In 2007, the ACMA commissioned an independent review (the **Review**) entitled the Economics of Spectrum Management. The Review characterised the radiofrequency spectrum as a "key strategic asset for the economies of industrialised nations".²¹ That spectrum is economically significant means that the mechanisms by which spectrum is licensed and priced is integral to the spectrum management process.

8 Johannes Bauer, 'A Comparative Analysis of Spectrum Management Regimes' (Department of Telecommunication Michigan State University, East Lansing, Michigan 48824, USA) 2, <www.ictregulationtoolkit.org/en/Document.2298.pdf> at 11 August 2009.

9 Productivity Commission, *Radiocommunications*, Report no 22, AusInfo, Canberra (2002), xxxi.

10 'The usable spectrum today is five thousand times larger in terms of bandwidth than in 1927'; Kevin Werbach, 'Supercommons: Toward a Unified Theory of Wireless Communication' (2004) 82 *Texas Law Review* 867. See also Productivity Commission, *Radiocommunications*, above n5, xxxiv.

11 Bauer, n 8, 2; Kevin Werbach, 'Supercommons: Toward a Unified Theory of Wireless Communication' (2004) 82 *Texas Law Review* 863.

12 Productivity Commission, *Radiocommunications*, above n9, xxx.

13 RA s 46.

14 Freyens, n 4, 8.

15 ACMA, 'Spectrum Options: 403-520 MHz', *Discussion Paper*, (2008) 7.

16 RA s 103.

17 RA s 130. See ACMA, 'Spectrum Trading: Consultation on trading and third party authorisations of spectrum and apparatus licences' (2008) 21.

18 RA ss 131AA-131ACA.

19 RA s 65.

20 RA ss 85-88.

21 Freyens, n 4, 2.

Determining who gets what spectrum once restacking has occurred, is the crucial issue.

Pricing approaches

The perception that spectrum is a scarce resource with competing uses has driven the economic interest in spectrum management. The typical approach to managing the scarcity is twofold: encourage efficient spectrum usage and 'ration' the demand for it.²² This can occur via both regulatory and technical means.²³

Historically, spectrum inefficiencies have been managed with technical responses that increase the productive capacity of spectrum.²⁴ However the growing demand for multi-use spectrum is placing increasing pressure on spectrum management. As technical advances have not yet caught up to this demand, market pricing and trading options have emerged as a complementary solution.²⁵

(a) Traditional approach to pricing (administrative pricing)

Traditionally, licences were allocated on a first-in basis with prices set administratively. However, in 2002, the Productivity Commission stated that spectrum charges should not be aimed at raising government revenue or providing a return to the community but should rather be based on opportunity cost (that is, the value of the best forgone alternative use of that spectrum).²⁶ There has since been an increasing trend towards a market approach to radiofrequency spectrum licensing.

(b) Market-based approach to pricing (auction / opportunity cost pricing)

ACMA is now permitted to use auctions, tenders, pre-determined prices and negotiated prices for the sale of spectrum licences.²⁷ It may also determine a price-based system for the allocation of apparatus licences.²⁸ Auctions are now widely accepted as legitimate and effective methods of allocating spectrum, particularly for high demand.²⁹ Auctions are not fool-proof however and exceptions can arise where incumbent monopolies have a competitive advantage. However in Australia, bidders are subject to competition limits which prevent acquisitions which would have the effect of substantially lessening competition in a market.³⁰ Indeed the Act treats the issue of spectrum licences as an acquisition of an asset for this very purpose.

ACMA has recently stated that "auctions should always be used in allocation unless there is a good reason not to use them".³¹ ACMA

has nonetheless acknowledged that there will be occasions where auctions are not possible, even in cases of very high excess demand.³² As a result, the practice of non-auction based allocation of licences has continued, though pricing methods have changed in recent times. Apparatus licences in particular tend to be licensed administratively. The first two Spectrum Principles³³ reflect and will no doubt reinforce the trend towards market-based pricing.

Secondary markets for spectrum – trading and leasing provisions

Secondary markets help to increase spectrum efficiency by enabling and encouraging spectrum to move to its highest value use or uses. Trading and leasing mechanisms help to correct inefficient allocations made – often because of uncertainty of demand for services or rapid technological and market changes – in the primary issue of licences.³⁴ These mechanisms can also enable licensees to consolidate or aggregate contiguous blocks of spectrum.

The digital dividend spectrum is being sought after by a range of prospective spectrum users.

The RA permits both spectrum and apparatus licences to be traded³⁵ by allowing licensees to assign spectrum under their licence,³⁶ transfer apparatus licences,³⁷ or authorise third parties to operate devices under their licence.³⁸ A Consultation Paper was issued in 2008 on the measures that ACMA may take to facilitate the efficient transfer of spectrum to users or uses which value the spectrum more highly.³⁹ Submissions identified a lack of certainty regarding licence tenure beyond licence expiry as a particular barrier to trading.⁴⁰ Nonetheless, ACMA recently noted that since 2002 "there have been thousands of successful trades".⁴¹ As a recent example, Austar has confirmed that it will lease its 2.3GHz spectrum to SP AusNet for a WiMAX smart-metering rollout in Victoria.⁴²

The digital dividend

Background

Since 2001, Australia has been transitioning from analogue television broadcasting to a system requiring broadcasting in digital mode. Currently, commercial television broadcasting licensees each have 7MHz of spectrum (in addition to the 7MHz they are each allocated to provide an analogue service) to provide a core broadcasting service that simulcasts their analogue station in digital mode, as well as an HDTV

22 Productivity Commission, *Radiocommunications*, n 9, 75.

23 Freyens, n 4, 8.

24 *Ibid* 10.

25 *Ibid* 11.

26 Productivity Commission, *Radiocommunications*, n 9, 191.

27 RA, s 60.

28 RA, s 106(1).

29 Coutts in Productivity Commission, *Radiocommunications*, n 9, 169.

30 *Trade Practices Act 1974* s 50.

31 ACMA, 'Opportunity Cost Pricing of Spectrum: public consultation on administrative pricing for spectrum based on opportunity cost' (2009) 8.

32 For example, there are certain fixed point-to-point services that require careful frequency assignment and coordination. ACMA argues that in these circumstances, auctions would be 'unwieldy'. In addition, compliance with the objective in section 3(b) of the Act requires that sufficient spectrum be allocated for defence and essential services. In these cases, open auctions are also inappropriate.

33 (1) Spectrum should be allocated to the highest value use or uses; and (2) enable and encourage spectrum to move to its highest value use or uses.

34 Productivity Commission, *Radiocommunications*, above n 9, 145.

35 Spectrum licences were actually designed to be traded and were able to be traded from the time they were first introduced in 1992. Apparatus licences were only permitted to be traded from 1995. Trading is not applicable to class licences as these licensees are not allocated to a specific licensee.

36 RA s 85.

37 RA s 131AA.

38 RA ss 68 (for spectrum licences) and 114 (for apparatus licences).

39 ACMA, 'Spectrum Trading: Consultation on trading and third party authorisations of spectrum and apparatus licences', (2008), 1.

40 ACMA, 'Responses to submissions on Spectrum Trading' (2009) 4.

41 ACMA, n 39, 5.

42 Luke Coleman, 'SP AusNet to use Austar 2.3GHz spectrum', *CommsDay*, 13 June 2009.

The US administration last year raised US\$19 billion from its digital dividend licence auctions, with the lion's share of spectrum going to mobile networks.

multichannel and an SDTV multichannel.⁴³ Eventually, the number of multichannels, high definition or otherwise, that a commercial broadcaster will be able to broadcast, will be restricted only by their spectrum capacity. From 2010 to 2013, analogue television will be progressively switched off through a staged process commencing with certain regional areas and concluding with metropolitan areas.⁴⁴ As a result of the switch-off, significant amounts of spectrum will become available. The benefit of using this freed-up spectrum is known as the 'digital dividend'.⁴⁵

Decision making

Although ACMA fulfils various planning, management and compliance functions in respect of spectrum,⁴⁶ the replanning of the Broadcasting Services Bands (BSB) specifically is a decision for the Minister,⁴⁷ who may (after consulting with ACMA) designate part of the spectrum for broadcasting purposes and refer it to ACMA for planning under Part 3 of the BSA.⁴⁸ The Minister may also determine by written instrument that such a designation ceases to be in force at a specified time. The power to determine what is in the BSB implies a power to determine what falls outside of the BSB.

If the spectrum vacated following the cessation of analogue broadcasting remains part of the BSB, ACMA must continue to manage that spectrum in accordance with the BSA.⁴⁹ The Minister has powers to give certain directions to ACMA.⁵⁰ ACMA's functions also explicitly include reporting to and advising the Minister in relation to the radio-communications community.⁵¹

The Minister has not yet decided how the digital dividend will be used and whether the newly available spectrum will remain within the BSB. The Minister is preparing a green paper seeking views for this purpose. What is clear, is that this will undoubtedly be a policy decision, albeit one likely to take into account recommendations from ACMA.

Technical considerations

The BSB encompass the UHF and VHF bands of the radiofrequency spectrum which are highly valuable because of their propagation characteristics and flexibility of use. The 7MHz of digital spectrum assigned to each broadcaster were allocated in blocks of spectrum adjacent to the corresponding blocks of analogue spectrum. In order to determine the size and fully realise the benefit of the digital dividend, the spectrum in the BSB may need to be restacked. This will enable a contiguous block of spectrum to be made available for potentially alternative uses. Some of the digital dividend spectrum may also be needed to provide coverage for digital broadcasting blackspots.

However, restacking is costly and may mean that users will need to retune their digital set top boxes in order to receive the new signal.

Broadcasters may also require new or adjusted transmitters. The benefits of using the digital dividend spectrum for alternative uses will need to be weighed against the costs to both users and broadcasters of restacking and reallocating existing spectrum. Determining who gets what spectrum once restacking has occurred, is the crucial issue. As Australia is switching off analogue later than other countries (for example, the UK and the USA), it is likely that it will be influenced by the decisions made internationally in respect of the digital dividend.

Options for the digital dividend

There are a variety of uses for the digital dividend, including: new mobile services with high quality video and interactive media; wireless broadband services offering high-speed data and voice services; wider coverage for advanced services in rural and remote areas; advanced business and broadcasting services; and additional television channels, including possible HDTV channels carried on Freeview.⁵² The digital dividend spectrum is consequently being sought after by a range of prospective spectrum users.

Most countries have not yet established concrete plans for the use and allocation of the digital dividend spectrum.

To date, the most vocal of these have been the mobile and the free-to-air broadcasting sectors. Despite, or perhaps because of this, Senator Stephen Conroy emphasised at the Radcomms09 conference that "the government does not see the digital dividend as a telecoms versus broadcasting debate".⁵³

(a) Mobile broadband

Interest in the digital dividend spectrum from the mobile sector is due to the propagation characteristics of the UHF spectrum (particularly around 700MHz), which is suitable for low-cost wider-area coverage. These characteristics mean fewer base stations and heavily reduced infrastructure costs, which would enable the provision of greater coverage, especially throughout rural and regional Australia, and reduced interference risk.⁵⁴

As emphasised in its submission to the national broadband network Regulatory Reform Discussion Paper, the mobile sector regards mobile wireless broadband as a market that is already saturated by demand.⁵⁵ 3G subscriptions grew by 88 percent in 2007/2008 from 4.6 million to 8.6 million and it is forecast that mobile phones will be the primary device used in connecting to the internet by 2020.⁵⁶ Redeploying digital dividend spectrum for mobile operators, it is argued, will enable the mobile telcos to better meet this burgeoning demand.⁵⁷

In advancing its case, the mobile sector has focused efforts on presenting the economic benefits of allocating spectrum for various uses. The Australian Mobile Telecommunications Association (AMTA)⁵⁸ commissioned a study to examine the potential economic value of

43 One of the benefits of digital television is that where only one station could be broadcast using 7MHz of analogue, digital television enables the multichanneling of several stations as well as the use of HDTV within 7MHz.

44 Note that whilst the Minister has announced a timetable for switch-off, this timetable is not legislated and has been postponed several times already due to the initially slow uptake of digital television.

45 ACMA, 'Five-year Spectrum Outlook 2009-2013: ACMA's spectrum demand analysis and indicative work programs for the next five years', (2009) 24.

46 See s 9 of the *ACMA Act*.

47 *Ibid*.

48 RA s 31

49 *Ibid*.

50 *ACMA Act* s 14.

51 *ACMA Act* s 9(c); See also definition of 'radiocommunications community' in s 3 of the *ACMA Act*.

52 Alastair Gellatly, 'The Digital Dividend', (Paper presented at Radcomms06, 11-12 December 2006).

53 Stephen Conroy, 'Address from Senator the Hon. Stephen Conroy', (Podcast recorded at RadComms09 – Foundations for the Future, Sydney, 29 April 2009).

54 Chris Althaus, 'Digital Dividend', (Podcast recorded at RadComms09 - Foundations for the Future, Sydney, 30 April 2009).

55 Australian Mobile Telecommunications Association (AMTA), 'National Broadband Network: regulatory reform for 21st century broadband, Discussion Paper', (submission by AMTA) (2009), 4.

56 Althaus, n 54.

57 Wireless broadband subscriber numbers more than tripled to 1.5 million in 2008 alone. Dominic White & Neil Shoebridge, 'PM's \$1bn digital dividend', *MIS Financial Review*, 23 July 2009.

58 AMTA's members include Telstra, Optus and VHA.

Australia is likely to take its cue from overseas developments

the digital dividend in a range of scenarios. The study found that the economy would be boosted by up to \$10 billion over a 20 year period if 40 percent or 120MHz of the band of low-frequency spectrum (that is, 700MHz spectrum) released after analogue switch-off was made available for mobile broadband use.⁵⁹

Although Senator Conroy has insisted that “the digital dividend is not about revenue to the budget” but rather “the economic and social benefits of the services that it can support”,⁶⁰ commentators have noted that the revenue opportunity offered by the digital switchover is unlikely to be ignored. Further, “the well-capitalised mobile phone industry is best placed to pay the biggest fees”.⁶¹ The US administration last year raised US\$19 billion from its digital dividend licence auctions, with the lion’s share of spectrum going to mobile networks. Nonetheless, the mobile industry faces another potentially large bill to renew its 2G and 3G spectrum licences as they expire between 2013 and 2016. The capacity and appetite of industry participants to acquire rights to additional spectrum therefore remains to be seen.

As most of the spectrum relevant technology deployed in Australia is designed overseas, there are also technical and commercial benefits of aligning Australia’s digital dividend spectrum with global trends in spectrum allocation. Internationally, analogue television spectrum has already been identified for use for International Mobile Telecommunications (IMT).⁶² Nine administrations in Australia’s region (including New Zealand, Japan, Korea, China and India) have recently indicated that they support the use of the 700MHz band for IMT.⁶³

It is worth noting that the digital dividend spectrum is currently being proposed as the ‘stick’ to encourage Telstra to structurally separate. The *Telecommunications Legislation Amendment (Competition and Consumer Safeguards) Bill 2009* provides that if Telstra does not structurally separate, then it will be forced to functionally separate and it will be prohibited from controlling spectrum useful for advanced wireless broadband, including 520 MHz to 820 MHz (digital dividend spectrum).

(b) Broadcasting Services

The free to air television networks have also been lobbying the government, expressing both a desire to retain their current spectrum to enable them to provide enhanced digital services, as well as their concerns that the allocation of a significant portion of this spectrum to the mobile sector might cause interference with the reception of their broadcasts. Lobbying efforts have attempted to secure a guarantee from the government that the freed up spectrum will not be used to provide new commercial television services. The fracturing of audiences in recent years as a result of Pay-TV and new media services such as IPTV, means that further fracturing as a result of a fourth commercial television channel could be detrimental to the already “debt-laden networks”.⁶⁴ The preference for the free to air television networks if they are unable to retain the spectrum, is that the relevant

spectrum is allocated to the mobile sector with restrictions on use.

At the National Press Conference in June 2009, FOXTEL chief executive Kim Williams called for the auctioning of the analogue spectrum before the switch-off (as has already occurred in the USA). More controversially, he also demanded an end to the protection of the incumbent free to air broadcasters by proposing that others, like FOXTEL, should be given the opportunity to own and operate a new television network either terrestrially or via satellite.⁶⁵

Although Senator Conroy has stated publicly that a fourth commercial television channel has not been ruled out, it seems unlikely that the analogue spectrum will be used for this purpose. Auctions of digital dividend spectrum overseas have led to estimates that the Australian spectrum could be valued at about \$1 billion, which would more than offset the costs associated with analogue switch-off.⁶⁶ As broadcasting licence fees are tied to revenue rather than spectrum usage, the allocation of spectrum for use by another commercial television network would make it less likely that this amount could be recovered. Further, there is a reduced incentive to use spectrum efficiently.⁶⁷

Overseas approaches

Most countries have not yet established concrete plans for the use and allocation of the digital dividend spectrum. Nonetheless, there are a number of countries that either have or will switch off their analogue television signal prior to Australia and who may provide guidance.

Between 2012 and 2021, a total of 679 spectrum licences are due to expire. Most of these licences are used for mobile telephony... Some of these licences are extremely valuable.

To date, the USA is leading the way in freeing up and allocating the digital dividend spectrum. The USA ended all full-power analogue television broadcasts at midnight on June 12, 2009. It completed the auction of spectrum in the 700MHz band over a year earlier, in March 2008. The nation’s two largest mobile phone providers – AT&T and Verizon – won most of the spectrum and the auction generated proceeds of US\$19 billion.⁶⁸ Although the subsequent economic downturn could result in lower than anticipated proceeds, the revenues raised nonetheless demonstrate the value placed on this spectrum by wireless operators.

The last transmitters in the UK are scheduled to be switched off by March 2013⁶⁹ and in July 2009, Ofcom (the UK regulator) officially announced its plans to free the 800MHz band to provide mobile broadband services. Some other European nations have also decided to release the entire 800 MHz spectrum for wireless services, including Finland, France, Switzerland, Germany, Sweden, Denmark and Spain.⁷⁰ It is expected that other European nations will follow suit.

59 Spectrum Value Partners / Venture Consulting, *Getting the most out of the digital dividend in Australia: Allocating UHF spectrum to maximise the economic benefits for Australia*, (Report commissioned by AMTA) (2009).

60 Conroy, n 53.

61 White & Shoebridge, n 57.

62 International Mobile Telecommunications-2000 (IMT-2000) is the global standard for third generation (3G) wireless communications, defined by a set of interdependent ITU Recommendations; International Telecommunications Union, *ITU Activities on IMT-2000* (2009) <<http://www.itu.int/home/imt.html>> at 23 July 2009.

63 AMTA, n 55, 10.

64 Stephen Bartholomeusz, ‘Recasting the digital revolution’, *Business Spectator*, 16 June 2009 <<http://www.businessspectator.com.au/bs.nsf/Article/Recasting-the-digital-revolution-pd20090616-T3B5T?OpenDocument>> at 23 July 2009.

65 Jane Schulze, ‘Kim Williams calls for fourth free-to-air TV network’, *The Australian*, 16 June 2009.

66 Bartholomeusz, n 64.

67 For a long while, Ten was the only commercial broadcaster using an additional channel (called One HD), although Nine began broadcasting its new channel Go! in August 2009 and Seven began broadcasting its new channel 7two in November 2009.

68 PWC, ‘Timing is Everything: releasing the value of spectrum’, <http://www.pwc.com/en_GX/gx/communications/pdf/spectrum_releasing_value.pdf> at 10 August 2009.

69 Independent Spectrum Broker, *Report from the Independent Spectrum Broker: findings and policy proposals*, UK (2009) 42.

70 ‘Digital Dividend Spectrum: the way ahead’, *CXOtoday.com*, 16 July 2009, <http://www.cxotoday.com/India/News/Digital_Dividend_Spectrum_-_the_Way_Ahead/551-104423-912.html> at 10 August 2009.

the role of wireless broadband services within the NBN framework has been given little attention to date.

As Australia is predominantly an importer of technology, it is likely to take its cue from these overseas developments in order to ensure that the relevant technologies are suitable for domestic use.

The need for certainty

For all the stakeholder lobbying, the ministerial releases and overseas digital dividend activity, the digital dividend debate in Australia is still plagued by uncertainty as to timing and approach. Reallocation and auctioning of spectrum cannot occur until a date for analogue switch-off has been finalised and transmission blackspots have been identified. Although switch-off timelines have been published and the Minister has released media statements claiming this will occur in 2013, there has to date been no official declaration confirming the actual timing for switch-off.

The Productivity Commission recommended that the remaining analogue spectrum "should be replanned and sold two years before the conclusion of the simulcast period."⁷¹ Not only will this reveal the opportunity cost of continued analogue use, but new spectrum owners would have an incentive to encourage the digital conversion process,⁷² as well as allowing time for new infrastructure build.

Spectrum licences

Background

Between 2012 and 2021, a total of 679 spectrum licences which range from 500MHz to 31GHz are due to expire. Most of these licences are used for land mobile, mobile telephony, WAS or 3G mobile telephony. Some of these licences are extremely valuable.⁷³ The commercial and political focus is expected to be on licences in the 800MHz, 1800MHz, 2.1GHz, 2.3GHz and 3.4GHz bands which were auctioned to VHA, Telstra and Optus.

Options for expiring spectrum licences

There are two main options for the re-issue of spectrum licences under the RA: (1) reallocation by an auction, tender, or pre-determined or negotiated price⁷⁴ within 2 years of expiry; or (2) renewal of the licence to the incumbent in certain circumstances, in which case incumbent licensees will be charged a spectrum access charge determined by ACMA.⁷⁵ A third, though less likely option, is to re-assign the spectrum for another use, for example, by issuing an apparatus licence in the relevant band. The Act permits ACMA to vary the conditions of re-issued spectrum licences under any of these options.

The government has not yet determined the approach that it will take. However, the urgency of assuring a degree of certainty for stakeholders is increasing as the expiry dates approach.

The National Broadband Network

The final 10%

In April 2009, the Minister announced its intention to establish a company (**NBN Co**) that will build and operate a new national broadband network. Over an expected eight year construction phase, up to \$43 billion will be invested in the NBN. The NBN will connect 90 per cent of all Australian premises with broadband services with speeds of up to 100 megabits per second and the remaining 10 per cent of premises with next generation wireless and satellite technologies that will

deliver broadband speeds of 12 megabits per second.

The Implementation Plan

As one of its first steps in the NBN process, the government released a discussion paper to consult on the options for broader reforms to make the existing regulatory regime more effective in the transition period before the network is fully rolled out (the **Discussion Paper**).⁷⁶

The Discussion Paper contained only a brief section on spectrum, which noted that:

*Spectrum may need to be reserved at appropriate frequencies to deliver superfast broadband services using wireless and satellite technologies in areas that will not be covered by fibre optic to the home and workplace...[T]hese future demands will place pressure on available spectrum.*⁷⁷

The Discussion Paper and the relevant submissions focused on whether competition restrictions are necessary to limit access to valuable spectrum, as well as how the Commonwealth can encourage competition between different technology platforms.⁷⁸ It also noted that "the relative roles of satellite and wireless in the National Broadband Network will be determined by the Government following the Implementation Study". The majority of submissions that commented on these issues found that the current competition restrictions provided under the *Trade Practices Act* are adequate.

the perceived spectrum scarcity is not actually reflective of spectrum utilisation, with many bands heavily underutilised for much of the time.

Further issues

Aside from the limited competition-focused issues mentioned in the Discussion Paper, the role of wireless broadband services within the NBN framework has been given little attention to date. However, in order to realise its commitment to providing wireless broadband access to 10 percent of the population, the government will need to acquire or provide access to adequate spectrum and necessary services, within the confines of the NBN mandate. Consideration will therefore need to be given to the following issues, which will undoubtedly intersect with spectrum management and spectrum demand.

(a) Operational structure

The way that the provision of wireless broadband to the remaining 10 per cent will fit into the operational structure of NBN Co, especially given the requirement to construct and operate a wholesale only open-access network, will require consideration. Some options could include:

- **Option 1:** NBN Co provides backhaul to retail service providers. The Commonwealth could provide a subsidy to either retail service providers or to consumers to close the gap between retail prices in metropolitan and rural areas in exchange for the retail service providers providing services in the relevant areas.
- **Option 2:** NBN Co acquires the spectrum (or satellite bandwidth where applicable) and makes this spectrum/bandwidth available to retail service providers at a subsidised rate.

71 Productivity Commission, *Broadcasting*, Report no.11, AusInfo, Canberra (2000), 13.

72 Ibid.

73 ACMA, 'Five-year Spectrum Outlook 2009-2013: ACMA's spectrum demand analysis and indicative work programs for the next five years', above n 45, 23.

74 RA s 60.

75 RA s 294.

76 Department of Broadband, Communications and the Digital Economy, *National Broadband Network: Regulatory Reform for 21st Century Broadband Discussion Paper*, (2009) 1.

77 Ibid 26.

78 Ibid 27.

- **Option 3:** NBN Co acquires the spectrum/bandwidth and provides retail services to the remaining 10 per cent (this would require an exemption from the requirement that NBN Co operate a wholesale only network).

(b) Universal Service Obligation (USO)

Whether any of the options set out above would obviate the need for the USO also needs to be considered. For example, as noted by the ACCC in its submission to the Discussion Paper, consideration could be given to whether universal service should focus on ensuring access to a wholesale level service or the infrastructure element that provides services (for example, access to NBN or spectrum or satellite bandwidth) rather than retail services. Alternatively, if Option 3 is adopted, an issue is whether the USO should apply to NBN Co as a retail service provider in relation to its provision of wireless broadband services, such that it would be a provider of last resort.

(c) Technical requirements

The most appropriate spectrum for the purposes and the speeds that can be delivered using the technologies available will need to be taken into account. Although some retail service providers such as Telstra, Optus and VHA offer broad network coverage, they may need to upgrade their networks to deliver services with speeds of at least 12 megabits per second. If Options 1 or 2 are adopted, subsidies to retail service providers may need to be subject to a condition that the retail service providers provide wireless or satellite services with speeds of at least 12 megabits per second. Further, if Options 2 or 3 are adopted, regard will need to be had to the most suitable spectrum and technologies for delivering wireless access services (which could include 3G or LTE services).

(d) Licensing

Options 2 and 3 will also require consideration of the appropriate licensing framework (for example, apparatus licensing, spectrum licensing or class licensing), as well as the nature of any licence conditions.

An integrated approach

The implications of the digital dividend and the upcoming expiry of spectrum licences will both need to be considered when making decisions about the use of spectrum for the NBN. The occurrence of all of these events within a relatively small time period, offers a unique opportunity to harmonise spectrum management and in doing so, maximise the efficiency and standard of relevant services. Although in Australia each of these spectrum issues appears to be being considered in isolation, this is not the approach being taken elsewhere and Australia can be guided by these approaches.

The Digital Britain Report has recognised that adopting an integrated approach to spectrum management, and more specifically, these upcoming developments, could have significant benefits. For example, the report noted that:

[t]he rationale for an integrated approach derives largely from the fact that [Next Generation Network] technologies require large blocks of spectrum both at low and high frequencies. Addressing these requirements in an integrated way, if that can be achieved quickly, should give operators greater certainty over their future spectrum holdings whilst continuing to support a competitive market outcome.⁷⁹

The need for an NBN solution that provides competitive and early deployment of wireless next generation networks, should in theory drive such an integrated approach in Australia. Whether this approach is adopted, however, remains to be seen.

Conclusion

Spectrum management is now at a vital juncture. The demand for spectrum is increasing exponentially as new bandwidth-intensive and media-rich wireless broadband services are becoming essential utilities; as important as electricity or gas.⁸⁰ Nonetheless, the perceived spectrum scarcity is not actually reflective of spectrum utilisation, with many bands heavily underutilised for much of the time. Licensing mechanisms and a lack of longevity are providing damaging uncertainty to incumbents. At the same time, the upcoming digital switch-off, expiry of spectrum licences and roll-out of the NBN, offer a unique opportunity to reassess the spectrum management regime, including the allocation mechanisms by which spectrum management has traditionally been undertaken.

Tensions between the property rights and commons models reflect broader political and economic relationships.⁸¹ Accordingly, the policy shift towards privatising the public airwaves over the past few decades reflects a more general shift to market-based approaches and deregulation. In addition, there has been an increasing recognition that exclusive forms of allocation predicated on assumptions of spectrum scarcity are becoming inappropriate, particularly as spectrum is being used less for traditional broadcast media and more for data communications services.⁸² This shift in paradigm has particularly gained traction internationally with the adoption of hybrid commons models.

In Australia, developments appear to have stalled. Despite the influx of spectrum consultations conducted in late 2008 and early 2009, upcoming spectrum issues suddenly took a back seat on the national communications agenda following the announcement of the NBN in April 2009. Remarkably, spectrum issues have barely garnered a mention in (public) NBN discussions. This is despite the fact that spectrum management will have both a significant role to play in, and will also be significantly affected by, the provision of broadband access via the NBN. The NBN will undoubtedly be a catalyst for higher volume communication and radiofrequency spectrum will necessarily be part of the network structure. Poor NBN planning with little regard to spectrum could result in wireless bottlenecks or last-mile failures. The speed with which the NBN is gaining momentum only accentuates the urgency and the importance of making decisions about spectrum management which will factor in considerations relating to *all* of the upcoming developments discussed above.

Spectrum mis-management can have serious social and economic implications. Both ACMA and the Department for Broadband, Communications and the Digital Economy now have the potential to reshape the spectrum environment for the long term. Where spectrum policy has typically evolved haphazardly, the coincidence of these regulatory and technological developments provides a unique opportunity to streamline the approach to spectrum management, leading to greater efficiencies in both the regulation and use of spectrum. In order to do so, however, there is a need to adopt a holistic approach, commit the necessary resources and provide a degree of certainty to the relevant stakeholders. Importantly, these steps need to occur without political motivation and without regard to the fact that there are at least two federal elections due before most of these developments will be complete.

79 Department for Business Innovation and Skills, *Digital Britain Report: Impact assessment* (2009) 73.

80 Department for Culture, Media and Sport and Department for Business, Innovation and Skills (UK), *Digital Britain Final Report* (2009), 52.

81 Victor Pickard and Sascha Meinrath, 'Revitalizing the Public Airwaves: Opportunistic Unlicensed Reuse of Government Spectrum' (Working Paper No. 24, New America Foundation, 2009) 7.

82 *Ibid.*