Broadcast Australia

Submission in response to
Digital Dividend Green Paper

26 February 2010

1. Executive Summary

Context

This Green Paper is not just about megahertz, frequencies, bit rates and restacking. It attempts to set out a way in which all Australians can benefit most from the introduction of digital terrestrial TV transmission technology.

It sets out how the Government's target of 126 MHz for provision of a so called Digital Dividend can be realised for the benefit of next generation mobile and wireless voice and data users and how the digital terrestrial free-to-air radio and TV broadcasting platforms can be maintained, enhanced and to an extent future-proofed.

Probably 99% of Australian homes and motor vehicles have at least one device which receives terrestrial free-to-air TV and or radio services.

The terrestrial broadcasting platforms are the only way currently that broadcast TV and radio services are genuinely free-to-air. All other platforms require some ongoing payment either directly or indirectly (eg access fees or excess download fees to ISPs) for consumers to watch or listen to so called free-to-air content.

Therefore it is vitally important that the terrestrial free-to-air broadcasting platforms which:

a) Australians rely on every day; and
b) have generated significant household investment in reception equipment

are both protected during the restacking process to create the digital dividend spectrum and are future proofed to a reasonable extent.

Free-to-air terrestrial broadcasting platforms need to have the ability to keep pace with other more proprietary content delivery platforms which inevitably charge for access or content consumption.

Government decisions on these issues should contemplate providing the free to air broadcasters with the ability to deliver next generation services or take advantage of next generation technologies such as improved compression.

As an example, on 23 February 2010, Sony announced it would bring to market in Australia full 3 dimension (3D) TV sets and accompanying 3D consumer product glasses in July 2010. If 3D services available via subscription cable and satellite, Blue Ray DVDs and possibly the NBN become popular, then, in our view, it is vitally important to the Australian community that the people's free-to-air terrestrial TV platform has the ability to provide such technology and services.

Broadcast Australia believes strongly this should be the case. **This submission encapsulates how it is possible for the Government to achieve this without encroaching in any way on the Government's 126 MHz Digital Dividend target – Scenario One.**

This submission also outlines how the Government can achieve seven national digital television channels, an appropriate allocation for the introduction of regional digital radio (21 MHz) and a practical transition to the DVB-T2 standard, also without encroaching on the Government's Digital Dividend outcome for 4G / mobile broadband – Scenario Two.

Overview

BA notes the Government's objective of re-allocating the maximum amount of spectrum freed up on the cessation of analogue TV services for new services that will maximise economic and community benefit. In achieving this objective, BA acknowledges and fully supports the Government's ongoing commitment to ensuring the continued provision of high quality free-to-air digital terrestrial TV services.

The Digital Dividend Green Paper ('Green Paper') canvasses issues that are of vital and long-term importance to Australia, the resolution of which will impact all communications services (costs, efficiency, capability etc) provided in this country and on all Australians.

In considering its response, BA has taken a holistic view of current and emerging wireless communications technologies encompassing free-to-air broadcasting (TV and radio), mobile telecommunications/broadband, and fixed wireless services which are likely to play an important role in bringing the National Broadband Network (NBN) to fruition in regional and rural Australia.

In seeking to maximise the Digital Dividend (defined to be 694 MHz – 820 MHz) and maximise spectrum utilisation outside the nominated Digital Dividend, BA proposes the following for consideration by the Government in the finalisation of its policy in this area:

- The Digital Dividend objective should be the clearing and reallocation of 126 MHz of spectrum at the upper end of the broadcasting services band (BSB) portion of UHF Band V as well as the provision of sufficient spectrum for **seven nationwide digital TV channels** (consisting of six in-home broadcast channels and a seventh for either in-home or mobile broadcast services). Importantly in respect of the spectrum availability for future digital TV channels, BA's spectrum planning analysis shows that a seventh digital TV channel is able to be accommodated. Economically this additional channel is viable as the minimal restacking costs are significantly less than the estimated net present value of the channel. This creates flexibility for Government and delivers in the most efficient use of this spectrum asset.

- Utilisation of the Digital Dividend should anticipate and plan for the next stage in the **evolution of digital terrestrial TV services** which will offer a range of enhanced services to consumers and enable Australia to be a part of global technological advances in broadcasting. Based on its interactions with the global industry, BA sees this evolution taking the form of a transition from the current DVB/MPEG-2 standard, which is currently the basis of digital terrestrial TV in Australia to DVB-T2/MPEG-4. This will, among other things, facilitate new applications such as'3D-TV', Super High Definition services and further consumer choice. There is clear evidence that this transition has commenced in Europe. As outlined in this submission, this can be achieved without reducing the spectrum requested by the mobile telecommunication carriers for 4G services.

- The alternative to providing a development path for broadcasting technology migration would be to lock Australian free-to-air terrestrial broadcasters and their viewers in to the current technology at a time of significant technological/service opportunity and alternate platform competition.

- As a consequence of providing a relatively small spectrum allocation for next-generation digital TV services as part of the Digital Dividend arrangements there will be scope for a **second digital dividend** at a later date. This might occur at the point at which DVB-T2/MPEG-4 services ultimately replace the current digital TV standard which will provide the basis for the release of a significant amount of valuable spectrum at that time (21 MHz in our recommended approach).

- The Digital Dividend provides a unique and **low-cost opportunity to meet the Government's objectives for the NBN** in regional and rural Australia (i.e. 12 Mbps data speeds for the 10% of the population who will not be covered by the fibre-to-the-premises (FTTP) network). BA concurs with the CSIRO's view that the utilisation of Broadcast Services Band (BSB) spectrum and existing tower infrastructure offers a highly effective and cost-efficient means of delivering NBN services to a significant proportion of those homes where it will not be economic to provide FTTP.

- If a '126 MHz + 7 TV channels' plan is adopted, mobile TV is an ideal usage to be considered for the seventh channel. Importantly BA does not agree with the Green Paper's view of the obstacles associated with a mobile TV deployment (particularly in terms of required network density) and considers there is both significant unmet demand for, and market interest in, this service. BA contends that mobile TV can be deployed under current legislative settings and in a relatively short timeframe. This can be done well in advance of analogue TV shutdown.

- The sixth digital TV channel (and seventh digital TV channel if not used for mobile TV) presents a major opportunity for additional in-home free-to-air content that will be attractive to viewers. BA submits that the use of this important channel should be expanded beyond the soon-to-commence simulcast of community TV services in several state capital cities. Options include additional ABC/SBS multi-channel services, datacasting/open narrowcasting services or, in Scenario One, future DVB-T2/MPEG-4 services.

- The approach to the revised spectrum plan is to provide a one-off opportunity to lay the platform for the **regional deployment of digital radio** services beyond the initial five capital cities service. The restacking process creates the opportunity to plan for digital radio transmissions in a way that minimises interference issues and maximises spectrum efficiency. BA's analysis shows that the deployment of digital radio to capital city, adjacent and other regional markets will require three contiguous VHF TV channels (i.e. 12 ensembles using the 'DAB+' digital radio standard) to be allocated for this purpose. BA understands Commercial Radio Australia, the ABC, SBS and CBAA have positions consistent with this approach.

- The restacking work required to achieve a Digital Dividend release of 126 MHz is a major planning and engineering undertaking involving changes to at least 200 transmission sites impacting over 400 existing digital TV services across Australia. In order to achieve the timely allocation of spectrum (and associated financial returns), BA believes that **spectrum planning must be completed in 2010**, with transition planning and contract negotiations completed by early 2011 and implementation works associated with restacking commenced immediately thereafter.

- The restacking engineering work represents a project of national importance and scale. BA, as the owner of a majority of the affected sites and contracted service provider for many existing services, believes that a co-ordinated national approach by Government is required to achieve the outcomes expeditiously.

In this submission, BA sets out two options for the configuration of the 126 MHz Digital Dividend and future digital TV spectrum. Both options provide for seven national digital television services and a reservation of DAB+ spectrum within the restacked spectrum with no encroachment on the spectrum sought for the introduction of 4G / mobile broadband services. In addition, Scenario Two has significant benefits as it provides a dedicated transition path to future broadcast transmission technology (and related capacity for enhanced and additional services) whilst meeting the capacity requirements of the telecommunications operators. Diagrammatic representations of these options can be found below.

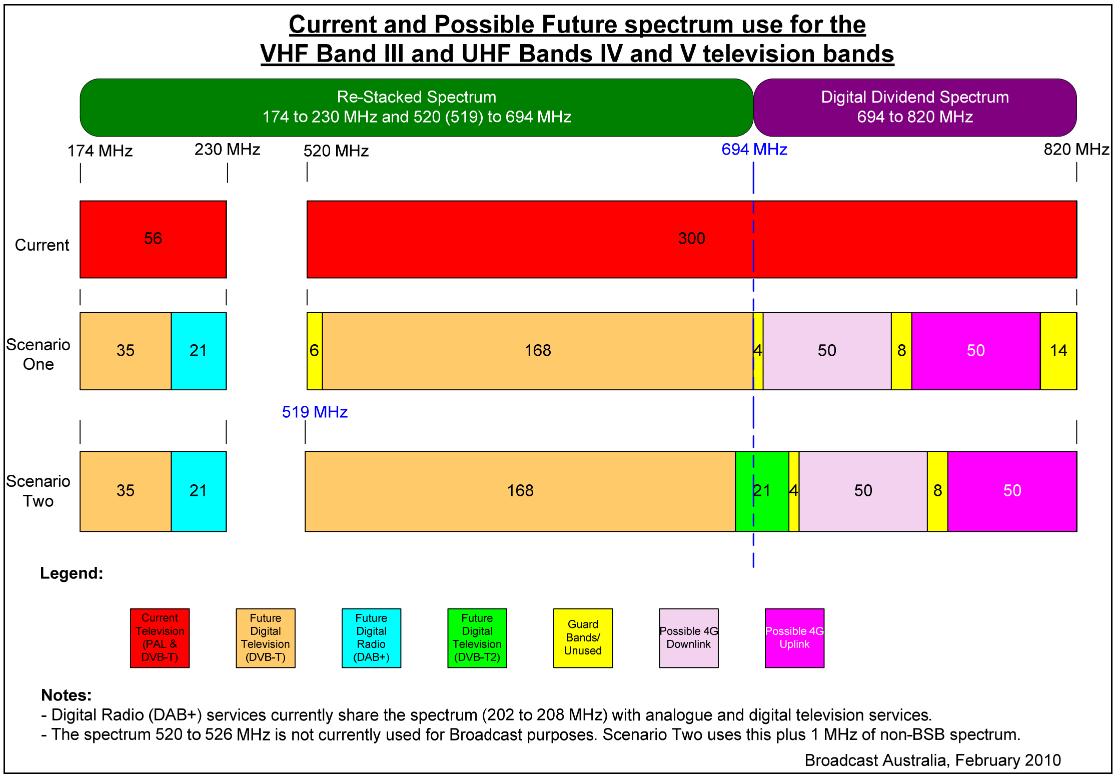


Figure 1: Spectrum Scenarios Overview

Summary of Benefits from Scenarios One and Two

	Re-stacked Spectrum 174 to 230 MHz and 520 (519) to 694 MHz	Digital Dividend Spectrum 694 to 820 MHz
SCENARIO ONE	6 In-home Digital Television RF Channels (i.e. ABC + SBS + 3 Commercial + “Channel A”); + 3 TV channels reserved for DAB+ Australia-wide; + 1 RF Channel for broadcast Mobile TV OR Further in-home Digital Television service OR DVB-T2 transition	2 x 50 MHz blocks for 4G / wireless broadband services; + 14MHz unassigned at top end of band
SCENARIO TWO	6 In-home Digital Television RF Channels (i.e. ABC + SBS + 3 Commercial + “Channel A”); + 3 TV channels reserved for DAB+ Australia-wide; + 1 RF Channel for broadcast Mobile TV OR Further in-home Digital Television; + 7 MHz for DVB-T2 transition (687 to 694 MHz)	2 x 50 MHz blocks for 4G / wireless broadband services; + 14 MHz for DVB-T2 transition (694 to 708 MHz); + Second future Digital Dividend of 21 MHz post DVB-T2 transition (687 to 708 MHz)

Figure 2: Scenario Benefits Overview

Recommended Approach

BA recommends Government seriously consider adopting Scenario Two outlined in this submission as it meets all of the stated policy objectives of Government. This innovative approach delivers:

- the **full** amount of spectrum required (as identified by the telecommunications industry) **now** to provide today's Digital Dividend;
- a transition pathway for television broadcasters to the next generation transmission system which will allow new and innovative services to be provided to the Australia audience more efficiently;
- flexibility to Government by the provision of an additional 7 MHz channel nation-wide to provide either a mobile broadcast service or a seventh in-home television service;
- a pathway to provide DAB+ services to Regional Australia in an equitable manner to that received in the five Metropolitan markets; and
- a future (second) Digital Dividend of 21 MHz which will deliver further economic and/or community benefits to Australia.

BA has addressed each of the specific questions posed in the Digital Dividend Green Paper. These can be found at Attachment 1.

2. Determining the Digital Dividend

BA endorses the Government's recent policy determination that a Digital Dividend of 126 MHz will be made available on the cessation of analogue TV and that this should take the form of a contiguous spectrum block. We note reference to the analysis undertaken by Kordia and the Australian Communications and Media Authority (ACMA) which, the Green Paper states, supports the proposition that 126 MHz of UHF spectrum from 694 to 820 MHz can be made available.

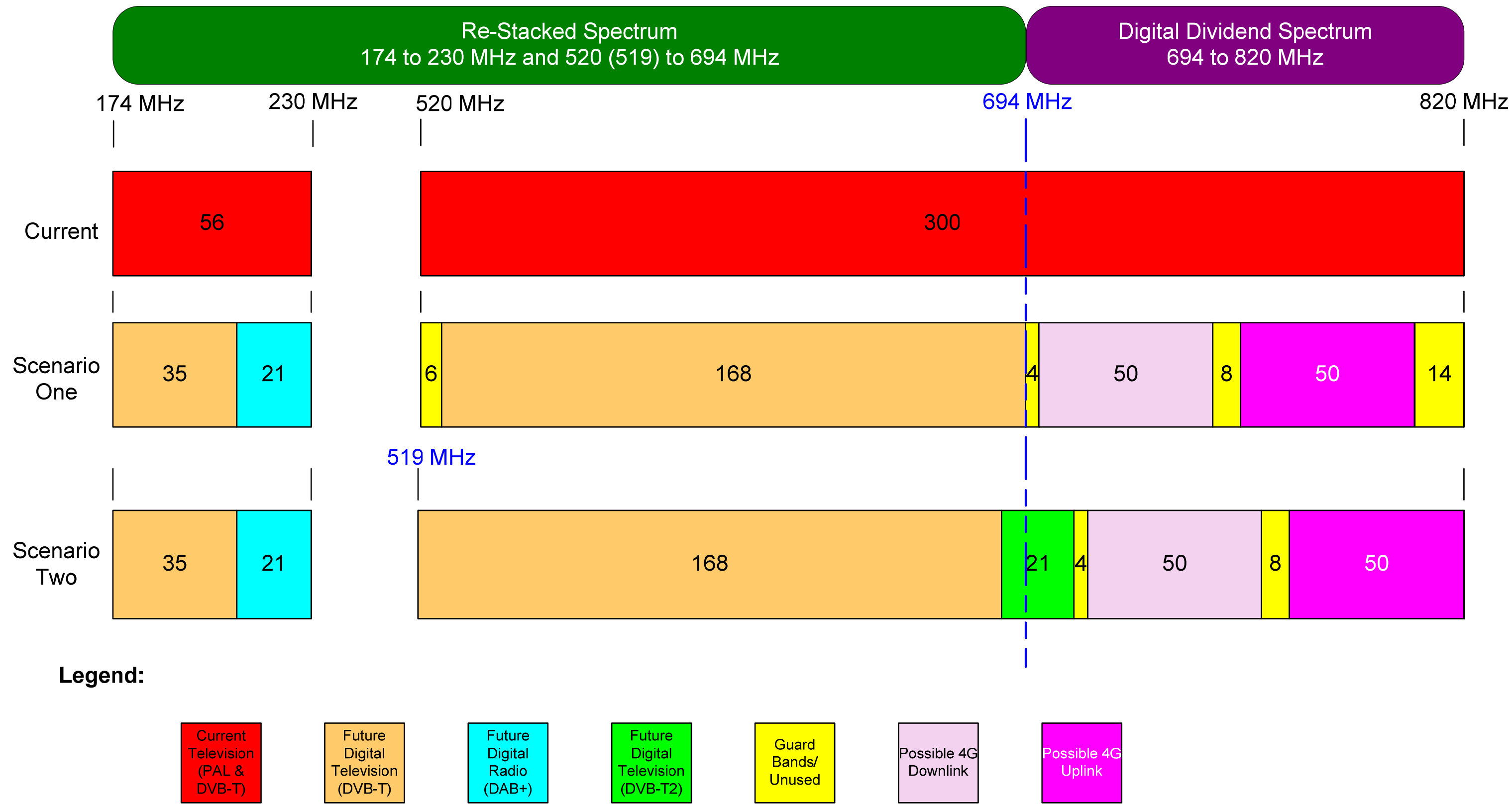
BA has previously undertaken, and tabled with stakeholders including ACMA and broadcasters, spectrum analysis that supports a Digital Dividend of this size however we have also developed the analysis showing that it is possible to plan for seven digital TV channels (one more channel than that confirmed feasible by Kordia and ACMA) and still deliver the 126 MHz. To illustrate how this can be achieved, BA has updated its Victorian planning case study to include the 126 MHz dividend, seven digital TV channels as well as reserving three TV channels (i.e. 12 DAB+ ensembles) to facilitate the broader deployment of digital radio. This case study is provided at Attachment 2.

BA acknowledges there is some additional cost in the overall restacking exercise associated with planning for a seventh channel and reserving three Band III TV channels for DAB+ however our analysis indicates this to be an increase in the order of less than 5% of the estimated restack costs. In economic terms, an additional national channel of 7MHz will be considerably more value to Government that the incremental costs involved in creating this additional public asset, whatever its allocated purpose.

In setting out its policy framework for the Digital Dividend, the Government has set out a range of principles (pp. 12-13 of the Green Paper) that recognise the considerations and trade-offs that are involved in maximising the dividend. At its core, the Government wishes to maximise the economic and community benefit associated with the allocation of this spectrum while ensuring continuity of access to free-to-air TV services and avoiding undue disruption and expense associated with the restacking exercise.

It is with this policy balance in mind that BA has formulated two Digital Dividend/ future BSB scenarios for consideration (both are based on a Digital Dividend of 126 MHz). While subsequent sections of this submission go into greater detail on specific uses, the following diagram sets out these high level scenarios:

Current and Possible Future spectrum use for the VHF Band III and UHF Bands IV and V television bands



Notes:
- Digital Radio (DAB+) services currently share the spectrum (202 to 208 MHz) with analogue and digital television services.
- The spectrum 520 to 526 MHz is not currently used for Broadcast purposes. Scenario Two uses this plus 1 MHz of non-BSB spectrum.

Broadcast Australia, February 2010

Summary of Benefits from Scenarios One and Two

	Re-stacked Spectrum 174 to 230 MHz and 520 (519) to 694 MHz	Digital Dividend Spectrum 694 to 820 MHz
SCENARIO ONE	6 In-home Digital Television RF Channels (i.e. ABC + SBS + 3 Commercial + "Channel A"); + 3 TV channels reserved for DAB+ Australia-wide; + 1 RF Channel for broadcast Mobile TV OR Further in-home Digital Television service OR DVB-T2 transition	2 x 50 MHz blocks for 4G / wireless broadband services; + 14MHz unassigned at top end of band
SCENARIO TWO	6 In-home Digital Television RF Channels (i.e. ABC + SBS + 3 Commercial + "Channel A"); + 3 TV channels reserved for DAB+ Australia-wide; + 1 RF Channel for broadcast Mobile TV OR Further in-home Digital Television; + 7 MHz for DVB-T2 transition (687 to 694 MHz)	2 x 50 MHz blocks for 4G / wireless broadband services; + 14 MHz for DVB-T2 transition (694 to 708 MHz); + Second future Digital Dividend of 21 MHz post DVB-T2 transition (687 to 708 MHz)

The key features of these Scenarios are as follows:

Scenario One

This Scenario aligns with the Kordia/ACMA model which provides for a Digital Dividend of 126 MHz. Existing digital television services would continue to be provided in VHF Band III and UHF Bands IV and V.

In this scenario BA agrees with Kordia's finding that six networks can be planned within the restacked spectrum whilst retaining the 126 MHz Digital Dividend.

We further believe, that improved spectrum efficiency can be achieved and that a seventh channel, Australia-wide, can be interleaved within the restacked spectrum in addition to providing 21 MHz at the top of VHF Band III for the broader national rollout of digital radio services. The seventh network could be used for either broadcast mobile television or as an opportunity to introduce next generation transmission systems such as DVB-T2.

BA has conducted significant channel planning work across the most densely populated (and spectrum congested) areas of Australia to confirm that the above approach can practically be achieved. This work also included the provision of spectrum (within the restacked bands) for new in-fill facilities and the conversion of existing self-help television facilities to digital.

Under this model, 100 MHz would be allocated for advanced mobile telecommunications and broadband (4G networks) – 50 MHz for 4G downlink and 50 MHz for 4G uplink – together with relevant guard bands. This spectrum allotment is consistent with the GSMA allotment approaches[1]. A significant unused portion of spectrum (14 MHz) remains at the very top of UHF Band V (806 to 820 MHz) to provide consistency with US frequencies that may be used for 4G services. While some telecommunications operators have ascribed a benefit to this US spectrum planning consistency, BA believes that there is little value in this approach and that the opportunity cost for Australia would be significant (see benefits from Scenario Two below).

BA does not favour this scenario on the basis that spectrum efficiency is not maximised and it could thereby lead to a technology "cul-de-sac" for broadcasters and Australian viewers as it would be extremely difficult to transition to the next generation transmission and reception/display systems.

[1] GSMA input to the New Zealand "Digital Futures, Planning for Digital Television and New Uses, A Discussion Paper of August 2009";

http://www.rsm.govt.nz/cms/pdf-library/policy-and-planning/digital-futures-planning-for-digital-tv-and-new-uses/submissions/Digital%20Futures%20Submission%20-%20GSMA.PDF

Scenario Two

The restacked spectrum component of this plan is as described for Scenario One.

In addition, by reducing the amount of unused spectrum in Scenario One (6 MHz at the bottom of UHF and 14 MHz at the top) and moving the proposed 4G spectrum allocation up to the top of the band, this scenario maximises the spectrum available for transition to next generation broadcast technologies whilst retaining the usable 4G spectrum requirement at 100 MHz.

In their 2008 paper "Spectrum Options: 403-520 MHz", the ACMA noted that the use of channel 27 (519-526 MHz) was outside the scope of the paper. Significantly, there is currently an embargo (ACMA Embargo 45) on new frequency assignments in the range 518-520 MHz to preserve the ACMA's flexibility to use channel 27 for broadcast purposes. BA believes the restack of the BSB spectrum is an opportune time to release this additional channel.

In this scenario BA proposes three DVB-T2 dedicated channels (i.e. 21 MHz requirement; including 14 MHz from nominated Digital Dividend spectrum) be used either to introduce a single DVB-T2 service within a particular area and re-use the spectrum on a lattice planning type approach in adjacent markets; or all three could be used within a single market for transition to the new platform progressively used throughout the country.

Importantly, at the end of the transition to DVB-T2, this 21 MHz would be available to provide a second Digital Dividend to Australians enhancing the economic and community benefit of this spectrum.

3. A Two-Stage Digital Dividend: Facilitating the Evolution of In-Home Broadcast Services

BA acknowledges that the Digital Dividend will properly provide for next-generation mobile telecommunications and broadband services – 4G networks probably including LTE and mobile WiMAX. These are likely to be high value uses in terms of upfront financial return to Government and benefit/productivity for the Australian community.

BA notes developments in Europe (Denmark, Finland, France, Germany, the Netherlands, Spain, Sweden and the UK) where 72 MHz (790 to 862 MHz)[2] is proposed for the provision of 4G network services (2 x 30 MHz plus guard bands); and the US where <60 MHz was acquired at auction for 4G services. In both cases, similar to the Australian environment, additional spectrum will be required at higher frequencies to supplement capacity and/or enhance coverage.

The central issue for consideration in the context of the Green Paper is the extent to which these 4G uses are balanced against demands from competing communications services that also offer significant economic and community benefit/service.

BA recommends that the Government reserve a spectrum block at the bottom end of the Digital Dividend (e.g. 687 to 708 MHz) for the evolution of next generation digital TV services. This will provide a pathway for digital TV's evolution from the current DVB-T/MPEG-2 standard (which is circa 15 years old) to DVB-T2/MPEG-4 standard which will provide a range of benefits for consumers and broadcasters, including:

- Greater spectrum efficiency, allowing broadcasters to provide a substantially greater number of programs on the same amount of spectrum. The new DVB-T2/MPEG-4 combination can provide twice as many television programs as the existing DVB-T/MPEG-2 combination. This is achieved by an increase in carrying capacity of circa 50% through the use of DVB-T2 modulation improvements and a reduction of circa 50% in the data-rate requirements of the video when MPEG-4 compression is used.

- Major qualitative advances in the viewer experience, for instance in the form of 3DTV will bring this popular cinema format into the home. The shift to 3DTV is properly seen as another stage in consumer demand for higher quality viewing experience that have over recent years included DVD, standard definition TV, high definition TV and Blu-Ray. Sony has announced that televisions and 3D glasses will be available in Australia during July 2010.

Whilst a transition to DVB-T/MPEG-4 (simply improving the video compression technology) would provide some benefit in terms of lower data rate per program, the legacy issue of the smaller capacity "transmission pipe" provided by the DVB-T modulation is likely to be a long term impediment to a truly vibrant terrestrial broadcast industry. Under this scenario, some existing programs would likely be lost to MPEG-2 only receivers as the DVB-T capacity would be inadequate for the broadcasters to simulcast both MPEG-2 and MPEG-4 content under the current arrangements, even for a transition period.

Based on recent global developments encompassing standards, receiver development, content creation and viewer demand, BA strongly contends that current consideration of Digital Dividend policy by the Australian Government provides the appropriate juncture for

[2] Report for the European Commission 'Exploiting the digital dividend' – a European approach; Final report – executive summary; 14 August 2009; analysys mason, econ, Hogan & Hartson; http://www.analysysmason.com/PageFiles/13825/20090814%20EC%20final%20report%20-%20Final%20(Executive%20summary%20only).pdf

provision to be made for the inevitable transition to DVB-T2. While the details of these developments are set out in Attachment 3, the most significant of these include:

- Certification in January 2010 by Freeview (UK free-to-air digital TV consortium) of the first DVB-T2 receiver for the UK market (the Vestel T8300 set top box). The product will be launched in the market in March 2010 and, similar to other products under development, will be backwards compatible to also receive DVB-T signals.

- The launch in December 2009 of the 3DTV Working Group by the world's leading digital broadcasting standards body, MPEG Industry Forum.

- The major resurgence in 3D cinema in recent years, including box office takings in excess of $1 billion in 2009.

- Announcement of plans by significant broadcasters, such as ESPN and Sky UK, to launch 3D services. This follows the launch of the world's first 3D channel in Korea in January 2010.

BA is seriously concerned that, in the absence of an appropriate spectrum reservation in the context of the current Digital Dividend, Australia runs the risk of being left behind in the next phase of free-to-air digital TV evolution. This outcome would be damaging to the long-term interest of both the broader community and the free-to-air broadcasting industry, as well as undermine the Government's policy to ensure the ongoing provision of high quality free-to-air broadcast services commensurate with other developed markets.

A key issue for consideration in facilitating the DVB-T2 transition through the Digital Dividend is determining the appropriate spectrum allocation for this purpose. Ideally, this would take the form of a 42MHz block at the bottom end of the Digital Dividend (i.e. six 7MHz digital TV channels) that would enable each existing broadcaster to replicate their existing digital TV service suite as well as introducing new services (including 3DTV) to provide the value proposition for consumers to invest in a new receiver (i.e. set top box or integrated TV). A substantial spectrum allocation of this scale would have the clear advantage of facilitating a relatively quick transition to DVB-T2. However, given the desire to maximise the economic and community return from the Digital Dividend through providing access to a significant portion of spectrum for 4G services, BA acknowledges this option is unlikely to gain wide support.

As an alternative, BA has proposed a smaller DVB-T2 spectrum reservation option that would have no impact on the proportion of the Digital Dividend that is available for 4G network uses. Clearly, the less spectrum that is allocated for DVB-T2, the more complex and lengthy the transition process will be from DVB to DVB-T2. BA has nominated a 'compromise' position in Scenario Two which provides for 3 DVB-T2/MPEG-4 multiplexes to be provided (only two of which would occupy nominated Digital Dividend spectrum as shown in Scenario Two).

Provision for the evolution of in-home digital TV services will give rise to a second digital dividend, with the size and timing of this dividend dependent on the amount of spectrum allocated to this purpose. While BA believes that a transition from DVB to DVB-T2 could occur relatively quickly if there is effectively a full simulcast of DVB services plus capacity for additional services (i.e. the 42 MHz option), the transition would likely be slower under Scenario Two in the absence of a government-mandated timeframe.

Under Scenario Two, at the end of the conversion from DVB-T to DVB-T2, (and perhaps simply when the spectrum was no longer required in a geographic region), the Government of the day would have the option of how to best use the reserved 21 MHz for future services. Whilst a relatively small parcel of spectrum, it would serve to provide an opportunity to either introduce new broadcast services from existing broadcasters or, perhaps, satisfy some of the future expected growth in mobile broadband demand.

Scenario One does not readily allow for a second Digital Dividend as the fragmented nature of the remaining spectrum would inherently have a lower value.

4. Digital Dividend and the National Broadband Network

As suggested in the Green Paper, it is important to consider the Digital Dividend in the context of the NBN and potential spectrum that will be required for that network.

BA understands that the Government's current NBN policy is that 90% of Australian homes, schools and workplaces will be covered by FTTP technology providing speeds of up to 100 Mbps. For reasons of economic viability, the remaining 10% of the Australian population may not receive optical fibre access and a speed of at least 12Mbps is to be provided in these areas. In relation to fulfilling the latter requirement, the options available to the Government/NBN Co are either wireless or satellite technologies.

BA submits that the Digital Dividend has a centrally important part to play in providing the most efficient and cost/time effective solution for the delivery of wireless services that will form part of the NBN. BSB spectrum is particularly well-suited to the provision of wide coverage area fixed wireless services and offers the prospect of a rapid, cost effective and environmentally benign deployment due to the reutilisation of an existing, mature tower network located throughout regional and rural Australia.

In the Digital Dividend spectrum options that BA has outlined, it would be possible to allocate some of the identified 4G spectrum for fixed wireless services which can provide between 12 and 50 Mbps downlinks to consumers.

BA notes with interest the recent development of patented regional access technology by the CSIRO which it states can deliver 100Mbps solutions to sparsely populated communities using BSB spectrum. The CSIRO claims that this can be achieved at significantly lower costs than WIMAX or LTE with savings as high as $5.3 billion. See:

http://www.aph.gov.au/Senate/committee/broadband_ctte/submissions_from_april_2009/sub80.pdf

5. Mobile TV: A Short-term Opportunity

BA has had a longstanding interest in the potential deployment of mobile television in Australia using a broadcast model. This interest has seen the company jointly fund and participate in a number of mobile TV trials in Australia and develop significant knowledge of relevant international developments and key technical issues. Consumer interest in video/television services via mobile devices is growing rapidly and it is likely that this trend will continue. Evidence collected by BA and its partners in the various mobile TV trials strongly supports this proposition.

BA maintains its view that mobile TV delivered via a broadcast network (one to many) represents a substantially more spectrum efficient model than one based on the concept of unicasting (one to one). By their nature, unicast services are limited in capacity and this has been the experience of 3G operators in Australia, particularly at time where high interest events are underway (e.g. Olympics, cricket).

To date, attempts to deploy multicast models within the 3G standards, as referenced in the Green Paper, have not met with success in Australia. This has occurred for a variety of reasons

- Lack of appropriate spectrum or potentially very wasteful use of paired spectrum for multicast.
- Failure of the initial MBMS standard to gain operator and vendor support.
- Current IMB standard has gained very limited support and uses unpaired spectrum which is limited and only available to certain operators.

There seems to be growing industry support for the proposition that multicast or broadcast technologies will be required to meet the growing consumer appetite for mobile TV services. From a broadcast perspective, existing global standards (for example; DVB-H and FLO) continue to offer a very viable route to network deployment with the benefits of significant vendor support, deployments in a number of markets (e.g. Italy and the US) and an evolution path alongside future digital terrestrial TV.

BA is keen to clarify an implication in the Green Paper suggesting broadcast mobile TV will require a network density similar to existing unicast networks (and, therefore, should not be favoured). BA does not agree with this proposition and contends as follows:

- The UHF broadcasting spectrum offers much better propagation characteristics than many of the higher frequency mobile band (i.e. the 1.8 GHz and 2 GHz bands).
- The design and build of mobile networks in populated areas is often driven to provide very dense networks to provide the desired capacity. This is not required by broadcast where the number of viewers at any one time does not demand higher network density (i.e. there is no ‘contention’ issue). Only desired coverage needs to be provided for.
- By building broadcast mobile on existing high power transmission networks, the number of lower power in-fill sites is dramatically reduced.

To illustrate this point by example, to cover the Sydney metropolitan area for broadcast mobile TV, BA has developed a coverage plan that requires the use of three existing broadcast transmission sites plus between 20 and 50 ‘in-fill’ sites (depending on exact design criteria). This would deliver coverage comparable with current mobile network coverage utilising less than 10% of the sites.

From the consumer perspective, the trials conducted by BA and our partners, as well as those undertaken by our sister organisation, Arqiva in the UK, have demonstrated significant consumer demand. Over 50% of trialists stated that they would be willing to pay for the mobile television service. This unmet demand from consumers for mobile broadcast services is currently being addressed through unicast 3G services and video downloads. The former lacks the ability to reach the truly mass market; and the latter is unable to provide time critical services such as sport and news.

In the context of the two Digital Dividend scenarios that BA has developed and presents in this submission, both would see a seventh national digital TV channel outside the dividend which could potentially accommodate a broadcast mobile TV network. Given that the legislative settings to accommodate mobile TV on what was formerly known as ‘Channel B’ were provided in 2006, BA contends that mobile TV can be licensed and deployed in a relatively short timeframe (i.e. well in advance of analogue TV shutdown).

In this respect, BA notes that the incremental restacking cost associated with planning for a seventh national digital TV channel (an increase in cost of not more than 5%) is likely to be substantially outweighed by the financial and broader economic benefit associated with the deployment of a broadcast mobile TV network. Indeed, to ensure that the direct financial benefit to the Australian Government outweighs the cost of allocating this seventh digital TV channel for mobile TV, the reserve price for the spectrum could be set equivalent to the incremental restacking cost.

If the Government were to release a mobile broadcast licence and allow ‘Channel B’ spectrum to be used prior to DSO completion, the Government has the options of requiring any restack cost for the mobile broadcast service be met directly by the mobile broadcast licensee.

6. Maximising the Potential of the New In-home DTV Channel

The Green Paper refers to the two national digital TV channels (previously known as Channels A and B) that were reserved in 2006 for a limited range of in-home services (datacasting and open narrowcasting, Channel A) and broadcast mobile TV (Channel B). BA has had a longstanding interest in the potential of these channels to provide innovative digital-only in-home content of interest to the community (thereby spurring take-up of digital TV receivers) as well as mobile services (referred to in the previous section).

In relation to the Channel A datacasting/open narrowcasting opportunity, BA has operated a trial in the Sydney market of such a service since 2003. While the content has been relatively undeveloped (given the trial nature of the services), the trial has indicated the potential for a variety of interesting niche content spanning news, sport and weather; public information content; leisure/tourism content; commercial information services; indigenous programming; and religious programming. BA strongly believes that there is a market appetite for spectrum to carry Channel A genre programming.

BA welcomes the Government's restatement in the Green Paper that it retains an open mind as to the future deployment of these types of services. As stated previously, however, BA does not concur with the proposition (page 22) that restacking associated with the Digital Dividend will require either of Channels A or B to be rolled into the dividend. In relation to the seventh national digital TV channel (Channel B), BA believes the Government should consider its future utilisation for either mobile TV (section 5, above), in-home television or, as part of Scenario One, DVB-T2 (section 3, above).

In relation to the sixth national digital TV channel (Channel A), the Government has recently announced that this spectrum has been loaned to community TV broadcasters in the five major capital city markets until the end of 2013 (together with some funding) to enable the transition of these broadcasters to digital. Given the value associated with a 7MHz digital TV channel, the carriage of only a single program stream on this channel is highly spectrum inefficient and will be a lost opportunity in the absence of additional services being carried. Optimal utilisation of this channel has the potential to be a significant driver of national digital TV take-up in its own right. Further it would enhance the amount of Australia audio visual content broadcast and hence enhance the Australian audio visual content production industry.

In the context of a '126 MHz plus seven national digital TV channels' plan in which the sixth channel is likely to be the long-term 'home' for community TV, BA contends that the Government can and should make a short-term decision to allocate the remaining majority of the channel to other in-home uses. The balance of the channel could be used for the provision of additional innovative National broadcaster services. Alternatively, these uses could encompass datacasting/ open narrowcasting for which a legislative framework already exists and which would likely be a combination of niche commercial and public interest/information services (the latter might, for example, include NITV, 'Teachers TV', emergency services and public health information via State Government etc).

In order to progress the options BA recommends the Government should progress utilisation of the sixth channel as the home for additional national broadcast multi-channels. Alternatively, Government could begin an “Expression of Interest” process to determine the level of interest and viability of proceeding with an early release of the sixth channel. (Continuing the current situation of utilising a full 7 MHz channel to broadcast one standard definition program for a further 4 years is an inefficient use of this spectrum.)

High Definition – a base level requirement

High Definition content, pioneered by the terrestrial broadcast platform in Australia, is now the benchmark picture quality standard. This standard is now also being delivered by Pay TV services and in-home entertainment devices such as Blu-ray players and games consoles (eg Play-station 3).

We understand that there is no legislative requirement to provide HD content once the simulcast period ceases.

In constrained bandwidth environments, there may be a temptation for broadcasters to reduce the amount of HD provided to allow the provision of additional (SD) content. BA supports the continuation of a minimum amount of HD content provision on each multiplex and the provision of a transition path to a higher bandwidth environment (eg Scenario Two) to ensure that broadcasters can provide the full suite of services (including HD) to their free-to-air audience.

7. Making Provision for Digital Radio

Since its commencement in mid-2009 in Australia's five mainland State capitals, digital radio (using the DAB+ standard) has offered listeners the possibility of enhanced quality and choice (i.e. new programming). Enthusiastic launch and post-launch marketing by national and commercial radio broadcasters has meant that digital radio's debut has been successful and that significant consumer take-up digital radio receivers has commenced.

The Digital Dividend and associated restacking of digital TV services is the right juncture for a decision to be taken on planning for digital radio's long-term future, beyond the initial five capital city markets. A comprehensive and integrated approach to spectrum planning encompassing both digital TV and radio will maximise spectrum efficiency and coverage, and minimise interference and channel allocation difficulties (and the financial costs that go with them).

BA's spectrum analysis concludes that a minimum of three contiguous digital TV channels (each TV channel consisting of 4 DAB+ frequency blocks or 'ensembles') will be required for the national expansion of digital radio and that the most efficient solution would consist of three VHF channels. This is shown graphically in the BA Scenarios presented in Section 2, above – essentially, the eight VHF channels in the BSB would be split between five digital television services and three for digital radio services.

This spectrum requirement for digital radio arises because interference reasons mean that it is not possible to re-use the same channel in adjacent, second adjacent or even, in some cases, third adjacent areas. This conclusion assumes the continuation of high powered transmission (i.e. wide area coverage from a single site or small number of sites) of digital radio services, as per existing digital and analogue radio services in Australia.

There are a number of channel assignment issues to be considered including interference, antenna performance, and the requirement for coverage improvement within metropolitan areas at sites independent of television services and existing channel assignments. Based on BA's preliminary technical analysis, the optimal allocation of VHF channels following the restack would see channels 10, 11 and 12 as the appropriate solution for DAB throughout Australia.

8. Restacking UHF Spectrum

As identified in Chapter Four of the Green Paper, restacking the BSB following the shutdown of analogue TV services will be essential to creating the 126MHz of contiguous spectrum that the Government has called the Digital Dividend.

BA is keen to underscore the timing imperative and scope of undertaking associated with the restack that will be required to achieve the Digital Dividend in the timeframe required by the Government. We assume the Government's ideal target timing is to actually release the Digital Dividend spectrum to new licensees in 2014, with spectrum sale to occur sooner (2011 or 2012) to allow time for the introduction of the new services..

From a consumer perspective, aligning DSO and re-stack changes in each region would be beneficial as it would mean only one interaction with the digital television receiver and would ensure that the receive system would be designed and optimised for both the pre and post restack environments.

This approach would also have significant benefit to Government in reduced communications, household assistance scheme and administration costs through a single communications approach to the general public – saving tens of millions of dollars.

Unfortunately, delays in deciding upon the approach to the Digital Dividend mean that it is almost impossible to conduct re-stack work aligned with DSO for regions due to commence DSO prior to 2012.

At the consumer level, the Green Paper sets out the additional anticipated issues involved in the restack.

Whilst most receivers do automatically pick up new programs within an existing 7 MHz channel – for example ABC3 when ABC1 is already being received – this is not necessarily the case when a new RF channel is introduced. In most cases, a user initiated channel rescan is required which will normally involve moving to a second or third level menu and sometimes include the provision of a PIN.

The restack program will therefore require a significant communications and publicity campaign by Government (likely similar in scope to the Digital Ready campaign) to ensure that all viewers are able to maintain their reception post channel change in their area.

On the issue of automatically rescanning receivers, BA is concerned that this approach may not provide the viewer with the best reception outcome (because of receive antenna arrangements and local reception conditions) or maintain their current program choice. Therefore, we would recommend against this approach as a nationwide strategy.

The issue relating to the potential obsolescence of some UHF rooftop antennas is an important one, and reinforces the need for a national co-ordination of restack planning – any delay in channel allocation planning will result in a greater number of UHF antennas being purchased by consumers and the household assistance scheme that may require short-term replacement, and consequent annoyance in the part of the consumer.

At the broadcaster level, the implications of the restack will be substantial with BA calculating that in excess of 400 services operating from at least 200 transmission sites across Australia will need to move frequencies. The critical path to achieve a 2014 release of the Digital Dividend will require the finalisation of new channel plans in 2010 and contract negotiations in early 2011 as well as the rollout of a national engineering project on a national scale that will, in many cases, require the procurement and installation of new antennas and other transmission equipment.

The final scope and scale of the restack work is dependent upon a number of factors such as:

1. Final channel plan
2. Timing for transition - both overall as a program and for each service on a site
3. Broadcaster and Government expectations about service continuity
4. Number of organisations actually conducting the work
5. Capacity of existing infrastructure to accommodate the proposed changes
6. Commercial arrangements under which the work is to be conducted
7. Implications for and of existing contractual arrangements

Until all of the above factors are known, cost and timing estimates for the restack are subject to significant variability.

To provide a meaningful estimate, BA has conducted channel planning work for Queensland, NSW, ACT and Victoria to determine practical post restack digital channel plans. This work identified that channel changes would be required at 156 of the 223 sites considered.

Based on this minimalistic channel change approach, BA undertook a cost estimate of the works required taking the following delivery approach:

- use of an efficient delivery model provided by a single entity;
- planned roll-out of works with sufficient design and implementation resource available; and
- provision for service continuity consistent with our understanding of Broadcaster requirements and community expectations.

By extrapolating from this detailed work in the eastern mainland states, BA believes that the transmission component of the restack work would cost between A$75 and A$100 million.

Under this scenario, a project schedule has been developed (Attachment 4). From this schedule it can be seen that even with near-term decisions from Government, the digital dividend spectrum will only just become available during 2014 in the more populous areas.

As would be expected, a different channel plan; different approach to implementation; and/or expedited timeframes would require that a new cost estimate be provided.

ATTACHMENT 1: Response to Specific Digital Dividend Green Paper questions

BA's response to all questions below is from the perspective of our recommended option – Scenario Two.

3.1	Should digital dividend spectrum be used to provide mobile telephony and broadband services?

BA fully supports the creation of the digital dividend and believes a significant proportion will be used to provide such services as detailed in the band plan options outlined in this response.

3.2	How much spectrum would be required to provide these services?

BA believes it is feasible to provide 100 MHz of usable spectrum for such services with the balance to be used or reserved as outlined in this response.

3.3	When would this spectrum be required?

BA anticipates that mobile network operators will want to access digital dividend spectrum as soon as possible after analogue turn off. As detailed in section 8 of this response we strongly urge spectrum and transition planning of restack be completed as soon as possible to ensure the earliest possible availability.

3.4	What would be the benefits of this use? Arguments should focus on the value this use of spectrum presents for the Australian community and economy.

BA believes the eventual users of this spectrum are best placed to make this benefit / value justification.

3.5	How might the roll-out of the NBN impact on the provision of fixed wireless broadband services?

BA believes that the provision of fixed wireless services as part of the NBN will increase the demand for the most cost effective spectrum available to provide these services. In many areas, fixed wireless will be most cost effectively provided by spectrum in the 700 MHz band because it has very favourable propagation characteristics relative to higher frequencies.

3.6	How much spectrum would be required to provide these services?

The spectrum required will depend upon network configuration and technology selected. Telecommunications operators are best positioned to estimate this requirement.

3.7	How many networks will need to be accommodated to provide a competitive communications industry?

BA has no comment to offer on this issue.

3.8 When would this spectrum be required?

Through discussions with industry, BA understands that the spectrum is required as soon as practical, ideally early in 2014. Spectrum could be made available earlier in regional markets.

3.9 What would be the benefits of this use? Arguments should focus on the value this use of spectrum presents for the Australian community and economy.

BA has no comment to offer on this issue.

3.10 What are the spectrum implications associated with the NBN?

BA has no comment to offer on this issue.

3.11 What other implications might the NBN have for the allocation of digital dividend spectrum?

BA has no comment to offer on this issue.

3.12 What would be the benefits of this use? Arguments should focus on the value this use of spectrum presents for the Australian community and economy.

BA has no comment to offer on this issue.

3.13 Should digital dividend spectrum be used to provide mobile television services?

As discussed in the body of the BA submission, we believe that a seventh digital television channel can be planned within the restacked spectrum nationwide. It is our contention that this could and should accommodate a mobile television service.

3.14 How much spectrum would be required to provide these services? Please provide estimates for each delivery model (i.e. unicasting, multicasting and broadcasting).

No digital dividend spectrum would be required for the BA proposed mobile broadcast television service which would use one 7 MHz channel only.

3.15 When would this spectrum be required?

As noted in the body of the BA submission, we believe that the existing Channel B spectrum should be made available immediately for use as a mobile broadcast television channel with the service transitioning to the seventh channel in each area as part of the restack work.

3.16 What would be the benefits of this use? Arguments should focus on the value this use of spectrum presents for the Australian community and economy.

As described in Section 5, BA's research conducted during the field trials identified significant user demand for the mobile television services. This is consistent with the move to mobility and accessibility which is driving mobile broadband demand.

3.17	Should digital dividend spectrum be used to allow expansion or enhancement of existing broadcasting services? What would it deliver?

BA has been actively involved in reviewing the spectrum requirements for terrestrial gap-fill and self-help retransmission facility conversion to digital. We believe that the proposed circa 100 additional gap-fill and self-help retransmission facility conversions will provide an expansion of the existing broadcasting services. Our work has confirmed that no additional spectrum is required for these facilities given their isolated nature (in an RF sense) and generally lower radiated power levels.

3.18	How much spectrum would be required to provide these services?

BA has demonstrated to Government through briefings in 2009 that no additional spectrum would be required to address the proposed gap-fill and self-help retransmission digital conversions.

3.19	When would this spectrum be required?

Not applicable.

3.20	What would be the benefits of this use? Arguments should focus on to the value this use of spectrum presents for the Australian community and economy.

Whilst no digital dividend spectrum will be required, the provision of the additional circa 100 terrestrial transmission sites will provide local content to the target audiences and digital television content a reduced reception system cost to consumers relative to the proposed satellite DTH solution.

3.21	Should digital dividend spectrum be used to implement DVB-T/MPEG-2 to DVB-T2/MPEG4 or DVB-T/MPEG-4 conversion strategies? If so, which strategies

BA believes that a small portion of the digital dividend should be used for the conversion to DVB-T2/MPEG-4. As discussed in Section 3.

3.22	Would additional spectrum be required? If so, how much?

As outlined in Scenario Two, BA's approach is to use guard bands, or unused spectrum, to provide a transition to next generation digital transmission systems whilst maintaining the amount of usable spectrum available for 4G services.

3.23	When would this spectrum be required?

This spectrum is unlikely to be required until after the restack of the spectrum. (post 2014)

3.24	What would be the benefits of this use? Arguments should focus on to the value this use of spectrum presents for the Australian community and economy.

The use of DVB-T2/MPEG-4 will provide the maximum range of services within a limited spectrum and provide for twice the number of "programs" to be provided to the audience at the same high quality as delivered today.

3.25	Should spectrum from the digital dividend remain designated as broadcasting services bands spectrum to provide capacity for additional broadcasting services?

As outlined in both Scenarios One and Two, BA believes that there is sufficient spectrum available outside the Digital Dividend to provide for seven television networks and reserve three VHF television channels for DAB+ nationwide. Therefore, only the small component (14 MHz from 694 to 708 MHz) should be retained as part of the Broadcast Services Band to allow transition to DVB-T2 technology.

3.26	How much spectrum would be required for this purpose?

14 MHz from within the digital dividend plus a further 7 MHz from the creation of channel 27 by reclaiming 1 MHz currently under embargo as described above.

3.27	When would this spectrum be required?

As part of the restack or shortly thereafter to create the option of a stream-lined DVB-T2 transition.

3.28	What would be the benefits of this use? Arguments should focus on to the value this use of spectrum presents for the Australian community and economy.

Greater range of broadcast services can be provided longer term.

3.29	Is access to digital dividend spectrum required for government purposes? If so, for what purposes?

BA has no comment to offer on this issue.

3.30	How much spectrum would be required for these purposes?

BA has no comment to offer on this issue.

3.31	When would this spectrum be required?

BA has no comment to offer on this issue.

3.32	What would be the benefits of this use? Arguments should focus on the value this use of spectrum presents for the Australian community and economy.

BA has no comment to offer on this issue.

3.33	How much spectrum are these devices likely to require in the future?

BA has no comment to offer on this issue.

3.34	Will there be room in the broadcasting services bands, after digital switchover and restacking, to meet their future spectrum requirements?

BA has no comment to offer on this issue.

3.35	Should separate UHF spectrum be reserved Australia-wide for use by these devices from the digital dividend spectrum? If so, how much?

BA has no comment to offer on this issue.

3.36	When would this spectrum be required?

BA has no comment to offer on this issue.

3.37	What would be the benefits of this use? Arguments should focus on the value this use of spectrum presents for the Australian community and economy.

BA has no comment to offer on this issue.

4.1	What issues will arise through viewers being required to rescan? Can receivers be developed that are able to automatically rescan?

Section 8 addresses the key issues of rescan complexity and the requirement for consumer education and support. As stated above, whilst technically feasible BA does not support the use of receivers which automatically rescan for new RF channels.

4.2	In the small number of cases potentially affected, what is the likely cost for viewers associated with replacing their existing UHF antennas? It would be helpful if the cost per antenna and the likely total cost for all affected viewers could be identified.

BA has no comment to offer on this issue.

4.4	What is required in the restacking process for broadcasters? Are there potential spectrum use implications? How much time is required for broadcasters to plan and implement transmissions at new frequencies?

This is addressed at a high level in Section 8. A detailed project plan is dependent on a final spectrum and Transition Plan.

4.5	How much is it likely to cost broadcasters to move digital television services to alternative frequencies, both in terms of the purchasing of new transmission equipment or the retuning of existing equipment? It would be helpful if best and worst case scenarios could be presented.

Detailed cost estimates are dependent on the factors outlined in Section 8.

4.6	How would low-interference potential devices be best accommodated in the UHF bands in light of the proposed digital dividend and the restacking of digital broadcasting services?

BA has no comment to offer on the specific issue of existing devices which share the BSB.

BA does, however, have concerns about any potential use of “white space” broadband consumer devices as currently under investigation in the US as these do have the potential to significantly disrupt television reception. Before any such device is allowed within the Australian market, thorough and rigorous testing would be required to ensure compatibility.

4.7	Do these devices use specific frequencies within the UHF bands? Which frequencies do they use?

BA has no comment to offer on this issue.

4.8	What costs would be involves for users to move frequencies?

BA has no comment to offer on this issue.

4.9	Should one or more discrete frequency bands be set aside within the UHF bands for use by low-interference potential devices?

BA has no comment to offer on this issue.

ATTACHMENT 2: Victorian Digital Dividend Case Study

Possible Post Analogue Closure Digital Channel Plan for Victoria

	Pol.	6	7	8	9	9A	10	11	12	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
Mt Dandenong	H	D	ND	D	ND	ND		XD	XD		XD			U			U																																		
Selby	H																						D		NU	D		NU	D			D	ND		XU	XD													XU		
Upwey	V																						D		NU	D		NU	D			D	ND		XU	XD													XU		
Ferntree Gully	H																						D		NU	D		NU	D			D	ND		XU	XD													XU		
Marysville	H																						ND		NU	ND		NU	ND			ND	D			XD			XD			XD			XD			XU	XU		
South Yarra	V																						ND		NU	ND		NU	ND			ND	D			XD			XD			XD			XD			XU	XU		
Warburton	H																						ND		NU	ND		NU	ND			ND	D			XD			XD			XD			XD			XU	XU		
Safety Beach	H																						ND		NU	ND		NU	ND			ND	D			XD			XD			XD			XD			XU	XU		
Rosebud	V																						ND		NU	ND		NU	ND			ND	D			XD			XD			XD			XD			XU	XU		
Latrobe Valley	H											D			D			D			D			D			U			U																					
Bairnsdale	H									ND	ND		ND			ND												ND	U		U			XD				XD			XD			XD			XD				
Bruthen	H									XD									ND	D																															
Cann River	H/V	ND	ND	ND	ND	D			D														U							XD			NU		XD		XD													XU	
Churchill	H																								ND	U		ND	U		D	D	D		XD														XD		
Foster	H									ND	ND		ND			ND			NU	NU								ND					XU		XD			XD			XD			XD			XD		XU		
Genoa	V									D		D			D			U			D					D	U																								
Lakes Entrance	H													ND			ND						ND				ND		U		NU	ND			XD					XD			XD			XD			XD	XU	
Mallacoota	V										ND		ND	ND			ND							ND					NU		U			XU	XD			XD			XD			XD			XD				
Nowa Nowa	H																																D																		
Orbost	H															XU			D	D		D			D	D		XU	NU		NU																				
Goulburn Valley	V/H				XD						ND							D	D				U	D		U	D																								
Balranald	V														NU		ND		D	U	ND	D	D												XU			XD													
Bendigo	H									D		ND	D		NU															D	U		D	XU		XD															
Ballarat	H																		D			D	D		D	U		D	U																						
Apollo Bay	H									ND		ND			ND			ND		ND																XD															
Cobden	V																										ND			ND	ND	ND	ND								XD										
Colac	V										ND		ND			ND					ND			ND										XD	XD																
Lorne	H									ND		ND			ND			ND		ND																				XD											
Upper Murray	H	ND	D	D	ND	D	XD		XD																NU						U			XU																	
Albury North	H									U	D		D			ND	U	ND				ND																		XD			XD			XD					
Bright	H									D			D			D		D				D						U	U																						
Corryong	V													D		D			D			D	ND	U	U																										
Khancoban	V									ND	ND	ND	ND		ND		NU	NU																XU	XD		XU				XD			XD			XD				
Kiewa	V									U							U	D					D			D		D	D																						
Kiewa Valley	H										ND					ND								U	U							D					XD												XD		
Myrtleford	H											ND		ND	ND		ND			ND								NU	NU						XD	XD				XD			XD			XD		XU		XU	
Tawonga South	V												D			D						D					D	U	U																						
Walwa/Jingellic	V											ND	ND		ND		ND	ND		NU	NU														XU					XD			XD			XD			XU		
Yackandandah	H											ND	ND	ND	ND				ND	NU	NU											XU									XD			XD			XD			XU	
Western Victoria	H	D	D	ND	ND	D	XD		XD								U			U																															
Casterton	H																		ND				ND	ND			ND		NU	XU	ND	NU	XU			XD			XD			XD			XD			XD			
Coleraine	H									ND	ND	ND	ND		ND	NU		NU						XD																											
Halls Gap	H																				NU			NU			ND			ND	ND	ND	D			XD			XD			XD			XD			XU	XU		
Portland	H									ND	ND	ND	ND		ND	NU		U						XU														XD			XD			XD			XD			XD	
Warrnambool	V													XU							NU			NU			D			D	ND	D	D		XD	XU															
Warrnambool City	V									ND	ND	ND	ND	ND		NU	XU	NU		XU																		XD			XD			XD			XD			XD	
Horsham	H																			ND	ND			ND			ND		U		D	U		XD	XD		XD	XD													
Nhill	V									ND	ND	ND	ND		ND	NU		NU																						XU		XU	XD		XD	XD		XD	XD		
Murray Valley	H	ND	ND	ND	ND	ND											NU	NU																						XD	XD	XD		XD			XD	XU	XU		
Hopetoun	V									XD		XU			XD	XD		XD	U			ND	ND		ND	ND		ND	NU																						
Mildura	V		XD					XD	XU	D	ND	ND	D	NU	D			U																																	

Legend:	
DAB Reservation	
Existing DTTB Channel	D
Existing Unassigned Channel	U
Change Required to existing DTTB	XD
New Channel for Existing DTTB	ND
Change Required to Unassigned	XU
New Channel for Unassigned	NU

ATTACHMENT 3: Recent Developments in the Evolution Towards DVB-T2/MPEG-4

1. Vestel Receives First FreeView HD Certification

Article in Digital TV News from 20 January 2010;
http://www.digitaltvnews.net/content/?p=12644

2. Motion Picture, Broadcast Television Experts to Focus on 3D Production, Distribution at SMPTE Conference in October [2009]

SMPTE experts work on new 3D standards:
http://www.shootonline.com/go/index.php?name=Release&op=view&id=rs-web2-712529-1256148881-2

3. MPEGIF launches '3D over MPEG' campaign

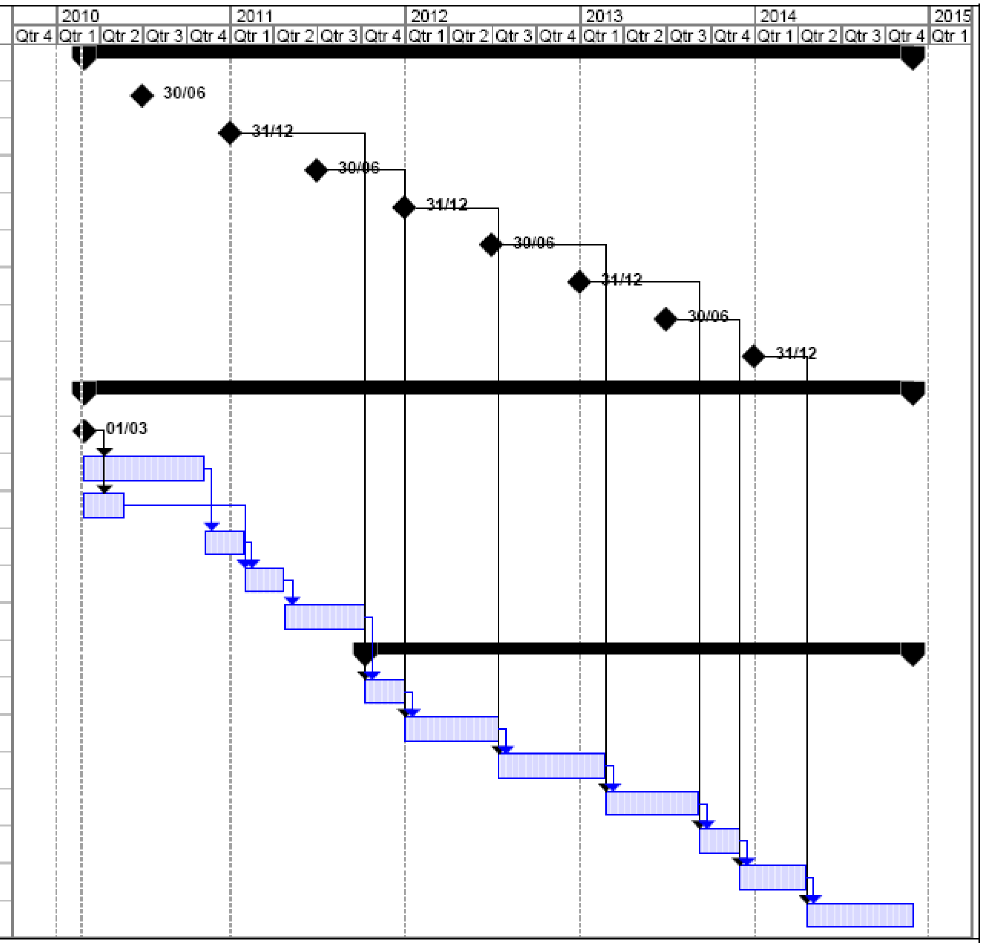
MPEGIF PRESS RELEASE: 24 December, 2009 - 10:10
www.mpegif.org

4. Sony announces its 3D TV after Panasonic and Samsung

http://www.topnews.in/sony-announces-its-3d-tv-after-panasonic-and-samsung-2254489

ATTACHMENT 4: Draft Project Plan – National Restack to Support the Digital Dividend

ID	Task Name
1	**DSO and DD**
2	DSO Mildura
3	DSO SA
4	DSO Vic
5	DSO Qld
6	DSO SNSW
7	DSO NNSW
8	DSO Tas, Perth, Brisbane
9	DSO Melb, Adl, Dwn, Syd, Remote
10	**Restacking**
11	Direction on Planning Approach to ACMA from Govt
12	ACMA Conduct Channel Planning
13	Implementation Contractual Principles Agreed
14	Transition Plan Development
15	Contractual Arrangements Finalised
16	Equipment Procurement and Project Team Establishment
17	**Site Changes at sites following DSO timetable (if possible)**
18	SA
19	Vic
20	Qld
21	SNSW
22	NNSW
23	Tas, Perth, Brisbane
24	Melb, Adl, Dwn, Syd, Remote



Project: DSOandDD 4
Date: Mon 22/02/10

Task

Split

Progress

Milestone

Summary

Project Summary

External Tasks

External Milestone

Deadline

Page 1