

# Regulation Impact Statement

## Opportunity Cost Pricing in the high density areas of the 400 MHz Band

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# Introduction

As part of its review of the 400 MHz band the Australian Communications and Media Authority (ACMA) is implementing a series of changes to its spectrum management arrangements. At the time of announcing the outcomes of the review the ACMA noted that further consideration and analysis of the taxes associated with apparatus licences<sup>1</sup> within the band was necessary.

The ACMA's analysis of the level of apparatus licence taxes indicates that the current taxes are approximately half of what a well functioning market would set for efficient use of the band. Despite the changes to the other arrangements within the band, the taxes are contributing to high levels of demand for licences in the band and are therefore contributing to congestion in the band.

To address these issues, the ACMA proposes to increase apparatus licence taxes in high density areas of the 400 MHz band from \$99 per kHz of spectrum to \$199. The ACMA also proposes to phase in the increase by equal increments over a five year period. This incremental approach will give industry time to adjust to revised taxes and allow the ACMA to monitor the market giving the ACMA the option to hold price increases in the event that supply and demand balance.

The ACMA has consulted on these specific proposals to assist in considering the merits of the methodology chosen to estimate the opportunity cost price of the tax and the potential impact on industry and users. The ACMA released the *Adoption of opportunity cost pricing for apparatus licences in the 400 MHz band* discussion paper (the "2012 OC Consultation Paper") in April 2012 for a 6-week consultation period.

If the proposal is implemented amendments will be made to the *Radiocommunications (Transmitter Licence Tax) Determination 2003 (No. 2)* and *Radiocommunications (Receiver Licence Tax) Determination 2003 (No. 2)* (the Tax Determinations).

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<sup>1</sup> Under the Radiocommunications Act 1992 an apparatus licence is issued to an individual party and specifies technical conditions, such as frequency, transmit power, emission type and, importantly, geographic location, for the operation of a specific device. See Attachment A for more details.

# Background

## Administrative based incentive pricing (AIP)

The taxes included in the Tax Determinations for administratively allocated spectrum are currently set to attempt to create incentives for the efficient allocation and use of the spectrum. The annual tax is an estimate of the value of the spectrum to be used and takes into account such factors as the geographic location of where the licence will operate, the amount of spectrum used, the power of the equipment, changes to the Consumer Price Index (CPI), and an adjustment factor.<sup>2</sup>

However, to date, the ACMA has not explicitly priced spectrum based on market principles or prices such as opportunity cost. Rather, administrative prices (annual taxes) have been based on a number of mixed policy goals, principally incentive pricing and cost recovery. In 2002, the Productivity Commission undertook the “Review of Radiocommunications Acts” and recommended a number of changes to spectrum management. In particular Recommendation 8.4 stated that:

“To achieve efficient outcomes, spectrum charges should be based on opportunity cost, that is, on the value of the best forgone alternative use of that spectrum.”<sup>3</sup>

### *What is opportunity cost pricing?*

The opportunity cost of a part of the radiofrequency spectrum is the highest value alternative use that is denied by granting access to one party rather than to the alternative party/ies.

When markets set prices they will often be based on opportunity cost (OC). Well functioning markets with prices that reflect OC are typically efficient along three dimensions: allocative, productive and dynamic.<sup>4</sup>

1. **Allocative efficiency:** The mix of goods and services that are produced in the economy is such that no other mix can increase the wellbeing of society. In terms of spectrum, users of spectrum should be such that the right final mix of spectrum-related products is being made available.
2. **Productive efficiency:** Production of goods and services ought to be undertaken at the lowest possible cost (cost is measured in terms of inputs). In terms of spectrum, users of radio spectrum should choose inputs (capital, labour and spectrum) in order that production of services is at the lowest overall cost.
3. **Dynamic efficiency:** Resources are deployed in a way that encourages the most desirable level of research, development and innovation. In terms of spectrum, the right amount of innovation in spectrum use and spectrum-related products should be encouraged to enable supply and demand to interact over time to optimise allocation and technical outcomes.

## The 400 MHz band

The 400 MHz band refers to spectrum in the range 403–520 MHz, including the segment 420–450 MHz that supports various Department of Defence/other government applications.

The 400 MHz band is heavily used for land mobile applications such as CB radio, law enforcement/public safety, dispatch (courier, taxi etc) but also accommodates fixed point-to-point and point to multipoint such as telemetry/control, telecommunications,

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<sup>2</sup> Refer Appendix D of the Apparatus Licence Fee Schedule. More information on how apparatus licence taxes are calculated can be found at [http://www.acma.gov.au/WEB/STANDARD/pc=PC\\_1614#schedule](http://www.acma.gov.au/WEB/STANDARD/pc=PC_1614#schedule)

<sup>3</sup> Productivity Commission 2002, Radiocommunications Inquiry Report, Report no. 22, AusInfo, Canberra (‘Productivity Commission Report’). Available at <http://www.pc.gov.au/projects/inquiry/radiocomms>

<sup>4</sup> Doyle, Chris, *The Pricing of Radio Spectrum: Using Incentive Mechanisms to Achieve Efficiency*, Centre for Management under Regulation, Warwick Business School, January 2007.

radiolocation and amateur services. Government users are among the main users of this spectrum due to technical requirements (propagation/antenna size) and equipment availability.

This band is heavily congested in major capital cities. Congestion in highly populated areas such as Sydney and Melbourne prevents new users from acquiring spectrum and deploying new systems. Other areas such as Brisbane are also experiencing high levels of licensing in this spectrum.

### **Review of the 400 MHz Band**

In response to the circumstances faced in the band and requests from industry, the ACMA commenced a review of spectrum management arrangements in the 400 MHz band (frequency range 403-430 MHz and 440-520 MHz) in April 2008 with the broad objectives of implementing measures to:

- improve government spectrum harmonisation to facilitate more efficient government networks and improved interoperability
- improve the efficiency with which the band is allocated and used
- facilitate new technologies and complementary uses
- minimise the need for ongoing ACMA intervention in the band.

#### *Considering opportunity cost pricing principles*

The ACMA has examined the possibility of using opportunity cost pricing to better manage high demand and congestion. In October 2008, Plum Consulting was commissioned to do a pricing report (“the Plum report”).<sup>5</sup> The 400 MHz band was selected as a case study to explore ways in which pricing could be used to better manage high demand and congestion within this band in Sydney (representative of a high density area) and Perth (representative of a medium density area).

In April 2009, the ACMA released a consultation paper “Opportunity Cost Pricing of Spectrum: Public consultation on administrative pricing for spectrum based on opportunity cost” (The 2009 OC Consultation paper) on administrative pricing for spectrum based on opportunity cost.<sup>6</sup> In this paper the ACMA examined administrative incentive pricing using opportunity cost pricing for administratively allocated spectrum, which is expected to result in more efficient allocation of spectrum. The ACMA also used the Plum report to illustrate how opportunity cost pricing could be used to manage high demand and congestion in the 400 MHz band.

In January 2010, the ACMA provided a response to the submissions made to the 2009 OC Consultation paper. The response noted that many of the submissions expressed general support for opportunity cost pricing. Some submissions made useful comments about the methodologies for calculating opportunity cost.

In December 2010, the ACMA released the final in a series of four papers concerning the review titled “The way ahead: Timeframes and implementation plans for the 400MHz band” (The Way Ahead Paper). The ACMA noted in The Way Ahead Paper that the introduction of opportunity cost pricing in the 400 MHz band would be subject to more consideration and consultation.

Key announcements from the consultation included:

- substantial changes to the overall structure of the band through the provision of a dedicated harmonised spectrum to enable interoperable radiocommunications between national security, law enforcement and emergency services
- improvements to underlying technical arrangements in the band via a reduction in channel bandwidths and updates to the assignment and coordination rules

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<sup>5</sup> [www.acma.gov.au/webwvr/\\_assets/main/lib310867/ffc12-09\\_app\\_a\\_1\\_plum\\_report\\_to\\_acma.pdf](http://www.acma.gov.au/webwvr/_assets/main/lib310867/ffc12-09_app_a_1_plum_report_to_acma.pdf)

<sup>6</sup> [http://www.acma.gov.au/scripts/nc.dll?WEB/STANDARD/1001/pc=PC\\_311707](http://www.acma.gov.au/scripts/nc.dll?WEB/STANDARD/1001/pc=PC_311707)

an increase in the technology options able to be supported in the band through the introduction of frequency duplex arrangements in the 450–470 MHz band, and channelling scheme,

#### *Further consideration of opportunity cost pricing*

Given the changes to the technical arrangements in the 400 MHz band that had taken place since the opportunity cost pricing study done in 2008, the ACMA re-engaged Plum Consulting to provide the ACMA with an updated opportunity cost price for the high density areas of the 400 MHz band in 2011. The updated study took into account additional vacant channels that would be available for apparatus licensing upon the expiry of licences in the 500 MHz band spectrum licences in 2012<sup>7</sup>. Details of updated Plum study are included in **Attachment A**. Details of licences issued by the ACMA are referred at **Attachment B**.

The study also took into account additional factors that were noted in the 2010 OC Response paper. In Plum Consulting's updated study, it recommended that it would be appropriate to increase apparatus licence taxes for land mobile services in high density areas of the 400 MHz band to \$199 per kHz.

The ACMA has consulted on these specific proposals to assist in considering the merits of the methodology chosen to estimate the opportunity cost price of the tax and the potential impact on industry and users. The ACMA released the 2012 OC Consultation Paper in April 2012 for a 6-week consultation period.

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<sup>7</sup> The 500 MHz band is currently spectrum-licensed and is mainly used for land mobile service. The 500 MHz band licence is due to expire in May 2012 and will be used to assist in the overall migration of licences displaced from other parts of the 400 MHz band by the outcomes of the 400 MHz review.

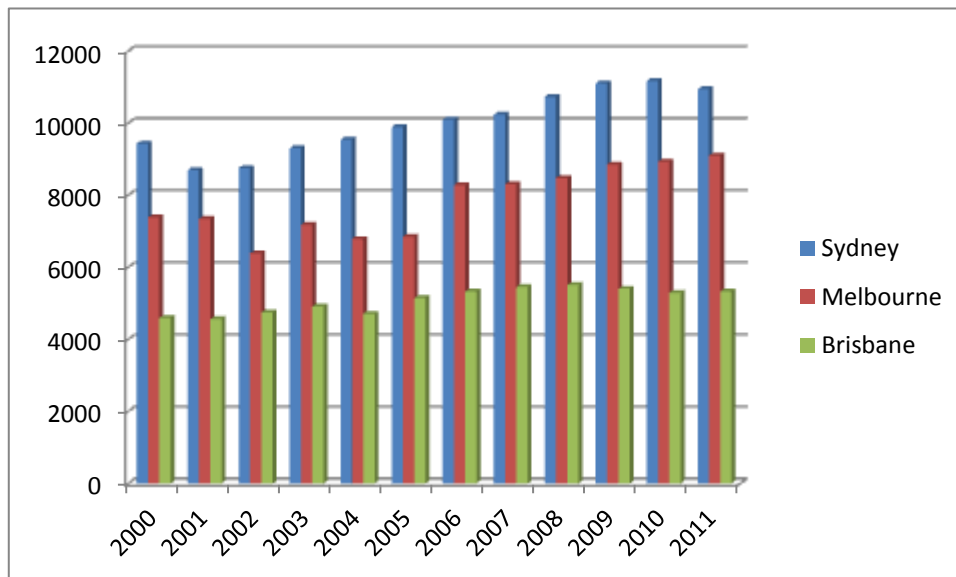


# Problems

Users of the 400 MHz band have advised the ACMA they are experiencing difficulty in gaining access to the band in certain geographic areas. This difficulty manifests through an inability of spectrum users to acquire licences (licence congestion<sup>8</sup>) which in turn is influenced by the technical assignment rules that form the basis for the coordination (and ultimately licensing) of stations in the band. This situation prevents new users from acquiring spectrum and deploying new systems in the highly congested areas such as Sydney and Melbourne. Other areas such as Brisbane have high levels of assignments and may face similar difficulties in time.

The chart below highlights the growing number of assignments in the Sydney, Melbourne and Brisbane regions within the 400 MHz band over the last decade.

**Number of assignments within the 400 MHz band in high density areas**



As part of its review of the 400 MHz band the ACMA is implementing a number of spectrum planning and technical arrangements to assist in the efficient allocation of the spectrum in the band. However, the ACMA's analysis of the level of apparatus licence taxes indicate that the current taxes are significantly below what a well functioning market would set. The current taxes were based on a mix of policy goals and had not been considered in light of opportunity cost principles and pricing. As such the current taxes are contributing to the high levels of demand for licences in the band and are therefore contributing to congestion in the band.

Without considering a coordinated approach between the new planning and technical arrangements and the taxes associated with the licences, the taxes are likely to remain inefficient and efficient allocation of the spectrum will not be possible. That is demand will remain high and new and existing users will continue to have difficulty in acquiring spectrum and deploying new systems with highly valued uses.

<sup>8</sup> Licence congestion is a situation where it is difficult to obtain a licence to operate in a particular frequency band. A licence provides exclusive use of a particular channel in a particular area. Licence congestion can occur even if the licences in the band are not used.

# Objectives

The ACMA's responsibilities in managing access to the radiofrequency spectrum are principally discharged under the *Radiocommunications Act 1992* (the Act). The most relevant objectives in relation to these responsibilities are to provide:

1. for management of the radiofrequency spectrum in order to maximise, by ensuring the efficient allocation and use of the spectrum, the overall public benefit derived from using the radiofrequency spectrum<sup>9</sup>
2. an efficient, equitable and transparent system of charging for the use of the spectrum taking account of the value of commercial and non-commercial use of the spectrum.

In doing that, the ACMA is also guided by the Principles of Spectrum Management<sup>10</sup> in its decision making process. In summary, the principles are as follows:

1. allocate spectrum to the highest value use or uses
2. enable and encourage spectrum to move to its highest value use or uses
3. use the least cost and least restrictive approach to achieving policy objectives
4. to the extent possible, promote both certainty and flexibility
5. balance the cost of interference and the benefits of greater spectrum utilisation.

In the context of the review of the 400 MHz band and the proposal outlined in this Regulation Impact Statement (RIS) to increase taxes, the first two principles are considered the most relevant. Having taxes that promote efficient outcomes is necessary to enable and encourage spectrum to move to its highest value use or uses. However the ACMA is also mindful that the implementation of the proposed changes should represent the least cost and least restrictive approach to achieving an efficient outcome and promote certainty and flexibility for users.

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<sup>9</sup> Paragraph 3(a) of the Act

<sup>10</sup> The Principles of Spectrum Management can be found at [http://www.acma.gov.au/WEB/STANDARD/pc=PC\\_311683](http://www.acma.gov.au/WEB/STANDARD/pc=PC_311683)

# Options for achieving the objectives

In considering how the ACMA can resolve the problem and achieve the objectives outlined in this paper the ACMA has analysed two options for the purposes of this RIS. The second option has a number of facets and these are also considered as part of this analysis.

As part of the extensive consultation process that the ACMA has undertaken for the 400 MHz band review another option such as greater use of auctions has been canvassed. However, responses to the recent consultation indicate that the two options discussed below are the most relevant options to provide a solution to the problem of congestion in the band. The suggestion of introducing auctions is also discussed but not considered.

## *Auctions*

An alternative to increasing administrative prices to mimic market prices as is proposed could also theoretically be achieved by introducing a market mechanism such as auctions to allocate spectrum in the band. The ACMA prefers to use auctions as an allocation methodology where there is excess demand for spectrum. Auctions are generally more likely to result in an efficient allocation of spectrum than administrative pricing. Auctions can be structured to reveal bidders' private valuations and give the highest value users the best opportunity to access spectrum. However, auctions are not appropriate in all instances<sup>11</sup>. It was noted in the submissions to the 2009 OC Consultation Paper that auctioning of narrow band frequency assignments like those in the 400 MHz band may not be optimal. The specific requirements of each of the assignments in the 400 MHz band implies it would be difficult to create a generic product that could be of interest to a number of potential bidders and be technically efficient for the different services that could be provided. Careful spectrum frequency assignment and coordination is needed for over 85,000 assignments across all geographic areas in the 400 MHz band and this would make auctions complex, and costly for the ACMA to organise and for industry to participate.<sup>12</sup> In these cases auctions may be unwieldy, and may not generate a more efficient outcome than administrative allocations. One of the submissions to the 2012 OC Consultation paper reiterated the view that "where spectrum auction allocations are not practical or effective, Telstra agrees that OC pricing is the next best alternative."<sup>13</sup> Given the difficulties in introducing auctions as part of the allocation process for the 400 band and the general lack of support from stakeholders of this mechanism, a detailed analysis of the impacts of such an option is not considered warranted.

## *Two preferred options*

The two options that the ACMA has considered to address the objectives are:

### **Option 1: Maintaining current administrative prices (taxes) and increase by CPI**

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<sup>11</sup> In the responses to the 2009 OC Consultation Paper, one submission commented that spectrum auctions and the partitioning of spectrum within bands for specific uses or users are useful when blocks of contiguous spectrum are needed for the deployment of large networks, but are not suited for narrowband frequency allocations such as for land mobile services.

<sup>12</sup> Assignments include land mobile services, fixed services, general assigned services and amateur services. As at 1 March 2012, there were about 60,000 land mobile assignments and 19,000 point-to-point assignments across all regions in the 400 MHz band

<sup>13</sup> Page 5 of Telstra's submission to the 2012 OC Consultation Paper.

The ACMA considers that it could keep the status quo and continue to reflect apparatus licence taxes to account for routine CPI in the 400 MHz band every year.

**Option 2: Increase the administrative prices (taxes) to reflect opportunity cost prices (including an increase in CPI).**

In this option, the ACMA expects to raise apparatus licence taxes to reflect opportunity cost prices of land mobile services in high density areas from \$99 per kHz of spectrum to \$199 per kHz. There is however a number of facets to this option and these include:

- adjusting the geographical location factor in high density areas in this band
- keeping the relativities between the land mobile services, fixed services (point to point and point to multi point services) and general assigned services constant. Taxes for amateur services will remain unchanged except for annual increases by CPI.<sup>14</sup>
- raising taxes in equal, annual increments over a five-year period, until the opportunity cost price is reached
- monitoring the market and holding taxes at that level if market equilibrium is reached in high density areas.

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<sup>14</sup> Previously, segments allocated for fixed services (point-to-point and point-to-multipoint) in bands below 960 MHz became so congested that some licensees had been prepared to pay the higher land mobile rate to access adjacent land mobile spectrum. Consequently, the ACMA increased taxes for fixed services below 960 MHz towards equivalence with land mobile taxes. The point-to-multipoint taxes are the same as land mobile taxes and point-to-point taxes are a quarter of the land mobile taxes. More information can be found in Appendix D at [http://www.acma.gov.au/scripts/nc.dll?WEB/STANDARD/1001/pc=PC\\_1614](http://www.acma.gov.au/scripts/nc.dll?WEB/STANDARD/1001/pc=PC_1614).

# Impact analysis

## **Option 1: Maintain current administrative prices (taxes) in the 400 MHz high density areas and continue to increase these taxes by CPI**

The overall costs and benefits of Option 1 are detailed below. The specific likely impacts on licence categories are outlined in **Attachment C**.

### **Benefits**

- The status quo would provide continuation of the current pricing structure to existing licensees in the 400 MHz band. The CPI increases to taxes are accepted by industry participants and are considered routine adjustments to the administrative prices.<sup>15</sup> The potential tax increases for the next five years are detailed in **Attachment C**.
- For licensees in the band whose services are located in high density areas of the 400 MHz band this option will enable them to continue to provide the same service/s without the prices changing above CPI.
- Those licensees that need to change equipment or move to another part of the band due to other initiatives of the 400 MHz review will not incur the additional costs associated with the increase in apparatus licence taxes proposed in option 2.
- On the basis of previous responses received from consultation with the public and industry concerning opportunity cost pricing this option would allow the ACMA to implement all its spectrum management arrangements as proposed in The Way Ahead paper and consider whether these new arrangements have alleviated congestion within the band before implementing any other changes. This will allow determination of whether further changes are necessary.

### **Costs**

- Without considering a coordinated approach between the spectrum management arrangements and the taxes associated with the licences, the taxes are likely to remain inefficient and the efficient allocation of the spectrum will not be possible. If the tax remains at half the price that an efficient market would set then current licensees with low valued services will continue to access the band and compete for spectrum with users capable of providing higher valued services. This competition will result in continued congestion in the band.
- Increasing apparatus licence taxes merely keeps licence taxes constant in real terms, and would neither change licensee behaviour nor create incentives for licensees to deliver more highly valued services and address congestion issues.
- This does not reflect the recommendation by the Productivity Commission that in order “to achieve efficient outcomes, spectrum charges should be based on opportunity cost, that is, on the value of the best forgone alternative use of that spectrum.”<sup>16</sup>
- If congestion remains in the band then industry is likely to expect further changes to the arrangements in the band. This expectation is likely to lead to uncertainty about investment decisions for industry participants.

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<sup>15</sup> The OBPR RIS exemption number for increases by CPI is 12297.

<sup>16</sup> Productivity Commission 2002, Radiocommunications Inquiry Report, Report no. 22, AusInfo, Canberra ('Productivity Commission Report'). Available at <http://www.pc.gov.au/projects/inquiry/radiocomms>

## Risks

As referred above, it is anticipated that the measures being introduced in the 400 MHz band as part of the recent review will result in a reduction in congestion but are unlikely to reduce congestion sufficiently without a change in price. As Plum's updated analysis in 2011 shows, the current taxes are approximately half of what it estimated a well functioning market would set. Given the difference between the two prices it is unlikely to change current behaviour by current and prospective licensees. Consequently demand is likely to remain high and congestion will continue.

### **Option 2: Increase the administrative prices (taxes) to reflect opportunity cost prices (including an increase in CPI)**

The overall costs and benefits of Option 2 are detailed below. The specific likely impacts on licence categories are outlined in **Attachment C**.

## Benefits

- When used in conjunction with implementation of the new spectrum planning and technical arrangements outlined in The Way Ahead paper, opportunity cost prices will assist to alleviate congestion in the 400 MHz band by enabling and encouraging the allocation of the spectrum to the highest value use or uses. More specifically:
  - higher opportunity cost prices may lead users to reassess existing spectrum holdings, and relinquish unused spectrum or move to other spectrum uses based on highest value.
  - opportunity cost prices would create a price incentive for users moving to narrower bandwidths and free up spectrum for potential users (for example, users moving from 25 kHz equipment to 12.5 kHz or 6.25 kHz equipment).
  - the highest value use of a band will also change over time as users update technology use when new technologies become commercially viable.
- As opportunity cost prices seek to mimic market prices, the administrative prices are more likely to reflect the current environment in the 400 MHz band. The analysis undertaken by Plum Consulting in reviewing its earlier analysis of opportunity cost pricing in the 400 MHz band included references to the administrative cost components suggested by respondents to the April 2008 consultation paper. Refer **Attachment A** for details of Plum's updated analysis.
- This option involves adopting a conservative approach to pricing, noting that consequences of overpricing are more inefficient and costly than underpricing. Consequently, incremental price changes can reduce the burden of an increase in tax on licensees, and allow licensees to plan future investment decisions with greater certainty. In the submissions to the 2012 OC Consultation paper there was broad ranging support for introducing incremental price changes. However, one submitter did note that such an approach introduced some uncertainty over the period of implementing the price changes.
- By introducing the proposed changes to the taxes in the near future industry will have time to adjust their investment decisions while also considering how to implement the other changes as a result of the 400 MHz review. Adopting opportunity cost pricing reflects the decision that the Productivity Commission recommended in its review in 2002 that "spectrum charges should be based on

opportunity cost<sup>17</sup> and allows the ACMA to manage radiofrequency spectrum more efficiently.

- Certain apparatus licensees already benefit from apparatus licence tax exemptions and would not incur these price increases. Provision for tax exemptions is made by the Governor-General under regulation 5 of the Radiocommunications Taxes Collection Regulations.<sup>18</sup>

## Costs

- In its first year of the implementation of opportunity cost pricing, an increase in administrative price could increase licensee expenditure by about 19%. For some licensees this would represent a significant enough change in the cost of their licence fees especially if they have numerous licences in the 400 MHz band – refer **Attachment C** for more details to change their behaviour. The higher expenditure would have an impact on licensee margins, and could result in some investments being deferred or changes in the way services are being provided.
- For those licensees with lower valued services in the 400 MHz band this proposal may mean that they find it less economical to remain in the band. These licensees will need to find alternative methods or technologies to provide the same services. As some licensees will already need to make investment decisions about new equipment and services provided due to the review of the 400 MHz band, this will imply that the costs associated with the tax increase will be mitigated to some extent.
- For some licensees this option implies relinquishing spectrum that is not being used or being under-utilised. For these licensees the costs associated with the change are expected to be minimal.
- It is not possible to quantify the costs that various licensees may face due to a change in equipment to deliver services. It is not expected that the costs associated with option 2 would be greater than the costs of the tax increase. For example, there may be measures licensees can adopt in order to reduce the full impact of the tax increase such as using an alternative technology solution. Where the cost of adopting these measures is less than the cost of the tax rises over the expected life of the equipment, it makes sense for the licensees to adopt these measures (all else being equal).
- It is not possible to quantify how these changes will affect the customers or those receiving services from the different government, community users and commercial organisations with licences in the 400 MHz band. Apparatus licence taxes are only part of the costs that a licensee charges for goods or services to its customers, and such costs will differ depending on licensee and service provided. This makes it difficult for the ACMA to estimate the flow on affect (if any) to the public in general. It is noted that the responses to the 2009 OC Consultation Paper did not address costing issues that could affect those receiving services from the licensees. The 2012 OC Consultation Paper concerning this option provided little information about the direct costs faced by licensees. Telstra noted that it expected its licence fees to increase its fees by \$900,000. Another submitter noted that the proposal will add to the compliance costs with implementing the other elements of the 400 MHz review but provided no cost information.

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<sup>17</sup> Productivity Commission 2002, Radiocommunications Inquiry Report, Report no. 22, AusInfo, Canberra ('Productivity Commission Report'). Available at <http://www.pc.gov.au/projects/inquiry/radiocomms>

<sup>18</sup> More information on parties who are eligible for exemptions is available in Attachment F of the Apparatus Licence Fee Schedule - [http://www.acma.gov.au/WEB/STANDARD/pc=PC\\_1614](http://www.acma.gov.au/WEB/STANDARD/pc=PC_1614).

## **Risks**

As the choice of adopting an opportunity cost methodology is subjective, there is a risk that opportunity cost prices may be set too high and this could lead to underutilisation of spectrum. Alternatively, if opportunity cost price increases were too slow to match the increase in demand for spectrum in the 400 MHz band, congestion will continue.



# Consultation

On 23 April 2009, the ACMA published the *Opportunity Cost Pricing of Spectrum: Public consultation on administrative pricing of spectrum based on opportunity cost* consultation paper. The ACMA received 10 public submissions to the consultation paper from members of the telecommunications, radiocommunications and broadcasting industries and government organisations.

Many respondents to the paper expressed general support for opportunity cost pricing. Some submissions made useful comments about the methodologies for calculating opportunity cost. Several respondents contended that they should be exempt from opportunity cost pricing citing their delivery of public interest services using the band. Some stated that under the object of the Act, the ACMA had an obligation to make adequate provision of spectrum for public and community users.

Some submissions agreed with the ACMA that although auctions may often be the most appropriate way to ensure an efficient allocation of spectrum, auctions may not always be practical or effective when there is excess demand and administrative pricing will be more appropriate in some circumstances.

## Methodology for estimating opportunity cost

In respect to the most appropriate methodology, for pricing based on opportunity cost, some submissions raised specific concerns about the use of market benchmarking and some market information. Some submissions:

- expressed some support for the optimal deprival valuation (ODV) calculation method. However, submissions stressed that certain steps should be taken by the ACMA to account for methodological limitations.
- commented that use of 500 MHz band spectrum licence auction values as market benchmarks for administrative prices in the 400 MHz band would not be suitable
- noted that inference of spectrum value based on company valuation would not be appropriate in the 400 MHz band because of limited company information and uncertainties of non-spectrum asset values
- noted that modelling the Net Present Value (NPV) of future returns resulting from increased access to spectrum would be challenging for a regulator. It is difficult for a regulator to realistically model the commercial environment in which business choices such as the purchase of spectrum are made
- expressed a concern that cost calculations would not be reliable
- suggested that an additional direct opportunity cost estimation method could include direct surveys of relevant spectrum users on the maximum price they would be willing to pay for spectrum, although there would be limitations in getting survey respondents to reveal true valuations.

Some submissions made the following points about additional costs and factors that should be considered in the pricing of the 400 MHz band. The case study in the paper<sup>19</sup>:

- did not factor in the costs such as mobile radio installations, base station installation and other costs such as multicoupling, feeders and antennas;

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<sup>19</sup> In 2008, the ACMA commissioned Plum Consulting to perform a study on administratively allocated spectrum based on opportunity cost pricing methods. Plum Consulting used the 400 MHz band as a case study. The case study focussed on two urban areas – Sydney (a high density area) and Perth (a medium density area). Plum Consulting used the optimal deprival value (ODV) method to estimate the opportunity cost of a marginal unit of spectrum for a typical system in the 400 MHz band. It also examined two choices of narrow bandwidth technology and public trunked systems.

- only considered costs of equipment and not the cost of services required to effect the change;
- did not consider down-time or forgone productivity associated with moving to alternative delivery systems;
- should account for the potential adoption of 6.25 kHz channelling given that many systems were already capable of operating on 25 kHz or 12.5 kHz channels.

### **Exemptions from opportunity cost pricing**

Submissions from government organisations and agencies that did not support the application of opportunity cost pricing principles generally accepted the rationale for adopting opportunity cost pricing (with particular pertinence in the 400 MHz band to address congestion issues), but argued for exemption from opportunity cost pricing because of the ‘public good’ nature of their services. Specifically, these submissions asserted that their organisations should not be subject to opportunity cost pricing because their services:

- met alternative government objectives such as diversity of media
- provided public good/positive externality properties<sup>20</sup>
- provided emergency services/public protection/public safety
- supported other community services.

Some of these submissions also cited Section 3b(ii) of the Act that requires the ACMA to ‘make adequate provisions of the spectrum for use by other public or community services.’

One submission suggested that any increased licence costs for state government use of spectrum constituted a transfer of funds from a state to the Commonwealth.

### **Timing of introduction of opportunity cost pricing**

- Many submissions recommended that opportunity cost pricing in the 400 MHz band should be considered following the finalisation of the review of the 400 MHz band. Other submissions argued that the proposals in the review of the 400 MHz paper will serve to address spectrum shortages in the short to medium term, and opportunity cost pricing will serve to manage availability into the future.
- One submission warned that simultaneous technical changes in the 400 MHz band (such as smaller channelisation, and cessation of 500 MHz spectrum licences) with pricing changes, may create an oversupply of spectrum.
- There was also mention that clear notice of price increases should be given to industry to allow predictable capital investment.

### **Response to the Submissions to the 2009 consultation**

In January 2010, the ACMA announced its response to key issues raised as part of the consultation process. In its response the ACMA:

1. acknowledged that there were circumstances where auctions might not be optimal
2. acknowledged that the inclusion of additional cost components identified by stakeholders could improve price estimates, and that the ACMA would re-examine costing for opportunity cost price in the 400 MHz band where cost components information was available
3. accepted that government and community users might provide public goods (such as the provision of public safety and emergency services). However other services could use spectrum to create positive externalities too. Opportunity cost pricing is consistent with Section 3b(ii) of the Act and considered that government and community users should face appropriate apparatus licence taxes to allow

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<sup>20</sup> A public good is considered to be both non-excludable and non-rival. That is, once it is produced, it is not possible to withhold its benefits from anyone, and the benefits for one person do not reduce the benefits available to others. This means that private producers might not supply public goods, or might produce less than is desirable. Positive externalities are the indirect benefits resulting from a transaction that are not captured by either party to the transaction.

them to reconsider unused or underutilised spectrum holdings. The ACMA can apply concessions and exemptions for apparatus licence taxes and charges, and radiocommunications tax exemptions can be made under regulations by the Governor-General<sup>21</sup>

4. stated its intention to adopt a conservative approach to pricing and noted that any price increases in the 400 MHz band would be incremental so as to enable the ACMA to assess the combined effects of technical changes and pricing changes on the demand for spectrum. The effectiveness of those price increases, in reducing congestion, would be reviewed annually.

## Consultation in 2012

The ACMA consulted on proposed price increases in Option 2 in April 2012 when it released the 2012 OC Consultation Paper for a six week consultation period. In this paper, the ACMA proposes to increase apparatus licence taxes to the new opportunity cost (OC) price of \$199/kHz for high density areas (that is Sydney, Melbourne and Brisbane) of the 400 MHz band in the second half of 2012. As noted separately in this RIS these calculations were undertaken by Plum Consulting and took into account the suggestions made in the submissions of 2009. The paper sought comment on a variety of issues concerning option 2 of this RIS, including:

- all services in the 400 MHz band in high density areas, with the exception of amateur licences
- increasing licence taxes in the 400 MHz band in equal percentages as it allows licensees to further plan their investment decisions.
- using the apparatus licence tax formula given that the 400 MHz band is the first band in which OC pricing is to be implemented.

## Summary of submissions received in 2012

The ACMA received 15 submissions. The majority of submitters were federal or state government agencies engaged in law enforcement, security or public safety. There was some general support for the principles associated with OC pricing, the use of the current apparatus licence tax formula, the proposed conservative approach to implementing the changes in taxes over five instalments and the exclusion of amateur services from OC pricing. In addition, the submissions reiterated themes raised in the consultation in 2009. These themes included:

- Federal and state agencies should be exempt from OC pricing, due to the public interest nature of the services they provide.
- A number of stakeholders also noted that the adoption of OC pricing in the 400 MHz band should be postponed until the transition process mandated by the band plan is complete. One stakeholder stated that the taxes should be delayed until 2015 because it has a number of contracts in place.
- In addition, some submitters commented that there had been little change in the transition process of the 400 MHz band since the conclusion of its review and
- Some submitters sought additional information about the further work undertaken by Plum Consulting and noted what they believed were the limitations in the analysis caused by relying on data relating to the average user.

More details are included in the “Implementation and Review” section.

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<sup>21</sup> More information on parties who are eligible for exemptions is available in Attachment F of the Apparatus Licence Fee Schedule - [http://www.acma.gov.au/WEB/STANDARD/pc=PC\\_1614](http://www.acma.gov.au/WEB/STANDARD/pc=PC_1614).

# Conclusion and recommendation

The ACMA is of the opinion that Option 2, increasing taxes for apparatus licensees in the high density areas of the 400 MHz band, is most consistent with the objectives of this RIS and the review of the 400 MHz band (as outlined in the Background section) to address congestion.

Given the current level of congestion in the band and the significant difference between the current and proposed rates of tax, Option 2 is most likely to provide a tax which enables licensees in the band to move to higher value uses rather than merely relying on the spectrum management arrangements the ACMA is currently implementing. This will assist in managing the radiofrequency in order to maximise the overall public benefit of the spectrum by ensuring the efficient allocation and use of spectrum.

It is expected that the increase in taxes will have a varying impact on licensees, depending on the size of the organisations and spectrum holdings. Therefore, increasing licence taxes gradually over the next five years is recommended as it achieves what the new spectrum managements arrangements for the 400 MHz band are set to do and creates much less disruption to licensees. It also provides increased certainty and improves licensees' ability to plan around the future program of fee increases, and allows the ACMA to assess the impact after each fee increase to determine whether further increases are necessary.

The ACMA has consulted on the above recommendations.

# Implementation and review

## Implementation

The ACMA has consulted further with stakeholders to provide them with an opportunity to comment on:

- the methodology for estimating the opportunity cost of spectrum;
- the price increases that will apply in high density areas of the band;
- implementation issues associated with the changes;

Any implementation of price changes will affect the *Radiocommunications (Transmitter Licence Tax) Determination 2003 (No. 2)* and *Radiocommunications (Receiver Licence Tax) Determination 2003 (No. 2)*. The ACMA will consider the submissions to the 2012 OC Consultation Paper in making a decision about the amendments to the two instruments mentioned above.

## Review

If the ACMA implements the changes to the Tax Determinations then it also plans to implement price increases in stages, and perform future price reviews to assess the effectiveness of the price changes and adjust prices accordingly. The ACMA plans to engage with industry about those price reviews.

# Attachment A: Updated opportunity cost price analysis in the 400 MHz band

In 2008, the ACMA commissioned Plum Consulting to perform a study on administratively allocated spectrum based on opportunity cost pricing methods. Plum Consulting used the 400 MHz band as a case study. The case study focussed on two urban areas – Sydney (a high density area) and Perth (a medium density area). Plum Consulting used the optimal deprivation value (ODV) method to estimate the opportunity cost of a marginal unit of spectrum for a typical system in the 400 MHz band.<sup>22</sup> It examined two choices of narrow bandwidth technology and public trunked systems. The estimated cost of switching to more efficient equipment and maintaining their existing output was \$269 per kHz.

In 2011, the ACMA invited Plum Consulting to re-visit assumptions used to calculate the revised price for a typical user operating in high density areas. The opportunity cost pricing update study would address major changes in the 400 MHz band such as:

- mandatory requirements to migrate from 25 kHz to 12.5 kHz channel bandwidth in high density areas;
- release of additional channels at 500 MHz; and
- use of improved co-ordination and assignment procedures.

Where such information is available, Plum Consulting has incorporated additional cost components that were previously identified in the 2009 OC Consultation Paper.<sup>23</sup> These include:

- costs of mobile radio installations, base station installation and other costs such as multi-coupling, feeders and antennas;
- costs of equipment and services to effect the change;
- down-time or forgone productivity associated with moving to alternative delivery systems; and
- potential adoption of 6.25 kHz channelling for equipment that are already operating on 25 kHz or 12.5 kHz channels.

## Plum Consulting's recommendation

Based on the above findings, Plum Consulting concluded that OC prices should be set based on the least cost alternative action to a user denied access to spectrum, (that is, use the estimated costs of migration for reprogrammable systems). The new OC prices would range from \$199 per kHz to \$398 per kHz depending on whether users were migrating to 12.5 kHz equipment, or 6.25 kHz equipment.

Plum Consulting's recommendation is that OC prices should be set to at least twice the current level (i.e. \$199/kHz in high density areas). In coming to this recommendation, it was noted that:

- There is no "typical system" to model as actual systems varied in characteristics;

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<sup>22</sup> Page 25 of the "Opportunity Cost Pricing of Spectrum: Public consultation on administrative pricing for spectrum pricing based on opportunity cost" on [http://www.acma.gov.au/WEB/STANDARD/pc=PC\\_311707](http://www.acma.gov.au/WEB/STANDARD/pc=PC_311707)

<sup>23</sup> [http://www.acma.gov.au/WEB/STANDARD/pc=PC\\_311707](http://www.acma.gov.au/WEB/STANDARD/pc=PC_311707)

- Replanning the 400 MHz band would ease the congestion problem in high density areas but was unlikely to remove it;
- Additional channels in the 500MHz band would support transition and could be used for additional spectrum supply. However, the ability of equipment to address only part of the spectrum in the 400-520 MHz range would mean that the 500 MHz band will not be attractive for some users; and
- OC pricing is likely to be required to provide on-going incentives for more efficient spectrum use.

# Attachment B - Types of radiocommunications licensing

There are currently three different licensing types that the ACMA can use to authorise the use of the radiofrequency spectrum:

- > class licence
- > apparatus licence
- > spectrum licence.

## ***Class licence***

The ACMA uses a class licence to manage spectrum used by services that employ a limited set of common frequencies using equipment under a common set of conditions. This type of licensing involves minimum licence administration by the ACMA. A class licence sets out the conditions under which any person is permitted to operate. It is not issued to an individual user and does not involve licence fees.<sup>24</sup>

## ***Apparatus licence***

Apparatus licences specify technical conditions, such as frequency, transmit power, emission type and, importantly, geographic location, for the operation of a specific device. An apparatus licence is issued to an individual party. Fees are payable for the issue and renewal of these licences.<sup>25</sup>

## ***Spectrum licence***

A spectrum licence authorises a licensee to use a parcel of spectrum space; that is, a particular frequency band within a particular geographic area, for up to 15 years. This approach provides exclusive spectrum access to a potentially large area, typically Australia-wide, or across a state or regional area. Licensees are responsible for network deployment and management within the bounds of a generic technical framework. The technical framework manages interference at the frequency and geographic boundaries and provides a degree of technology flexibility. The ACMA allocates spectrum licences for particular frequency bands that the Minister for Broadband, Communications and the Digital Economy has designated as spectrum-licensed bands.<sup>26</sup>

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<sup>24</sup> Further information is available at [www.acma.gov.au/WEB/STANDARD/pc=PC\\_1612](http://www.acma.gov.au/WEB/STANDARD/pc=PC_1612).

<sup>25</sup> Further information is available at [www.acma.gov.au/WEB/STANDARD/pc=PC\\_1611](http://www.acma.gov.au/WEB/STANDARD/pc=PC_1611).

<sup>26</sup> Further information is available at [www.acma.gov.au/WEB/STANDARD/pc=PC\\_300172](http://www.acma.gov.au/WEB/STANDARD/pc=PC_300172).



# Attachment C - Impact of the two options on prices

There are various licensees in the 400 MHz band. A list of existing licence sub-types in the 400 MHz band is provided below:

Licence sub-types	Licence categories
Ambulatory system	Land Mobile licences
Land Mobile system >30 MHz	
Paging System – Interior	
Point to multipoint – land mobile spectrum	
Fixed receive	Fixed Point to Point Licences
Point to point	
Amateur beacon	Amateur licences
Amateur repeater	
Ambulatory – Initial	Assigned Licences
Ambulatory – copy	
CBRS repeater	
Scientific assigned	

The ACMA assessed the likely impacts of each option and undertook an analysis of how each of those categories would be affected.

## Likely impacts on licence categories of option 1

It is anticipated that the measures being introduced in the 400 MHz band as part of the recent review will result in a reduction in congestion in the 400 MHz band, with the halving of channel bandwidth available to many services to have the most significant impact. It is estimated that this may result in an approximately 50 percent increase in utility for the land mobile service; however only slight changes are anticipated for fixed services.

Licensees in the 400 MHz band understand that CPI increases are imposed every year by the ACMA to keep licence taxes constant in real terms. It is unlikely that an increase in apparatus licence taxes by CPI will affect licensee decisions in the 400 MHz band and assist to address congestion.

## Likely impacts on licence categories of option 2

If Option 2 is adopted, the cost of accessing spectrum in this band is estimated to be \$199 per kHz in high density areas. The ACMA has, in the first instance, assessed the impact of such an increase on the following categories of services. These are:

### ➤ Land mobile services

The 400 MHz band is heavily used for land mobile applications. With application of opportunity cost prices in high density areas, prices of land mobile licences are set to double.

### ➤ Fixed services

Fixed services consist of point-to-point (P-P) licences and point –to multipoint (P-MP) licences. The cost of a land mobile licence is a reasonable approximation of the value of a fixed service licence. Should the cost of a land mobile licence double, the P-MP licence would also double, and the cost of a point to point licence would be a quarter of that price.

➤ General assigned services

These licences include ambulatory services (station and copy) and CBRS repeaters. These are typically land mobile services, and prices should similarly be increased to reflect opportunity cost prices.

➤ Amateur services

Amateur licences are charged a fixed tax per licence every year, and not on a per spectrum access basis. The percentage of amateur licences in the 400 MHz band as at November 2011 was about 2 per cent. It is considered that the low number of amateur licences in this band would not deny spectrum to other major services in this band. Therefore opportunity cost pricing would not apply to non-assigned licences.

As opportunity cost price increases, licensee decisions in congested bands will be affected. With complementary changes to the spectrum management arrangements, the ACMA expects existing licence holders to rationalise their use of spectrum in congested bands and move to more efficient equipment use to ease congestion or considered alternative technology solutions. In the long run, these licensees will be in a position to use less spectrum and thus pay lower taxes.

As such, it is hard to predict what licensees will do and determine who will be affected by the transition process, and this makes such calculations problematic. For this reason, the ACMA intends to assess opportunity cost price increase each year. If congestion eases sufficiently, the ACMA will review the need to implement further tax increases.

The ACMA has also included a comparison of likely prices that would apply on a per kHz basis under both options. The ACMA has estimated the price per kHz under both options for years 2012 to 2016 (5 year time horizon) but has not attempted to predict the impact beyond the first year as transition arrangements are likely to affect the number of licensees in the band. The ACMA has also assumed CPI rates of 3.6% for 2012<sup>27</sup> and 2.5% in 2016<sup>28</sup>. Proposed taxes to be charged in 2012 and 2016 for the different categories of licences in the 400 MHz band (high density area) are detailed in Table 1.

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<sup>27</sup> Based on ABS website - CPI for June Qtr 2010 to June Qtr 2011 at

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/3E263FB203221FE1CA2579340011D9A3?opendocument>

<sup>28</sup> The ACMA has assumed an inflation rate of 2.5% based on forecasts and projections for years 2012 to 2014 included in "Mid-Year Economic and Fiscal Outlook - Table 1.2: Major economic parameters" at [http://www.budget.gov.au/2011-12/content/myefo/html/01\\_part\\_1-01.htm](http://www.budget.gov.au/2011-12/content/myefo/html/01_part_1-01.htm). In 2013, the CPI was assumed to be 2.25%, 2014 assume CPI 3.25%, 2015 assume CPI 2.5%.

**Table 1: Proposed price increases on a per kHz basis for all categories of licences in high density areas**

Category	Current price (per kHz)	Option 1		Option 2	
		First-year price (2012)	Fifth-year price (2016)	First-year price (2012)	Fifth-year price (2016)
Land mobile licences	\$98.56	\$102.10	\$113.25	\$117.51	\$228.57
Fixed services; Point-to-point	\$24.64	\$25.52	\$28.31	\$29.37	\$57.14
Point-to-multipoint	\$98.56	\$102.09	\$113.24	\$117.51	\$228.57
General assigned licences	\$1.33	\$1.38	\$1.53	\$1.59	\$3.09

Table 2 shows increase in aggregate revenue for the various stakeholders in implementing both options

**Table 2: Changes to revenue by client types from implementing both options**

Client Types	2011 taxes		2012 taxes		Increase	
		Option 1	Option 2	Option 1	Option 2	
	\$'000 (A)	\$'000 (B)	\$'000 (C)	\$'000 (B-A)	\$'000 (C-A)	
Commonwealth Department	109	113	129	4	20	
Community or Volunteer Group	347	360	389	12	42	
Company	8,406	8,709	9,479	303	1,073	
Local Government	525	544	604	19	78	
Other Commonwealth Agency	699	725	825	25	126	
Person	112	116	125	4	13	
State Government	7,511	7,782	8,336	270	825	
<b>Grand Total</b>	<b>17,709</b>	<b>18,347</b>	<b>19,887</b>	<b>638</b>	<b>2,178</b>	

The "State Government" and "Companies" categories on a consolidated basis are expected to contribute about 90% of aggregate licence taxes in 2012.

Option 1 shows an increase in aggregate revenue of \$638,000 (3.6%) whereas option 2 changes for 2012 will result in overall tax increases of about 12% for all licensees in this band if these licensees continue to hold the same number of licences in high density areas in this band.

For the purpose of this RIS, impacts of tax increases on licensees have been calculated on the basis that there would be no changes to the number and distribution of licences as a result of the tax changes. In addition to holding assignments in high density areas, it is likely that each of those licensees will hold various other assignments in other geographical areas.

The ACMA has also compiled a list of the likely top 10 tax revenue generators under option 2 and the industry they belong to. These include agencies from the Commonwealth and the state and companies in the telecommunications and rail industry. These same entities would also be the top 10 generators under option 1. The ACMA has not included details of licensees in its analysis as certain information is not available in the public arena.

**Table 3: Top 10 apparatus licence tax contributors**

<b>Entities</b>	<b>Option 2 2012 taxes (\$'000)</b>	<b>Option 2 2011 taxes (\$'000)</b>
Commonwealth Agency	382	320
State Government	1,101	1,067
State Government	970	813
State Government	376	316
Company	327	275
State Government	638	619
State Government	1,718	1,656
Company	921	879
Company	981	884
State Government	1,195	1,002