

Sub. no. 73  
ID no. - 354



## **The Productivity Commission's Review of the Radiocommunications Acts and the Role of the Australian Communications Authority**

A submission by the Network Economics Consulting Group

**November 7, 2001**

## Contents

<u>1</u>	<u>Introduction</u>	4
<u>2</u>	<u>The context</u>	4
<u>3</u>	<u>Economic characteristics of the spectrum market</u>	6
	<u>3.1 Public goods and externalities</u>	7
	<u>3.2 Property rights</u>	9
	<u>3.3 Coordination failures</u>	10
<u>4</u>	<u>The current allocation mechanism</u>	13
<u>5</u>	<u>Secondary markets</u>	15

## 1 Introduction

The Network Economics Consulting Group (“NECG”) welcomes this opportunity to provide some initial comments on the Productivity Commission’s (“**the Commission**”) issues paper on the *Review of the Radiocommunications Acts and the Role of the Australian Communications Authority* (“**the Issues Paper**”). NECG believes this review offers substantial scope for a thorough examination of the critical issues surrounding the allocation of spectrum.

NECG believes that the essential problem facing the Commission is how to reform the set of regulations governing the allocation of spectrum to ensure the efficient use of an increasingly valuable resource. In this submission, NECG briefly examines four important aspects of this problem:

- section 2 briefly surveys the contending pressures on the market for spectrum, highlighting the increasing complexity this introduces into the allocation process;
- section 3 examines the economic characteristics of the spectrum market, noting that while some characteristics of the market are incorrectly identified as market failures, it is true that the market is characterised by interference and congestion problems that necessitate government intervention in the *definition* of property rights. The necessity for government intervention in the *allocation* of property rights is, however, far less certain and would seem to be limited to the periodic need to ameliorate some coordination failures;
- section 4 examines some of the potential inefficiencies that may arise from the current spectrum management process, which involves substantial government intervention in the allocation process; and
- finally section 5 details the major benefits and problems associated with secondary markets, which in NECG’s view is a potentially much more efficient mechanism for the allocation of spectrum.

NECG would be pleased to discuss any of these issues at greater length with the Commission.

## 2 The context

For many years the allocation of spectrum has been an important but largely invisible activity undertaken by a small group of specialists. In recent years, however, the massive sums paid for access to the 3G spectrum and the debates surrounding the use of the broadcasting spectrum in the context of

digitisation have brought this area of policy to the fore. As the Commission notes in the Issues Paper, the considerable economic value of the spectrum is increasingly apparent. Ensuring the efficient use of this resource is an important, but particularly difficult task for a number of related reasons.

To begin with, the spectrum is a finite resource and demand has the potential to grow rapidly – particularly in the upper parts of the VHF band and the UHF band used for such commercially important activities as mobile communications, television and radio broadcasting, communications between fixed points, and communications with and via satellite. As bandwidth-intensive wireless applications are refined and rolled out, demand for spectrum has the potential to grow at an even greater rate than has been experienced to date.

It is important, however, not to overestimate the potential for spectrum congestion. In the short term, the predictions for mobile demand growth that underpinned the bids for 3G spectrum are looking increasingly inflated. A report by Ernst & Young and BMI-TechKnowledge, for example, has found that both broadband and 3G cellular services could take off some five years later than generally expected with substantially lower levels of demand in the earlier rollout phases than was predicted less than 2 years ago.<sup>1</sup>

Over the longer term, it is useful to recognise that dire predictions of a spectrum shortage have been a mainstay of almost every World Administrative Radio Conference meeting since the 1950s. However, a series of technological advances have consistently managed to improve the efficiency with which spectrum is utilised, increasing the amount of spectrum effectively available. A striking feature over the past 60 years is that scarcity-based forecasts has proved very pessimistic compared to the technological possibilities offered by progress. As Gasman explains:

With lower-power communications, data compression, and practical communications at high frequencies, spectrum may still be scarce, but it is not as scarce as it once was, and it is becoming less scarce all the time.<sup>2</sup>

---

<sup>1</sup> See “Broadband and 3G could take off later than expected – report”, [www.3GNewsroom.com](http://www.3GNewsroom.com), Oct 31, 2001

<sup>2</sup> Gasman L, 1994, “Who Should Own the Airwaves” *Telecompetition: The Free Market Road to the Information Superhighway*, Washington, D.C.: The Cato Institute.

Technological advances, however, also increase the complexity of the spectrum allocation process. For example, while digital compression may mean that some existing users have the potential to economise on spectrum usage, this is only possible after the outlay of substantial investments by both producers and consumers. Spectrum pricing policies have the potential to distort this investment process. Spectrum prices set below opportunity cost will distort the incentives to make such investments; prices set above opportunity cost may mean that such investment is inefficiently brought forward.

The spectrum allocation process is further complicated by a variety of policies that impinge directly upon the demands for and supply of spectrum. Spectrum policy has been built up over a number of decades with significant inconsistencies developing in the way spectrum is allocated across uses. Broadcasting spectrum, for example, is allocated very differently from the spectrum used for 3G mobiles. Achieving consistency in approach is potentially very desirable, but also very difficult. This is particularly so when the explicit or implicit agreements put in place between government and the various spectrum users are considered. For example, both the 3G and broadcasting spectrum was allocated with at least implicit guarantees that the number of parties that would be able to utilise the spectrum for the provision of such services would be strictly limited.

Finally, there is a range of social policy objectives that require access to the spectrum if they are to be realised. These range from the provision of the necessary spectrum to the emergency services through to the provision of necessary spectrum to the public sector broadcasters. Ensuring such access is achieved in an efficient manner further increases the difficulties facing spectrum managers.

Given these complexities, it is crucial that the mechanism for allocating the spectrum is the most efficient available. In what follows we consider the economic characteristics of the market for spectrum and the implications for policy.

### **3 Economic characteristics of the spectrum market**

Traditionally, it has been assumed that the market for spectrum is characterised by extensive market failures – in particular, the spectrum is commonly said to exhibit public good and externality properties – and that this justifies pervasive government intervention. NECG submits that this assumption is premised on a misunderstanding in part of the public good and externality concepts and in part of the intervention that such market characteristics necessitates. In general, government should limit itself to the definition and enforcement of property rights associated with spectrum. However, NECG accepts that there are coordination failures inherent in the market for spectrum that may

necessitate a more extensive role for government in terms of periodic intervention in the allocation process.

### 3.1 Public goods and externalities

Modern economic theory offers a comprehensive analytical framework for the assessment of market failure.<sup>3</sup> Unfortunately, this framework is often not utilised rigorously with respect to the analysis of the market for spectrum.

A case in point is the suggestion that the radio spectrum has the characteristics of a public good. This assertion is incorrect. Public goods are a class of goods which cannot practically be withheld from one individual consumer without withholding them from all consumers (“non-excludability”) and for which the marginal cost of an additional person consuming them, once they have been produced, is zero (“non-rivalrous in consumption”).<sup>4</sup> Neither condition applies to the spectrum, on the assumption that the property rights for the spectrum are clearly defined. If such rights are not clearly defined then the problem is less one of public goods and more likely to be an issue of overuse commonly referred to as the ‘tragedy of the commons’.<sup>5</sup> The confusion seems largely to arise as a result of the public good characteristics of some services that utilise the radio spectrum extensively.

Similarly, the alleged scarcity of the spectrum is frequently labelled an externality necessitating government intervention. Externalities occur when there is a divergence between the private cost (or benefit) and the social cost (or benefit) associated with an activity resulting in under or over-provision of the activity compared with the social optimum.<sup>6</sup> It is incorrect to suggest that the spectrum is characterised by externalities simply because its usage by one party prevents its usage by another.

---

<sup>3</sup> The theory is now largely extensive on externalities, public goods, imperfect competition, imperfect information, non-convexities, indivisibilities and market incompleteness. See Salanié B, 2000, *The microeconomics of market failures*, Cambridge, MIT Press

<sup>4</sup> Samuelson P A, 1954, “The Pure Theory of Public Expenditure” *Review of Economics and Statistics*, 36:387-89

<sup>5</sup> Hardin G, 1968, “The Tragedy of the Commons” *Science*, 162:1243-1248.

<sup>6</sup> Pigou A C, 1920, *The Economics of Welfare*, MacMillan.

Only the effects not already included in the price mechanism are potential externalities. In other words, the mere fact that one's use of a scarce resource tends to raise its price is not an externality *per se*. Rather this is a normal feature of a market characterised by goods that are rivalrous in consumption. As Coase has observed in relation to scarcity:

It is a commonplace of economics that almost all resources used in the economic system (and not simply radio and television frequencies) are limited in amount and scarce, in that people would like to use more than exists. Land, labor, and capital are all scarce, but this, of itself, does not call for government regulation. It is true that some mechanism has to be employed to decide who, out of the many claimants, should be allowed to use the scarce resource. But the way this is usually done in the American economic system is to employ the price mechanism, and this allocates resources to users without the need for government regulation.<sup>7</sup>

Unlike scarcity, congestion and interference can correctly be considered externalities. Congestion is the impedance users impose on each other in conditions where the use of the system by means of which the service is provided approaches its capacity limits. The ensuing outcome reflects a negative externality, namely that the attempted consumption of an additional unit will lower the utility derived from total realised consumption. Similarly, if the frequencies of two transmissions meet in time and space, they interfere. The immediate effect is the reduction of the quality of the radio signal for both. This is also correctly characterised as a negative externality.

Importantly, neither congestion nor interference appears to necessitate government involvement in the allocation of spectrum. Rather such problems seem only to require the government to define and enforce property rights to the spectrum. As Hazlett points out:

Economists, political scientists, and lawyers generally agree that the interference rationale for licensure in "the public interest" is nonsensical. The interference problem is widely recognized as one of defining separate frequency "properties"; it is logically unconnected to the issue of who is to harvest those frequencies. To confuse the definition of spectrum

---

<sup>7</sup> Coase R H, 1959, "The Federal Communications Commission" *Journal of Law and Economics*, 2:1-40.



rights with the assignment of spectrum rights is to believe that, to keep intruders out of (private) backyards, the government must own (or allocate) all the houses.<sup>8</sup>

As Krattenmaker and Powe further explain:

Interference, like scarcity... is a bogeyman. All resources are subject to interference in the sense that their value will decline if everyone attempts to use them at once. This is why governments recognize property rights (which include the right to exclude others from using) in resources exchanged through the marketplace. Interference will... destroy the value of any resource, but usually the government does not choose to displace the market to prevent interference. Two people cannot comfortably sit at the same time in the same desk chair. Yet this fact has not led government to parcel out the right to sit in a chair. Rather, ownership of the chair is taken to confer authority to exclude others from sitting in it, no matter how eager they may be to do so.<sup>9</sup>

In other words the externality is the result of a missing market; when there is no market for an economic good, the price system cannot play its role in limiting interference or reducing congestion. What is required in such circumstances is a rule that assigns rights over the externality to a particular party. The price mechanism can then function as it does for all other goods and services.

## 3.2 Property rights

From an economic perspective, it seems that at most the presence of congestion and interference requires government to carefully define and enforce property rights. NECG acknowledges that the definition of property rights is a non-trivial exercise that raises a number of important issues for policy makers. In this submission NECG will only address one of the more contentious issues facing policy makers in the design of property rights –the duration of the property right. Specifically, policy makers face a choice between issuing time-delimited rights to spectrum use or some form of enduring right such as a lease with an automatic right of renewal or a perpetual lease.

---

<sup>8</sup> Hazlett T W, 1990, “The Rationality of U.S. Regulation of the Broadcast Spectrum” *Journal of Law and Economics*, 33:145

<sup>9</sup> Krattenmaker T G and Powe L A, 1994, *Regulating Broadcast Programming*, London, MIT Press.

Telstra has clearly spelt out the costs of time-delimited leasehold in its submission to this Inquiry. The costs of time-delimited licenses arise primarily from the properties of investments in spectrum and in the infrastructure necessary to supply services using the spectrum. Because investments in the industry are long-lived and highly specific, there are significant sunk costs associated with the deployment of infrastructure to supply services using spectrum. Accordingly, it is necessary to ensure that there is adequate incentive for appropriate investment decisions.

In addition, the extent to which the costs are sunk gives rise to a significant asymmetry in bargaining power between the ultimate owner of the spectrum (the Commonwealth and its agent the ACA) and the investor in infrastructure that makes use of that spectrum.

The firm invests in a specific asset, which is risky behaviour. Once this investment is made (and sunk), the Commonwealth has an incentive to extract any profits associated with a successful investment but no symmetrical requirement to compensate for unsuccessful investments. This could simply take the form of the potential threat of withdrawing the license, unless the firm bid a significantly increased licence fee as part of an auction process.

Such behaviour – a classic example of a hold-up problem – is costly to society. Consider a license holder that is seeking to extend its right to use the spectrum because it has not recouped the whole cost of its investment. It is likely that such a firm will have an incentive to successfully bid for renewal of the license, even if it were not the most efficient user of the spectrum compared with current technologies. The argument is that the incumbent has invested to use the spectrum and it is assumed that a significant part of this investment is sunk, in that it cannot be recovered in the event of the incumbent losing the spectrum license. The firm faces a choice of losing its sunk investment costs or producing while incurring losses. Therefore, it will have an incentive to win the auction even if it is not socially efficient, with the resultant economic efficiency losses ex post.

If the firm anticipates this situation, it will have an incentive to under-invest ex ante. If the project requires sequential investments, under-investment will become apparent as the end of the licence period approaches. If there is a once-off investment, the investment will be tailored to fit the tenure period ex ante, regardless of whether or not such an investment is socially optimal.

While the hold-up problem tends to argue for the grant of an enduring right of use, the presence of coordination failures complicates this picture. It is to these problems we now turn.

### **3.3 Coordination failures**

Coordination failures are situations where decentralised bargaining does not produce efficient outcomes. Such bargaining failures arise for a number of reasons. For instance, the lumpy nature of

technological and investment decisions introduces non-convexities<sup>10</sup> into the allocation process, which may cause private negotiations to fail. Consider a new technology that requires access to parcels of spectrum held by multiple parties. The developer of the technology places no value on an individual parcel, only on the entire set. Therefore, because the positive value the developer attaches to any individual parcel is conditional on the success of the full venture, bargaining over individual parcels may fail. Indeed, to each parcel holder considered individually the maximum price he would pay is zero. However, once the developer had secured a substantial parcel of rights, the remaining rights holders would have incentives to hold out for the entire value to the purchaser of the relevant spectrum. Knowing this, the parties would each walk away from the transaction before initiating it, despite the fact that the transaction as a whole would yield benefits in excess of its costs. Put more generally, the presence of transaction costs and moral hazard has the potential to reduce the scope for successfully concluding a wealth-increasing bargain between private individuals.

In the context of spectrum, the coordination failure tends to arise in circumstances where changes in demand patterns or technology mean that an incumbent holder of spectrum is no longer the most efficient user of that spectrum and hence general welfare is maximised by its relocation. However, the incumbent refuses to be relocated or demands an excessive price for such relocation. This is the classic hold-out problem akin to the landholder refusing to sell his/her land for the development of a public highway or airport.

In spectrum markets, there are a number of situations in which holders of particular parcels of spectrum could engage in hold-out activity. These hold-out opportunities have arisen because of the traditional requirement for some parties to gain access to the same piece of spectrum in different geographical locations. For example:

- in the case of personal communication services, consumers typically desire roaming, permitting them to use their telephones throughout an open area. While seamless roaming can be arranged by contracts between independent providers, such contracts require coordination on frequencies;

---

<sup>10</sup> This property refers to nothing more than the fact that producing one unit of output costs more than the average of separately producing zero unit and two units. The relationship between non-convexity and externalities is discussed at some length by Starret D, (1972) "Fundamental Nonconvexities in the Theory of Externalities" *Journal of Economic Theory* 4:180-199.

- similarly, the optimal introduction of a new technology may depend on the ability to gather a certain number of licenses in the hand of one single holder; and
- finally, there are global synergies defined as those gains in value that accrue from obtaining increased numbers of licenses or markets: economies of scale or scope among multiple licenses.

As a general matter, coordination can be provided either by internalisation or through some form of administrative control. Internalisation would occur if a single firm controlled a sufficient block of rights to impose the efficient outcome. Even if this could occur, and it seems unlikely, it would probably give rise to substantial market power, with associated welfare losses. The alternative is some form of administrative control over the use of the rights, which implies that the rights can be reallocated from one use to another, in line with changing efficiency.

If the incumbent in question simply has a leasehold right over the spectrum, the reallocation necessary to facilitate these situations can occur relatively easily at the termination of the lease period. However, as we have noted above, such time-delimited leases may have significant detrimental impacts on investment.

For policy-makers, there appears to be a trade-off between the inalienability of a property rights – which is necessary to foster efficiency in investment and use decisions – and the eventual need to limit that inalienability in the name of the public interest and to prevent hold out.

However, NECG submits that it should be possible to protect society from the more egregious examples of hold-out behaviour while in general terms protecting investors from the hold-up problems inherent in time-delimited licenses. As in property law where the Crown grants freehold interests in land but retains the ability to completely resume it and regulators have rights to shape planning and management of that property asset, the Commonwealth and the regulator could still be able to plan and manage the appropriate use of the spectrum asset through appropriate and publicly transparent processes.

In summary, the role of government in respect of spectrum should be primarily limited to the definition and enforcement of property rights. In this context, policy-makers should avoid placing time limits on the property rights. Nonetheless, the potential for coordination failures provides some residual justification for regulators to go beyond the simple definition and enforcement of property rights to an involvement in the allocation process. But this should be seen very much as an exceptional situation, involving a public inquiry and a strict assessment of the costs and benefits of spectrum resumption.

Consideration should also be given to whether compensation ought to be provided in the event of resumption. There are some economists who argue that as a general matter, no compensation should be payable for regulatory changes. This is because of rational expectations: the probability of alienation of the right is built into its initial valuation; paying compensation in no way alters the economics. In this view, compensation may only be justified if the party to which the right has been sold is more risk adverse than the State; however, even so, private insurance against compulsory reacquisition may be preferable in such circumstances. While these arguments have some merit, account also needs to be taken of the risk that removing any compensation requirement creates in terms of incentives for moral hazard by the regulator.

## 4 The current allocation mechanism

Despite the apparent lack of any overarching justification for sustained government involvement in the allocation of spectrum, spectrum has traditionally been allocated via a highly centralised administrative process. Under such a system, regulators have the option to assign licenses to the particular purpose *they* believe would put the spectrum to its best use.

With respect to the prices spectrum managers charge for usage of the spectrum, this has traditionally had nothing to do with the allocation process and was largely seen as an issue of secondary concern. Licence fees were usually set at a level that covered the administrative costs of the licensing system.

More recently, auction mechanisms have been used to both assign spectrum licenses within a particular allocation and to set the license fees. Some agencies – such as the Radiocommunications Agency in the United Kingdom – have also sought to use economic models to determine fees that more closely parallel the opportunity costs of spectrum use. It is important to recognise, however, that these more recent developments have not altered the way the various spectrum blocks are allocated to particular uses in the first place – this continues to be done administratively. As Hazlett notes:

“while auctions can distribute licenses in a relatively low-cost manner, they do nothing to distribute spectrum more efficiently. The federal government still micromanages markets, ... doling out entry rights to new players.”<sup>11</sup>

---

<sup>11</sup> Hazlett T W, 1990, “The Rationality of U.S. Regulation of the Broadcast Spectrum” *Journal of Law and Economics*, 33:145

The major drawback of this method is that administrators – no matter how well intentioned – seldom, if ever, have sufficient information to allocate efficiently. Economic analysis indicates that the use of administrative mechanisms to allocate spectrum is highly likely to result in inefficient allocation because of the informational constraints that impede any administrative body. It is simply not possible for an administrative agency to accurately assess the relative social value of alternative uses. As the Spectrum Management Agency (now the ACA together with the Australian Telecommunications Authority) has acknowledged, even with the best efforts, any forecast about future usage patterns on which it bases its allocation decisions is doomed to fall short of real market conditions:

The demand for the use of frequencies in the radio-frequency spectrum both here in Australia and internationally has increased dramatically in recent years and continues to increase at a rapid rate. A significant influence driving this growing demand is the deregulation on a global basis of the telecommunications industry; this is particularly relevant to Australia at this time, with an open, fully competitive regime to come into effect in mid 1997. Advances in technology, particularly for telecommunications mobile services, with digital techniques and increasing semiconductor integration allowing for economic enhancement of radiocommunications devices, are leading to more frequent changes in network platforms and air interfaces, invariably involving new or changed spectrum requirements. These developments are fostering the emergence of a rapidly growing consumer market for spectrum based telecommunications services, to an extent consistently beyond business projections.<sup>12</sup>

NECG acknowledges that the ACA has sought to ameliorate some of these information problems by utilising auction mechanisms – rather than so-called ‘beauty contests’ – to assign spectrum rights. Welcome as these reforms are, they do not go far enough. The allocation of spectrum – as opposed to its assignment – continues to be undertaken without direct reference to any market mechanism. Spectrum managers determine the usage to which particular blocks of spectrum will be put – including crucially the number of potential users – using some form of social calculus and then go to auction to determine what price firms are prepared to pay for the right to be one of the select group of firms able to supply a particular service.

---

<sup>12</sup> ACA information paper, *Spectrum Management Issues Relevant to Telecommunications*, prepared by the Spectrum Management Agency, August 1996. Available at <http://www.aca.gov.au/frequency/telecom/ctsinfo.pdf>.

The implication of this model is that the shadow prices for different spectrum blocks can differ greatly. Private broadcasters pay less for their spectrum allocation than do cellular mobile operators, but more than taxi companies. This will be inefficient in so far as reallocating spectrum so as to equalise shadow prices across application areas would increase aggregate social output.

Already now, some spectrum bands such as the 700MHz band and the 2.5GHz band that are currently allocated to television broadcasters could be utilised for cellular mobile services. Moreover, technological change – such as the development of multi-band and software-radio technologies – mean that the strict correspondence between applications and frequency will further break down in the coming years. If substitutable bands have different shadow prices this simply means that the same constraint is being priced differently. This suggests that significant allocative inefficiencies could result.

Given these problems with the current allocation process, NECG would urge the Commission to consider the scope for the use of alternative allocation mechanisms. In particular, there is scope for enhancing the role of secondary markets in spectrum. These would complement, rather than replace, spectrum auctions, with auctions playing a primary role with respect to the allocation of new spectrum, while trading in secondary markets would serve to enhance the efficiency with which already allocated spectrum was deployed. In what follows we briefly examine the use of secondary markets.

## **5 Secondary markets**

As a general rule, spectrum should be allocated to those uses that provide the maximum social benefit. This is achieved when the licence fees for using spectrum reflect the opportunity cost to the community of licensees holding the spectrum. Such fees help ensure that the licensees are those that value the spectrum most highly and that they have the incentive to continually pursue more efficient mechanisms for delivering their services.

To identify the opportunity cost of spectrum usage, the relationship between the allocation of spectrum and the pricing of spectrum needs to be reversed for all blocks of spectrum. Instead of usage being determined first and then prices, the price mechanism should be used to determine allocations. A potentially tractable way to do this is through the development of a technology-neutral secondary market in spectrum licenses.

Under a secondary market approach, the rights to use spectrum can be traded. Some or all of the spectrum allocated to a taxi company, for example, could be sold to a mobile phone operator. Any excess spectrum held by the broadcasters could also be sold to other users. The party that values the

spectrum most highly should be prepared to pay the highest price and hence is most likely to obtain the spectrum – in short we get an efficient allocation.

In the past such a system has not been considered technically feasible because frequencies were hard-wired into equipment on the basis of international standards and hence there was limited scope for cross-usage trading. This has begun to break down over the past decade and is likely to become less relevant as technological developments increase the substitutability of the spectrum between uses.

The use of secondary markets to allocate spectrum has been strongly advocated in the United States. In a common submission to the US Federal Communications Commission, 37 economists contend that<sup>13</sup>:

- a. The Commission is correct in exploring market allocation of radio spectrum, and should proceed boldly in this direction;
- b. The Commission should seek not to create secondary markets directly but instead to institute rules permitting such markets to emerge;
- c. Relaxing restrictions on the use of radio spectrum by both current licensees and new entrants is the key enabling policy;
- d. The Commission should eliminate all wireless license requirements unrelated to interference or anti-competitive concentration.

Regarding the secondary markets for radio spectrum, they explain:

---

<sup>13</sup> 2001, *Comments of 37 concerned economists*, in the matter of “Promoting efficient use of spectrum through elimination of barriers to the development of secondary markets”, before the Federal Communications Commission, Washington, WT Docket N° 00-230. “The signatories to this submission include 1 Nobel Laureate, 2 former members of the Presidents Council of Economic Advisers, 6 former Chief Economists and Deputy Chief Economists of the Commission, 10 former Deputy Assistant Attorneys General in the Antitrust Division, as well as many other former government economists involved in competition and telecommunications policy, telecommunication scholars, and auction experts.”



Currently, there are significant restrictions on the ability of a licensee to lease allocated spectrum to other parties. These restrictions should be minimized to facilitate market transactions. Just as a building owner can rent out space, a wireless service provider should be able to lease out the use of spectrum assigned to its license.

[...] Without resale restrictions and with antitrust oversight, buildout requirements are unnecessary and can harm the operation of a secondary market because they burden secondary market transactions with additional compliance and monitoring costs. If a licensee faces the appropriate opportunity cost of not using spectrum, then there is no need to have a buildout requirement.

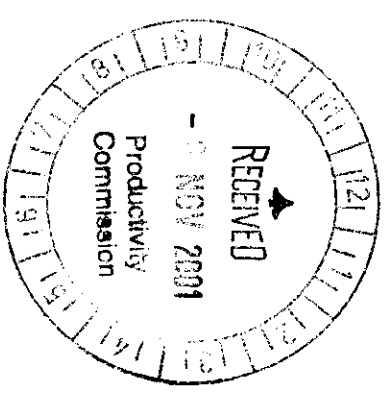
In promoting secondary markets, the Commission should generally remove restrictions and not mandate the terms upon which spectrum markets emerge. In the 700 MHz Guard Band decision, the Commission has instituted requirements to force a secondary leasing market by mandating that a carrier lease out more than half of its spectrum to unaffiliated entities. While leasing may facilitate efficiency, requiring the operation of a secondary market can reduce efficiency and lead to regulatory game-playing simply to comply with the express provisions of the rules.

Instead of either preventing or requiring a secondary market, the Commission should quickly restructure its rules to allow a secondary market. Delays will impose huge costs on consumers as the market starves for access to radio spectrum today. Further delays continue the costly waste of perishable services available from misallocated spectrum.

NECG accepts that there are a number of issues that will need to be addressed if secondary markets are to develop. Not least amongst these is the ongoing problem of the initial allocation of the property rights. If the simplest model were adopted and the rights were transferred to the current licensees there are likely to be significant concerns about the potential wealth transfers this would involve. Ideally, all spectrum licences would be revoked and the right to perpetual leases would be auctioned. However, such a process would run into the *ex post* hold-up problems identified in section 3 above. Alternatively, a windfall tax could be applied on the transfers if, and only if, the windfall gains become apparent.

A further issue with secondary markets is whether the various social policy objectives that require access to spectrum can be efficiently accommodated in such a mechanism. In general terms, there seems to be no good reason why social policies could not continue to be achieved within secondary markets. There is clearly a role for government in subsidising the various bodies that require access to the spectrum, be they the emergency services, the department of defence or the public sector broadcasters. Initially, of course, this is just a matter of letting them own their current spectrum

allocation. Ideally we would also let them sell on any spare spectrum subject to a strict requirement to serve clause. In other words, the emergency services can sell any spare spectrum as long as this does not interfere with their various charters. The emergency services could be given an incentive to sell excess spectrum by allowing them to keep the proceeds from any sale.



# o neccs

N E T W O R K E C O N O M I C S C O N S U L T I N G G R O U P

# *The Productivity Commission's Review of the Radiocommunications Acts and the Role of the Australian Communications Authority*

*A submission by the Network Economics  
Consulting Group*



# Key issues addressed in our submission

- The context in which the review is being undertaken
  - Why reform of the allocation mechanism is increasingly important
- The economic characteristics of the market for spectrum
  - What are the market failures that characterise the market for spectrum and what intervention does this necessitate
- Limitations with the current model
  - Why there is a need for greater use of price signals to determine spectrum allocation as well as assignment
- Secondary markets
  - The scope to use cross-block trading as a means if improving the efficiency of the allocation process

# The context

- The complexity of the spectrum management process is increasing:
  - Demand for what remains a finite resource has grown dramatically, the development of bandwidth-intensive services may increase demand further
  - Technological developments have traditionally enhanced spectrum availability, but can be complex to manage in transition
    - E.g. digital broadcasting
  - Legacy policies further complicate the allocation process
    - E.g. ‘social’ spectrum allocations to broadcasters, emergency services and defence may no longer be efficient, but very difficult to change
- Hence the importance of this review and the chance to move towards a more efficient spectrum allocation process

# Economic characteristics of the spectrum market

- Public good arguments and scarcity arguments are a red herring and do not justify government intervention in the spectrum market
- Congestion and interference, on the other hand, are negative externalities apparent in the spectrum market that necessitate an active government role in the definition and enforcement of property rights
- Coordination failures arising from non-convexities and transaction costs suggest a role for government in the spectrum allocation process akin to a land planning office

# Hold-up vs hold-out

- In defining the spectrum property right, there are good reasons to avoid time-delimited leases and instead grant perpetual rights
  - Time-delimited leases provide regulators with the scope to hold-up licensees that have made sunk investments
- However, time-delimited leases are a parsimonious mechanism for avoiding the hold-out problems
  - Band-clearing or relocation can occur at the point of license expiration
- Preferred option is to have perpetual rights with a compulsory acquisition process similar to that applied in property law
- Compensation for perpetual, but not for time-delimited leases



# The current allocation process

- Governments have intervened much more systematically in the market for spectrum than appears necessary
  - An administrative allocation process, coupled more recently with the use of auctions for assignment purposes
- This process could lead to substantial inefficiencies
  - Information asymmetry means that it is very unlikely that spectrum managers will allocate blocks efficiently
  - Currently, shadow prices differ across spectrum blocks
    - This is inefficient in so far as reallocating spectrum so as to equalise shadow prices across application areas would increase aggregate social output

# Secondary markets

- An, at least partial, alternative to the administrative allocation process is to use secondary markets to determine allocation
  - Usage patterns continue to be determined by ITU standards, but technological developments are allowing drift from these standards
    - E,g, greater development of multi-band equipment and software radio
  - Current candidates for trading include
    - 700MHz: broadcasters  $\Rightarrow$  integrated disaster relief
    - 800MHz: broadcasters  $\Rightarrow$  CDMA2000
    - 2.5GHz: Live TV transmission  $\Rightarrow$  UMTS spillover
- There are issues, but there are tractable
  - Initial allocations
  - Social policy objectives