



# **Spectrum Review**

**Submission to the  
Department of Communications**

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## Key recommendations

Vodafone proposes a series of reforms to transition the spectrum management framework to a more efficient and flexible system:

- **Adopt a market-oriented licensing framework.** Transition the licensing framework toward the use of transferable property rights. These property rights would be similar spectrum licences, with homogeneous emissions and power limits however they would be available in smaller frequency and geographic blocks. The transition to the new framework would include the allocation of licences even if there is no identified use for the spectrum. This arrangement would create a more flexible system for ensuring efficient allocation and innovative use of the spectrum.
- **Require assembly of licences to assist with interference management.** Emissions and power limits should only be binding if the user does not hold rights to the adjacent frequency or geographic areas. This will permit spectrum users to assemble licences to build frequency and geographic buffers that protect their transmitters and receivers.
- **Increase the maximum term of licences to 25 years.** Short licence terms inhibit the secondary market for spectrum and impose administrative costs and risks on government. The maximum licence term should increase and new licences should generally be issued for the maximum term.
- **Make an economic regulator (e.g., the ACCC) responsible for spectrum allocation in contestable industries.** The allocation of property rights within contestable industries requires advanced analytic capabilities in microeconomics, industrial organisation and game theory. It is preferable for this task to be undertaken by a specialist economic regulator. Currently there are limited arrangements for the ACCC to be involved in spectrum management; its role should be expanded, permitting the ACMA to focus on their core technical competencies.
- **Create an objective to “promote competition” in the Radiocommunications Act.** Insufficient regard has been given to competition matters in spectrum allocation decisions. With more widespread use of transferable property rights, safeguards will be required to avoid excess concentration of spectrum holdings and to promote competition in contestable industries.
- **Introduce efficient pricing principles and payment practices.** Opportunity cost pricing should be used to set spectrum access charges and reserve prices for the allocation of spectrum. Flexibility between upfront and annual payment terms should be introduced and the timing of upfront payments should coincide with licence commencement.
- **Expand the enforcement toolkit and resource enforcement.** For a market-oriented system to be effective, it is essential to protect the integrity of property rights. This requires expanding the ACMA’s enforcement toolkit and resourcing it to police interference.
- **Legislate maximum timeframes for regulatory processes.** Regulator efficiency can be improved by introducing legislatively prescribed timeframes for core regulatory processes.



*It is sometimes implied that the aim of regulation in the radio industry should be to minimize interference. But this would be wrong. The aim should be to maximize output.*

- Ronald Coase (1959)<sup>1</sup>

*There would be no difficulty about efficient control or planning were conditions so simple that a single person or board could effectively survey all the relevant facts. It is only as the factors which have to be taken into account become so numerous that it is impossible to gain a synoptic view of them, that decentralisation becomes imperative.*

- Friedrich Hayek (1944)<sup>2</sup>

## 1. Introduction

Vodafone congratulates the Government for establishing this comprehensive and wide-ranging Spectrum Review. It comes at a critical time in the management of this vital resource. The mobile revolution and the importance in spectrum for uses such as communications, broadcasting, emergency services and national defence, means that policymakers must look to ensuring the spectrum management regime can sustain and grow the **spectrum-enabled economy** in the decades ahead.

An effective, modern spectrum framework is essential to unlocking Australia's growth potential. Radio technologies are increasingly being used across an array of industries to drive productivity, foster innovation and to deliver a range of social benefits such as public protection and disaster relief. Spectrum is already helping to enable the internet of things, powering sensor-driven decision analytics and facilitating remote process optimisation in industries ranging from health to electricity demand management.<sup>3</sup> If our society is to maximise the benefits from the technological progress being made in economies around the world, it is imperative for Australia to ensure it makes the most productive use of its spectrum resources today while ensuring those resources can efficiently move to more productive uses tomorrow.

The mobile industry is a large part of the spectrum-enabled economy. The Centre for International Economics (CIE) indicated that mobile broadband increased Australia's economic activity by \$33.8 billion

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<sup>1</sup> Coase, R.H. (1959), 'The Federal Communications Commission', *Journal of Law and Economics*, Vol. 2, October, p27.

<sup>2</sup> Hayek, F.A. (1944), *The Road to Serfdom*, Routledge, Great Britain, p51.

<sup>3</sup> McKinsey & Company (2010), *The internet of things*, McKinsey Quarterly, March.



in 2013 and identified that lack of access to spectrum “could potentially constrain or reduce the future economic value of mobile broadband”.<sup>4</sup>

Australia has an unusual mobiles market. We enjoy the benefits of three large, high-quality and advanced metropolitan mobile networks, and yet there is significant market dominance in regional Australia. Many regional consumers have limited choice, resulting in higher prices and less productivity improvements in the regional economy. Policy and regulatory frameworks have contributed to this outcome, and spectrum management is one area where scrutiny is required.

In regional Australia, Telstra now has access to 58% of the low-band mobile spectrum (i.e., 700, 850 and 900 MHz bands) – double the quantity of its nearest competitor. And yet the policy framework has limited mechanisms to even formally assess whether this is an appropriate or efficient outcome.

This is not to say that more prescriptive and interventionist approaches to spectrum management should be considered. Far from it. In this submission, Vodafone advocates less prescriptive regulation and more flexible arrangements for spectrum use. It is time to remove the layers of regulatory protection that insulate incumbents and to instead let competition, innovation and investment flourish.

## 1.1 Ensuring the productive use of Australia’s spectrum resources

Australia’s interests are best-served not only by ensuring that spectrum moves to its highest value use but ensuring it does so in a timely manner. That outcome is not being achieved today. There are numerous instances where the spectrum management framework is not delivering for the industries that rely on it, and for the people and businesses who benefit from the services offered over it:

- The interplay between auction design, reserve prices, allocation limits and, existing spectrum and infrastructure endowments has meant that the promotion of competition in contestable industries has not adequately been considered in spectrum allocation decisions. Telstra has accumulated **58%** of the low-band mobile spectrum (i.e., the 700, 850 and 900 MHz bands) in regional areas – double the quantity of spectrum of its nearest competitor. This concentration of low-band spectrum holdings is a significant barrier to the expansion of competitive mobile services in regional Australia.
- The potential for innovative spectrum uses (e.g., low-powered wide area networks) to develop can be constrained by lack of clear opportunities to acquire and use spectrum. The current spectrum management framework emphasises planning but it is difficult to plan for innovation. The

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<sup>4</sup> The CIE (2014), *The economic impacts of mobile broadband on the Australian economy from 2006 to 2013*, March, p2.



administrative processes for accommodating new spectrum uses are lengthy and drawn out, threatening to curtail innovative technologies before they have an opportunity to gain scale.

- The framework does not encourage the efficient reallocation of spectrum. For instance, 700 MHz spectrum licences will be issued on 1 January 2015, nearly five years after the Government announced the “digital dividend” in June 2010. During this time, the broadcast industry received **\$143 million** from the Australian Government to assist it with the digital switchover after it stopped using **126 MHz** of spectrum in the 700 MHz band. The ACMA then sold **60 MHz** of that spectrum to two mobile network operators for nearly **\$1.9 billion**.
- The framework is characterised by highly inefficient and inconsistently applied administrative processes, which are epitomised by the variations in payment terms for different spectrum licences. Payment for Vodafone’s spectrum licences in the 800 MHz band and parts of the 1800 MHz band was required **12 days** before licences commenced. Whereas, payment for our other licences in the 1800 MHz band was required **368 days** before licences commenced. For the digital dividend auction, the ACMA was directed by then Minister to issue a notice for the balance of 700 MHz payments no earlier than 1 October 2014, which suggests payment was required around **64 days** before the licences commenced.<sup>5</sup> (Under the original auction rules payment for 700 MHz licences could have been required more than **580 days** prior to licences commencing).<sup>6</sup>
- Vodafone has been prevented from making investments to deploy 4G mobile services at **387** locations in regional Australia using the 1800 MHz spectrum band because the ACMA has had the spectrum under embargo while it has spent more than two years contemplating how to re-plan the band. An ACMA paper from 2012 indicated “the ACMA’s view is that apparatus licensing arrangements will allow it to provide stakeholders with access to the band in early 2013”.<sup>7</sup> The spectrum Vodafone is seeking is not being used in many parts of the country and yet the ACMA had still not made a decision on how the mobile industry can access it as at 2 December 2014. A contributor to the delay is the ambiguity of who and how the call should be made to allocate spectrum to interested parties.

Such processes and outcomes were arguably not intended to occur given the historic origins of Australia’s spectrum management framework and the reasons given for its adoption.

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<sup>5</sup> Australian Communications and Media Authority (*Spectrum Licence Allocation – Combinatorial Clock Auction – Eligibility Deadline and Payment Terms*) Direction 2013 and *Radiocommunications (Spectrum Licence Allocation – Combinatorial Clock Auction) Determination 2012*.

<sup>6</sup> ACMA (2012), *Digital Dividend Auction: Auction guide*.

<sup>7</sup> ACMA (2012), *Regional and remote apparatus licences in the 1800 MHz band*, Issues paper 1, December.



## 1.2 Historic spectrum reforms did not achieve their goals

Australia's current spectrum management framework commenced after the *Radiocommunications Bill 1992* (the **Bill**) was passed into law. The Explanatory Memorandum that accompanied the Bill indicated the reforms were intended to deliver a three-part reform strategy consisting of:

1. the progressive introduction of a market system of spectrum management to operate in defined spectrum bands alongside the existing administrative system;
2. improvements to the current administrative system; and
3. the establishment of the Spectrum Management Agency (**SMA**) to undertake management of the radiofrequency spectrum.<sup>8</sup>

The Explanatory Memorandum to the Bill also stated:

*The reforms are primarily aimed at achieving greater efficiency in spectrum allocation and use. A market system will provide increased flexibility for users and improved opportunities for manufacturers. The creation of the SMA and other improvements will increase planning and operational flexibility, and provide greater transparency and accountability. Overall, the reforms will remove structural obstacles to the introduction of new communications technologies and services, and encourage initiative, innovation and investment in radiocommunications services.<sup>9</sup>*

The Bill was clearly intended to support a framework that shifted Australia's regulatory "command and control" approach to a more market-oriented system. Market systems were recognised as being more flexible and better at encouraging innovation and investment than centrally-planned systems.

The promise of the 1992 reforms requires new impetus. The use of a market system of spectrum management remains limited and the use of market mechanisms has arguably been decreasing in recent times. The existing administration of the spectrum management framework is cumbersome and inefficient, imposing regulatory burdens on industry and increasing administrative costs for the regulator. As a consequence, spectrum has not move from low yield to high yield uses in a timely or efficient manner.

At the centre of the spectrum management framework is the ACMA, the agency now responsible for undertaking the management of the radiofrequency spectrum. Unfortunately, the nature of spectrum management functions as defined within the *Radiocommunications Act 1992* and in the *Broadcasting Services Act 1992* have led the ACMA (and its predecessors) to assume the role of "central planner" rather than "market facilitator". As a consequence, the current spectrum management framework has only

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<sup>8</sup> Parliament of the Commonwealth of Australia (1992), *Radiocommunications Bill 1992*, Explanatory Memorandum.

<sup>9</sup> *Ibid.*, p2.



provided a small evolution beyond the regulatory “command and control” approaches that preceded it and the core goals of the 1992 reforms have not been achieved.

### 1.3 Re-invigorating spectrum reform

Australia cannot afford to be complacent about its spectrum management framework. There is growing evidence that the framework is beginning to limit opportunities for Australia’s people and businesses.

The regulatory processes to allocate and reallocate spectrum are not working efficiently, with the ACMA often taking years to undertake planning processes and to make decisions. Administrative processes are cumbersome, costly and complex imposing unnecessary regulatory burdens on business and deterring innovative uses of the spectrum by small and medium-sized users. The transparency of regulatory processes and accountability for regulatory decisions is low, leading to inconsistency in spectrum management and uncertainty for spectrum users. Despite clause 3(a) of the *Radiocommunications Act 1992* specifying that an object of the Act is to maximise the overall public benefit by ensuring efficient allocation of the spectrum, there has been insufficient regard for competition matters in spectrum allocation and reallocation decisions.

With the range of equipment and devices that make use of spectrum growing in the economy, Australia’s spectrum management framework must do better. A “root-and-branch” review of the spectrum management framework is essential to unlocking the productivity potential of Australia’s spectrum-enabled economy. For this reason, we congratulate the Government for the timeliness and ambition of this review.

The remaining sections of this submission provides Vodafone’s views on spectrum market characteristics, the current spectrum management framework and opportunities for improvement:

- the supply and demand of spectrum (see **Chapter 2**);
- rationales for market intervention (see **Chapter 3**);
- the core functions required of a spectrum management framework (see **Chapter 4**);
- the institutional arrangements necessary to perform spectrum management functions and tasks (see **Chapter 5**); and
- the design of effective regulatory processes (see **Chapter 6**).



## 2. Spectrum market characteristics

Before considering potential reforms to the spectrum management framework, it is useful to explore the supply and demand characteristics for use of the spectrum.

### 2.1 Supply

The radiofrequency spectrum is the portion of the electromagnetic spectrum that transmits radiocommunications. The boundaries of the radiofrequency spectrum are considered to range from 3 kilohertz (kHz) to 300 gigahertz (see **Table 1**). Each unit of spectrum has frequency, geographic and time dimensions.

**Table 1: Broad radiofrequency spectrum bands**

Frequency band	Lower bound	Upper bound
Very low frequency	3 kHz	30 kHz
Low frequency	30 kHz	300 kHz
Medium frequency	300 kHz	3000 kHz
High frequency	3 MHz	30 MHz
Very high frequency	30 MHz	300 MHz
Ultra high frequency	300 MHz	3000 MHz
Super high frequency	3 GHz	30 GHz
Extremely high frequency	30 GHz	300 GHz

Source: Based on Cave, M. (2002), *Review of Radio Spectrum Management*, Prepared for the UK's Department of Trade and Industry and Her Majesty's Treasury, March.

### Spectrum: A finite, non-depletable resource

The Productivity Commission (2002) identified four features about the supply of radiofrequency spectrum that are critical to informing an effective spectrum management framework.<sup>10</sup> The spectrum is:

- **finite** and bounded by its frequency range, with section 8(1) of the *Radiocommunications Act 1992 (Cth)* defining radiocommunications as “any emission of electromagnetic energy of frequencies less than 420 terahertz without continuous artificial guide”;

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<sup>10</sup> Productivity Commission (2002), *Radiocommunications*, Inquiry report No. 22, 1 July.



- **non-depletable**, with use of the spectrum today not impacting how much spectrum is available to use tomorrow;
- **non-storable**, spectrum that is not used today cannot be stockpiled and used tomorrow. If spectrum is not used at a moment in time its economic value is lost forever;
- **rivalrous**, the use of a parcel spectrum for one purpose may prevent its simultaneous use for other purposes due to the potential for *interference* and *congestion*. Interference refers to instances where radio receivers are unable to distinguish wanted radio signals from unwanted radio signals. Interference inhibits the ability of radiocommunications to work as intended and may completely prevent communications connectivity in some instances. Congestion may occur in bands with compatible uses due to the physical limits of the radiofrequency spectrum. It will often have a temporal dimension (e.g., peak period demand, which is often referred to as the “busy hour” in telecommunications); and
- **non-homogeneous**, different radiofrequencies have different *propagation* characteristics. Propagation refers to the area or distance of coverage that a transmitting device can achieve. Lower frequency transmissions tend to travel further and penetrate buildings more effectively than higher frequency transmissions.

The utility of spectrum is also influenced by its *bandwidth*. Bandwidth refers to the frequency range used to transmit or receive radio signals – the greater the bandwidth the more information that can be transmitted.

### The Government has ultimate power over spectrum property rights

Appropriately, under the current spectrum management framework the Australian Government has ultimate responsibility for defining and allocating the primary property rights for the radiofrequency spectrum. The Government determines the quantity of spectrum to be allocated or reallocated for a particular purpose and often sets the minimum price for which that spectrum will be sold. While ultimate power for spectrum allocation should rest with Government, it is also essential that the Government establish a framework that delivers flexibility and economic efficiency.

The Government often has dual objectives in spectrum allocation decisions. The first objective is its pursuit of an allocation that maximises the public benefit. The second objective is to maximise revenue from the allocation of spectrum property rights to benefit its fiscal position. These dual objectives may not always be compatible, and when they are not spectrum may not be allocated efficiently. This is why careful framework design is essential.

### Secondary markets and the supply of spectrum

After spectrum has been allocated by Government, the current spectrum management framework enables spectrum trading via the transfer of licences between parties and permits licence holders to provide authorised use of their spectrum to third parties. Secondary markets and third party authorisations



have facilitated efficient outcomes for bands where spectrum licences are used. However, the use of the secondary market and third party authorisations is relatively limited for apparatus licences. This is a missed opportunity in the current spectrum management framework.

## The role of international harmonisation in the supply of Australian radiofrequency spectrum

Radiofrequency spectrum is characterised by significant efforts to coordinate and harmonise the use of radiofrequency bands. These efforts are primarily determined by the International Telecommunications Union (ITU), a specialised agency of the United Nations. As a signatory to the Constitution and Convention of the ITU, Australia must ensure that its satellite networks comply with the ITU's Radio Regulations so that our space networks can receive international protection.

International coordination is also important for spectrum users whose use is difficult to limit to national boundaries or for users with regular cross-border activity (e.g. maritime services). For commercial users of the spectrum such as the mobile industry, international harmonisation of radiofrequency planning influences the availability and the affordability of radiocommunications equipment and assists in the viability of providing certain types of commercial services (e.g., international mobile roaming).

There are costs to harmonisation. The effect of international coordination via the ITU's Radio Regulations is to further limit the supply of radiofrequency spectrum for specific uses.

On balance, the economic benefits for Australia of supporting the ITU's spectrum coordination efforts are likely to offset its costs; indeed any associated costs with international coordination are often reduced by the ITU's approach of defining multiple uses for radiofrequency ranges and leaving it to individual national administrations to determine the specific use of greatest benefit to that particular country.

## 2.2 Demand

The industries that use spectrum take many forms including mobile communications, broadcasting services, fixed services (i.e., point-to-point or point-to-multipoint services), radio-based navigation and location systems, satellites, meteorology, radio-astronomy, emergency services, defence and domestic devices such as remote-controlled devices. Across these industries there are three distinct types of spectrum users: commercial users, government users and community users.

### User dimensions

#### *Commercial*

Spectrum is an essential input into a range of commercial services including mobile telecommunications services, fixed wireless broadband services, satellite communications and broadcast television. These services require unimpaired access to the spectrum and use that access provide services across a wide area.



Spectrum is also used by commercial manufacturers to deliver consumer convenience across a range of customer premise equipment (**CPE**) including remote-controlled devices, Wi-Fi enabled modems and wireless microphones. Often CPE has a lower output which means the geographic dimensions to the CPE use are limited and manufacturers design equipment tailored to use spectrum that is not used for other purposes.

The economic value of spectrum to commercial users is derived from downstream demand for their goods and services and the cost of using alternative ways to meet that demand. For instance, if users' willingness-to-pay for fixed wireless broadband is not sufficient to cover the costs of the network excluding spectrum it will not be economic for the fixed wireless operator to acquire spectrum at any positive price. There are sometimes technology alternatives to spectrum. For instance, mobile network operators can use additional sites rather than additional spectrum to address capacity constraints.

When the available spectrum for a particular purpose is scarce, the distribution of spectrum between the industry's participants will have significant implications for the industry's market structure. Specifically, if spectrum holdings are concentrated then industry participants with more spectrum will have greater capacity to support downstream demand for services than participants with less spectrum.

Bandwidth-related network capability differences are another instance where the scarcity of spectrum may impact an industry's competitive dynamics. For instance, 4G mobile technology can use 20 MHz carrier channels however not all bands commonly used by mobile network operators (**MNOs**) have sufficient spectrum to support a 20 MHz channel for each of the three existing MNOs.

The market structure for an industry is also influenced by the availability of additional spectrum. There are no prospects for entry into an industry or expansion into a geographic area without access to spectrum. For instances, less spectrum in the 1800 MHz band was allocated for mobile use in regional areas than was allocated in metropolitan areas at the then Australian Communications Authority auctions in 2000. In most parts of regional Australia that spectrum was wholly acquired by Telstra. Under the current spectrum management framework, Vodafone cannot use the additional regional 1800 MHz spectrum until a series of administrative decisions have been made so that the spectrum can be re-purposed for mobile use.

Twenty-five years ago commercial users' spectrum holdings were relatively modest outside the broadcast industry. Today it is common for commercial users to have a suite of spectrum holdings – for instance, the spectrum bands Vodafone uses are set out in **Appendix A**.

Existing spectrum holdings and the infrastructure installed to utilise those holdings have a significant impact on commercial users demand for spectrum. Such endowments impact a commercial users' willingness-to-pay for a new allocation of spectrum because:

- a spectrum endowment might mean the user places a low value on incremental spectrum because they can meet forecast demand via their existing holdings;



- alternatively, where the commercial user has a concentrated portion of that industry's spectrum within a geographic region that endowment may mean the user places a relatively high value on the incremental spectrum to reflect the potential foregone economic rents that would otherwise occur from the introduction of competition to the region; and
- an existing infrastructure endowment may lower the incremental cost of using a new allocation of spectrum relative to a commercial user that does not have such an endowment. A commercial user with an infrastructure endowment may be able to generate a higher economic return from new spectrum and, in such circumstances, would likely have a higher willingness-to-pay for the new spectrum.

Heterogeneity of spectrum and infrastructure endowments (including the lack of any endowment for prospective entrants) may cause significant divergences in the willingness-to-pay for new spectrum among commercial users.

### *Government*

Federal and State governments use spectrum in a range of areas including defence, emergency services, state-owned public transport services (e.g., rail signalling systems) and meteorology.

Government demand for spectrum is often derived from demand for services that can be characterised as a *public good*. Public goods are *non-rivalrous* and *non-excludable* (e.g., national defence, emergency services).<sup>11</sup> Public goods may be under-supplied relative by competitive markets because producers are unable to recoup the cost of supplying the good from users. Hence public goods are often supplied by governments. The optimal provision of public goods is determined by assessing where the marginal social benefits of the good's provision are greater than or equal its marginal social cost.

While the services supplied by Government might be public goods, access to spectrum is not a public good. It is therefore important to separate the Government's provision of public goods from its allocation of property rights to the radiofrequency spectrum. Often this reality has been overlooked, with spectrum allocated to government agencies and then under-utilised. This is not a good outcome for the Australian community.

Spectrum impacts the cost of a public good's provision. There are two parts to assessing that impact:

- (i) if the public good could not be provided via access to the spectrum how would it be provided instead (i.e., what is the cost of the next best alternative); and

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<sup>11</sup> *Non-excludable* means it is prohibitively costly to prevent non-payers from enjoying the benefits of the good or service. *Non-rivalrous* is a good or service whose consumption by one person prevents simultaneous consumption by other people.



- (ii) what are the net economic and social benefits from the next best alternative use of the spectrum if it were put to use for another purpose (i.e., the opportunity cost of the current use).

An answer to the first question ensures access to spectrum is the most efficient means of supplying the public good. An answer to the second question ensures an optimal allocation of spectrum to maximise the public good by measuring the economy-wide social benefits and costs.

### *Community*

A range of community groups and recreational users rely on access to spectrum to support their interests. These uses range from Citizen Band radio to community television. Community organisations that use spectrum include country fire authorities and the Royal Flying Doctor Service.

Community use of the spectrum enables a range of social benefits that might not otherwise be possible without access to spectrum. Community use of the spectrum is often compatible with a range of competing demands for access to the spectrum. However, when spectrum is scarce, it is important for governments and/or regulators to assess the opportunity cost of allocating spectrum to community users.

### **Demand dimensions**

There are benefits to assessing different users demand for spectrum across frequency, geographic and temporal dimensions. Different spectrum users have different propagation and bandwidth requirements, and often have different tolerances for interference.

Differences in demand dimensions may afford opportunities for spectrum sharing. For instance, some argue that there are opportunities to exploit unused frequencies (“white space”) within spectrum designated for broadcast television. In the case of mobile services, Vodafone uses its national spectrum holdings more heavily in metropolitan areas than it uses it in remote parts of Australia.

The challenge with determining whether spectrum sharing is possible hinges on the information available to spectrum users and prospective users about the current spectrum use, the prospective spectrum use as well as any limitations imposed by the definition of property rights within the spectrum management framework.



## 3. Rationale for market intervention

Regulatory intervention in markets often leads to a range of unintended consequences. As a matter of principle, intervention should be avoided unless there is evidence of a durable market failure. In the case of spectrum, the potential for a user to create electromagnetic emissions that cause interference to other users is the most obvious source of potential market failure. However, it is not the only area where governments and regulators are asked to intervene in spectrum management – two further areas of intervention include standardisation of spectrum use and providing spectrum access for uses that deliver social benefits.

### 3.1 The creation of property rights

The primary reason to intervene in the spectrum market is to avoid overuse of a scarce resource. Spectrum is susceptible to the **tragedy of the commons** phenomenon due to its characteristics as a rivalrous, non-excludable resource. The tragedy of the commons occurs when there are no restrictions on the use of a common resource with high demand; each individual receives private benefits from using the resource but does not incur the full social cost from its use. Collectively, individuals consume more of the resource than is socially desirable and the society's welfare is below the economically efficient level.

In the context of spectrum, an individual user may have an incentive to use parts of the spectrum without considering the impact of their use on other spectrum users. The spectrum then becomes congested and prone to interference,<sup>12</sup> and the value of the spectrum resource to each individual user diminishes.

The means of addressing potential overuse of spectrum resources with high demand is through assigning well-defined **property rights**. Property rights transform spectrum from being a non-excludable resource to an excludable resource (see **Table 2**). Property rights can also be used to reduce the rivalrous aspects of spectrum by, for instance, only permitting compatible users into certain portions the frequency range.

**Table 2: Spectrum property rights and resource characteristics**

	<b>Excludable</b>	<b>Non-excludable</b>
<b>Rivalrous</b>	Private goods (e.g. <i>spectrum and apparatus licences</i> )	Common pool resources (e.g. <i>unlicensed spectrum*</i> )
<b>Non-rivalrous</b>	Club goods (e.g. <i>class licences</i> )	Public goods

Note: \* Australia does not have unlicensed radiofrequency spectrum.

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<sup>12</sup> Interference is a negative externality from spectrum use.



Unsurprisingly, the definition of property rights has been the cornerstone of spectrum management frameworks around the world and is a feature of Australia's current regime. Australia's *spectrum* and *apparatus licences* define excludable property rights for spectrum with high demand. Spectrum and apparatus licences are distinct from the other licence category used in Australia, *class licences*. Class licences are a form of non-transferable property right provided after the regulator mandates standards that authorise the use of devices that meet the conditions of the licence.

Property rights address the problem of spectrum overuse. However, poorly defined property rights may lead to less than efficient use of the radiofrequency spectrum. Four economic considerations are often cited as important for ensuring the efficiency of property rights:

1. **Exclusivity** – property rights are exclusive rights, with the benefits of costs of owning and using the resource flowing to the owner.
2. **Universality** – all scarce resources are owned by someone.
3. **Transferability** – ensure resources can be allocated from low yield to high yield uses.
4. **Enforceability** – ensure property rights are secure from misappropriation by others.

There are two additional considerations the creation of spectrum property rights requires to ensure economic efficiency from their use:

- how to promote **competition** in contestable industries that depend on spectrum access; and
- how to avoid **excess concentration** of spectrum property rights.

Both these matters warrant careful consideration in the initial allocation of spectrum property rights. However, in the reallocation of spectrum property rights, both matters can be covered by the general competition framework set out in the *Competition and Consumer Act 2010*.

Australia's existing spectrum management framework is reasonably strong on delivering exclusivity and it supports enforceability. Insufficient attention has been provided to the universality and the transferability of property within the framework and these areas should be given considerable attention during the current review. For instance, there are many parts of regional Australia where property rights have not been assigned for use of regional 1800 MHz spectrum and, in parts of regional Australia where property rights have been assigned these rights cannot be transferred to the mobile industry to deploy services.

A longer licence term will increase scope for the transferability of property rights between spectrum users. It will also reduce the administrative costs associated with planning and reissuing licences. A modern spectrum framework should have a licence term of at least 25 years as the default option. In addition, the framework should provide discretion for the government to increase the term beyond 25 years if they consider it in the public interest to do so. The relatively short term currently used for apparatus licences



should not be a feature of the new system as they increase the regulatory burden for licensee and provide false view of the framework's flexibility.

The mere assignment of property rights will not be effective when rights holders are not responsive to market forces. This might occur when spectrum property rights are assigned to government users and the agencies responsible for the property right do not take a whole-of-government approach to the management of the asset. Specifically, an agency might emphasise the social benefits from the use of the spectrum without considering the opportunity cost to the economy from the agency's management of the property right. The lack of a profit-maximising incentive undermines the universality of property rights and may require the government to consider additional measures to ensure the efficient allocation and use of spectrum by state and federal government agencies.

## 3.2 Standardisation

Standards have an important role in spectrum management. Standards facilitate spectrum coordination in industries with frequent cross-border interactions (e.g., air and maritime services) and promote economics of scale in network and end-user device manufacturing.

A standard is a set of informal or formal technical specifications adhered to by spectrum users. David and Greenstein (1990) describe four different incarnations of "standards":

1. **Un-sponsored standards** – specifications have a well-documented form in the public domain but do not have an identified originator with a proprietary interest, or a subsequent sponsoring agency.
2. **Sponsored standards** – a sponsoring entity with a direct or indirect proprietary interest creates inducements for other firms to adopt a particular set of standards.
3. **Voluntary standards** – standards agreements that are developed and written in organisations whose members have agreed to a standards-writing function.
4. **Mandated standards** – developed by government agencies with a specified regulatory function.<sup>13</sup>

Each of these standards is relevant to the spectrum community. For instance, the international popularity of re-farming 1800 MHz spectrum to deploy 4G networks was initially an unsponsored effort that rapidly led to the band becoming a standard band for mobile device manufacturers to support. Voluntary standards are common in spectrum management with international organisations such as the Asia-Pacific Telecommunity setting optional technical specifications for the use of some spectrum bands in the

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<sup>13</sup> David, P.A. and Greenstein, S. (1990), 'The economics of compatibility standards: An introduction to recent research', *Economics of innovation and new technology*, Vol. 1, pp. 3-41.



region. Under the existing spectrum management framework, the ACMA has responsibility for mandating standards by, for instance, creating radiocommunications assignment and licensing instructions.

There are several reasons to use standards in Australia's spectrum management framework:

- to improve the efficiency of secondary markets by providing information to users and prospective users regarding permitted uses for the spectrum;
- to define coordination rules for compatible spectrum uses; and
- to preserve the option of using spectrum for a particular purpose, for instance due to a desire to facilitate international coordination.

Despite several benefits, standards may impose significant economic costs if they are not properly implemented. For instance, mandating standards on how particular spectrum bands are used will limit the transferability of property rights and prevent spectrum from moving to higher value uses. A modern spectrum management framework should generally avoid prescribing the *purpose* for which spectrum bands can be used and instead define permissible *parameters* for a band's use. A parameter-based approach to the creation of standards preserves the technology neutrality of spectrum property rights and ensures the spectrum management framework is resilient to technical change.

Standardisation will have a central role in the modernisation of Australia's spectrum management framework. However, the question of how standards are formed should be considered as part of the Department's review. Self-regulatory or co-regulatory standards-setting processes may provide an alternative to the use of mandatory standards for some parts of the spectrum management framework. For instance, it might be possible to replace class licences with the use of standards developed by an industry peak body (e.g., Communications Alliance) under a co-regulatory approach.

The use of self-regulatory or co-regulatory approaches will not always be appropriate. For instance, the spectrum management framework should avoid self-regulatory or co-regulatory approaches when there are:

- concentrated interests and standards are used to increase barriers to entry; or
- insufficient stakeholder interest in the formulation of robust standards.

### 3.3 Access for services that deliver social benefits

There are many government and community services that deliver significant social benefits which require access to spectrum. However, social benefits by themselves are not sufficient to justify spectrum being allocated to government and community users. Spectrum should only be allocated to government agencies and community users after an assessment of the opportunity cost of doing so. In many instances, the opportunity cost of allocating spectrum to public and community users will be low. Sometimes the opportunity cost of allocating spectrum to public and community users will be extremely high.



The opportunity cost should be used to set the price for the government or community access to spectrum. Government should then determine what portion of the spectrum it will explicitly or implicitly subsidise in setting the price for spectrum access.

Generally, government and community users should be provided with an explicit spectrum property right rather than having spectrum bands set aside for their purpose. An explicit property right will provide government and community users with better incentives for efficient asset management and encourage more timely revisions to the user's consideration of the opportunity cost of holding the asset. Indeed, a property right that can be "traded for value" could result in the spectrum being used for both the public service and other private uses (for example, as part of a commercial discussion, the spectrum could be provided to a mobile network operator to build emergency service capabilities and then be put to other uses).

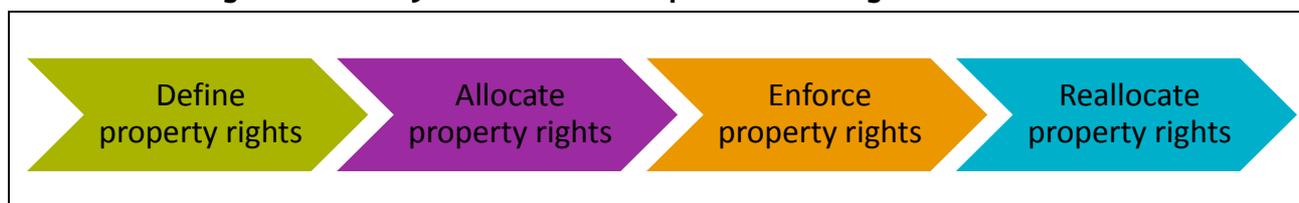


## 4. Spectrum management functions

There are four tasks that a modern spectrum management framework needs to perform (see **Figure 1**):

- define property rights;
- allocate property rights;
- enforce property rights; and
- reallocate property rights.

**Figure 1: Primary functions of the spectrum management framework**



The scope of each spectrum management functions ought to be reflected in legislation so that there is a logical connection between the objectives of the spectrum management framework and the tasks performed by Australia’s spectrum regulators.

### 4.1 Define property rights

The most important task in the spectrum management framework is define the nature and scope of property rights. There are two broad categories of property right that should be used in a modern spectrum management framework:

- transferable property rights (e.g., parameter licences); and
- non-transferable property rights (e.g., parks for specific or non-rivalrous users).

#### Transferable property rights

Transferable property rights is one aspect of the spectrum management framework where the Department is proposing reforms. The existing spectrum management framework defines two types of transferable property right – spectrum licences and apparatus licences. The Department has proposed replacing these two categories of licence with a single licensing framework, which is sometimes referred to as a **parameter licence (Proposal 2)**.

The Department’s proposal has significant merit and Vodafone supports reform to this aspect of the spectrum management framework. However, flexibility of licencing is not the primary reason for the



reform. We would be greatly concerned that a single licence schema is developed to improve the ability for “the ACMA to develop bespoke solutions where necessary”.<sup>14</sup> This is not desirable and would perpetuate many of the problems with the current regime. Rather, the move to a single licence regime is to reduce uncertainty and to ensure that there is an efficient and effective assignment of a property right.

The main reason to move to a streamlined licencing framework is to increase the transferability of property rights. Markets tend to be more efficient when goods are commoditised rather than customised. This requires licences to have greater homogeneity rather than providing the ACMA with the flexibility to set heterogeneous parameters.

The major problem with the current licencing framework is that it does not provide universality of property rights nor does it promote appropriate transferability of property rights.

Heterogeneity in licences (as per the current regime) may prevent efficient spectrum transactions from occurring by imposing unnecessary transaction costs. The mobile services and rail transport industries have direct experience of the cost and legal complexity caused by heterogeneous parameters. Misalignment of spectrum licence expiry dates was one of the impediments to the aggregation of 1800 MHz spectrum into contiguous blocks in metropolitan areas.

Many of the problems of the spectrum management framework arise from the pervasive use of apparatus licences. The frameworks used to support the ACMA issuing apparatus licences have prevented spectrum from moving to its highest value use in the 1800 MHz band. Apparatus licences are costly and impose a significant regulatory burden on spectrum users due to administrative fees and the levying of inefficient taxes.

The problems occur because apparatus licences are an imperfect property right:

- Apparatus licences pertain to systems rather than geographic areas. As a consequence, the use of apparatus licences has led to a patchwork geography of spectrum property rights, which means the universality and the transferability of the property right is limited.
- The maximum tenure for apparatus licences is five years although most licences are issued for one year. While apparatus licences are often rolled-over for the incumbent rights holder, their short tenure limits the transferability of the licence.
- To facilitate systems’ deployment, the ACMA develops complex sets of rules known as Radiocommunications Assignments and Licencing Instructions (**RALI**) for apparatus licences. RALI’s prescribe complex technical rules that impede the transferability of apparatus licences.

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<sup>14</sup> Department of Communications (2014), *Spectrum review: Potential reform directions*, Consultation paper, November, p7.



They have also encouraged regulatory “command and control” approaches to spectrum management that have hampered spectrum moving to its highest value use.

- Apparatus licences are issued without a competition assessment or any regard to the spectrum users’ existing suite of spectrum property rights. The framework has, in the case of regional 1800 MHz band, led to the near monopolisation of this band in some areas without any scrutiny of whether this outcome is in the public interest.

The move to a single licensing framework can address these problems.

The maximum term for licences in the new spectrum management framework should be increased up to 25 years to ensure an efficient and effective property right system. This would facilitate greater transferability of licences and to reduce the frequency and cost of tenure-related investment uncertainty. The Consultation Paper prematurely suggests the maximum licence term of 15 years should be maintained to provide “flexibility to enable spectrum to be re-planned so that it moves to the most beneficial use”.<sup>15</sup> The mobile industry’s recent experience with the renewal of 15-year spectrum licences suggests the economic cost of this option more than offsets any purported benefits from re-planning flexibility.

For spectrum bands where transferable property rights are to be allocated, the “parameter licence” should define standardised limits on out-of-band emissions limits and in-band power limits to promote transferability of licences. These limits should only be binding if the rights holder does not hold rights to the adjacent frequency or geographic area (see **Figure 2**). This will permit spectrum users to assemble licences to suit their specific transmitter or receiver requirements. In addition, users should be free to manage potential interference between their own equipment as they see fit regardless of licence conditions.

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<sup>15</sup> Department of Communications (2014), *Spectrum review: Potential reform directions*, Consultation paper, November, p7.



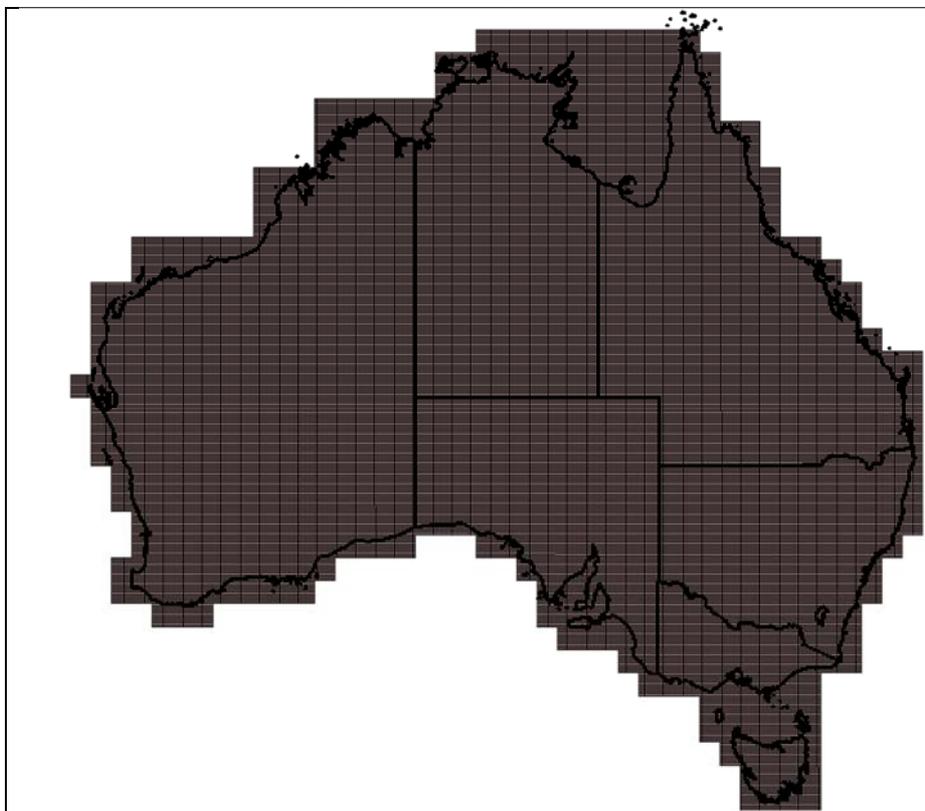
**Figure 2: Licence assembly and power & emissions limits**

<p><b>Geographic assembly</b></p> <p>If a user only has a licence for the B2 area, its emission and power limits would ensure that it did not cause interference problems to its neighbouring spectrum parcels in areas A1, B1, C1, A2, C2, A3, B3 and C3.</p> <p>Alternatively, if a user in addition to holding licence for B2 also holds licences for A1, B1, C1, A2, C2, A3, B3 and C3, then it would be permitted to install equipment at B2 that transmits into A1 to C3. The additional property rights also ensures no equipment can be installed in adjacent areas to B2 without the user’s authorisation.</p>	<table border="1"> <tr> <td>A1</td> <td>B1</td> <td>C1</td> </tr> <tr> <td>A2</td> <td>B2</td> <td>C2</td> </tr> <tr> <td>A3</td> <td>B3</td> <td>C3</td> </tr> </table>	A1	B1	C1	A2	B2	C2	A3	B3	C3			
A1	B1	C1											
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<p><b>Frequency assembly</b></p> <p>If a user only has a licence for F block, its emission and power limits would prevent interference into E and G blocks. If the user desired greater power or emission limits for the F block then it could purchase the adjacent frequency blocks (D, E, G and H) and the limits for transmissions using the F block, would be determined by the emissions out of the D and H blocks.</p>	<table border="1"> <tr><td>12.5 kHz channel</td></tr> <tr><td>12.5 kHz channel</td></tr> <tr><td>12.5 kHz channel</td></tr> <tr><td>12.5 kHz channel</td></tr> <tr><td>H block (12.5 kHz)</td></tr> <tr><td>G block (12.5 kHz)</td></tr> <tr><td>F block (12.5 kHz)</td></tr> <tr><td>E block (12.5 kHz)</td></tr> <tr><td>D block (12.5 kHz)</td></tr> <tr><td>12.5 kHz channel</td></tr> <tr><td>12.5 kHz channel</td></tr> <tr><td>12.5 kHz channel</td></tr> </table>	12.5 kHz channel	12.5 kHz channel	12.5 kHz channel	12.5 kHz channel	H block (12.5 kHz)	G block (12.5 kHz)	F block (12.5 kHz)	E block (12.5 kHz)	D block (12.5 kHz)	12.5 kHz channel	12.5 kHz channel	12.5 kHz channel
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Parameter licences should be issued so as to provide complete coverage each level 1 in the Hierarchical Cell Identification Scheme (**HCIS**) of the Australian Spectrum Map Grid to provide universality of property rights. This includes the creation and allocation of property rights for spectrum for which there are no identified uses. There are 123,984 HCIS level 1 identifiers covering Australia (see **Figure 3**). All licences should be issued for the maximum term and, with a given frequency band, each licence should have homogeneous parameters for out-of-band emission limits and in-band power limits.



**Figure 3: Australian Spectrum Map Grid – HCIS level 1 squares**



Notes: HCIS Level 1 for the five minute arc square cells (approximately 9 km x 9 km).  
Source: ACMA.

Under a system of transferable property rights different spectrum bands may still have different characteristics (although these differences should be minimised as much as is practical). For instance, there might be different minimum frequency blocks, different out-of-band emissions limits and different in-band power limits. However, all licences within a band should be identical on these dimensions to facilitate transferability and assembly of licences.

The designation of frequency ranges as being part of a paired allocation or an unpaired allocation will remain an administrative task. In the case of paired spectrum, the spectrum management framework should use the concept of a **stapled spectrum property right** to ensure paired spectrum is transferable as a package with minimal administrative overheads. The stapled spectrum property right will require technical specifications defined for each part of the property right.

The volume of spectrum parcels arising from the creation of transferable property will be significant. As an example of the volume, if the 1800 MHz band (1805 – 1880 MHz) had minimum frequency block 12.5 kHz (i.e., 0.0125 MHz) and stapled spectrum rights (i.e., paired channels with 1700 – 1775 MHz) there would be 6000 frequency channels. This would create potential for up to 744 million distinct spectrum parcels across the different HCIS Level 1 geographies and the different frequencies. While the volume of parcels could be reduced by increasing the minimum frequency block, modern computing power and data storage capabilities means this amount of information is manageable.



The use of transferable property rights should be the preferred option in the spectrum management framework. Transferable property rights should be encouraged for government or community users of spectrum to foster effective asset management practices and facilitate a more timely transfer of spectrum to its highest value use than is possible via administrative mechanisms.

### Non-transferable property rights

There are several circumstances where the cost of allocating transferable property rights may not offset the benefits and non-transferable property rights may be a preferred solution. Three ways to conceptualise non-transferable property rights include:

- **“Public park” licences:** support for a range of compatible users for whom it would be prohibitively costly to assign and enforce individual property rights (e.g., low interference potential devices);
- **“Rights of way” obligations:** preserves spectrum for a specific purpose but does not assign property rights to any individual users due to transient use or international obligations; and
- **“Private park” and “sandpit” arrangements:** support for a range of compatible commercial users who either have temporary demand for spectrum or who can be coordinated via voluntary standards. A “fee” could be applied to limit entry.

A public park and rights of way would provide a non-transferable property right by limiting how a certain frequency range can be used. Permitted uses would be set out in a standard in the same way as class licences determine the conditions for the operation of radiocommunications equipment. To set standards, the system of class licences could be maintained or options for transitioning to a co-regulatory framework could be explored.

The purpose of creating a private park is to provide a low entry barrier option to access spectrum and support spectrum sharing when demand for the particular frequency range is limited. A private park has some similarities to the way apparatus licencing works today. However, unlike apparatus licences, the administrative and regulatory burden of using the private park will be much lower. In addition, users of the private park would not be afforded any regulatory protection from interference by other “members” in the park it would merely provide protection from interference caused by users in other bands or adjacent geographic areas. If demand for access to spectrum in a private park begins to exceed supply, transferable property rights should be allocated for the frequency range. The use of private parks in the spectrum management framework should be limited.

## 4.2 Allocate property rights

The allocation of property rights is a broken concept in the current spectrum management framework. Repairing the arrangements for allocating property rights would substantially improve the operations of the spectrum management regime.



## Existing allocation methods for spectrum licences

The process of allocating spectrum licences is cumbersome, lengthy and excessively costly for both the regulator and prospective acquirers of spectrum licences. The separation between the ACMA's decision over the allocation mechanism – typically some form of auction – and the ACCC's assessment of allocation limits is also operationally problematic; allocation limits strongly influence auction dynamics and bidding strategies, and should be considered in conjunction with the auction format within the same institution.

Past approaches to determining allocation limits have not sufficiently promoted competition in downstream markets. Given spectrum is a scarce and finite resource, the current approach of setting allocation limits for spectrum in contestable industries is more akin to creating competition for the market than promoting competition within the market.

The ACCC has expressed a preference for “setting limits at 50-60 per cent of the available spectrum in the band”.<sup>16</sup> However, the interplay between the allocation mechanism, reserve prices, competition limits and, existing spectrum and infrastructure endowments does not appear to have been well understood prior to the auction. Telstra acquired 40 MHz of the 60 MHz of spectrum sold in the 700 MHz band (equivalent to 66 per cent of the spectrum allocated at the auction). In regional Australia, Telstra now has access to 58% of the low-band mobile spectrum (i.e., 700, 850 and 900 MHz bands) – double the quantity of its nearest competitor. The scale of this low-band holding is a significant impediment to the emergence of effective regional mobile competition.

For the allocation of spectrum in contestable industries, allocation limits should be based on a promotion of the long-term interest of end-users (LTIE) as described in clause 152AB of the *Competition and Consumer Act 2010*. Critically, existing spectrum and infrastructure endowments must be taken into consideration in setting allocation limits for new spectrum. Allocation limits can and should differ between prospective auction participants and between geographic areas.

## Existing allocation methods for apparatus licences

The allocation of apparatus licences is even more problematic in the current spectrum management framework, with the ACMA often using long, drawn out planning processes that create uncertainty for both current and prospective users. The inefficiency of the planning process is compounded by the ACMA's practice of putting embargoes on issuing new apparatus licences while its planning processes are underway. In the case of the 800 and 900 MHz bands, the review commenced in 2011 and an embargo has been in place since 7 December 2011,<sup>17</sup> yet there are still no signs that the ACMA will conclude its

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<sup>16</sup> Australian Government (2012), *Competition limits on the sale of digital dividend (700 Megahertz) and 2.5 gigahertz spectrum*, Regulatory Impact Statement.

<sup>17</sup> ACMA (2011), *Embargo 64*, 7 December.



review of these bands in a timely manner. In the case of spectrum in the regional parts of the 1800 MHz band, the ACMA has had in embargo in place since 21 January 2011 while it considers how to permit mobile network operators access to this spectrum.<sup>18</sup> Vodafone has provided detailed information to the ACMA on the several hundred locations where it would like to use the 1800 MHz spectrum to deploy 4G services – in many of these locations there are no current users of the 1800 MHz frequency and yet the ACMA’s planning approach has prevented Vodafone from making investments in these areas and delayed the availability of competitive 4G services to people and businesses within those regions.

Once the ACMA’s planning processes is complete, the actual allocation of apparatus licences is excessively complex requiring multiple steps including the obtaining of a frequency assignment certificates and then the issuing of a licence. The process of obtaining frequency assignment certificate is costly for wide scale network deployments both in terms of time and resources, requiring an “authorised person” to issue the certificate after making a detailed assessment of the potential for interference.

The property rights for apparatus licences often extends well beyond the geographic locations for which the user has notionally acquired the licence. This leads to situations where the price for obtaining apparatus licences in some bands is well below the opportunity cost of using that spectrum. This fact, combined with the non-transferability of apparatus licences, strongly discourages apparatus-licensed spectrum from moving to higher value uses.

### Payment terms

The allocation of spectrum and apparatus licences has been accompanied by unnecessary rigidity over payment terms. Payment for both sets of licences are typically made upfront, in advance of licences being issued – for spectrum licences, payment can be required up to 18 months before licences are issued. This approach to payment creates a mismatch for spectrum users between payment and the cash flow generated from spectrum use. As a consequence, upfront payment terms impose a significant financial barrier to the efficient use of spectrum and may discourage spectrum acquisition when the utility of the spectrum is not expected to be material until well into the licence term. In the case of spectrum sold at auction, arbitrary decisions to require payment for spectrum access more than a year before licences commence could have an asymmetric effect on bidder behaviour and distort auction outcomes.

Payment terms should be a parameter in the allocation of licences with the flexibility to set the parameter to upfront payment or to an annual payment – with annual payments made over the term of the licence. If licences that have an annual instalment parameter are transferred between parties, the payment obligation would transfer with the licence.

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<sup>18</sup> ACMA (2011), *Embargo 62*, 21 January.



## Allocating property rights for commercial uses

The allocation of transferable property rights in contestable industries should be undertaken by a single institution who is responsible for selecting the allocation mechanism (or setting an over-the-counter price) and determining allocation limits for the spectrum. The institution must have the specialist economic expertise to allocate spectrum efficiently to commercial users in contestable industries particularly if the ACMA does not consider competition assessments are within its remit.

## Allocating property rights for “non-commercial” uses

The allocation of non-commercial (or social purpose) property rights has been a contentious area in the spectrum management framework. Public use of spectrum (and non-financial allocations) is appropriate but spectrum management for these purposes has been disjointed and extremely slow.

There are three main challenges in determining whether government or community uses should be granted spectrum access:

- the economic and social benefits from non-commercial spectrum uses are difficult to quantify;
- the range and cost of alternatives to spectrum access can be difficult to assess; and
- the opportunity cost of allocating spectrum to a particular purpose might not be clear.

Despite the challenge of performing these tasks, it is important to assess each one prior to allocating spectrum to non-commercial spectrum users. These steps will enable the Government and/or the ACMA to determine if it is necessary to set a spectrum price, what price should be set and, for Government, whether it wants to provide an implicit or explicit subsidy to the non-commercial user to facilitate spectrum access.

## 4.3 Enforce property rights

Property rights are of a limited use if they are not legally enforceable. At present, the spectrum management framework encourages excessive resource allocation toward the defining of property rights and insufficient resources (and inadequate mechanisms) for enforcing them.

Spectrum is a scarce and valuable resource that is vulnerable to the tragedy of the commons phenomenon. In the absence of effective enforcement, there will be inefficiently high use of the spectrum by non-rights holders and the value of spectrum property rights will diminish. In terms of the broader economic impact, the lack of property rights enforcement means that less valuable spectrum uses will displace valuable spectrum uses.

Given the economy-wide benefits from property rights enforcement, it is useful to consider what deterrents and remedies are effective at preventing the misappropriation of property rights. The spectrum management framework emphasises the administratively costly and cumbersome approach of pursuing



criminal proceedings to enforce property rights. This places a high administrative burden on the regulator to gather evidence and prosecute cases. Often the cost of this approach is disproportionate to the instance of interference that frequently occur in Australia. Pragmatically, the ACMA relies on a range of investigative and educative mechanisms to address interference. However, it relies on interference being reported by spectrum rights holders and, despite its effectiveness, the under-resourcing of this function has led to a backlog of cases.

The spectrum management framework requires a range of deterrents to effectively protect property rights. For instance, the ACMA should be provided with powers to issue infringement notices and to apply civil penalties to deter the misappropriation of spectrum property rights. To deter the supply of non-compliant consumer devices, the ACMA should be given the power to issue recalls, ban products and to issue warnings to suppliers and importers. To facilitate the performance of this function, the ACMA should be provided with additional resources to police property rights and to investigate potential misuse of the Australian radiofrequency spectrum.

Consumer awareness campaigns are useful tool for informing people and businesses about legitimate use of the radiofrequency spectrum. Often illegitimate use of the spectrum occurs because people and businesses are unaware of the electromagnetic emissions caused by their devices or the property rights associated with the spectrum being used. Building awareness via targeted education campaigns will help protect consumers from acquiring devices that they cannot then legitimately use in Australia.

Enforceable property rights will enable rights holders to pursue their own action to prevent misappropriation of their spectrum. For instance, rights holders could consider civil litigation including injunctions against the use of equipment or devices that are infringing with their spectrum space. In more serious cases, the rights holder could consider seeking damages for the infringement through the civil legal system. The capacity of rights holders to take civil legal action should not be regarded as a substitute for administrative actions by a regulator. Many property rights holders will not have the resources to undertake lengthy and costly civil legal processes, creating the potential for an unbalanced enforcement of property rights.

## 4.4 Reallocate property rights

Markets are efficient at conveying information about the relative value of goods and services to different buyers and sellers. Market mechanisms ought to be relied on to a much greater extent to reallocate spectrum to higher yield uses than is currently the case in the spectrum management framework. Greater use of transferable property rights will reduce the spectrum management framework's need for complex, cumbersome and costly planning processes to reallocate spectrum to higher yield uses.

Market mechanisms are already used with respect to Australia's spectrum licences. Markets have proved effective in, for instance, allowing the then Hutchison Telecommunications (Australia) Limited to acquire 850 MHz spectrum and then using them to rollout a 3G network after the merger to form VHA. (The technology neutrality of spectrum licences has now enabled VHA use its 850 MHz spectrum to deploy 4G



mobile network equipment). There are several other instances of spectrum licences being traded to mobile network operators and numerous examples of mobile network operators “re-farming” their spectrum holdings to deliver upgrades in network technology.

Spectrum licences demonstrate how effectively market mechanisms can work to reallocate spectrum property rights. By contrast, apparatus licences have not proved effective for ensuring the reallocation of property rights to higher yield uses. Indeed, the requirement for prescriptive administrative planning by the ACMA to facilitate apparatus licences being allocated has meant that these licences provide minimal improvements over the archaic “command and control” measures to spectrum management that were used in the past.

Unfortunately, neither regulators nor governments are well-placed to gather timely, accurate information about the potential uses of spectrum. In the absence of robust information, governments and regulators are also not well-placed to identify the “highest value use” of a particular radiofrequency range. In the context of the administrative approaches used to plan and potentially reallocate apparatus licences, these information deficiencies lead to two types of welfare-reducing outcome:

- **status quo bias** – the requirement for government and regulators to gather evidence for decisions, while appropriate, may bias against potential new spectrum uses whose business or operating models have yet to be proven. Incumbent spectrum users are generally better-placed to illustrate the value of existing spectrum uses than are prospective users with innovative new technologies with strong growth potential but a potential risk of failure.
- **“picking winners”** – at the other end of the spectrum, government and regulators might be tempted to “pick winners” for spectrum access. Often justification for this approach is predicated on spectrum access being essential in the delivery of a “priority” or “key” economic or social policy objective. However, it is difficult to assess the net benefits from prioritising spectrum access to one user type over another type and post-implementation reviews of this type of decision are seldom undertaken.

Under a modern spectrum management framework, the reallocation of property rights should be less prescriptive about assigning spectrum to a particular purpose and more focused on commoditising out-of-band emissions limits and in-band power limits to foster the transferability of spectrum property rights between different users. This action will better facilitate spectrum moving to its highest value use than the current framework.

A more market-oriented spectrum management framework will change rather than remove the need for regulator involvement. For instance, the purpose for which spectrum is used is heavily influenced by international considerations and institutions such as the ITU. If there is a change in international standards, the regulators’ role might be to negotiate with existing rights holders to change the out-of-band emissions limits or in-band power limits. Alternatively, if Australia wished to support international coordination efforts that require the resumption of licences then the spectrum management framework must ensure



appropriate compensation so that such adjustments can be made. The resumption of licences by either the government or the regulator should generally be a remedy of last resort.

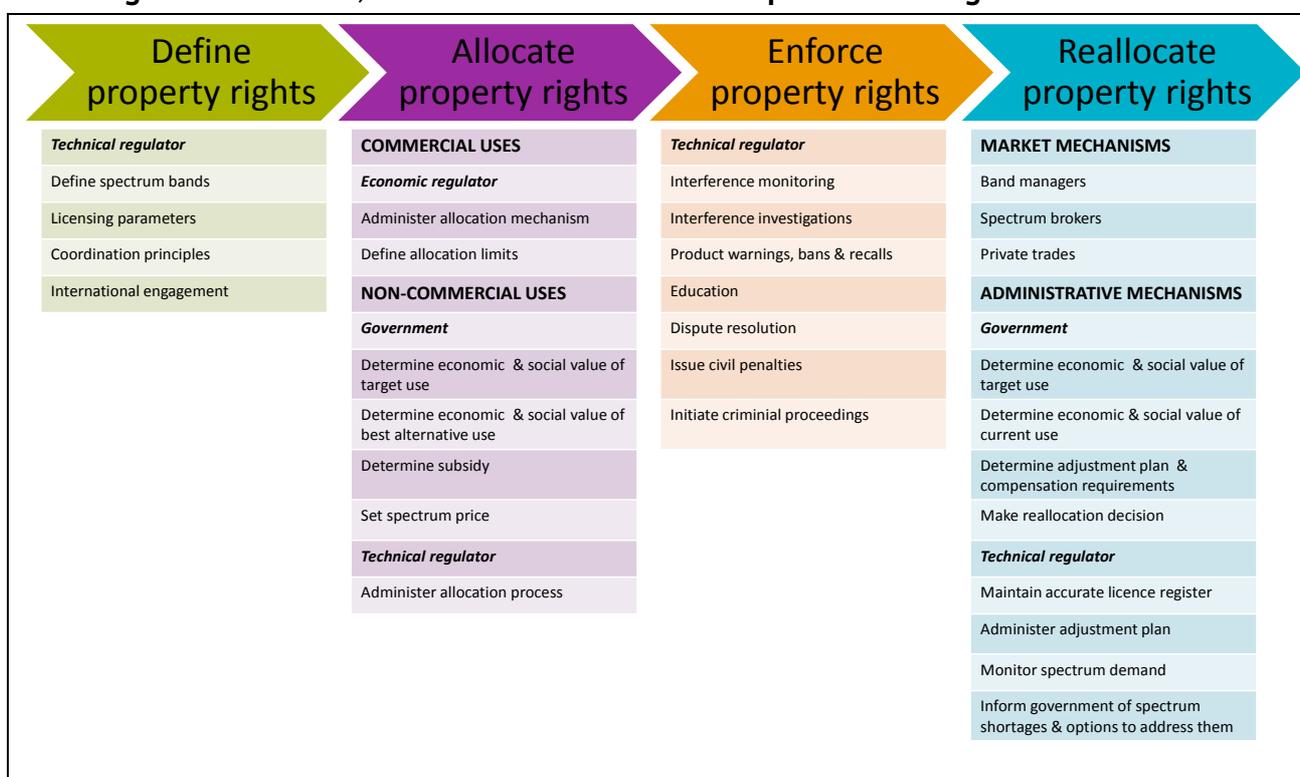
The broader use of transferable property rights in a future, modernised spectrum framework will create a new range of spectrum management issues associated with reallocation of property rights. For instance, it is conceivable that **hold-out** problems may arise if certain rights holders are able to use relatively small spectrum parcels to delay or prevent other rights holders from assembling a large, contiguous spectrum block by holding out for a price in excess of their opportunity cost. It not clear that the possibility of hold-out is an economic problem that warrants a solution. There are often a range of substitute radiofrequency ranges and solutions such as “resumption” lead to a risk of excessive transfer and the diminution of property rights. Any decision to “resume” licences should have a clear public purpose, unequivocally maximise the public benefit and only used after all other reasonable avenues to acquire the licence have been exhausted.



## 5. Institutional arrangements

A modern spectrum framework requires the involvement of at least three distinct institutions – the Australian Government, a technical regulator and an economic regulator. A mapping of the separate functions and tasks described in **Chapter 4** to these institutions is set out in **Figure 4**. The benefit of making institutions responsible for specific tasks is that it ensures accountability for regulatory decisions and processes.

**Figure 4: Functions, tasks and institutions in the spectrum management framework**



### 5.1 Technical regulator

The Australian Communications and Media Authority (**ACMA**) is and should remain Australia's technical regulator for the spectrum management framework. The ACMA's engineers and investigators excel at two core functions of the spectrum management framework – defining property rights and enforcing property rights – with a strong track record across the following areas:

- technical specification and documentation;
- preparation and participation in international spectrum fora; and
- investigating and resolving interference issues.



The ACMA has established processes to assist with the two other major functions of a spectrum management framework – the allocation of property rights and the reallocation of property rights. To assist in determining whether the allocation and use of spectrum maximises the public benefit, the ACMA developed the “Total Welfare Standard”.<sup>19</sup> The ACMA also established its Spectrum Management Principles and a policy paper on opportunity cost pricing to provide guidance on how its decisions will be made in accordance with the Objects of the Radiocommunications Act 1992 and how it would set administrative prices for spectrum.<sup>20</sup>

Despite seemingly sound decision-making frameworks, the ACMA has proven itself to be fundamentally incapable of resolving critical spectrum allocation and reallocation decisions in a timely manner. For instance, the ACMA put a large portion of regional 1800 MHz spectrum under embargo in January 2011 to facilitate the band’s use by MNOs for regional 4G network deployments. Now, four years later, the spectrum remains under embargo. As a consequence, up to 80% of regional 1800 MHz spectrum sits idle and unused in many major regional centres and regional areas. People and businesses in these areas have been denied the opportunity for early competition and investment in 4G mobile services.

The regional 1800 MHz spectrum is not an isolated case of allocation or reallocation process mismanagement by the ACMA. Other examples include the 800 / 900 MHz band review and the excessive complexity of the digital dividend auction. Spectrum is scarce and valuable resource that delivers significant economic and social benefits across a broad range of industries. The cost, uncertainty and regulatory burden imposed by poor processes impedes productivity across the spectrum-enabled economy.

For these reasons, the ACMA’s role in the allocation and reallocation of property rights must change.

The allocation of property rights within in contestable industries requires advanced capabilities in microeconomics, industrial organisation and game theory. The ACMA could build and develop these capabilities. However, since they are only infrequently required, it might be preferable for the allocation of spectrum property rights to be undertaken by a specialist economic regulator. An economic regulator would also continue to have responsibility for determining allocation limits that promote competition and the long-term interests of end-users.

The modern spectrum framework should make much greater use of market mechanisms than occurs in this existing framework. The ACMA could have a role in improving the functionality of the secondary market by facilitating spectrum brokers and an active trading market. This aspect of the ACMA’s responsibility could evolve to resemble the Australian Energy Market Operator (**AEMO**) or the Australian Securities Exchange (**ASX**). To perform this function, significant improvements are required in the

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<sup>19</sup> ACMA (2009), *Principles for spectrum management*, March.

<sup>20</sup> ACMA (2009), *Principles for spectrum management*, March.



usefulness and accuracy of the ACMA's information registers as well as an expansion of the ACMA's information capabilities to, for instance, provide bid or offer prices for spectrum parcels across different geographies and frequencies. While, given the technical aspects of the spectrum property rights, there are some natural reasons for this market-facilitation role to reside with the ACMA, it is conceivable that another institution could be created to perform this role.

## 5.2 Australian Government

The allocation of spectrum property rights to government and community uses often requires a subjective assessment of the qualitative social benefits associated with the use. In this circumstance, the Australian Government (administered via the relevant Minister and Department) is better-placed to assess the public interest from assigning spectrum to non-commercial users and to appraise the opportunity cost from doing so. Reforms to the spectrum management framework should make this responsibility explicit and include an option for the Government to refer complex spectrum allocation decisions to the Productivity Commission for a benefit-cost analysis.

If spectrum is allocated to government or community users then it should be issued as a transferable property right to facilitate reallocation via market mechanisms if the benefits or opportunity cost of using the spectrum change through time.

Well-defined property rights, a broad allocation of initial property rights and a functioning secondary market should significantly reduce any need for the Australian Government to become involved in the reallocation of spectrum property rights. Nonetheless, the spectrum management framework should retain provisions for the Australian Government to pursue the resumption of spectrum property rights on just terms in exceptional circumstances where there is a strong public interest for this to occur.

The ACMA should retain its role in administering the Australian Government's allocation and reallocation decisions for non-commercial users.

## 5.3 Economic regulator

As set out in section 5.1, there is merit in considering whether the allocation commercial spectrum property rights should reside with an economic regulator rather than a technical regulator. The Harper review's draft report recommended the introduction of an access and pricing regulator.<sup>21</sup> An access and pricing regulator would be well-suited to the task of designing and implementing a mechanism that balances the efficient allocation of spectrum with the promotion of competition in contestable industries.

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<sup>21</sup> Australian Government (2014), *Competition Policy Review*, Draft report, September.



Of course the performance of these tasks would also fit within the current ACCC arrangements (although as per our submission to the Harper Review, improved sectorial experience would be needed).

To preserving institutional integrity, accountability and independence, the economic regulator should be responsible for all aspects of the allocation process. In particular, the access and pricing regulator should be responsible for setting prices for over-the-counter allocations, determining reserve prices for auctions and setting out a range of options for payment terms ranging from upfront payment to annual payments over the term of the licence. To that end, the Ministerial powers to provide written directions on the level of spectrum access charges under section 294 of the *Radiocommunications Act 1992* should be limited in the future spectrum management framework.



## 6. Regulatory processes

The administrative tasks within the spectrum management framework will not be effectively performed without well-defined, predictable and efficient regulatory processes. The key elements of an effective regulatory process are a clear linkage between legislative objectives and regulatory decisions, system flexibility, process certainty and, institutional transparency and accountability.

### 6.1 Objectives used to set priorities and make regulatory decisions

The object of the *Radiocommunications Act 1992 (Cth)*, as set out in clause 3, provides a clear foundation for a modern spectrum framework. The object states:

*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 radiocommunications 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 objects of the Act set a range of economic, social and public interest objectives for the spectrum management framework. There is merit in considering whether the object should contain an explicit objective to "promote competition in relevant downstream markets that are dependent on access to the radiofrequency spectrum". Arguably, this competition sentiment is captured by clause 3(a), which requires



the efficient allocation and use of spectrum to maximise the overall public benefit. Notwithstanding this clause, it has been Vodafone's experience that insufficient regard has been given to competition matters in spectrum allocation and reallocation decisions.

For the spectrum management framework to function effectively, its regulatory processes must have a clear and logical link to the object of the Act. It is important for regulatory decision-making to reflect these objects and to avoid introducing unrelated concepts into the decision-making framework (e.g., requiring "consensus" among industry participants before making a regulatory decision).

## 6.2 Flexibility from commoditised property rights

The commoditisation of spectrum property rights will provide greater flexibility than can be achieved via changes to administrative functions or administrative process. Market mechanisms will then create an incentive for spectrum to efficiently move to its highest value use in a manner that cannot be replicated by today's widespread use of apparatus licences for spectrum management.

In the absence of commoditised property rights, the lengthy delays that characterise the current system will increase and the burden on the Commonwealth to support the ACMA's administrative processes will increase.

## 6.3 Process certainty: Decision-making principles and frameworks

Greater process certainty is required for the performance of administrative tasks. The ACMA uses a variety of decision-making frameworks to guide spectrum management including the total welfare standard, opportunity cost pricing and the Spectrum Management Principles. Yet these frameworks have been inconsistently applied and led to uncertainty over how the objects of the Act will be interpreted for stakeholders. In the case of the total welfare standard and the Spectrum Management Principles, the frameworks are often too blunt or too vague to inform the decisions the regulator is required to make and there is often limited transparency about how they have been used. Nevertheless, these type of frameworks will be useful to retain in a modern spectrum management framework though they will need to be better defined and more consistently applied.

Separately, the planning and analysis required to make decisions using the existing regulatory processes is resource intensive and time-consuming. This is an unfortunate consequence of the heavy emphasis the current spectrum management framework places on centrally-planned, "command and control" approaches to spectrum allocation. This increases administrative costs, as well as imposing a regulatory burden on affected and prospective spectrum users. Unsurprisingly, this has led to timeframes for the ACMA's allocation and reallocation decisions to stretch well beyond what ought to be considered reasonable.

Greater use of market mechanisms will significantly reduce some of the problems associated with the current regulatory processes. In particular, it avoids the regulator undertaking speculative, high risk exercises to assess demand and supply across a broad range of industries and, in some cases, for different



participants within these industries. Such undertakings entail the regulator making decisions on the basis of analysis characterised by uncertainty and significant information asymmetries between the regulator and industry participants. Moreover, these decisions are often made in circumstances where the economic cost of regulatory error will be significant.

The introduction of mandatory maximum timeframes for allocation and reallocation planning processes should be incorporated into the spectrum management framework. Further, as a matter of principle, it is unacceptable for spectrum to be placed under “embargo” for several years while the ACMA make its plans. It should be prospective spectrum users to decide whether to make investments in light of ACMA planning uncertainty and the ACMA should not prevent them from doing so. Such administrative operating procedures demonstrate the inefficiency of “command and control” approaches to spectrum management and highlight how little Australia’s spectrum management framework has evolved since the 1992 reforms.

The use of opportunity cost pricing has provided industry with guidance on how the ACMA approaches the setting of spectrum access charges. Yet, the use of opportunity cost pricing is not widespread within current spectrum allocation processes. Instead, most spectrum bands attract an apparatus licence tax and an administrative fee that bears little resemblance to the opportunity cost of spectrum access. In the case of regional 1800 MHz spectrum, the use of the “tax and fee” approach means current licence holders are paying well below opportunity cost for access to this spectrum. If the current system of apparatus licensing is retained, a broader application of opportunity cost pricing is essential.

## 6.4 Transparency and public consultation

The principles of transparency and public consultation are well-established among Australia’s public institutions. Both are essential to fair and effective policy formulation and regulatory decision-making.

Transparency and public consultation reflect good governance and characterise good administrative processes; it is often assumed that transparency and consultation can be taken for granted in Australian regulatory processes. However, there has been a growing tendency in spectrum management to limit consultation to parties that are directly impacted by a decision. Many end-users and industry players who are indirectly impacted by a decision are not provided with an opportunity to provide their views on proposed regulatory decisions.

People and business, as well as the governments and organisations that represent them, should have an opportunity to participate in discussions about how spectrum is allocated. For instance, people and businesses in Canberra are better-placed than mobile network operators to determine if they want 1800 MHz spectrum allocated to supporting the universal service obligation or whether that spectrum is better used in delivering competitive, high speed 4G mobile services.

Transparency and public consultation must be embedded into the regulatory processes of a modern spectrum management framework. This may require changes to the legislation to prescribe appropriate consultation practices and to encourage greater transparency of regulatory decision-making.



## 6.5 Accountability for regulatory processes

Government and regulators must be accountable for their decisions. In the case of Government, there are some natural mechanisms (e.g., elections) that foster a sense of accountability. The drivers for ensuring regulators are accountable for their spectrum decisions is less clear. One dimension to accountability is the Administrative Appeals Tribunal (**AAT**), whose role is already defined in the *Radiocommunications Act 1992*. The AAT provides clear avenues for affected parties to request a review of certain decisions made by the ACMA. This review mechanism must be retained in any modernisation of the spectrum management framework.

The problems of regulator accountability are as often as much to do with inadequate processes as they are to do with inadequate decisions. For instance, regulators should not put Australia's scarce and valuable spectrum resources under embargo and then fail to make a timely decision about how that spectrum is to be used. Regulator efficiency can be significantly improved by introducing legislatively prescribed timeframes for core regulatory processes and by abolishing the process of using embargoes. If regulators do not meet the prescribed timeframe, the regulator should be required to publish its reasons for why the deadline has not been met and to make a formal request to the Minister to request an extension of time. In a similar vein, if a prospective spectrum users wants to take the investment risk of using spectrum that is the subject to re-planning consideration by the regulator it should be free to do so.



## A. Vodafone's use of radiofrequency spectrum

Vodafone is one of Australia's largest users of radiofrequency spectrum. We use spectrum to deliver mobile services to end-users, fixed links to provide connectivity between our base stations and our core network and operate a paging network that delivers critical priority messaging to a range of health and emergency service organisations. The range of our licensed spectrum holdings is set out in **Table 3** – Vodafone uses its spectrum licences to deliver mobile services.

**Table 3: Vodafone's licensed spectrum holdings**

Band	Category	Licence type
VHF (148-174 MHz)	Land mobile (Paging System – Exterior)	Apparatus
400 MHz	Fixed (Point-to-point)	Apparatus
800 MHz	Spectrum	
800 MHz	Fixed (Point-to-point)	Apparatus
900 MHz	PMTS Class B	Apparatus
1800 MHz	Spectrum	
2 GHz	Spectrum	
6 GHz	Fixed (Point-to-point)	Apparatus
6.7 GHz	Fixed (Point-to-point)	Apparatus
7.5 GHz	Fixed (Point-to-point)	Apparatus
8 GHz	Fixed (Point-to-point)	Apparatus
10 GHz	Fixed (Point-to-point)	Apparatus
11 GHz	Fixed (Point-to-point)	Apparatus
13 GHz	Fixed (Point-to-point)	Apparatus
15 GHz	Fixed (Point-to-point)	Apparatus
18 GHz	Fixed (Point-to-point)	Apparatus
23 GHz	Fixed (Point-to-point)	Apparatus
38 GHz	Fixed (Point-to-point)	Apparatus



## B. Comments on specific proposals

### Proposal 1: Implement a clear and simplified framework of policy accountability

Vodafone agrees that reform to the spectrum management framework must deliver a clear, simplified framework of policy accountability. If property rights are well-defined, enforceable and transferable market mechanisms will be the most effective form of spectrum management. Efforts to create an effective market should be the core focus of reforms to the spectrum management framework.

As set out in chapters 4 and chapters 5, the key to a clear and simplified spectrum framework is to identify the functions and tasks required to facilitate an effective spectrum management framework and assign responsibility for performing those tasks to the institutions that are most capable of performing them. We envisage a mix of roles for the Australia Government, a technical regulator (i.e., the ACMA) and an economic regulator (e.g., the ACCC). These roles are set out in **Chapter 5** at **Figure 4**.

Vodafone does not expect there will be much requirement for the Minister to issue over-arching policy statements after reforms that shift Australia's largely "command and control" approach toward a more market-oriented system of spectrum management. We would expect the Minister to have direction powers in the Radiocommunications Act to enable Ministerial intervention for specific purposes. However, to promote the integrity of the spectrum market and certainty for spectrum users, we envisage the use of these powers would be limited to matters that are in the public interest.

We do not see value in requiring the ACMA to notify the Minister of certain decisions and provide an annual program work beyond its normal requirements as an independent Authority. Again, if the spectrum market is expanded via the use of well-defined, transferable property rights the role of the ACMA in the allocation and reallocation of spectrum will be significantly diminished.

### Proposal 2: Establish a single licensing framework

Vodafone strongly supports efforts to streamline the licensing framework. However, the Department appears to be misguided in its reasons for pursuing such reforms. As set out in section 4.1, licences should become more homogeneous to facilitate transferability of spectrum licences and the emergence of a functional secondary market for spectrum. Markets tend to be more efficient when goods are commoditised rather than customised.

The spectrum management framework must move away from embedding excessive requirements for the planning and re-planning of spectrum bands. The "command and control" approach to spectrum management that is reflected by the extensive use of apparatus licences in the current spectrum management must be significantly reduced. The failure of the current framework to deliver timely reallocation of spectrum or facilitate timely use of unused spectrum is harming Australia's economic interests and burdening the taxpayer and industry with excessive administrative costs.



The role of class licences within the spectrum management framework is distinctly different from the role of spectrum and apparatus licences. As set out in section 3.1, class licences are suitable for creating an excludable, non-rivalrous “good” that is well suited to the non-transferable property rights identified in section 4.1. While these licences could be brought into a single licensing framework, it is not clear that there is a compelling reason to do so. Instead, the use of spectrum by compatible devices might be better suited to a co-regulatory framework with standards-setting jointly undertaken by industry and the technical regulator.

### Proposal 3: More flexible allocation and reallocation process

Greater flexibility in the allocation and reallocation of spectrum property rights obviously delivers benefits. However, we are not convinced it will assist the ACMA in making timely decisions over the allocation and reallocation of spectrum. The major problem in the allocation and reallocation of spectrum has arisen due to challenges in evaluating the net economic and social benefits associated with different uses of the spectrum and making a decision over which use should be given primacy. Such an outcome should not be surprising as it reflects the major problem with “command and control” approaches more broadly. Greater flexibility in the allocation and reallocation process will not solve this problem.

Instead, the emphasis should be on moving to a market-oriented system as this will solve many of the problems in determining the “highest value use” that plague the current system. Of course, market mechanisms will create some new problems in relation to excessive concentration of property rights and the promotion of competition in contestable industries. A modern spectrum management framework should anticipate these problems and include provisions for addressing them albeit only in circumstances where the problems cannot be addressed by the general competition provisions in the *Competition and Consumer Act 2010*.

The second problem is that the role of the ACMA is primarily as a technical regulator. The allocation of spectrum in contestable industries is an economic function. As set out in section 5.1, the design of allocation mechanisms and robust allocation limits require advanced skills in microeconomics, industrial organisation and game theory. As set out in section 4.2, the impact of existing spectrum endowments (including geographically differences in holdings) on allocation limits is critical to understand. For the reasons, responsibility for the allocation of spectrum should reside with an economic regulator (e.g., the ACCC) rather than the ACMA.

### Proposal 4: Establish a more transparent and flexible approach for spectrum pricing to promote efficient use and re-use of spectrum

Vodafone supports the use of auctions for the initial allocation of spectrum where demand exceeds supply. For the re-purposing of spectrum to move to higher value uses, property rights ought to be traded on the secondary market. In this context, there should be no need for a government or a regulator to infer “market-equivalent prices”.



For the allocation of spectrum where supply exceeds demand, Vodafone supports the use of opportunity cost pricing for spectrum though an obvious question that arises from the use of this approach is whose opportunity cost should be used to set prices – the government or the spectrum user. In our view, it is the former – that is, the price the government would otherwise obtain for allocating the spectrum to a different user (or set of users), whose purpose and valuation for the spectrum might be quite different to the user to whom spectrum is allocated. In contestable industries, the best alternative use might be to allocate the spectrum to a different user in the same industry so there might be little difference between the opportunity cost to the government and the opportunity cost to the spectrum user.

In many spectrum bands, supply will exceed demand and the opportunity cost of allocating spectrum to a particular purpose for government is negligible (after taking into account administrative costs). The Government should have little hesitation in allocating spectrum in this manner. This will provide significant benefit to prospective government and community users of spectrum. As set out section 3.1, it is important to create universality of spectrum property rights – it is better for spectrum to be allocated (at negligible cost to the acquirer) than to sit idle.

The re-issue of licences should not be used as an opportunity to levy new charges on licence holders. Rather, licences should automatically roll-over unless the Australian Government deems that is not in the public interest for the licences to be re-issued. To preserve universality of property rights, the resumption of licences should only occur in very limited circumstances.

### **Proposal 5: Structuring payment schedules for licences**

Vodafone supports payment structures being a parameter to the licence. The parameter should have two payment categories: upfront and annual. Upfront payments should be payable up to 30 days after licences commence instead of the ACMA's current practice of requiring licence payments 1-2 years before licences commence. The first annual payment should be made 30 days after licences commence with instalments made every year thereafter. Licences with an annual payments should still be capable of being auctioned, which may require an upfront payment that is different than the annual instalments and this should be accommodated via legislation and the regulatory process.

For licences in bands where supply exceeds demand, the preference should be to use an upfront payment parameter as we would expect the price of the licence to be negligible.

The two options for payment structures, and the timing of payment in relation to licence commencement, should be defined in legislation.

### **Proposal 6: The ACMA to take an open data approach to substantially improve the range, availability and quality of information provided to support an efficient spectrum market**

As set out section 5.1, the modern spectrum framework should make much greater use of market mechanisms than occurs in the existing framework. The ACMA may have a role in improving the functionality of the secondary market by facilitating spectrum brokers and an active trading market. This



aspect of the ACMA's responsibility should evolve to resemble the AEMO or the ASX. To perform this function significant improvements are required in the usefulness and accuracy of the ACMA's information registers as well as an expansion of the ACMA's information capabilities to, for instance, provide bid or offer prices for spectrum parcels across different geographies and frequencies.

Vodafone does not support an expansion of the ACMA's authority to collect information from industry. This will impose additional regulatory burdens on industry, without any clear offsetting benefit. We also do not support a requirement for additional reports to the Minister on the ACMA's work program. Such reports will add to the administrative costs for the both the ACMA and the Department, and reflect a desire to increase the "command and control" elements of the framework despite this approach having demonstrably failed to deliver timely economic and social benefits to the Australian community.

### **Proposal 7: Payment of compensation for resuming all or part of a licence**

The resumption of licences undermines the integrity of the property rights system. It should only occur in a very limited circumstances. As a matter of principle, the spectrum management framework needs to evolve away from the current system of planning and re-planning of spectrum bands – such exercises are administratively costly and require the introduction of these types of measures.

To the extent the resumption of licences is considered in the public interest then we agree it is fair and reasonable for compensation to be provided on just terms. We do not consider the resumption of licences should be specific licence parameter rather it should be a general condition of all spectrum property rights and therefore it should be reflected within legislation.

### **Proposal 8: Facilitate greater user involvement in spectrum management**

It is not clear that delegating spectrum management functions leads to any greater efficiency in spectrum management. Indeed, we consider it is masking the excessive administrative costs associated with current regulatory processes. The desire to devolve these tasks away from the ACMA should be regarded as a sign of the fundamental flaws with apparatus licensing more broadly rather than being regarded as a source of administrative efficiency.

There are opportunities for greater user involvement in other areas of spectrum management. For instance, the spectrum management framework should make use of co-regulatory approaches for class licences so that industry can take on greater responsibility for their development of these standards.

### **Proposal 9: Develop more principles-based device supply regulation**

Vodafone supports a principles-based approach to device regulation to facilitate interference management and manage health and safety risks associated with radiocommunications devices. It will remain critical under any new device supply regulation to ensure that enforcement of property rights is upheld in order to protect the integrity of the spectrum management framework. In addition to the dispute



resolution functions, the ACMA ought to broaden consumer and supplier awareness about certification processes.

In cases of interference encountered by Vodafone, the importation of non-compliant and uncertified devices is a common cause of problems. Once consumers are made aware of the issue they comply with the regulation. A greater emphasis by the ACMA on both device certification and improving consumer awareness about certification will significantly reduce interference issues from the importation of non-compliant devices. It is important that resources are dedicated to this purpose as not all spectrum rights holders will have the capabilities to identify and address interference to their spectrum property rights.

### **Proposal 10: Improve regulation by extending the suite of enforcement measures available to the ACMA**

Vodafone supports reforms that will expand and extend the compliance and enforcement measures available to the ACMA. As set out in section 4.3, it is essential the spectrum management framework include a suite of measures to effectively enforce the property rights created by it.

The introduction of civil penalties, remedial directions and formal warning are necessary to ensure the ACMA can effectively manage and control interference, as well as ensure the integrity of property rights. Vodafone does not consider the introduction of these measures should require the removal of existing measures, such as the capacity for the ACMA to initiate criminal proceedings for grave breaches of Australia's radiocommunications laws. Vodafone also supports the introduction of product recalls, interim bans and public warnings in relation to the supply of non-compliant devices.

### **Proposal 11: The ACMA to continually review options for allocating spectrum to alternative / higher value uses and to ensure that barriers to achieving this are reviewed and removed where appropriate**

Vodafone supports spectrum moving to higher yield uses. However, it is not clear that the ACMA is best-placed to perform this function. The use of regulatory "command and control" approaches has led to demonstrable inefficiencies in the current spectrum management framework. As set out in section 4.4, the spectrum management framework should place much greater emphasis on market mechanisms to facilitate spectrum moving from low yield to high yield uses. As set out in section 4.2 and 5.3, the responsibility for the allocation of new spectrum should reside with an economic regulator.