



## Case studies for the award of the 700MHz/800MHz band: Australia

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*Please note: This document is one of a series of case studies on approaches to awarding the 700MHz/800MHz band<sup>1</sup> for mobile broadband. The countries in this series are Australia, Finland, Germany, Mexico, and UK. Each case study is available as a separate document.<sup>2</sup>*

<sup>1</sup> Across the world, two harmonised UHF bands have been identified for mobile broadband: the 800MHz band (790–862MHz) in ITU region 1 (Europe and Africa) and the 700MHz band (698–806MHz) in the rest of the world.

<sup>2</sup> The case studies, plus a summary document plus presentation, are available for download from the GSMA website at <http://www.gsmworld.com/our-work/public-policy/spectrum/digital-dividend/>

# 1 Australia: Summary

The process of clearing Australia's 700MHz band for re-allocation is complicated by the prevalence of DTT channels in that band, and the resulting time it will take to move them to below channel 52 following analogue switch-off (the so-called 'restacking' process, due to be completed before the end of 2014). However, the outlook is good for a timely analogue switch-off (ASO) on 31 December 2013. Following a slow start in the take-up of DTT over the period 2001–2007, the measures put in place when the Digital Switchover Taskforce was set up in 2007 have since brought about a high degree of awareness and penetration of DTT. Australia now has a comprehensive and consumer-oriented switchover programme. The Taskforce's range of initiatives included:

- a programme of training retail advisors in electronics stores
- labelling of goods in retail stores into three categories of "digital readiness"
- a programme of training TV and antenna installers
- a programme of "endorsed" installers.

Although voluntary, these initiatives were attractively packaged, comprehensively designed and energetically promoted. As a result, they created interest among the various suppliers involved, which helped to provide a boost to take-up.

For users who could not respond to these commercially-oriented programmes, the Taskforce organised a series of targeted subsidies to address specific potential obstacles to DTT penetration (which would therefore be obstacles to ASO, and awarding the 700MHz band):

- Subsidies for vulnerable collectives. A Household Assistance Scheme (HAS), which provides a free decoder and corresponding installation (and antenna) work for certain eligible households, mainly low-income pensioners. This will cost approximately AUD350 per affected household, for a total of approximately AUD380 million (approximately USD390 million).
- A Satellite Subsidy Scheme (SSS) for non-covered areas, so they can receive a dozen or more free-to-air digital channels by satellite. The typical subsidy will be in the range AUD400–700 per household, with a co-payment by the user of AUD200–350.
- Help with digitalisation of "self-help" transmitters. The commercial broadcasting networks offered to pay for about 100 of these. The exact arrangements and payments are not yet clear, but some subsidy will be available for another few hundred of the approximately 570 transmitters not paid for by the broadcasters.

In addition to these initiatives directed at the equipment supply and signal transmission businesses, the Taskforce made use of 'pilot' switch-offs to create highly visible media stories about the process, which has raised further awareness, as well as a sense of urgency among another important group of stakeholders, the viewers.

The Australian Communications and Media Authority (ACMA) is preparing to auction the 2 x 45MHz digital dividend spectrum freed up by the transition to digital TV. The ACMA has chosen a combinatorial clock auction (CCA) format. However, as of September 2011, we are not aware of any decision regarding reserve prices or spectrum packaging. That said, the consultation ACMA ran in 2010 is over, stakeholder comments are in, and a decision is imminent. The ACMA is planning to complete the auction rules and run the auction before the end of 2012.

The Australian transition to digital TV, and the subsequent re-assignment of the digital dividend band to new users, has to be understood in the context of Australia's AUD36 billion National Broadband Network (NBN) initiative, which is proceeding in parallel. NBNco (the state-owned firm that will build and operate the NBN) is planning to use a combination of satellite and terrestrial wireless solutions to deliver service to the 7% of the population in regional and rural areas that will not be within the fibre footprint. The terrestrial wireless solution is being developed to use LTE in the 2.3GHz band and offering a peak download speed of 12 Mbit/s to fixed locations. In June 2011 NBNco awarded Ericsson a AUD1.1 billion ten year contract to roll out the wireless network. In addition, telecoms operators Telstra and Optus have promised not to market mobile broadband service in competition with NBNco's fixed wireless offering.

## 2 Australia: Detailed case study

### 2.1 Overview of process adopted by the regulator

The process of clearing Australia's 700MHz band for re-allocation is complicated by the prevalence of DTT channels in that band, and the resulting time it will take to move them to below channel 52 following analogue switch-off (the so-called 'restacking' process, due to be completed before the end of 2014). The outlook for a timely ASO is good, however. Following a slow start in the take-up of DTT over the period 2001–2007, the measures put in place when the Digital Switchover Taskforce was set up in 2007 have since brought about a high degree of awareness and penetration of DTT. Australia now has a comprehensive and consumer-oriented switch-over programme. The Taskforce's range of services and initiatives covers terminal subsidies, labelling schemes for retailers, antenna and installer endorsements, extensive technical advice, and clear information. Combined with a thorough programme of market research, the Taskforce's initiatives are well placed to drive DTT receiver penetration from its current level of 82% to the 90%+ required to make the ASO a success.

The ACMA is also preparing for the auction, by means of a public consultation. The ACMA has chosen a combinatorial clock auction (CCA) format [12]. However, at the time of writing this document, we are not aware of any decision regarding reserve prices or spectrum packaging. The consultation is now over, however, and a decision on these matters is imminent. The ACMA has set itself the objective of publishing the auction rules in 2012 [1], so it is on course to meet that deadline.

Figure 2.1, below, provides a timeline of the main events that are of greatest relevance to the creation (and planned release) of the 700MHz band.

**Figure 2.1: Summary of major events associated with 700MHz band in Australia**

Year	Event
1998	The government adopts a policy of requiring television free-to-air broadcasters (FTAs) in Australia (both commercial and national) to commence digital terrestrial television broadcasting (DTTB) in metropolitan areas by 1 January 2001. The original intention was to complete the transition to DTT during the period 2007–2010.
2001	Digital broadcasting begins, using the DVB-T standard. An association of industry players (broadcasters, manufacturers, retailers and government representatives) came into being to promote DTT, called Digital Broadcasting Australia (DBA).
2005	A report by ACMA showed adoption of DTT at around 13% of households, despite 85% of households being able to receive all channels via DTT [2]. The analogue/digital simulcast period had been set to end in late 2008 in the mainland capital cities, and later in regional and remote areas.
2006	Following the 2005 ACMA report, the government announced that the start of the ASO would be put back to 2010. Furthermore, the government called for a 'Digital Action Plan' in view of the 'purely market-driven approach' employed to date being 'unlikely to be sufficient to enable Australia to reach analogue switchover in the foreseeable future' [3].  'Digital Australia' is set up, following the model of UKDigital and Italia Digitale, to coordinate and oversee Australia's transition to digital, with a rather more specific brief than DBA's, based on the specific learning points of the 2001–2006 experience [4].
2007	Digital Australia is transferred to the Department of Communications.
2008	Digital Australia and DBA are supplanted, in effect, by the Digital Switchover Taskforce, a body inside the Department of Broadband, Communications and the Digital Economy. The Taskforce is still functioning at the time of writing, using the website <a href="http://www.digitalready.gov.au">www.digitalready.gov.au</a> . A comprehensive, attractively designed website, it reflected the government's desire to adopt a more consumer-centred strategy than previously applied, to further drive the penetration of digital receivers.  The digital switchover programme is timetabled to start in 2010, and due to be completed by 2013 [5].

<b>2009</b>	As part of the consumer-centred strategy, electronics retailers are brought into a labelling scheme organised by the Taskforce. Preparations begin for a similar initiative to create a regime of endorsed antenna installers.
<b>2010</b>	With 68% of households now converted to DTT, the Taskforce launches a high-profile, national campaign to raise awareness of the first 'pilot' switch-off of the analogue signal in Mildura and the surrounding area. Mildura's principal town has a population of only 35,000, but awareness reaches 99% [6].
<b>2010</b>	ACMA held a consultation on how to assign the digital dividend (700MHz) band. The consultation document did not specify how the (2 x 45MHz) spectrum was to be packaged, nor specified the auction format, but instead discussed how those issues have been tackled in other countries, and asks for respondents to give their views.
<b>2010</b>	A bill passed which mandates Viewer Access Satellite Television service (VAST) for digital television blackspot areas via the Satellite Subsidy Scheme (SSS), and addresses a range of other digital TV switchover-related matters. Funding of AUD375 million over 12 years is announced for the SSS initiative [8]. Also, AUD381 million is allocated to help eligible pensioners to convert to digital television via the Household Assistance scheme (HAS) [19].
<b>2011</b>	The third area, and by far the largest, to switch off the analogue TV signal was 'Regional Victoria' on 5 May 2011, with about 443,500 households. The DST ran a market survey (sample size: 10,000) in the following week, finding that 95% could watch digital TV following the switchover [9].
<b>2011</b>	The number of households with a DTT receiver reaches 84% (82%, if the already switched-off areas are excluded) [10].

The Australian transition to digital TV, and the subsequent re-assignment of the digital dividend band to new users, has to be understood in the context of Australia's AUD36 billion National Broadband Network (NBN) initiative, which is proceeding in parallel. NBNco (the state-owned firm that will build and operate the NBN) is planning to use a combination of satellite and terrestrial wireless solutions to deliver service to the 7% of the population in regional and rural areas that will not be within the fibre footprint. The terrestrial wireless solution is being developed to use LTE in the 2.3GHz band, offering a peak download speed of 12 Mbit/s to fixed locations [22]. In June 2011 NBNco awarded Ericsson a AUD1.1 billion ten year contract to roll out the wireless network [23]. In addition, telecoms operators Telstra and Optus have promised not to market mobile broadband service in competition with NBNCo's fixed wireless offering [24].

## 2.2 Justification for clearance of the 700MHz band

A report prepared in 2009 by Spectrum Value Partners for the Australian Mobile Telecommunications Association (AMTA, an association of mobile operators, handset manufacturers, retail outlets, network equipment suppliers and other suppliers to the industry) indicated that Australia's economy would be boosted by up to AUD10 billion if at least 120MHz of useable spectrum from the digital dividend were allocated to mobile broadband uses [25].

A 2010 study by Network Strategies for the AMTA [26] estimated a gross productivity benefit for Long Term Evolution (LTE) to be AUD62 billion over the period 2013 to 2020 (assuming that commercial launch of LTE over 2.5GHz (often referred to as the 2.6GHz band in other countries) would occur in 2013, with LTE over 700MHz available one year later). Furthermore, they found that a year's delay in the availability of these spectrum bands could reduce this productivity gain by nearly AUD17 billion.

The justification published by the government for clearance of the 700MHz band was based mainly on qualitative considerations and ‘common sense’. The case has been made in this way since the mid-1990s, when plans first emerged for DTT. Typical of such justifications is the chapter entitled Benefits in the “Digital Dividend Green Paper of 2010”. There is a clear recognition of the trade-off between costs and benefits:

*“If the vacated spectrum is reorganised or restacked into larger contiguous blocks, it is anticipated that it will be suitable for a larger number of potential spectrum uses.” [15]*

However, this observation is not accompanied by an attempt at a quantification of the costs or benefits of creating larger blocks. In the Green Paper, the justification is put simply and straightforwardly (our summary):

- demand for mobile broadband is growing rapidly and will require spectrum; this demand is greatest in bands between 400MHz and 3.5GHz.
- the majority of spectrum licences from the most recent auction of 700MHz digital dividend spectrum in the USA were acquired by mobile operators.
- submissions to consultations held in Australia have indicated that the broadcasting services band in the 520–820MHz range is attractive spectrum for the provision of telecommunications services.
- digital divided spectrum could be used to provide mobile TV services.

Aside from the digital dividend itself, other telecommunications initiatives have been accompanied by formal economic cost-benefit analyses, for example the NBN:

*“Allen Consulting estimates that a 10 per cent increase in Australians using the internet will lead to an increase of 0.44 per cent to national GDP. In addition, if the number of Australian households connected to the internet increased by 10 per cent, it would provide gains to households of \$2.4 billion per annum in terms of consumer surplus.” [13]*

## 2.3 Obstacles faced during band clearance

An important difference between Australia and other countries exploiting their digital dividends is the high prevalence of digital TV channels still operating in the digital dividend band. The process of moving those channels to lower frequencies, known as ‘re-stacking’, will only take place after space is freed up in those frequencies as a result of switching off analogue transmissions. Restacking is due to be completed by the end of 2014. This situation contrasts with countries which have managed to keep their digital dividend bands relatively free of digital TV: Mexico, for example, has no digital TV in its digital dividend band. The large number of digital channels in the digital dividend band might make the process of re-stacking ‘particularly acute’ [17].

### 2.3.1 Adoption of set-top boxes without subsidy

The switchover process followed in Australia has been characterised by the government’s attentiveness to the needs of the end users of TV services, in order to provide incentives to purchase DTT decoders or digital-ready TVs. It is worth noting that digital-ready TVs are a more important driver of DTT penetration than DTT decoders. For example, in the regions of Australia where the analogue signal was already switched off, 78% of DTT receivers were integrated into TV sets, 18% were decoders, and 4% were in DVD players [8].

In the years following the launch of DTT, adoption of the technology was low among households. After five years (as already mentioned above) the penetration had only reached 13%. The initiatives promoted by the Digital Switchover Taskforce to raise awareness and interest included:

- antenna installer endorsement scheme – A programme of training of retail advisors in electronics stores
- labelling of goods in retail stores into three categories of “digital readiness”
- a programme of training TV and antenna installers
- a programme of “endorsed” installers.

All the above initiatives were voluntary on the part of the installers and retailers. However, because they were attractively packaged, comprehensively designed and energetically promoted, they created interest among the various suppliers involved, which helped to boost take-up.

In addition to the above-listed initiatives directed at the equipment supply and signal transmission businesses, the Digital Switchover Taskforce made use of ‘pilot’ switch-offs to create highly visible media stories about the process, and thus further raise awareness, as well as a sense of urgency among viewers.

Another action taken by the government was to oblige DTT channels to broadcast locally-sourced free-to-air content in 16:9 widescreen format. This is an action sometimes pursued by governments when trying to persuade viewers of the benefits of switching to digital TV, so that viewers perceive some tangible difference in image quality between the simulcast channels which, in most other respects, appear identical. It is worth noting that the Taskforce’s consumer surveys (for example, the one done after the Regional Victoria analogue switch-off [9]) show that more people think the digital TV is higher quality, than those who think its quality is lower, than analogue TV.

### 2.3.2 Subsidies for vulnerable collectives

In 2009, the government launched a Household Assistance Scheme (HAS), which provides a free decoder and corresponding antenna work for eligible households. To be eligible for assistance, a person must receive the maximum rate of various Australian types of state benefit (the Age Pension, Disability Support Pension, Carer Payment, Department of Veterans’ Affairs Service Pension or Income Support Supplement), they must own a working TV and not already have access to digital TV. The costs of the scheme were allocated in three, successive state budget cycles [18]:

- AUD3 million targeted on the small area of the first ‘pilot’ switch-off
- AUD69.3 million to cover the first part of the ‘regional’ (i.e. not state capital cities) switch-offs
- AUD308.8 million to cover the remaining ‘regional’ areas, and the state capital cities.

As of May 2011, the scheme’s allocation of AUD15.1 million had assisted over 38,000 households. [19] The average cost at that point was therefore approximately AUD390 per household, a figure that is expected to reduce to AUD350 by the end of the switch-off programme [19].

### 2.3.3 Subsidies for non-covered areas

In 2010, the government announced that the Viewer Access Satellite Television (VAST) platform, a direct-to-home (DTH), free-to-air satellite service would be used to provide post-ASO coverage for viewers in television ‘black spot’ areas (that is those areas which receive a deficient terrestrial digital signal), via a satellite subsidy scheme (the SSS), which provides financial assistance to purchase and install a satellite dish, cabling and a set-top box. The typical subsidy is AUD400 per household, with higher subsidy amounts of AUD550 and AUD700 available for households in designated ‘very remote’ and ‘far north tropical’ areas. Each household is required to make a co-payment between AUD200 and AUD350 [11].

### 2.3.4 Digitalisation of “self-help” transmitters

There are approximately 680 so-called ‘self-help’ broadcasting stations in Australia, set up by local communities with the consent of the broadcasters to fill in gaps in analogue TV coverage. Of these, the industry has voluntarily agreed to upgrade around 100 stations to DTT [20]. This leaves around 580 that will stop working when the analogue signal is switched off. A subsidy has been made available to help communities adapt these to digital in preparation for the switch-off. The amount is not known, and in any case, where a ‘self-help’ transmitter is switched off, the SSS is available to viewers.

### 2.3.5 Clearing other (non-TV) users from the digital dividend band

There are a large number of low-power devices operating in the band across Australia, the greatest number of which is wireless audio devices, such as wireless microphones. To help users of this equipment prepare for the upcoming changes, the ACMA has set up a new web page containing information specifically for them. Ideally, these users would migrate into the side bands on either end of the digital dividend spectrum band. However, no detailed plan for these users has yet been published, or any economic consideration suggested.

## 2.4 Protection of other/neighbouring spectrum uses

### 2.4.1 Mid West Radio Quiet Zone

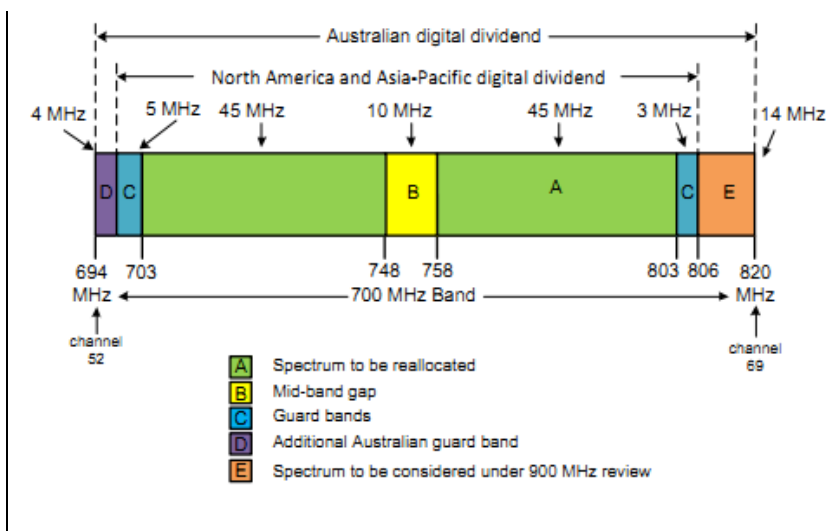
There is an embargo on issuing new apparatus licences in the 100MHz–25.5GHz frequency range around Boolardy Station, approximately 300km north-east of Geraldton, Western Australia. The ACMA maintains this Mid West Radio Quiet Zone (RQZ) to preserve the current ‘radio-quietness’. The area has very low levels of radiofrequency energy because of its sparse population and remote location. The RQZ facilitates the development and use of new radioastronomy technologies within that area. In its discussion document [7] and recommendation [16], the ACMA has excluded the RQZ from the geographic scope of the forthcoming licenses for use of 700MHz (and 2.5GHz) spectrum.

Australia’s RQZ is a special case of a strategically important national initiative unlikely to be seen in many other countries, at least not in the same way. However, other countries may have analogous needs for excluding certain relatively small areas of land mass from the scope of the digital dividend licenses.

### 2.4.2 Unusually wide guard bands

Australia’s digital dividend spectrum of 126MHz is a wider band than in other countries in the region. However, an additional guard band, plus a band subject to further review (see Figure 2.2) act, is being adopted in practice, to bring Australia back into line with the 2x45MHz band plan being adopted across much of Asia.

**Figure 2.2 Australia’s wider digital dividend band compared with the usual North American and Asia-Pacific bands**  
[Source: ACMA [16]]



The ACMA has said [16] that the additional Australian guard band of 4MHz (shown above) will further reduce any risk of interference between mobile communications services above channel 52 and the broadcasting services in the adjacent channel 51. In response to the public consultation, a number of broadcasters (among them SBS and Free TV) supported the creation of this guard band, but also noted that the question of such interference, with or without an extra guard band, is still an open issue, in any country.

In Figure 2.2 above, the guard bands marked C are of a typical size to those employed by other countries in the same context. By introducing the bands marked D (additional Australian guard band) and E (spectrum to be considered under 900MHz review), the Australian authorities have, in effect, ‘cropped’ each end of the Australian digital dividend band down to the width of the North American and Asia-Pacific harmonised digital dividend band. The main reason for doing this was to achieve benefits associated with global harmonisation, especially with Asia-Pacific countries.

Future opportunities for the use of the digital dividend spectrum in the range 803-820 MHz, including mobile broadband options, are now being considered separately by the ACMA as part of a review of the 800/900 MHz band.



## 2.5 Award mechanism for the 700MHz band

In June 2010, the ACMA published a consultation on plans for the award of the 700MHz band, plus the potentially complementary 2.5GHz band. Stakeholders' comments have been submitted and published, and the ACMA has prepared draft recommendations to the Minister about the overall approach to be taken in reallocating these bands.

The intention is to auction 700MHz and 2.5GHz together. So far the ACMA's preference is not clear on the following points:

- How to package the 2x45MHz (the document recognises that in other countries 2x5MHz packages have usually been used).
- What reserve prices to set for the spectrum packages.

Regarding auction timing, the draft auction rules are expected to be published in early 2012, and the auction held by the end of 2012. See <http://engage.acma.gov.au/digitaldividend/category/auction-rules/> for more information about the auction planning.

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