

Submission to: Consultation Paper: Digital Television Regulation

Stop Press:

Sony Australia 4K TV now HEVC/DVB-T2 capable

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By A. Hughes

Non-technical meaning of technical terms

Spectrum is like the real estate available television, radio and wireless broadband/mobile phone users. Instead of using square metres or hectares for block size the spectrum uses MegaHertz (MHz). A terrestrial television channel in Australia is 7 MHz wide

Channel Data rate or bit rate To continue the real estate example, it's like a house has fixed size measured in square metres. For current Australian digital TV its 23 Mbit/s.

Program Stream A house is divided into different rooms of different sizes and different purposes. The area of the house is equal to the addition of the area of each room. Similarly a digital television channel is divided up into different program streams of different sizes. For example the High Definition channel requires a data rate twice that of Standard Definition which may be equivalent to the lounge room which generally has the largest area. The High Definition programs are best watched on a large screen. The smallest room in the house may be equivalent to the poorest picture quality which is shown on a small screen. Datacasting has the lowest data rate of around 1.6 Mbit/s.

Insufficient data rate causes the picture to break up into blocks, particularly when there is lots of motion in the picture. The worst case is panning across a sporting crowd in a stadium. Note: Broadcasters use dynamic adaptive data rate control, which swaps data rate from a program with little movement and detail to a program which has lots of detail and movement. If more than one program has significant movement and detail, the demand caused will exceed the available data rate and the pictures on all programs from that broadcaster will break up into blocks.

Progressive Scan is to analyse an image just as we read a book, line by line from top to bottom.

Interlaced scan is to analyse an image by reading the odd numbered lines first and to start reading the even numbered lines 1/25th second later. Interlaced scanning was required for picture tube TVs none of which could store each image to show it a second time.

Full High Definition Its images consists of 1920 dots of light from left to right and 1080 rows of dots from top to bottom. The lines are read in a progressive order. Excluding the Americas, Japan, Korea and Philippines there are 25 frame (complete pictures)/second. Blu-ray discs and movies are 24 frame/s.

Comments on the Introduction

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“Under current broadcasting regulation, commercial and national broadcasters are each allocated a 7 megahertz (MHz) wide channel of spectrum in which to transmit their digital television services.”

Each broadcaster has a one way 23 Mbit/s channel over their coverage area. Every Australian citizen has access to 115 Mbit/s with an additional 23 Mbit/s available from a potential 6th broadcaster anywhere in Australia (excluding Antarctic territories). The pure fibre to the premises NBN download is 100 Mbit/s, but where fibre to the node is only guaranteed to be 25 Mbit/s, which is not available to all Australian citizens. For remote areas the **peak** download speeds are either 12 or 2 Mbit/s

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“Frost & Sullivan has also reported that that the Australian online advertising market is growing at a much faster rate than other sectors, accounting for 27 per cent of total advertising expenditure in 2013, but estimated to account for 41 per cent in 2018.6.”

What is the total dollar value of advertising on the internet for program compared to the dollar value spent on television advertising?

Internet advertising may be rapidly increasing from a low base, but commercial TV advertising which has always been considerable.

Overseas comparisons

Internationally, broadcasters and regulators are identifying the same trends. Comparisons with the USA need to be treated with caution. The prices charged for media streaming is considerably less than the prices these services charge as well as data usage charges in Australia, reducing take-up.

There is also a culture in the USA for TV to be Pay TV via cable, this has not been the case in Australia where we have free to view over the air TV.

The BBC3 closure

The transmitter network carries a number of programs on a single transmitter per site. If BBC3 is switched off, the cost of the terrestrial network is unchanged. The cost of servers and associated equipment increases exponentially as the number of viewers increases. The broadcast system price does not change with the number of viewers, but by the area covered. Most of the cost of BBC3 is the cost of program production, and it is aimed at a youth audience. <http://www.bbc.com/news/entertainment-arts-26452235>

BBC1 23.6 % Share 26/01/2015 – 01/02/2015

BBC2 6.1 %

BBC3 1.1 %

BBC4 0.7 %

<http://www.barb.co.uk/whats-new/weekly-viewing-summary>

With BBC3 off the air, the transmitters will have to transmit all 0s, in its time slot, unless other programming replaces BBC3

“, a drive for improved picture quality due to advances in transmission and compression technologies;”

The same compression technologies are used for on air **are also used on the internet**. MPEG-4 compression is commonly called MP4 in the internet is also used by UK HD TV and all of New Zealand’s Freeview TV. Our broadcasters have only transmitted MPEG-4 during 3-D trials. MPEG-4 is twice as efficient as the MPEG-2 compression used by Australian Broadcasters.

Implementation Questions

1. What factors will influence the decision to increase or reduce the number of services a broadcaster chooses to provide?

Note: An Australian TV channel can carry at least 3 full High Definition programs simultaneously using MPEG-4 compression.

Full High Definition looks good on a large screen particularly when compared to the tablet/mobile phone/computer monitor. TV networks need to use timely, popular programs in stunning quality, including surround sound to keep the viewers from migrating to the internet or pay TV. Cinemas are not going broke!

The number services are controlled by;

The cost of providing those services is the sum of the programming cost per viewer + the transmission cost per viewer

- $Program\ cost\ per\ viewer = \frac{Total\ program\ provision\ cost}{Number\ of\ viewers}$
- 2. New SD only studio equipment has not been available since the early 2000s. So the cost of HD production vs SD production is negligible.

- $Transmission\ cost\ per\ viewer = \frac{Program\ data\ rate}{23} \times \frac{Total\ transmission\ cost}{Number\ of\ viewers}$

This formula is for the current DVB-T modulation system used in Australia. If Australia were to upgrade to DVB-T2 like other countries the transmission costs becomes;

$$Transmission\ cost\ per\ viewer = \frac{Program\ data\ rate}{29} \times \frac{Total\ transmission\ cost}{Number\ of\ viewers}$$

Note Thus DVB-T2 modulation capacity increase is based on the same transmission network and the same coverage area. Improvements to receiving antennas could increase the available data rate. Maximum possible is 44 Mbit/s for a 7 MHz system.

Note: About 3 Mbit/s is used for housekeeping, Electronic Program Guide.

- Program data rate increases as the picture sharpness increases.

Picture Sharpness	SD	ABC24 HD	Australian HD	Full HD	UHD
Picture Elements	720 columns x 576 rows	1280 columns x 720 rows	1440 columns 1080 rows	1920 columns x 1080 rows	3840 column x 2160 rows
Pictures/second	25	50	25	25	25 or 50
MPEG-4 ¹ Mbit/s	2.5	4	4.5	6	15 or 30

Australian HD is a downgraded high definition signal which is not used elsewhere for broadcasting. It is used by SBS and commercial stations. No broadcaster production equipment is designed for Australian HD, only Full HD.

¹http://www.freetv.com.au/media/Engineering/Free_TV_OP_71_Recommended_DVB_T_Transmitter%20Modulator_Settings_Issue_1_December_2014.pdf

Nearly all TVs can display Full HD quality signals at that sharpness and less than 4 % cannot display a Full HD program at all.

- Program data rate decreases with the modernity of the compression system in use.

Based on MPEG-2 = (H262) is currently used by Australian broadcasters

MPEG-4 = (H264) halves the MPEG-2 data rate. From 2006 MPEG-4 is used in many countries & internet

HEVC = (H265) quarters the MPEG-2 data rate. HEVC was standardised last year but is yet to be implemented by any broadcasters, narrowcasters or by internet streamers. Integrated circuit manufacturers are currently designing decompressors. UHD requires HEVC for internet streaming and broadcasting, but terrestrial broadcasters will also need DVB-T2 as well.

- Increase the picture quality whilst decreasing the data rate.

Compressed progressively scanned images produce less data because motion detection in the compressor is more efficient and less error prone. Currently all of our transmissions are interlaced except for ABC24. Unfortunately most of the original video on ABC24 is shot in interlaced scan sequence. Interlaced scanning increases the jaggedness of sharp edges which are not parallel with the edges of the pictures. All film cameras and nearly all broadcaster quality cameras on the market contain shutters². This allows motion interpolation in TVs to be more successful in producing sharp images with smooth motion.

The viewers have bought TVs which are capable of much better pictures than what the TV broadcasters transmit. In analog the picture quality in a TV station was much better than the viewers' televisions.

Commercial broadcasters

$$\text{Program income per viewer} = \frac{\text{Total advertising income for this service}}{\text{Number of viewers}}$$

Profit =

(Program income/viewer - (Total program cost/viewer + Total transmission cost)) x number of service viewers.

The broadcast cost is not controlled by the data rate because both terrestrial and VAST satellite channels have a fixed data rate.

Examples of the above formulae.

Datacasting (TVSN, 4ME, Extra, Extra2, Aspire TV and Spree) are all advertorials where the broadcasters are provided with the programs and the network charges for their transmission cost and their profit. Datacasting provides a minimum audience, maximum profit with minimum risk to the broadcaster.

² Example <http://pro.sony.com.au/pro/product/broadcast-products-system-cameras-hd-system-cameras/hdc-2000w/specifications/#specifications> shows a shutter speed selectable from 1/32 to 1/2000 second

SBS HD is a simulcast of SBS1. Considering that virtually all viewers can view HD programs the SBS1 SD signal is redundant. The data for the SD signal could be used by SBS HD for full HD transmission instead of the downgraded version in current use, all at no extra cost.

Commercial stations are showing archive SD programs HD channels which is a total waste because the image sharpness is the same as all of their other SD services.

Commercial stations have been making high profile programs in Full HD and these can be seen overseas in Full HD but are transmitted here on SD. High profile programs attract the most viewers reducing the cost of transmission per viewer when comparing the use of HD for transmission of low rating HD program.

2. What safeguards, if any, should the Government put in place to make sure that an appropriate balance is maintained between giving broadcasters the freedom to use their spectrum how they see fit, providing audiences with a diverse range of television services and the appropriate and efficient use of spectrum?

1. Value for the purchasers of TVs who are also taxpayers and voters

The Australian public have spent considerable money buying TVs capable of Full HD or better quality along with surround sound. To give them value for money each broadcaster should be required to provide a minimum of one program stream of Full HD or better quality. Over 90 % of the program content must be of Full HD or better quality with surround sound. It should be noted that there is plenty of Full HD programming and there is no SD only studio equipment on the market. All prime time programming as a minimum must be accompanied by Closed Captioning for the hard of hearing and Assisted Dialog for those with poor vision.

2. Lack of region specific programming for 8 million regional Australians.

From the 2011 census there was 8 million people outside of the mainland State Capital cities leaving 13.4 million in the mainland State Capital cities. Why are there virtually no non-news regional/remote programs for 40 % of the Australian population?

We currently have Australian content rules to protect our national identity, this should be extended to license area identity, and such programs produced for regional/remote areas will also count for Australian content.

Broadcasting Services (Australian Content Standard 2005) needs to be extended to require small proportion for metropolitan/regional/remote area content.

Whilst ABC TV was able to separate regions prior to satellite distribution, they cannot now. It is possible for the ABC and SBS to separate their networks between city and country in each state by using the Digital Video Network which connects to remote studio centres.

ABC Radio has 48 studios in regional and remote areas. They collect news; why not give these journalists a camera, mini editor and training so that they can contribute to a state based TV news bulletin which is not fed into the capital city transmitters. The edited stories could be fed to the Ingleburn playout centre via the internet. All stories could be fed into ABC website. The 7 capital city transmitters should carry a program aimed at that state capital.

3. Commercial broadcasters

It is not in the commercial interests for commercial broadcasters to provide a diverse range of programs because the maximum profit comes from the maximum number of viewers for each program. This means minorities are automatically excluded.

Commercial broadcasters may find it more profitable to transmit a pair of Full HD programs instead of the current downgraded HD and a pair of SD programs. With the exception of the ABC, about three quarters of the viewing is using the broadcasters' primary channel.

Retain BSA section 43 which refers to local content of commercial stations. It is mainly aimed at the provision of local news. The ABC/ SBS are only capable of splitting their networks on a state/territory basis. This leaves the commercial stations with the responsibility of providing local content.

<http://www.nfsa.gov.au/collection/television/highlights/regional-television-from-colour-to-digital/> shows what regional TV was like before aggregation. Now the commercial coverage can be broken into 28 areas³ for commercials to be inserted. So with new technologies, more local content is possible. For example local current affairs and sporting events.

4. **SBS** after a legacy period has no need to transmit a simulcast of their SBS1 HD and SBS SD program streams.

Community TV in Sydney, Melbourne, Adelaide and Perth could have their SD program inserted into the local SBS transmitter. It would then automatically be carried on translators in those areas giving them the same coverage area as SBS. This will greatly increase their coverage area. This will keep community TV high profile instead of disappearing into the internet.

5. **ABC**

The ABC transmits very little HD content on their ABC24 because of a lack of HD camera and production equipment. They also import high rating HD programming from the UK which they have to show in SD.

ABC for Kids channel 22 for pre-schoolers 06:00 – 18:50. From 18:50 – 06:00 it is called ABC2 and has adult programming.

ABC3 channel 23 for 6 – 15 year olds 06:00 – 20:40

Once all programs are MPEG-4 compressed, ABC1 can return to HD but this time full HD.

ABC24 could become full HD as well, between 18:50 – 06:00, provided ABC2 adult content remains SD and ABC3 closes between 18:50 – 06:00.

ABC/SBS have been charged with the task of providing diverse range of programs but is limited in their ability because of funding and because they cannot break their networks more finely than by state. The lack of diversity means that for the ABC for example they produce no state wide current affairs. State based studios have been closed severely limiting program content from outside Sydney/Melbourne.

6. Delete redundant sections of the Broadcasting Act 1992 as amended. (27/10/2014)

Much of this act needs to be removed because it is controlling the switchover from analog to digital television which is now completed.

³ http://www.communications.gov.au/.../Attachment_D_-_Regional_Australia...

All references to prior to 2007, 2009 and 2013 which now longer apply. This includes the many references to simulcasting of analog and the primary digital channel. The word simulcast appears 109 times in the body of volume one and 129 in volume 2.

All references to teletext need to be removed because this technology has been superseded by the internet. (Closed captioning must remain, but it uses teletext technology).

The only protection that the Australian TV industry has against streaming services from overseas is to make and show programs which are culturally relevant to the viewers.

The ability to transmit multiple channels allows for the insertion of region specific programs either into the primary or a secondary channel.

The government is allowing broadcasters to use a valuable resource. So legislation should require broadcasters to maintain levels of Australian production including production for single licence areas. The ABC should also have to provide state specific production. SBS's contribution should be to continue Australian production and to carry an SD community broadcaster specific to that state capital city.

3. What consequences, if any, could the removal of 'service deficient' declarations have on the content delivered to viewers in smaller regional and remote areas?

Viewers who live in metropolitan and regional areas who cannot receive reliable local terrestrial broadcasts must not be left with no live television because of terrain or interference.

The VAST satellite system is encrypted, so that only authorised viewers can access programs. Licence areas have a known population on which program copyright is based. It also allows advertising to be directed to a specific audience. VAST licence area contains Northern (Country NT, Remote Qld), Southern (Outback NSW, Outback & Alpine Vic, Remote Tas, Remote SA) and Western (North West & inland WA). Other viewers are in areas covered by terrestrial licences who are different companies. A very small proportion of these viewers do not have adequate signals⁴ with an antenna 10 m above the ground. To provide these viewers with TV they may be authorised to receive the appropriate VAST signal. The number, identity and location of these viewers is recorded as part of the registration process."

Broadcasting Services Act, section 130 is aimed at the gradual switch on of digital transmitters including new black spots. Viewers in metropolitan and regional areas are able to receive all of the transmitters on an individual transmitter site or none of them. This is because of the restack which reallocated the transmitters on an individual transmitter site to consecutive channels. In addition all transmitters on an individual site are identical except for the transmission channel. Some areas of the Eastern remote licence area have not been restacked, but these transmitters are all fed with the VAST signal. Remember also that if a broadcaster can be received than all of the primary and secondary channels will be equally reliably received.

⁴⁴ Modulation Error Ratio worse than 24 dB
Channels 6 – 12 Signal strength 44 dBµV/m
Channels 28 – 39 Signal strength 50 dBµV/m
Channels 40 – 51 Signal strength 54 dBµV/m

The restack has enabled the Signal strength calculation in <https://myswitch.digitalready.gov.au/> identifies nearly all the areas which are inadequate with the antenna 10 m above the ground. The number of viewers who can only receive one or two commercial telecasters will be insignificant. Thus if an antenna installer cannot get the signal strength and quality in this footer then the receiving site should be authorised for VAST reception. All new transmitter sites must contain 5 or when required 6 transmitters to carry all networks.

The Discussion paper talks of service deficient areas restricts the ability of commercial stations from reducing the number of available program streams so as to fund licence area specific programming. If metropolitan viewers are any guide <http://www.oztam.com.au/> shows that the secondary channels have a tiny audience. Much of the programming on these secondary channels is repeats, so the purchase price of these programs must be low. So to replace some of these programs with licence area specific programming will largely be controlled by the cost of production of the replacement program and the advertising revenue to pay for it.

Only Cassilis and Collaroy both in the Northern NSW licence area contain only one commercial broadcaster (NBN).

There are only 33 sites which do not have 5 transmitters all but the two above contain either only an ABC TV or ABC and SBS TV transmitters. This is a waste of money because VAST receivers carry all programs including ABC/SBS radio in addition to the 3 commercial broadcasters. There are also 7 resorts all of which have 5 very low powered translators each.

Section 130ZH (Service deficient) can be removed because only applies to a tiny number of viewers and replacement programs are controlled by other factors.

Considering that each broadcaster has to have a transmitter and its appropriate feed system for the primary program, the addition of others only costs the program copyright for any secondary programs. Even if all secondary programs are switched off the transmission costs remain unchanged.

4. What impact, if any, will the removal of the requirement for the primary channel to be provided in SD have on viewers?

The transmission of full HD programs will improve the picture and sound quality from just better than analog to “Blu-ray” disc quality programs.

Less than 10 % of viewers will loose reception if programs change to high definition.

http://www.communications.gov.au/_data/assets/pdf_file/0011/222788/Digital-Tracker-Quarter-4,-2012-Full-Report-final.pdf shows 90 % of viewers can watch HD programs. This is more than 6 months before the sales rush caused by the analog switch off for 60 % of the Australian population. Your discussion paper quotes Newpoll as households are 96 % HD capable at the end of 2013. No SD large and medium sized TVs have been retailed since 2009. Most of these viewers have paid for a TV which can display the images in full HD quality which is currently denied them.

SBS HD Showcase Now

Right now, SBS should showcase Full HD quality, using MPEG-4 compression by switching their HD signal from logical channel number 30 to 3 to make it easier to select. Most TVs are advertised as full HD.

The sharpness and lack of jagged edges in their HD pictures will improve over their present HD pictures. Most but not all, of their programs are HD originals.

The viewers who cannot view the new HD signal can switch to channel 36 for a legacy SD transmission.

The Australian standards in 2010/2011 for broadcast and receivers recommend full HD MPEG-4 transmission.

5. What factors will influence a television broadcaster's decision to continue to offer HD content?

1. Proportion of the audience able to watch the program. – As mentioned above almost all of the audience can see HD programs.
2. The ability to show full HD on their primary channel for maximum impact for the most viewers.
3. Competition from Pay TV and internet competitors showing HD programming. (Foxtel charges \$10 extra per package for HD)
4. Competition from netcasters such as Netflix.
5. Availability of HD programming. All USA primetime, all 5 main UK channels run HD programs, the top 3 NZ channels so HD most of the time. There is plenty of HD programming around.
6. Re-equipping of news studios around the networks particularly in non-Sydney/Melbourne locations may prevent immediate transmission of HD news.
7. There are quite a few FHD Outside Broadcast vans around, some SD OB vans will need replacement.
8. The international production standard has been full HD ⁵ It was recommended by the European Broadcasting Union in 2005 all production should be full HD.
9. Programs made for export has to be in full HD to sell. If it is for cinema display they use 4K which is sharper pictures again. Unless these programs are transmitted in UHD, they can be downscaled to Full HD.
10. It costs more to downscale a Full HD program back to SD, just transmit it in its original resolution.
11. The only reason not to transmit in HD is when more profit can be made replacing the HD program stream with a pair of SD programs.

6. What form of regulation should there be for services that are indistinguishable to viewers from more regulated services and accessed with common equipment, such as HbbTV?

HbbTV should act like a personal video recorder without having to pre-record programs, as this is done by the broadcaster.

⁵ <https://tech.ebu.ch/docs/r/r115.pdf>

All Freeview+ should conform to <https://www.hbbtv.org/> version 1 with an upgrade to version 2 in 2016. (This includes HEVC video and HE AAC sound compression)

All programs which the TV broadcasters make available must have been or will be transmitted on their network. If Hbb can contain programs which will not be broadcast, the broadcaster becomes a netcaster who will have different rules eg Australian content in competition with the broadcasters' main output.

Until the National Broadband Network is complete, programs which are Full HD originals, should be available in Full HD and SD. This is because many viewers do not have a fast enough internet to prevent jerky motion, and high internet costs for viewers.

HbbTV should be provided for free but may contain advertising. The advertising should not be avoidable by the viewer, who should be able to stop, pause, fast forward and rewind program content.

All programs from each broadcaster should be available for a week as a minimum.

Hbb programs must not be encrypted to prevent broadcasters becoming pay for view broadcasters. **This is a conflict between Free to Air and pay for view in the same broadcaster.**

7. [What arrangements may be required to allow currently established datacasting services provided by commercial broadcasters to continue where necessary after the repeal of the datacasting provisions in the BSA and Radcomms Act?](#)

Datacasting has failed to provide innovative programming as set out in the BSA. The result is continuous mainly imported repetitive advertorials aimed at the gullible. Generally these products are not available in retailers. If they were worth buying, retailers would stock them.

Datacasting is easy money for broadcasters, which comes at the price of less available data rates for real programs.

There are no ratings for the datacast broadcasts to see how many people actually watch.

Datacasting uses part of the data allocation for the broadcaster, so reduces the capacity to transmit full HD and other additional programs.

We could end up with a single FHD primary program, no secondary programs and the rest of the data capacity filled with promoters selling products which won't sell in the shops.

8. [Other than narrowcasting services, are there any other types of services which broadcasters should offer on their television multiplexes?](#)

The TV channel has a fixed capacity which is controlled by the modulation type eg DVB-T or DVB-T2 and a 7 MHz wide channel. So if narrowcast is to be broadcast, it has to replace another program. VAST satellite has a data capacity of 44 Mbit/s which is greater than DVB-T2 of nearly 29 - 44 Mbit/s

Whilst narrowcasting has been used on VAST for training of remote area Doctors particularly when it has been supplied encrypted. They used phone in to ask questions live. Using satellite NBN this service is more cheaply done as a webinar. This can be extended to other areas of Australia. Narrowcasting is more expensive than using the internet where there are small number of viewers and is one way.

Subscription narrowcasting is Pay TV And a conflict of interest!

9. Is it likely that commercial television broadcasters will want to use their multiplexes and hence spectrum to offer third party content that they are not responsible for under the relevant broadcasting legislation? If so, what form of regulation would be appropriate to ensure such content was provided in a manner consistent with commercial broadcaster provided content?

Broadcasting is only cost effective if it is to be received by a large number of viewers. So third parties should have to abide by the same rules as broadcasters because a third party may wish to be a “broadcaster”. So third parties should be required to conform to the primary channel broadcaster rules.

The most likely third party broadcaster is likely to be a religious broadcaster and /or pay TV companies.

The converse should be considered, whereas free to air TV is not to sell their program streams for transmission on Pay TV no that there is total national coverage of free to air TV. This will give more capacity to Pay TV transmission systems to that they do not require free to air transmission capacity.

A third party may wish to encrypt their transmissions creating pay television in competition with satellite/cable systems. **This should be banned as a conflict of interest.**

Broadcasters have to pay a licence for the use of the electromagnetic spectrum. Third parties should also have to pay licence fees for their part of the spectrum.

10. How important is it that broadcasters have the regulatory flexibility to make greater use of new technologies to deliver their television services to viewers?

The definition of a “primary channel” has prevented the HD transmission of high profile programs such as the Melbourne Cup, AFL and NRL grand finals because they are on the anti-syphoning list. This is an example of the lack of regulatory flexibility.

Broadcasters were at the leading edge with the introduction of digital TV, where we were one of the few countries to transmit HD at the start of digital transmissions in 2001.

Since then broadcasters and regulators have dropped the ball. I say this because MPEG-4 and DVB-T2 have become worldwide standards, there has been no structured method of rolling out these technologies. We are in the situation of not knowing what proportion of TVs capable of receiving signals created using these technologies. Three years ago, Sony has stated publically that all their TVs retailed from 2010 onwards are MPEG-4 capable⁶ and their current models are DVB-T2 capable. Other importers have not made any statements on this topic, and their specifications do not mention compression and modulation characteristics.

AS 4599.1-2011 Digital television - *Terrestrial broadcasting - Characteristics of digital terrestrial television transmissions*” is compulsory via regulation through the ACMA’s *Digital Terrestrial Television Broadcasting Planning Handbook*. It allows broadcasters to transmit in MPEG-4 and full HD (1920 x 1080 x 25 progressive) and broadcasters have yet to transmit programs in this format. The closest they have tried to use MPEG-4 for the Seven network’s “4Me” datacasting channel but this did not last long and it returned to MPEG-2.

⁶ http://www.acma.gov.au/webwr/_assets/main/lib410179/ifc3-2012_sony_aust.pdf

The only experimentation has been non-frame compatible 3-D transmissions of the World Cup Soccer and NRL grand final. This experiment used MPEG-4 compression and the left and right images were compressed to half width and transmitted side by side. Unfortunately this technology is not compatible with existing transmission and as a result could not be implemented by all networks Australia wide. It also used spare transmitters on 8 transmitter sites.

The flexibility should be sufficient to allow all broadcasters to transmit UHD TV. This will require all viewers to be DVB-T2 and HEVC capable. This requires all new TVs to be capable of DVB-T2/DVB-T and HEVC/MPEG-4 to build up an audience base for around 7 years time. The complication for regulators is that to transmit UHD, some existing program streams will have to be sacrificed. If all receivers are DVB-T2/MPEG-4 capable it will allow the use of a legacy channel when UHD transmissions start, similarly to what is proposed for MPEG-4 now.

Flexibility is limited by receiver capability so a regulated approach is required to make all receivers capable of new features well ahead of time.

In other ways regulation needs to be tightened because without it new technologies will not be adopted. It is not worth viewers buying new receivers if only one broadcaster uses a new technology. It prevents the chicken and the egg situations.

12. How can the Government support the broadcasting and manufacturing industry in managing a transition to MPEG-4 only television?

Firstly there is no TV manufacturing in Australia. TV set manufacturers design their products to work in as much of the world as possible. To illustrate this Sony is selling all of its current range of TVs with DVB-T2 has national coverage in UK, Russia, and 27 other countries⁷. It has been adopted by 39 more including India with a population of 1300 million people. New Sony's TVs in Australia are DVB-T2 capable!

The lack of information on the capabilities of the current receiver population

Firstly an examination of the specifications of the currently available television sets, none of them tell you what type of signals they can decompress. The options are MPEG-2 only, MPEG-4 which are also able to decompress MPEG-2 or the new HEVC.

Standards Australia

They may need financial assistance to draft update DR2 AS 4599.1 Digital television - Terrestrial broadcasting - Part 1: Characteristics of digital terrestrial television transmissions comments closed 16 September 2013 and DR AS 4933.1 and Digital television - Part 1: Requirements for receivers for VHF/UHF DVB-T television broadcasts including ancillary services closed 05 February 2014 considering that AS 4599 is mandated and AS4933 should be.

⁷ Austria, Belarus, Belgium, Croatia, Denmark, Ghana, Italy, Kenya, Kyrgyzstan, Malawi, Mongolia, Montenegro, Namibia, New Zealand (Igloo pay TV), Nauru, Nigeria, Ruanda, Saudi Arabia, Serbia, Singapore, Suriname, Sweden, Tanzania, Thailand, Uganda, UAE, Vietnam, Zambia.

Both of these standards need modification to ban any interlaced transmissions. All modes of progressive scanning are already allowed. There will be a small cost to broadcasters and none to viewers.

In light of the insignificant cost to viewers of DVB-T2 technology, the availability of shuttered cameras and the standardisation of HEVC (H265) in October 2014 these standards need to be open for comment again with a view to publish both standards late this year. The ACMA is part of the committee CT02.

Showcase Full HD MPEG-4 broadcasting and view ability survey

Require SBS to showcase their upgraded full HD MPEG-4 signal whilst those who cannot see it can watch on channel 36. Department of Communications are to commission a statistically valid survey to find out what proportion of TVs are unable to view the full HD MPEG-4 signal. This will allow the calculation of how many TVs/STBs will be required and hence a MPEG-2 switch-off day.

Current TV stock in retailers and importers' warehouses

All importers and retailers need to check if they can view SBS on channel 3 to ensure that their current product is HD MPEG-4 capable.

Receiver Importers

Importers must be required that their terrestrial TV reception products they import must comply with the current edition of *AS 4933.1 Digital television - Requirements for receivers - VHF/UHF-DVB-T terrestrial free to air television broadcasts*. The instruction manual must include a statement of compliance to AS4933.1 - ##### which must also be visible at the point of sale. This should be legislated and the Commonwealth Government's Customs Act can be used to prevent the import of non-compliant receivers. The ACMA can already do this.

The new imports must comply with any new version of the standard within 6 months of publication.

Broadcasters

The broadcaster will need an MPEG-4 compressor for each program stream. The ABC and SBS will require a total of 20 MPEG-4 compressors plus at least 2 spares in the event of failure. Each commercial network need 28 MPEG-4 compressors for their primary channels and at least one for each other program stream. All compressors are installed in the network playout centre.

ABC & SBS use VAST satellite distribution. This will require Broadcast Australia to remove the MPEG-4 – MPEG-2 decompression and associated multiplexing equipment from every transmitter site in Australia. VAST's One, ABC24, SBSHD, 7Mate and GEM are MPEG-4 compressed

Stocktake the interlace/progressive settings of all studio and production equipment to provide the maximum amount of full HD program content. Test all signal paths for compatibility.

Co-ordinate the

- Start date for MPEG-4 compression of all programs except the legacy versions of the primary channels. On this date all primary channels and the existing HD channel will start full high definition transmission of any HD original programs.
- The same day start downscaled to SD versions of the primary channel will be broadcast on the following logical channel numbers. (TEN network 16, ABC 26, SBS 36, Southern Cross 56, Prime7/GWN7 66, Seven 76, WIN/NBN 86 and Nine 96). The viewer will use the remote control to select the legacy MPEG-2 primary channel until they upgrade their receiver.
- The cessation date for legacy transmissions.
- The commencement of the remaining secondary SD channel full HD broadcasting on the day legacy transmissions cease

Building owners and Antenna Installation industry

Some Master Antenna TV system as used in hotels, blocks of apartments etc contain set top boxes as a conversion from analog to digital TV. These were only required where the supplied TVs are analog only. These need to be removed so that the pure digital signal is distributed to digital televisions. The ACMA will need to warn building owners and the antenna installation industry that these boxes may not receive MPEG-4 signals.

VAST Community re-transmitters

Note that remote area licence area which is served by the VAST satellite system contains retransmission sites in towns financed by local councils, Aboriginal corporations and mining companies. The HD channels such as ABC24, SBS HD, One, 7Mate, and GEM are already transmitted in MPEG-4 and the ACMA forced those bodies had to convert those signals back to MPEG-2 prior to transmission. These compression converters will need to be removed.

<http://www.acma.gov.au/Industry/Broadcast/Spectrum-for-broadcasting/Spectrum-digital-television/digital-television-terrestrial-self-help-retransmission-services>

12. Should the Government consider any legislative mechanisms such as technical standards for MPEG-4 terrestrial transmitters and/or television receivers?

New receivers must comply with AS4933.1 current receiver standard

Importers must be required that their terrestrial TV reception products they import must comply with the current edition of *AS 4933.1 Digital television - Requirements for receivers - VHF/UHF-DVB-T terrestrial free to air television broadcasts*. The instruction manual must include a statement of compliance to AS4933.1 - ##### which must also be visible at the point of sale. This should be legislated and the Commonwealth Government's Customs Act can be used to prevent the import of non-compliant receivers. The ACMA can already do this.

From the start of the next financial year, Importers need to be required to submit yearly reports to the ACMA of the following;

- the number of AS 4933.1 compliant receivers and to which date of the standard imported.

- The number of televisions and projectors capable of UHD at 96 frame/s or more. The ACMA to publish the total numbers Australia wide to maintain corporate privacy. This is to enable regulators and broadcasters to estimate the penetration of receivers capable UHD reception, this when to start Ultra High Definition Broadcasting.

Terrestrial receiving antennas Standard

To increase the available data rate by using 256 QAM, an improvement of signal quality is required. *AS 1417.1 Receiving antennas for radio and television in the VHF and UHF broadcast bands - Design, manufacture and performance of outdoor terrestrial TV antennas.* This standard needs to be revised to require each antenna to only respond to a single block of channels⁸.

Master Antenna TV System (MATV) Standard

AS/NZS 1367:2015

Coaxial cable and optical fibre systems for the RF distribution of digital television, radio and in-house analog television signals in single and multiple dwelling installations

This standard needs to be enforced so that TV signals are not demodulated with a set top box and remodulated. This prevents upgrades of the type mentioned in this paper, prevents the viewing of more than one program per network and removes the program guide data.

VAST SMATV systems must either feed the intermediate frequency (to multiple VAST receivers) or transmodulate between DVB-S2 and DVB-T, with DVB-T2 when available (for conventional receivers). This will make all programs from a broadcaster available along with the Electronic Program Guide.

13. By what date does the broadcasting and manufacturing industry consider that MPEG-4-only television could be achieved?

“Since 2009, all Sony TV sets sold in Australia have been MPEG-4 capable”⁹ During the analog to digital switchover full pensioners were given a set top box which is HD MPEG-4 capable. The sound needs to be HE AAC2 which normally accompanies MPEG-4 compressed video.

Once the results of the SBS showcase mentioned in questions 4 and 11 is complete the numbers of TVs is known, the importers can estimate delivery quantities.

The use of MPEG-4 will free up data capacity which could be used to transmit the primary channel in SD on a new logical channel number.

2nd September 2015 would seem a good date for all networks to convert all program streams to MPEG-4 and to start transmitting the legacy channel. The primary channel will also start full HD transmission, using the equipment used for the existing HD channel. Networks may continue transmitting their existing HD channel.

⁸ Block A channels 6 – 12, B 28 – 33, C 34 – 40, D 41 – 46, E 47 - 51

⁹ http://www.acma.gov.au/webwr/_assets/main/lib410179/ifc3-2012_sony_aust.pdf

After 6 months the legacy channels will be closed and the secondary channels will change to full HD.

14. What does the industry consider should be the future standard(s) for broadcast television in Australia? Should a pathway to next generation technologies such as DVB-T2 or HEVC also be considered?

We should not make the mistakes we have just made in the huge delay in introducing MPEG-4

The advantage of upgrading to DVB-T2 and HEVC compression will enable Ultra High Definition transmissions to be radiated by each network. HEVC will also allow the transmission of Full HD 3-D images using Multi View Coding system.

Please note that the cinema industry uses 4K which is almost identical to Ultra High Definition TV. So there is a ready supply of programming.

Sony is currently including DVB-T2 in all their current products in competition with the other imported brands. Thus the price difference of adding DVB-T2 to the DVB-T is insignificant. 3-D display is commonly available in receivers.

Australian Standards AS 4599.1-2011 Digital television - Terrestrial broadcasting - Characteristics of digital terrestrial television transmissions and AS 4933.1 Digital television - Requirements for receivers - VHF/UHF DVB-T terrestrial free to air television broadcasts. needs to require DVB-T2 and DVB-T capability. As soon as a first world country starts broadcasting in HEVC then that capability needs to be required.

AS 4599.1-2011 Digital television - Terrestrial broadcasting - Characteristics of digital terrestrial television transmissions needs to require all program HEVC compression by a specified date so that all broadcasters can equip their play out centres. UHD specifications need to be included.

The number of HEVC compressors required by broadcasters is the same as what is required by broadcasters for the current MPEG-4 upgrade.

Less than 2900 DVB-T transmitters will require an upgrade to DVB-T2 convert all broadcasters. The replacement modulator needs to be able to be remotely switched from DVB-T to DVB-T2 to allow a switch over day to be implemented. If broadcasters are given 7 years to upgrade transmitters it is 82 upgrades/year.

Ultra High Definition

Retailers are selling UHD TVs now, however they are incapable of off air reception of UHD signals because they need an HVEC decompressor and DVB-T2 demodulator.

To transmit Ultra High Definition programs studio equipment will be required to produce and play Ultra High Definition programs.

To make UHD transmissions commercially viable, all receivers need to be DVB-T2 and HEVC capability is required even if the display is not capable of this quality of picture.

Each broadcaster needs to be able to transmit Ultra High Definition signals to make it worthwhile for viewers to upgrade.

This maximises the audience and removes the need for simulcasting, so secondary programs can continue. This approach will use the existing transmission network and transmitters and will not require the installation of new transmitters.

To achieve this as soon as a major country starts transmission (terrestrial, satellite, cable or internet) the Australian Standard for **AS 4933.1 Digital television - Part 1: Requirements for receivers for VHF/UHF DVB-T television broadcasts including ancillary services**. Needs to add that all broadcasts will become DVB-T2 and HEVC (H265) compliant in 7 years time. This means that at the change over date the minimum age of non compliant TV is 7 years which is about the average replacement age. However an HDMI dongle should be available so that existing flat screen TVs will not require replacement.

To transmit other programs alongside a UHD program a higher channel data rate is required. This is only achievable using existing transmitter infrastructure is to improve receiving antennas. The digital restack has broken the spectrum into 5 channel blocks of sequential channels. Each transmitter site uses a single block. For the same quantity of metal a receiving antenna can be made more sensitive to the wanted TV signals, less sensitive to unwanted signals. This will allow for 256 QAM modulation to be used.

AS 1417.1 *Receiving antennas for radio and television in the VHF and UHF broadcast bands - Design, manufacture and performance of outdoor terrestrial TV antennas*. This standard needs to specify that the physical dimensions of any antenna must be optimised for a single block of channels as specified by the ACMA planning guidelines. No non-compliant antennas will be available for sale from the start of 2016.

15. What consumer issues are raised by the transition to new transmission standard such as MPEG-4

Pensioners and VAST satellite viewers are already equipped for MPEG-4

All the full time pensioners who were given a STB by the Commonwealth Government are able to receive MPEG-4 in high definition. All VAST satellite viewers are already using HD MPEG-4.

HD MPEG-4 Set Top Boxes

For those who cannot receive MPEG-4 <http://www.kmart.com.au/product/audiosonic-hd-set-top-box-with-pvr/121000> for \$29 and others are available for \$50.
<http://www.jaycar.com.au/productView.asp?ID=XC4917>

Determining how many HD STBs are required.

Require SBS to;

1. Reprogram their multiplexers to move SBS1 SD on channel 33 to channel 36. Publicise the swap of SBS1 HD to channel 3 and to select channel 36 on your remote if you cannot see the program.
2. Publicise the forthcoming upgrades of full high definition to channel 3, and for those who cannot see it select channel 36 on their remotes for now. You will need a new Set Top Box or TV before 2nd March 2016.
3. Remove any MPEG-4 to MPEG2 decompressors from the metropolitan and regional transmitters as soon as possible starting with the biggest cities. (Still using channel 30 which starts MPEG-4 transmission from that site)
4. Organise to remove the MPEG-4 to MPEG-2 decompressor and multiplexer at every VAST Satellite receiving site. (All VAST HD programs are MPEG-4 compressed already). Start in the most populated coverage areas and move to the lowest populated coverage areas.
5. Reprogram their multiplexers so that SBS HD is on channel 3 instead of channel 30. Remove the downscaling of their HD signals, but convert when require interlaced signals to progressive. Now the best pictures are being transmitted.
6. Stock take the settings of the settings on their cameras and production equipment so as to set them to progressive scan from interlaced.
7. Modify contracts with outside program suppliers including Outside Broadcast vans to supply 1920 x 1080 x 25 frame/s progressive scan video. Surround sound should be requested where appropriate and possible.
8. Now a phone survey should be commissioned by the Department. It should ask if the viewer can see SBS channel 3. The number of people without TV reception and the number of viewers in the household are required to determine the number of HD MPEG-4 set top boxes or new TVs, which will be required.
 - The survey should ask if the viewer can view local TV from an antenna (not from Foxtel)?
 - What can they see if they select channel 3?
 - Do you have sound on channel 3?
 - If channel 3 does not work, ask what they see if they select channel 36 by typing in the numbers in the remote control. (This is to see if the receiver is tuned to receive SBS)
 - If the viewer cannot receive programs ask if they would buy a TV or a Set Top Box for \$30 - \$50?¹⁰

16. Are there any alternative arrangements to digital television multiplex licensing that the Government should consider?

¹⁰ <http://www.kmart.com.au/product/audiosonic-hd-set-top-box-with-pvr/121000>

The Australian digital radio licencing model, Commercial Radio Australia, an industry body with broadcasters as members, own the transmitters. The members who have broadcasting licences share the cost of transmission. The Department of Communications determined the number of available multiplex channels per transmission channel. This model could be replicated with Free TV Australia, but each multiplex channel is licenced to a different broadcaster. The three metropolitan telecasters own TXA who runs the TV transmitters. The existing broadcasters should allocated the single digit logical channel number eg, 1, 2, 3, 5, 6, 7, 8, 9 but must transmit the best quality images ie. Full HD and UHD in the future. The two digit LCNs would be licenced to others. Again the Department would have to determine the number of channels and their data rates. Remember that Full HD twice the data rate SD.

Note: If UHD is transmitted using existing receiving antennas, either half or a whole TV channel will be used. So some program streams may need to be removed from transmission.

Media concentration is very high in Australia. Three telecasters have a reach which is over 60 % of our population. However they also control much of the programming radiated by their affiliates of Prime7, WIN and Southern Cross/Austereo. Southern Cross/Austereo has a large proportion of reach in radio broadcasting as well. Each commercial transmission channel is divided into 3 FHD channels, we could then have nine broadcasters in each licence area and Free TV Australia could own the transmission facilities. I notice that there are only 4 major radio broadcasters as well.

17. Are there other ways commercial television broadcasters can be encouraged to share or utilise their spectrum more efficiently?

The TV industry has already relinquished 24 channels (0, 1 - , 5A, 9, 52 – 69) and has gained one channel (12). Also the original plan was 3 commercial broadcasters, 2 Government funded broadcasters, a future broadcaster and a datacaster. The datacaster has been dropped.

If DVB-T2 is adopted by all networks, they can include in their transmissions a signal which is ruggedized for reception by mobile phones.

At the restack auction there is still 2 x 15 MHz left unsold. The restack in the populous areas of Sydney, Melbourne, Brisbane, Sunshine, Gold and Central Coasts uses all channel blocks to cover the uneven terrain and buildings. This is the same area where there is maximum demand for mobile/broadband capacity.

The TV industry must not relinquish any spectrum because any technological improvements must be fitted into the existing channels. No new frequencies will be available in the future, which can be tuned by existing and future TVs. Broadcasting is by far the cheapest way to deliver digital program to very large numbers of people. Once a block of spectrum is relinquished it does not get it back again!

18. How might national broadcasters implement spectrum sharing while maintaining their distinct television services?

As for Question 17