

'Digital Television Reviews'

A Network Insight Seminar

8 June 2004

Opening remarks by Giles Tanner, General Manager, Australian Broadcasting Authority

Introduction

What do we know about television in 2006? Here are some factual observations to set the scene for the reviews and hopefully spark a few questions in your minds. First off, I'd like to make some observations about what happens to the Broadcasting Services Act ('BSA') in 2006. Then I'll turn to the facts on the ground. What is the potential for introducing new television services, analogue or digital?

The sunset provisions

As the BSA is currently drafted, 31 December 2006 looms as a sunset date for key restrictions affecting television.

The sunset provisions fall into two groups. The first are designed to bring to an end to the current moratorium on additional commercial television broadcasting licences. I shall keep this brief, as the Minister has announced an intention to take away the regulator's power to issue additional commercial television licences.

The issuing of commercial television licences has historically been a matter for Government. Given that this is an important question of public policy, the Government intends to amend the current legislative arrangements which give the Australian Broadcasting Authority (ABA) the power to allocate new commercial television broadcasting licences so that the power is vested in the Government.¹

¹ *Digital Television Regulatory Reviews to Commence*, News Release No. 61/04, 10 May 2004, The Hon Daryl Williams, Minister for Communications, Information Technology and the Arts.

Failing this amendment, the moratorium will end on 31 December 2006². The ABA would then be free to allocate additional licences following a licence area plan ('LAP') variation under section 26. In addition, any Australian company limited by shares would be entitled to apply for a 'section 40' (i.e. a non-broadcasting services bands) commercial television broadcasting licence³ over the counter⁴, in the same way as has already occurred for commercial radio. Examination of these ABA planning and licensing processes suggests there are significant choices involved in how the Government might do as the Minister says and reassert Ministerial authority in this area. For instance:

- How do you meld a Ministerial decision to invite licence applications with the ABA's current discretions in the area of spectrum planning?
- Would you retain or qualify section 40, which would currently allow eligible persons, rather than ABA processes, to trigger commercial licence allocation processes?

Helping to inform these choices will be an important task of the current reviews.

The other significant change to existing rules after 31 December 2006 relates to datacasting transmitter licences⁵. The BSA⁶ establishes different regimes for content on dedicated datacasting channels before and after 31 December 2006. It provides that the ABA's power to make spectrum available for 'datacasting

² BSA section 28 provides that the ABA 'must not... allocate any new commercial television broadcasting licences in any licence area before 31 December 2006.'

³ BSA sections 36, 38 and 40 refer.

⁴ Section 40 licences are already a feature of the commercial radio broadcasting landscape. Their application to television may be merely a legal curiosity, as I am not sure there is a credible non-BSB television delivery system available and the new licence would have to comply with the Australian Content and Children's Television Standards. However, the ABA would seem to have little discretion if it received such an application but to issue the licence, unless the applicant was not a 'suitable person' as that term is defined in section 41. The applicant would also have a free hand to nominate its own licence area – the ABA has already issued several s.40 commercial radio broadcasting licences with Australia-wide licence areas.

⁵ Datacasting refers to the regime established in the BSA for digital video broadcasting (DVB) services in light of the moratorium on additional commercial television broadcasting. The intention was to permit additional DVB services but prohibit them from carrying types of program that are considered typical of commercial television.

⁶ See BSA clauses 34(5) and (6), read in conjunction with the definition of 'datacasting service' in section 6 of the BSA.

services' refers, before 1 January 2007, to 'datacasting' only as it is permitted under the relatively restrictive datacasting licence scheme in schedule 6. From 1 January 2007, spectrum made available for datacasting can be used to carry services under 'any other licence allocated by the ABA under this Act'. This sunset clauses will remove many of the restrictions on 'datacasting' channels after 31 December 2006. However, it is narrower than it looks. In particular, it would not allow the licensee to broadcast a new commercial broadcasting service. To obtain a commercial broadcasting licence you would still need to go through the BSA s.26 LAP planning and subsequent price-based allocation processes. If you owned a datacasting channel and wanted to turn it into a commercial television service, you would have to give up your channel for re-planning then bid for it against all comers! What the provision does seem to accomplish is to permit a person to operate a subscription broadcasting service, a subscription narrowcasting service or an open narrowcasting service.

These changes would be a lot more significant and contentious if the ABA had made spectrum available and issued transmitter licences for long-term datacasting, as originally proposed. As it is, the only datacasting services to date using channels made available for datacasting have been short or medium-term trials conducted under scientific licences. All have terminated or (in the case of the Sydney datacasting trial) are due to terminate by 31 December 2006, meaning the 'datacasting' channels are potentially vacant from that date.

The spectrum planning landscape post-2006

A lot of water has flowed under the bridge since the great digitalization debates of 1997-2000. Any discussion about what should happen after 2006 needs to be based on the facts as they are today, so let us review them.

In 1998, the Parliament decided that existing national and commercial television services should convert to digital after a period of simulcasting. Subject to minor exceptions, broadcasters were promised a full 7MHz channel

each for digital transmissions and in return were obliged to carry specified amounts of high definition television ('HDTV'). The simulcast period was to last for eight years or such longer period as is prescribed, with broadcasters required to achieve 'the same level of coverage and potential reception quality' as soon as practicable after the start of the simulcast period⁷. Later, the law was amended to require digital television services to broadcast in standard definition mode ('SDTV') at all times as well as achieve HDTV quotas. This was promptly nicknamed the 'triple-casting' requirement.

Since that time, the ABA has been uniformly successful in finding the additional channel capacity required during the simulcasting period in all markets where it has completed planning. As of June 2004 it is now about thirty months from completing this planning, with the exception of remote television markets (where DCITA and the ABA are still developing a 'road map' for digital conversion). In turn, industry is well advanced in rolling out digital infrastructure and sale of receivers to date suggests there are free-to-air digital receivers in somewhat under 5% of homes.

Perth	Licence allocated
Sydney	Licence allocated
Melbourne	On air trial/ Allocation decision pending
Brisbane	On air trial/ Allocation decision pending
Adelaide	On air trial
Lismore	On air trial
Bendigo	Expressions of interest in a trial
Hobart	Expressions of interest in a trial
Mt Gambier	Expressions of interest in a trial
Goolwa/Victor Harbour	Expressions of interest in a trial
Ballarat	Expressions of interest in a trial

Figure 1: Current status of Community Television

Interestingly, the decision to digitalise has not stopped the expansion of analogue television. Funding to cure television 'black spots' has further expanded analogue television reception at the margins, with as yet no policies

⁷ See clauses 6 and 19 of Schedule 4 of the BSA.

on how the hundreds of self-help television re-transmission facilities across the country might ultimately digitalise. Meanwhile, the ABA recently issued licences for high-powered analogue community television broadcasting services using UHF channel 31 in two cities, Perth and Sydney. Allocation processes are nearing completion in Melbourne and Brisbane and a new community television trial has recently gone on air in Adelaide.

To keep its options open in advance of the current statutory reviews, the Government has given no guarantee channel 31 will be available beyond 31 December 2006. Nor is there is an agreed digital conversion process for community television broadcasting. This state of affairs creates a very high degree of uncertainty for community television operators. Whatever else happens before 31 December 2006, some resolution of the future of analogue community television broadcasting can hardly be avoided.

So what spectrum capacity remains to introduce additional television services? Let us look at digital channel capacity first.

- *The 'datacasting channels'*

The ABA has planned two additional channels for DVB digital television transmissions in all markets, more in spectrum-rich Adelaide, Perth and Darwin. All are potentially vacant. However, there are some significant limitations in key markets.

First, the ABA was unable to find separate suites of two additional channels in Sydney and Newcastle. Instead, the two channels planned for Sydney (UHF channels 29 and 35) can be operated as a single frequency network in Newcastle. This means the transmissions would need to be identical in both areas. Alternatively, you could use one vacant channel in Sydney and the other in Newcastle⁸.

⁸ Obviously this is a disappointing outcome. But shortage of frequencies is not news in this part of the world. Several years ago, the Central Coast area missed out on participating in the community television trial, not for want of a vociferous local aspirant group, but because there was no 'sixth analogue channel' available. The problem is that spectrum use is uniquely intensive in this area. For example, three translator sites on the central coast feature analogue retransmissions of all three

The situation of Brisbane in relation to its hinterland is similar. Figure 2 shows the areas covered by channel 38 single frequency networks. The good news is that there are two vacant high power digital channels available in Brisbane: UHF channels 38 and 50. Unfortunately, these are also the only channels available for an area stretching from Gympie, near the Sunshine Coast, to Currumbin, south of the Gold Coast. Both channels could be operated as a single frequency network throughout these areas. Moreover, the ABA was only able to identify one datacasting channel in the Northern Rivers region of NSW: channel 9A. To make up the deficit, the ABA identified channel 50 as the second datacasting channel. Figure 3 shows the areas covered by channel 50 single frequency networks. This would require the Brisbane SFN to be extended to Northern Rivers. While this provides options for additional services, needless to say, such widespread use of single frequency networks would not correspond to current television network practices in terms of local ownership and content.

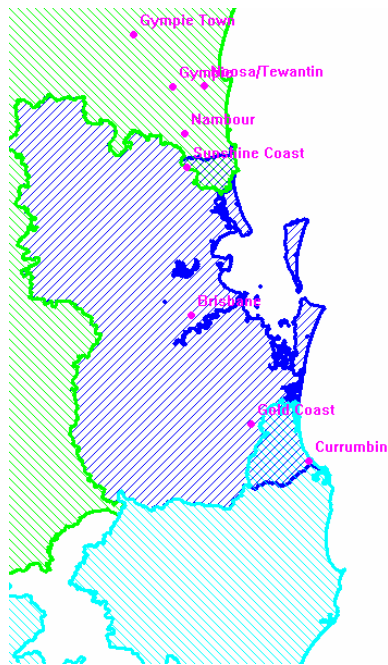


Figure 2: Location of channel 38 single frequency network transmitters.

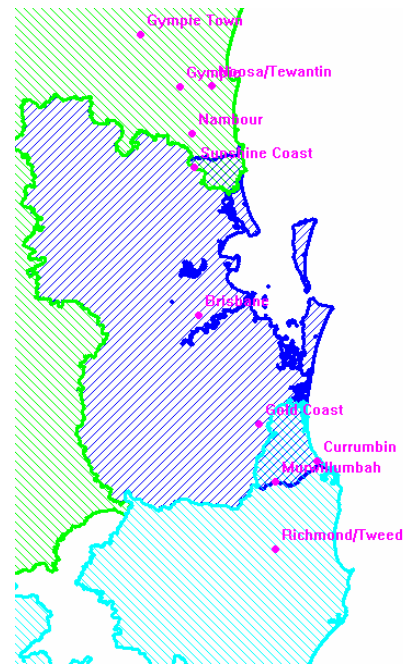


Figure 3: Location of Channel 50 single frequency network transmitters.

commercial television services from both Sydney and the Northern NSW licence area. Digital conversion means that each analogue channel must now be matched by a digital channel till the end of the simulcasting period.

The second limitation relates to the power of some of the vacant channels. Existing UHF digital television channels typically operate at 200kW Effective Radiated Power ('ERP') in metropolitan markets. To avoid interference to existing and planned services, some vacant digital channels are subject to power restrictions.

For example, channel 29 in Sydney is restricted to 10kW to the east, though the other Sydney channel is probably suitable, or could readily be made suitable, for unrestricted operation⁹. In Melbourne, channel 32 is potentially restricted if the analogue community television service on adjacent channel 31 continues to operate at lower power. Achieving very high power levels may require upgrading of the community facility.

Further re-planning or early analogue clearance in other areas could presumably fix some of these power limitations, though at a cost to someone. Meanwhile, one should not assume that power-limited digital channels are without value.

First, the relationship between transmitter power and coverage is logarithmic, not arithmetic. To illustrate, the main SBS digital television transmitter in Sydney is currently transmitting at 200kW ERP, delivering a huge 19.3 Megabits per second (Mbit/s) of data across the same area as its analogue service (coverage area boundary shown as a red line in Figure 4). A service operating at only 10kW ERP would deliver the same amount of data within a smaller area, shown in Figure 4 as a purple line. Incidentally, this smaller area contains 89% of the population served by SBS.

⁹ UHF channel 35 in Sydney is formally subject to a 10kW restriction to the south. However, it was used at full digital power (200 kW) for 2 weeks during the course of the hierarchical modulation trial carried out by CTVA. The ABA had no reports of interference at the time. Channel 35 currently carries a long term datacasting trial operating at



Figure 4: Sydney coverage areas

Furthermore, digital, unlike analogue, can be reconfigured to change its performance parameters. Notably, the amount of program content transmitted can be traded off against the robustness or ease of reception of the signal. It is well known that a single digital TV channel can carry one or even two HDTV television services or 3-5 SDTV services. What needs to be understood is that it can also be re-configured to carry only a single SDTV service, but with enormously greater ease of reception. This might mean, for example, mobile reception, or reception using only indoor receivers, or reception across an expanded coverage area. In technical language, this tradeoff between capacity and robustness is achieved by varying the modulation, forward error correction rate and guard interval of the signal.

To return to our Sydney example, by trading off data capacity against robustness, our 10kW transmitter could deliver a high quality standard

definition television service to the virtually same area as the SBS 200kW service (coverage area boundary shown as a green line in Figure 4) – this would serve 97% of the population covered by the SBS transmitter. So there you are – with a cheap 10kW transmitter, you could virtually match the performance of the 850kW SBS analogue service on channel 28.

- *The community television channels*

In addition to the datacasting channels, the channels currently reserved for analogue community television are also potentially available and suitable for high power digital transmissions. UHF Channel 31 is available in all five of our largest cities. There is also a community television channel available in certain other regional locations. As discussed below, the only problem with this option is that it would preclude analogue community television broadcasting.

- *Options involving re-planning*

Finally, more digital channels could be made available if we are prepared to re-plan existing services. For example, early clearance to digital of some analogue television services was a method commonly touted in the past for freeing up additional digital spectrum.

During the first digital debate, an option was canvassed of re-tuning the existing analogue channel 10 commercial services in the five major cities. These services are currently out of alignment with other VHF Band III services by 1 MHz (figure 5 relates). Re-tuning of the channel 10 transmitter would turn the present 6MHz interstitial channel 9A into a 7MHz channel suited to high power digital television transmissions. The suggestion was strongly opposed by TEN, as re-tuning would degrade reception of its service on a substantial but unknown percentage of receivers.

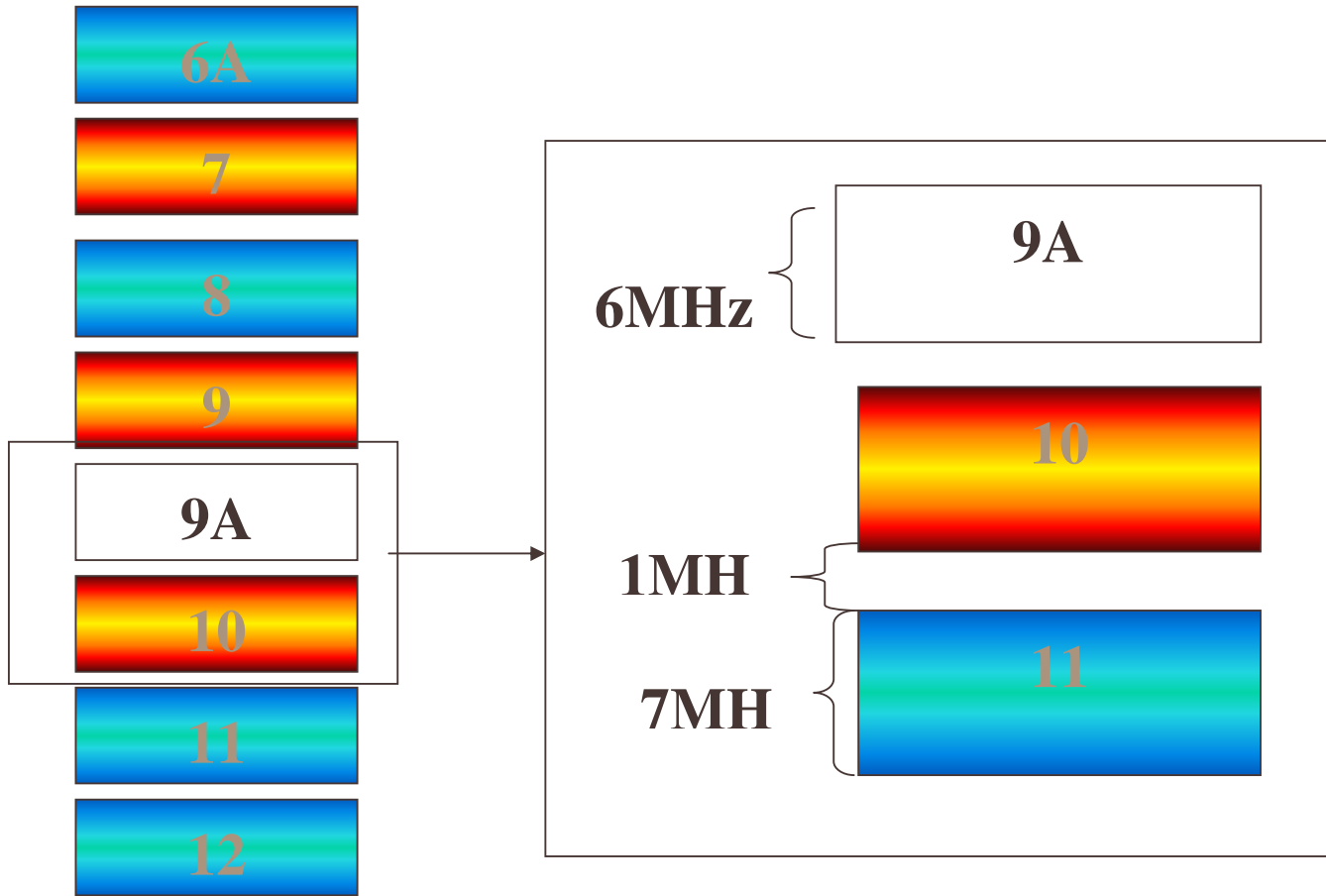


Figure 5: Channel 9A

Subsequently, because of the scarcity of 7MHz digital channels in parts of regional Australia, the ABA has had to ask several existing analogue channel 10 and 11 services in regional areas to re-tune their signals by 1 MHz. In April this year, the first of these re-tunings actually took place. The channel in question was Prime Television’s channel 11 service at Upper Murray, which serves Albury and Wodonga.

At a rough guess, the Upper Murray service serves around 50,000 homes¹⁰, so the 348 calls received on the industry’s digital interference management hotline represent about 0.7 % of potentially affected households. We do not know what the nature of all the calls were, though apparently a number of free home visits were provided. This anecdote is no substitute for a careful evaluation of the re-tuning experience in regional markets. However, I make

¹⁰ It is difficult being definitive about the population covered due to translators, reliance on prediction models and the need to smooth coverage contours, but very roughly, about 165,000 people are covered by Upper Murray channel 11. There at least two key translators, Albury North and Kiewa, that cover significant populations, so this would bring the figure down to around 135,000. Dividing by say 2.5 people per household gives around 54 000 homes, so our engineers guesstimate that 50,000 households were involved.

the point that experiences in regional markets over the next year or two should improve our understanding of the costs and disruption entailed in re-tuning analogue services.

Another significant development since 1998 is the upsurge of interest in Eureka DRB using VHF Band III spectrum. There are currently three temporary trials either on air or in the pipeline that will between them use all 6 MHz of channel 9A in Sydney and Melbourne. Channel 9A represents the only VHF Band III spectrum known to be available in Australia's largest cities before the shutdown of analogue television, so it may be a mistake to treat channel 9A as a potential digital television channel. A decision to go with VHF Eureka may not be the end of interest in re-tuning channel 10, however: a 7MHz channel 9A could accommodate up to four Eureka DRB ensembles, as opposed to the current maximum of three that can be accommodated on the 6MHz channel.

Additional analogue channel capacity

The outlook for additional analogue channels is much poorer. The ABA's channel plans used to make provision for a sixth analogue channel of equivalent quality to the existing five services. Planning for analogue/digital simulcasting has consumed most of this so-called 'sixth channel'

An important bit still remains: UHF channel 31 in our five largest cities, currently in use for community television or community trials. The other available high power channels are suitable for digital only. Those that are adjacent to existing analogue services, such as channel 29 in Sydney, cannot be used at all for analogue transmissions. Those that are non-adjacent, such as channel 35 in Sydney, might possibly prove useable for lower power analogue transmissions.

Be warned that channel 31 in Sydney is not the equivalent of existing analogue networks, as it has lost its five translator frequencies in the course of planning for digital simulcasting¹¹.

The map in Figure 6 shows the Sydney VHF rural grade signal contour in red and the coverage areas of the five Sydney translators.

We can only estimate what percentages of viewers in each area are using the translator or the main channel. The number could be somewhere between 600,000 and 900,000 out of a licence area population of 3.72 million people. So yes, we could bring the analogue community television experiment to an end and resume some planned digital capacity to put back perhaps some of those translators. But finding a sixth analogue channel in Sydney that is comparable to the existing five – as well as a migration path for that service to digital – would be very challenging.

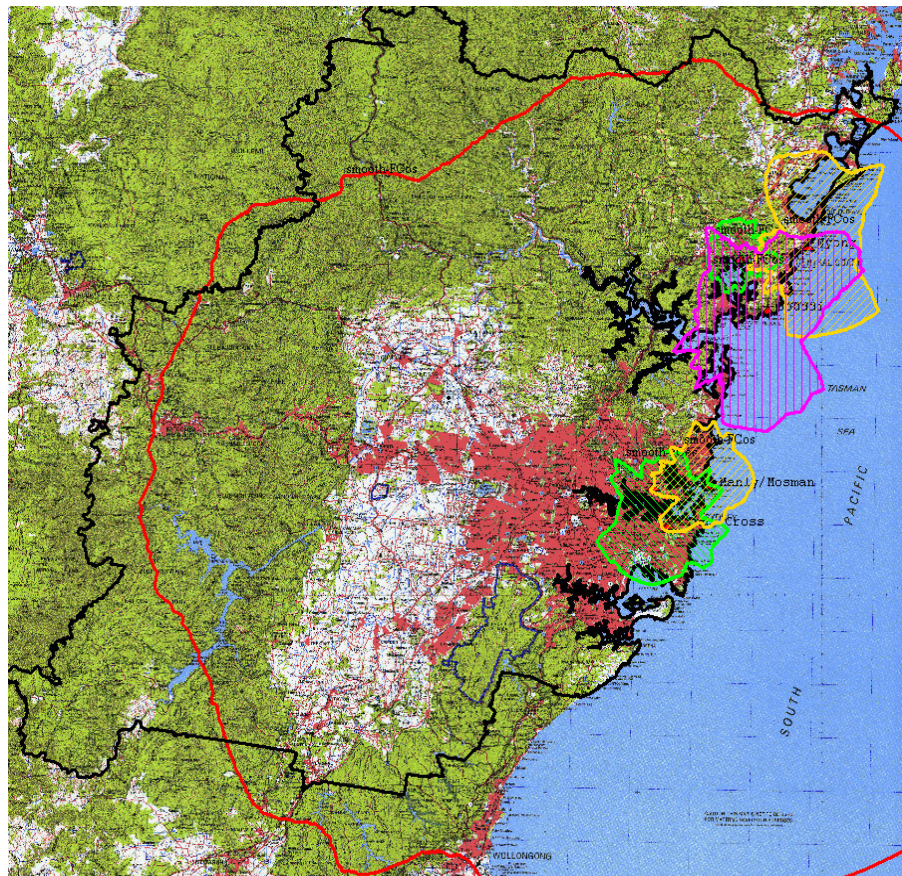


Figure 6: Analogue translators in Sydney

¹¹ A digital service on channel 31 would not necessarily face this problem. It could operate as a single frequency network

The 'same coverage' objective and the ABA review of the level of digital coverage

Finally, there is, of course, substantial capacity potentially available for additional services in the digital data streams of the five television networks. Each must simulcast its analogue service in SDTV digital mode at all times. In addition, each is required transmit in HDTV mode for an average of 3 hours a day¹². So at other times, there is potential capacity for two, three or even four other SDTV services.

I might conclude with an observation about the statutory requirement to achieve 'the same level of coverage and potential reception quality' and the impact of so-called 'triple-casting'.

Deciding what amounts to 'same coverage' is not as straightforward as it sounds. The quality of analogue reception can range from perfect to barely tolerable while digital reception is either perfect or non-existent. The ABA has the role of defining 'same coverage'¹³ and the definitions are set out in the DTTB Planning Handbook, which is available on the ABA's Website¹⁴.

I mentioned earlier that a digital signal can be reconfigured to change its performance parameters, meaning that data capacity can be traded off against coverage. In order to plan for same coverage, it follows that the ABA needed to make some preliminary assumptions about the amount of program content each channel was expected to carry. If you search the DTTB Planning Handbook you will find we assumed a capacity of 19.3 million bits per second. This was considered to be enough for a top quality HDTV channel.

When the law was changed to require simultaneous carriage of an SDTV signal, the capacity required for the SDTV service (typically around 6

¹² Each licensee (except 38B licensees) must simulcast 1040 hours per year of HDTV programs that are the same as programs broadcast either in SDTV or analog modes (unless the programs are covered by a determination under subclauses 6(9) or (10) of Schedule 4).

¹³ See clause 6 of both the Commercial and National Television Conversion Schemes.

¹⁴ http://www.aba.gov.au/tv/digitaltv/planning/pdftrf/papers/Digital_planbook.pdf

MBt/sec) was no longer available for transmitting the HDTV service or other services. Some broadcasters responded by further adjusting their forward error correction rate and guard interval to increase the channel capacity to around 23Mbt/sec of data, at the cost of further loss of signal robustness. Thus, there is at least a theoretical risk that either broadcasters will need to reduce their data rates or the ABA would need to engage in some re-planning to ensure 'same coverage'. Early indications are that this practice of carrying 23MBt/sec has not significantly reduced the coverage area. However, it could be creating or worsening problems for the operation of single frequency networks (SFNs) - which is one way the ABA has gone about maximizing spectrum productivity.

In consultation with industry, the ABA has begun assessing the level of coverage actually being achieved by digital television. This important study will help determine whether we are on track to achieving same coverage with analogue television. I am hopeful the results will be available to feed into the Ministerial review of the duration of the simulcast period, which must be conducted before 1 January 2006.

That is quite enough from me - in preparing this presentation, I would like to acknowledge the help of my ABA colleagues and in particular Gavin Bowman, Alastair Gellatly and Fred Gengaroli.