

March 2015



Executive Summary

Digital Terrestrial Television (DTT) is an integral part of Australian consumers' lives, touching over 99.6% of the population. It is the most cost effective way of delivering content to our geographically dispersed nation and plays an integral role in communicating our culture and history. As such, establishing an appropriate policy and regulatory framework is critical for maintaining the ongoing health and maximising consumer benefit from the platform.

BAI is broadly supportive of relaxing regulation surrounding the way broadcast spectrum is managed and utilised, to ensure the efficient and effective evolution of the platform. Our response focuses on the evolution of the DTT platform and the technology choices that the industry faces. Specifically, the following recommendations and observations are made:

- To be competitive into the future, the terrestrial platform will require the capability to upgrade to the significant improvements of next generations of picture and sound technology. Ultra High Definition (UHD/4K) content is starting to gain traction and we anticipate this will be a significant broadcast platform in the next 10 years. Future generations of picture and sound quality have been developed or are in prototype stage including 8K and 12K television. Delivering this improved capability is not possible under the current DVB-T/MPEG-2 or proposed DVB-T/MPEG-4 environment. We recommend DVB-T2/HEVC as the best way to ensure a vibrant and viable TV platform into the future.
- Any upgrade of the technology standards underpinning the DTT necessarily involves significant consumer disruption as well as substantial economic resources. We recommend Industry and Government adopt technologies that will provide a step change in consumer experience to drive demand and minimise any negative impact of consumer appliance change.
- Compelling the National Broadcasters to share spectrum on a DVB-T/MPEG-4 platform would restrict their ability to offer content at the quality and levels desired by consumers. It would be a retrograde step with consequential weakening of the entire DTT platform putting at risk the business models of the industry. This option could be considered following a DVB-T2/HEVC implementation, where additional capacity would be available to deliver High Definition (HD) and potentially Ultra High Definition (UHD/4K) services.

As outlined in our response, further industry consultation around the timing and implementation of agreed reforms and the evolution of technology standards is critical to ensuring the success of any such process. Broadcast Australia, as part of the BAI group, has a track record of working co-operatively with both Government and the broadcast industry and would welcome the opportunity to play a further role in technical and commercial discussions into the future.

Commercial and national broadcasters should deliver their services through spectrally efficient mechanisms

Preliminary Government Position: Broadcasters should commence the transition process to transmit their services in MPEG-4

Choice of Technology

Terrestrially delivered television, free at the point of consumption and reaching over 99.6% of the population, is a public good that informs, educates and entertains - a unique national achievement when comparing Australia with other countries. These services form part of the social and cultural fabric of Australian society. For the foreseeable future the terrestrial platform represents the most cost effective mechanism to deliver broadcast television across Australia's vast land mass.

The future viability and consumer appeal of the DTT platform is paramount and technology choices must be made which are robust and future proofed. There are several issues to consider regarding the technology upgrade path for the DTT platform:

- Technology change that is directed at spectrum release, or more efficient spectrum usage, must be accompanied by improvements to the consumer's experience, otherwise adoption will be slow, problematic and likely to be expensive to the Government. A retrograde step that reduces the consumer's choice (for example locking the National Broadcasters into delivering primarily standard definition (SD) content over a single multiplex) would not be a consumer driver of a new standard.
- The disruption to the consumer, and the resources required to support an upgrade of technology to the DTT network will be significant. Approximately 20%¹ of households are not currently capable of receiving MPEG-4 transmissions on their primary television sets. Taking into account 2nd and 3rd television sets, the numbers of households affected by any switchover becomes significant and is likely to be met with a high degree of resistance. Having only recently been taken through the process of migrating to Digital Television, it is critical that any upgrade to the network is completed using technology that will serve the needs of consumers and the industry well into the future to justify the investment of time and resources into a switchover.

Meeting the dual objectives of improved customer experience, and efficient spectrum usage, is best achieved by a progressive rollout of the HEVC compression standard, which is 50% more efficient than MPEG-4 along with an evolution to new transmission standards (a shift to DVB-T2, 30% more efficient than the existing DVB-T). This technology pathway provides substantial future proofing that will maximise the competitiveness and consumer experience (including enabling UHD / 4K services), avoids costly and redundant interim steps, and provides flexibility to longer term decision making and future technology improvements.

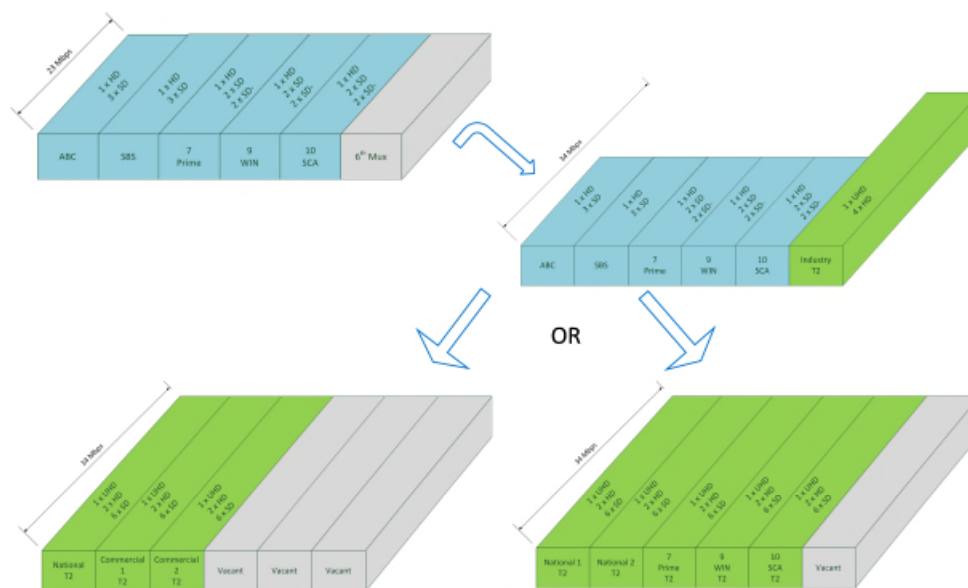
¹ Digital Television Consultation Paper – January 2015

Pathway to DVB-T2/HEVC

The upgrade path to DVB-T2/HEVC is straightforward. The existing sixth national DTT multiplex can be used to both demonstrate the technology and facilitate consumer switch over. The upgrade can occur in a timeframe consistent with the consumer upgrade cycle to new technology capable televisions, following which an opportunity to switch over all transmitters to DVB-T2/HEVC will occur.

The evolution path is outlined in the diagram below. The indicative timeframes and costs associated with this transition are discussed later in this paper.

Fig 1: Evolution of the DTT Platform to DVB-T2/HEVC

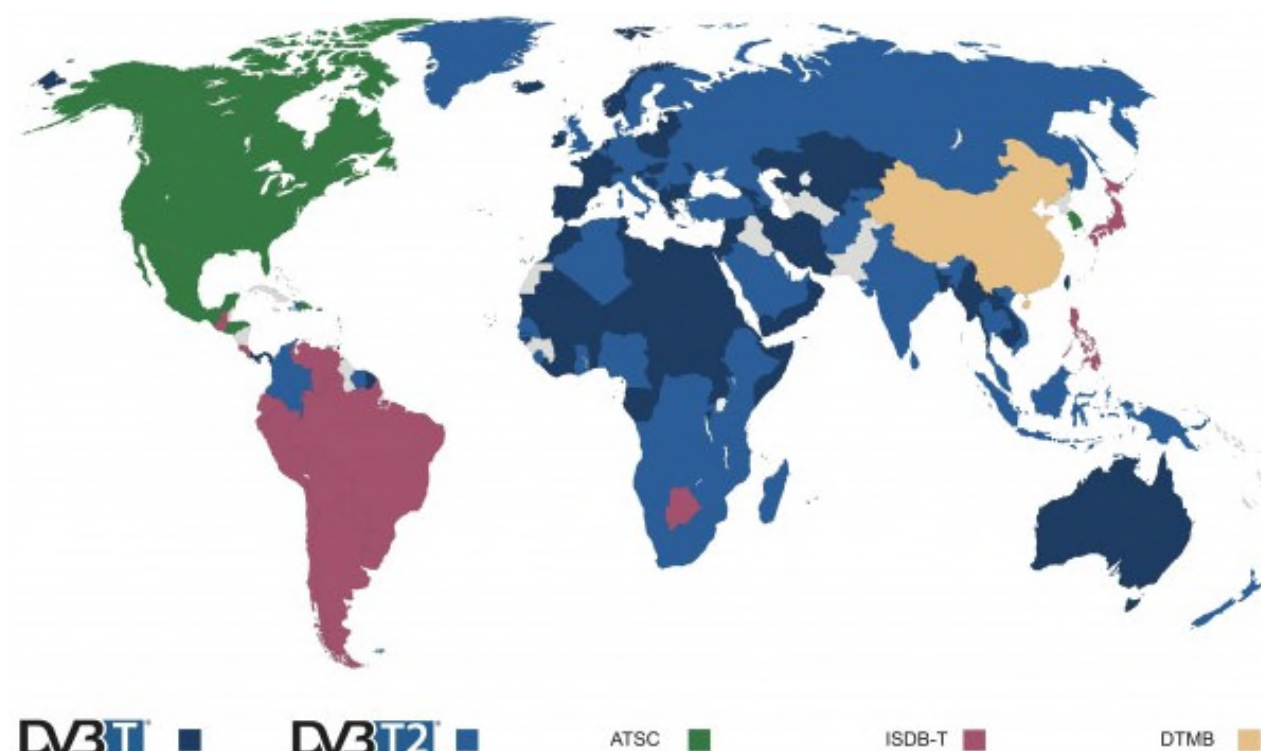


Although the diagram above suggests that DVB-T and MPEG-2 are used in the interim, there is nothing to prevent the gradual introduction of MPEG-4 services on each channel over time, as both MPEG-2 and MPEG-4 services can be broadcast from the same transmitter. The most important consideration here is that the use of MPEG-4 should not be mandated, as consumers would already be facing the switchover to DVB-T2/HEVC and any interim switchover points would likely cause significant disruption and confusion amongst the population, as well as the duplication of programme costs such as household assistance schemes.

Deployments in Other Markets

DVB-T2 is already a widely deployed, mature technology that has been operating commercially since 2009. A total of 68 (29 deployed and 39 planned) countries having adopted DVB-T2, including the United Kingdom, Germany and New Zealand. This makes DVB-T2 a low risk option for the next evolution of the DTT platform. Figure 2 below shows the adoption of the DVB standard around the world, with deployments being heaviest in Europe (DTT evolution) and Africa (Analogue switchover).

Fig 2: Deployment of DVB-T and DVB-T2 Globally



While HEVC is a recently developed standard, it is already being trialled in major markets. For example, a tender has been released for deployment throughout Germany² and the BBC is partnering with infrastructure and transmission services company, Arqiva, in the UK.³ Online services such as Netflix commenced streaming 4K programmes in 2014 and are doing so with HEVC encoding technology⁴.

What is evident from observing international markets is that all countries are embarking on a process of improving the capability of their TV platforms. A shift to DVB-T/MPEG-4 would place Australia merely on par with comparable countries today and by the time switchover was completed, likely to be lagging once more.

It is imperative that the DTT platform, far and away the most widely viewed television platform in the Australian market, not only keeps pace with technology changes around the world but maintains a leadership position in relation to its peers.

Timeframes and Costs

In considering the timeframes to conduct a switchover, it is instructive to examine the rollout of DTT services over 13 years from 2001-2013. In 2005, four years after the launch of DTT services in the Australian market, it was estimated that only 13% of households were DTV ready⁵. Given that it was another eight years until an analogue switch off date was able to be effected, it is a reasonable suggestion to anticipate something like an equivalent time period would be required to affect a DVB-T2/HEVC switchover.

² <http://www.broadbandtvnews.com/2014/11/18/germany-seeks-dvb-t2hevc-platform-operator/>

³ <http://www.bbc.co.uk/mediacentre/latestnews/2014/bbc-rd-announces-uhd-trials>

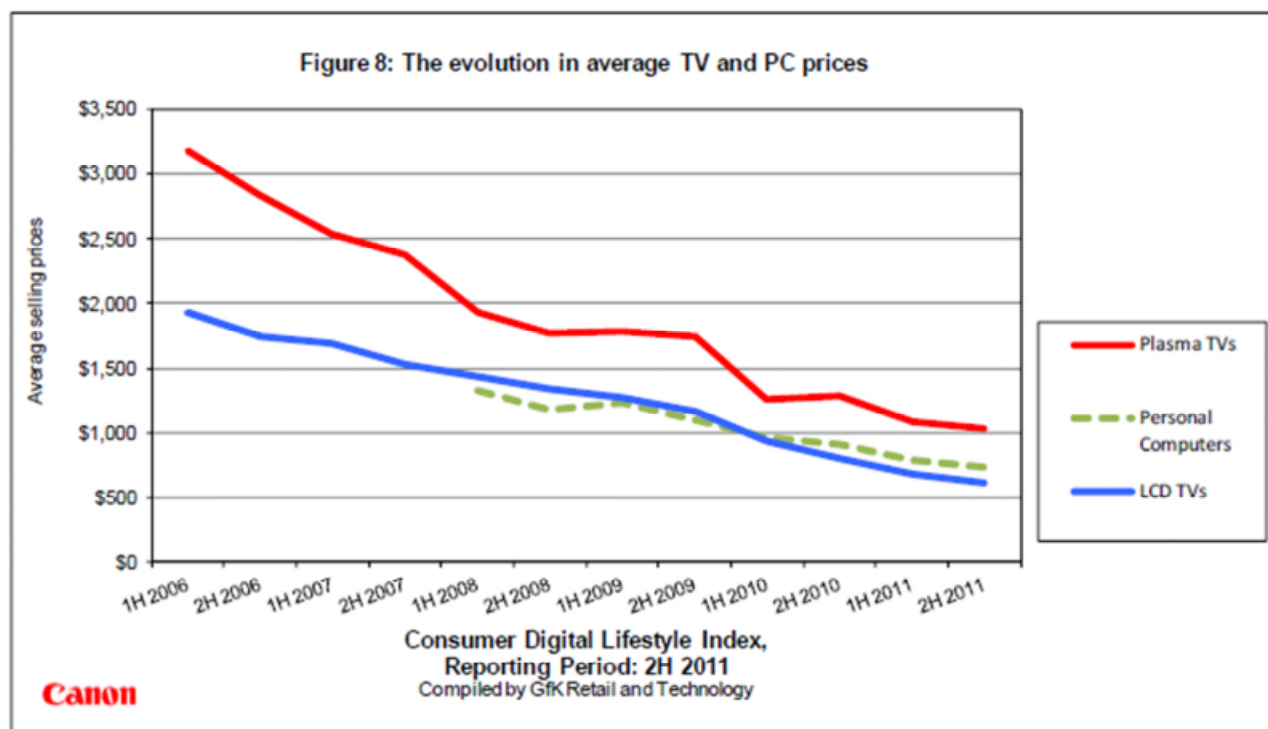
⁴ <http://techcrunch.com/2014/04/08/netflix-is-now-streaming-in-4k/>

⁵ DTV Switchover Evaluation Report July 2014

Available: http://www.communications.gov.au/data/assets/pdf_file/0008/242666/Final-Evaluation-Report-July-2014.pdf

A key factor in the take up of new technology platforms is the cost of new equipment for the consumer. As can be seen in Figure 4 below, as the price of digital televisions came down in Australia, the penetration of the technology rapidly increased.

Fig 4: The evolution in average TV and PC prices



Source: DTV Switchover Evaluation Report July 2014

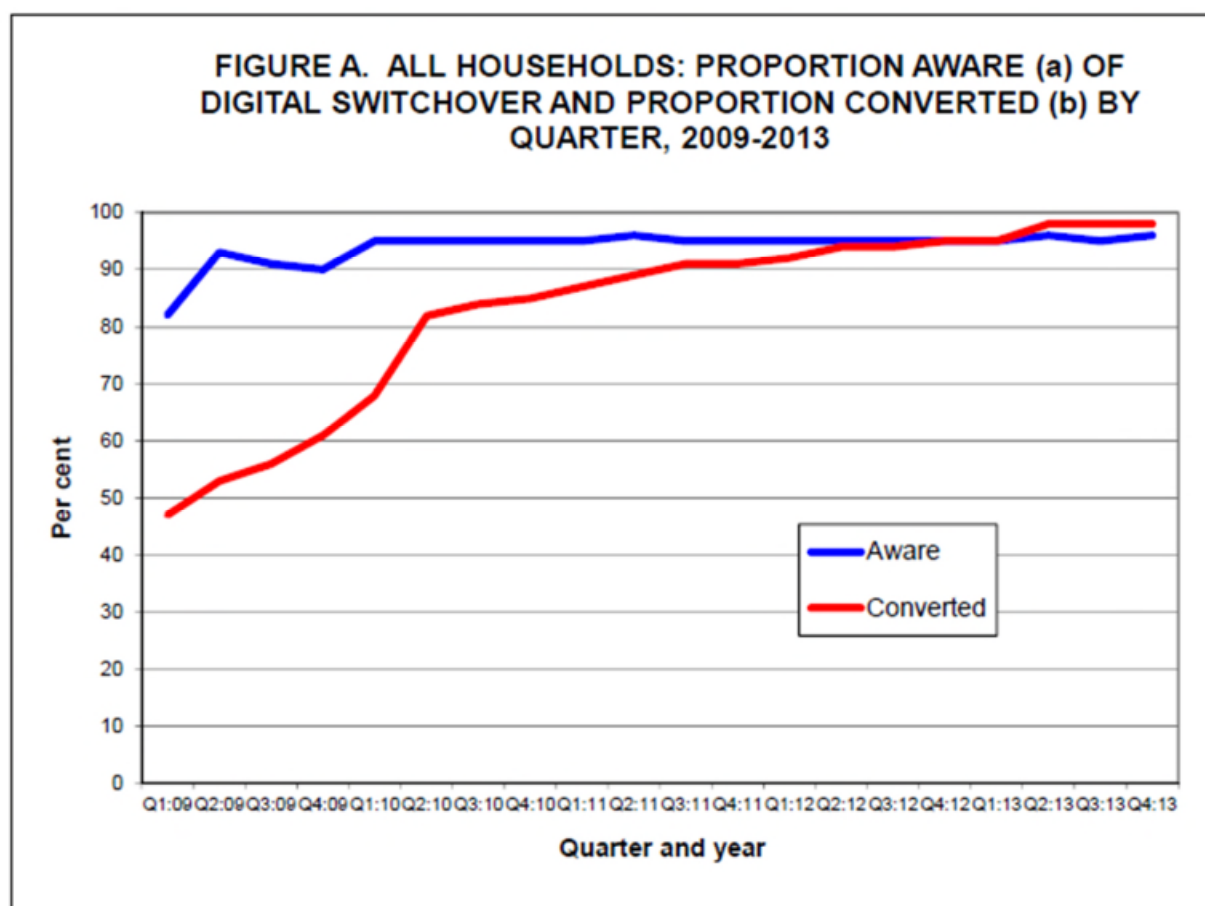
Notwithstanding the reduction in unit cost over time, each household still faces a material expense to upgrade. As many households have more than one television, the cost of migrating to new platforms can run into the thousands of dollars. Therefore, it is imperative that the evolution delivers a step change in viewing experience and thus be viewed as value for money by the consumer.

Another critical factor driving consumer take-up of the new platform is the availability of new or higher quality content. New content has been shown to drive consumer upgrade cycles. To accelerate a switchover to DVB-T2/HEVC, the sixth national DTT channel could be used to co-host key programming events – the AFL Grand Final, or Rugby League State of Origin, for example - that captures the national attention and fully demonstrates the quality and improved viewer experience of UHD.

A parallel can also be drawn to the adoption of digital television, during the switch from analogue to digital. From 2009-2011, a significant wave of new content was made available through the launch of multi-channels - One HD (2009), GO! (2009), 7TWO (2009), ABC3 (2009), SBS2 (2009), ABCNews24 (2010), 7mate (2010), GEM (2010) and Eleven (2011) - and that this drove adoption of DTV from 45% to greater than 90% penetration over this period of time (see Figure 5 below for more detail)⁶. Markets such as Tasmania which introduced the third commercial network services on digital only experienced an even faster take up of DTV receivers.

⁶ DTV Switchover Evaluation Report July 2014

Fig 5: Proportion of households aware of and that have converted to DTV



(a) At any given point in time, it includes only areas yet to switch over. (b) At any given point in time, it includes all areas and assumes 100 per cent for areas that have switched over.

Source: DTV Switchover Evaluation Report July 2014

Alongside the costs incurred by the consumer on equipment upgrades, implementation costs would also be incurred, for example the education and assistance programme provided to consumers to drive adoption of the new technology/services. Again, using the original migration to DTT as a reference point, the Household Assistance Scheme, which funded the provision and installation of set top boxes for those who had not yet made the switch cost approximately \$370m⁷. The significant and material cost of such a programme reinforces the point that DTT platform shifts should be completed in a manner which provides utility for a number of years before needing replacement. This further supports the choice of a DVB-T2/HEVC technology pathway.

⁷ DBCDE Budget Papers (FY12/13, FY13/14, FY14/15). Original programme was budgeted at \$380m Available: http://www.communications.gov.au/about_us/budget

Preliminary Government position: Digital television multiplex licensing will be introduced

The efficient use of spectrum is an objective that benefits the economy as a whole but it should not be completed at the expense of the consumer experience and viewer expectations.

Compelling the National Broadcasters to share spectrum on a DVB-T/MPEG-4 platform, however, would restrict their ability to offer content at the quality and levels desired by consumers with consequential weakening of the entire DTT platform putting at risk the business models of the industry. A more appropriate time to consider this option would be following a T2/HEVC implementation where additional capacity would be available to accommodate either more content streams on each multiplex or by facilitating a better viewer experience by High Definition (HD) and Ultra High Definition (UHD) services. In Figures 6 and 7 below, scenarios are outlined to illustrate the outcomes possible from the National Broadcasters sharing spectrum under the existing platform, a DVB-T/MPEG-4 platform and finally a move to a T2/HEVC platform.

Fig 6: Existing National Broadcaster multiplex utilisation

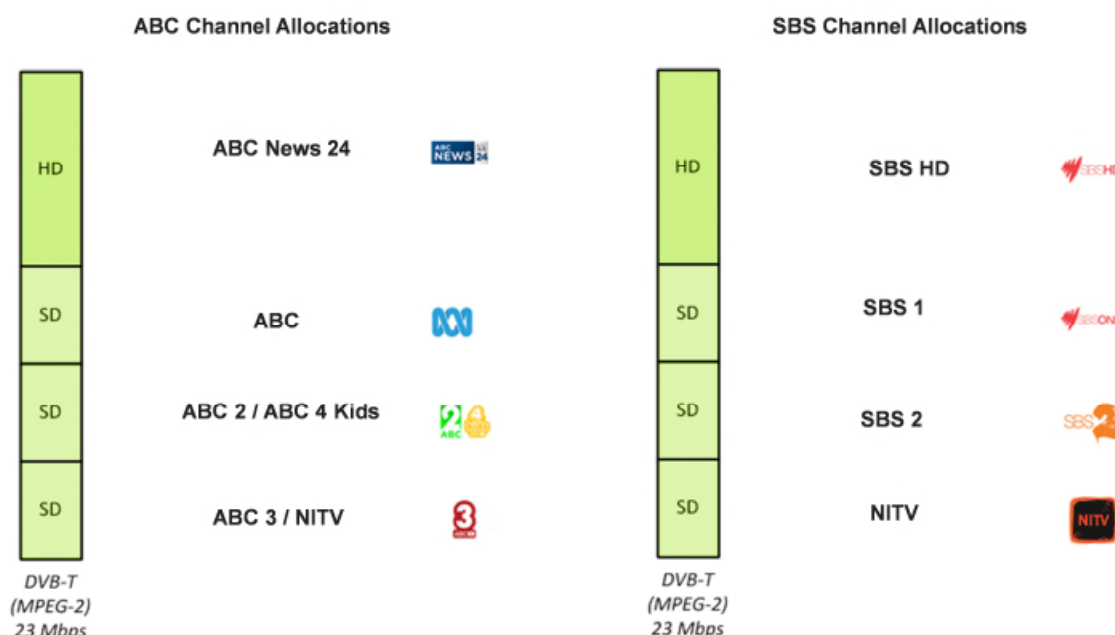
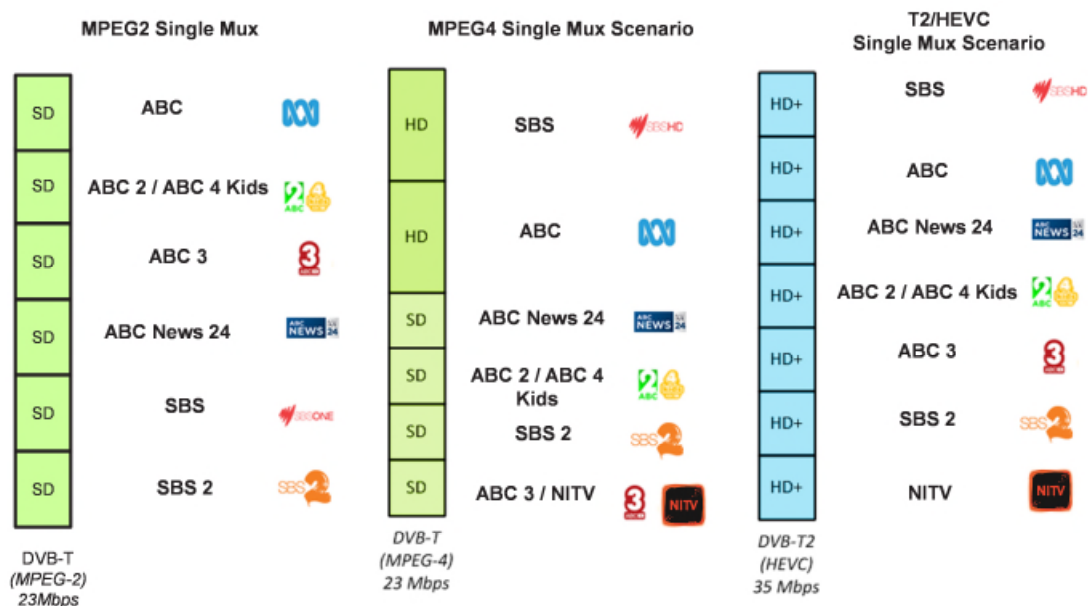


Fig 7: National Broadcaster spectrum sharing under various DTT broadcast and encoding technology combinations



As illustrated above, there are several consequences for each spectrum sharing scenario:

DVB-T/MPEG-2: Spectrum sharing under this model would necessitate the removal of one of the currently broadcast services (NITV has been removed above only for the purpose of this example) and the downgrade of all existing channels to standard definition services. Further, this would lock the National Broadcasters into a technology upgrade cul-de-sac, with no capacity to increase picture quality at all into the future.

DVB-T/MPEG-4: Spectrum sharing under this model would necessitate the removal of one of the currently broadcast services (NITV or ABC3 under this example) and only the primary channels of each Broadcaster available in HD. Although less limiting than the first option, there would still be no path to a broad HD offering across all channels and no option to provide UHD broadcasting.

DVB-T2/HEVC: Spectrum sharing under this model allows all services currently provided to be broadcast in full HD picture quality. Alternatively, this model would allow for the broadcast of some UHD services, supported by other standard definition services. Essentially, it provides a much greater degree of flexibility to the National Broadcasters.

As can be seen, the only viable path to merge the National Broadcasters onto a single multiplex whilst maintaining and allowing the upgrade of content is through the T2/HEVC option. For the consumer, this is the most desirable outcome, as it both maintains the breadth of programming offered by the National Broadcasters and also offers an upgrade path for picture quality as consumers' preferences and expectations change.

Conclusion

BAI is strongly supportive of taking steps to ensure the future viability of the DTT platform, due to its critical importance to Australian's lives. The technology choices that are made must be informed by the long term requirements of the platform, implementation costs and most importantly, the needs of the Australian public. Therefore, we re-iterate the following points:

- DVB-T2/HEVC is the most viable option to underpin the DTT platform into the future and provide the best path to take advantage of new technologies such as Ultra High Definition broadcasting. DVB T2/HEVC also provides the biggest benefit to the consumer and removes the need to undertake multiple disruptive upgrade programmes.
- If the National Broadcasters are to retain an equal standing in the television market into the future, spectrum sharing should only be considered under a DVB-T2/HEVC platform.

We would welcome the opportunity to play a further role in technical and commercial discussions into the future.

Contact

For further information on our submission or to discuss any issue raised directly, please contact:

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About BAI

BAI designs, builds and operates communications infrastructure and services, with operations spanning North America and Asia Pacific. The company's Australian businesses include Airwave Solutions Australia, which operates nationwide critical communication services for emergency & public safety authorities and private networks; Broadcast Australia, which provides national fully managed transmission services for all ABC and SBS radio and television, site sharing, co-hosting and infrastructure services to the telecommunications, emergency services and broadcasting industries; and Hostworks, a leading provider of critical application management and hosting services to online, digital media, enterprise and government.

The company's businesses in Canada (BAI Canada), Hong Kong (RFE), and the USA (Transit Wireless), specialise in the design, installation and operation of cellular and Wi-Fi networks in mass transit subway venues including the New York and Toronto subways and the Hong Kong Metro.

Technology Glossary

Picture Quality

SD (Standard Definition) refers to picture quality or resolution similar to the old analog television system. In Australia, generally 576 rows of pixels in each picture, but with the screen shape the same as modern televisions which is in a 16:9 “aspect ratio”.

HD (High Definition) refers to picture quality better than SD, being either 720 or 1080 rows of pixels in each picture, but generally the latter these days.

UHD (Ultra High Definition) refers to emerging standards offering better picture quality than HD. This is either 4K (3840 pixels wide by 2160 pixels tall) or in the future 8K (7680 pixels wide by 4320 pixels tall). Other improvements will include better colour and better fast motion achieved by capturing pictures more clearly (defined by the “frame rate”).

Broadcasting Technologies

Multiplex is a technical term for combining or aggregation of a number of signals into one. In this context, it represents the final aggregation of a number of television channels and related information into one signal for carriage on the final frequency for transmission.

Video coding is a term for the method and system used to reduce the amount of data required to carry a complex video signal in the limited bandwidth available. This reduction in data is often called “compression”. Various standards are used, or about to be used, and they often have two names due to the standards being developed by two bodies:

- **MPEG-2:** the system used today for digital television in Australia
- **MPEG-4:** also known as H.264 or AVC (Advanced Video Codec). A widely used standard, ~50% better compression than MPEG-2
- **HEVC (High Efficiency Video Coding):** also known as H.265: The newest defined standard, it has ~50% greater compression than MPEG-4

Transmission is the means to broadcast data from the transmitter to the end users. In this context, it also refers to the particular transmission standard used to do so:

- **DVB-T:** the existing transmission standard use for digital television in Australia
- **DVB-T2:** a more recent standard used, and generally selected in new deployments, which can offer >30% more data capacity for the same coverage than DVB-T

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