

## DIGITAL TERRESTRIAL TELEVISION BROADCASTING IN AUSTRALIA

### ISSUES AND OPTIONS

**THE ABA'S DIGITAL TERRESTRIAL TELEVISION BROADCASTING (DTTB) SPECIALIST GROUP (SEE ABA UPDATE No 9, JULY 1993) HAS PREPARED THE FOLLOWING DISCUSSION PAPER. THE GROUP INVITES COMMENT FROM THE PUBLIC AND INDUSTRY ABOUT THE OBJECTIVES AND ISSUES THAT MIGHT INFLUENCE THE DEVELOPMENT OF FUTURE DTTB SYSTEMS FOR AUSTRALIA.**

In the relatively short history of television in Australia, a dominant part of our way of life, there has only been one substantial change - the addition of colour in 1975.

While colour pictures made watching television more enjoyable, viewers had to invest in new television sets and broadcasters had to invest in new studio equipment in order to take advantage of the enhancement. Any further change which involves a large expense for both viewers and broadcasters requires careful consideration. For the public and broadcasters to decide that investment in new equipment is worthwhile, such a change will need to offer a similar major enhancement of television services.

Technological developments in the last decade have created an opportunity to consider such a change. There is potential to offer appreciable improvements in signal quality while, at the same time, making it possible to increase the number of programs available to viewers.

The new technical methods are grouped under a general term, Digital Terrestrial Television Broadcasting (DTTB). Several possible systems are in active development in North America and Europe, each having different advantages and disadvantages for application in Australia.

Improvements over the current PAL<sup>1</sup> broadcasting standard used by Australia may include:

- higher quality pictures and sound, allowing cinema quality viewing to home audiences, with large, wider screens;
- greater portability, allowing easy relocation of television sets around the house and outdoors, and even allowing reception in moving vehicles;
- consistent quality of reception across the area which a television station operator is licensed to serve, with freedom from current annoying problems like ghosting, interference and noise (snow);
- greater number of program channels, depending on the quality required;
- less spectrum may be required for television broadcasting in the longer term;
- flexibility in daily programming for broadcasters to move from very high quality pictures and sound for prestige programs like sport and movies, to four or more program channels where the technical quality is less important than program variety;
- improved capacity for providing access to sound and ancillary services such as closed captions for the hearing impaired, audio description channels for the sight impaired, multichannel sound which could allow audio in several languages to accompany pictures, stereo or surround sound, teletext, and other data services.

While it is possible that existing outdoor television antennas will be

able to be used by householders to receive DTTB signals, they will need to buy a new television set or a set-top signal converter. Any change will need to ensure that the public continues to receive the currently available television services on their existing sets for many years. Estimates indicate that DTTB would not be a significant challenge to current viewing patterns until into the next decade.

This discussion paper aims to introduce the issues related to DTTB to Australian television audiences, so that all views can be canvassed.

#### **BACKGROUND**

Recent developments in digital technology have allowed us to re-examine the delivery of broadcast television services to viewers in Australia. The Government has decided that satellite-delivered pay TV services should use digital transmission techniques which offer, among other benefits, more channels from which to choose.

In North America and Europe, satellite digital transmission developments are being paralleled by studies into using similar technology to improve the performance and spectrum efficiency of terrestrial broadcasting and the performance and channel capacity of cable.

In the USA, the decision has been made to introduce a new, technically advanced, television broadcasting system. This will be achieved by giving

*continued on p.21*

<sup>1</sup> See glossary.

continued from p.21

existing broadcasters first preference for advanced television channels which would be available within the existing broadcasting bands. This additional channel would allow broadcasters to develop public interest in advanced television and assist in the total transition to the new system. Eventually, these broadcasters must give up their current channel which will also become available for advanced television.

In Europe, the investigation of digital technology for television broadcasting began later, partly because the Europeans initially concentrated on trying to improve analog technologies like MAC and PAL-PLUS. The Europeans have now largely abandoned that work and are concentrating on digital technology.

Satellite digital television is expected to be available in Europe by 1995, with terrestrial digital television available around 1999. The Europeans plan to build compatible systems for all digital delivery modes - satellite, terrestrial and cable.

The ABA has been monitoring digital television developments in the USA and Europe and considers that they will have implications for planning broadcasting services in Australia. The ABA has established a specialist group of interested experts to examine options for a digital television broadcasting system which will best suit Australia's consumer and broadcasting needs into the next century. The move to digital transmissions is inevitable, but the specialist group is trying to provide direction for the introduction and implementation of digital services, taking into account the views of the public about the relative importance of the various issues involved.

#### **PUBLIC COMMENT INVITED**

The ABA's DTTB specialist group includes representatives from government, the broadcasting industry and manufacturing interests.

While the specialist group will provide the ABA with valuable advice about DTTB, the ABA also considers that there are important social and technology issues and business interests

which may only emerge if views are canvassed from the public as a whole. This discussion paper is intended to provide the basis for these contributions.

The ABA's specialist group has identified several key points related to DTTB technology and the planning issues which accompany its introduction, which should be addressed. The key points expose the implications for broadcasting-related services, such as program production, as well as implications for other communications services and the future use of the radiocommunications spectrum for broadcasting services. They also point to the policies that will need to be developed to ensure that change is handled as smoothly as possible.

The key questions identified by the ABA's specialist group are:

- HDTV and/or multichannel?
- Termination of PAL services?
- VHF and UHF?
- Channel spacing?
- USA or European standards?
- Relevance of pay TV standards to DTTB?
- Separation of television services into discrete licence areas?

The ABA is seeking comments

Comments should be sent to:  
Digital Terrestrial Television  
Broadcasting Specialist Group  
Australian Broadcasting Authority  
PO Box 34  
BELCONNEN ACT 2616.

about the issues raised in this discussion paper. Matters not addressed in this document may also be raised, but should have a definite relationship to Digital Terrestrial Television Broadcasting.

#### **HDTV AND/OR MULTICHANNEL?**

Whatever DTTB system is chosen for Australia, it should ideally be flexible and allow enhancements. There are significant and incompatible differences between digital transmission systems being developed by the USA and Europe, where the main work on digital

transmissions systems is being undertaken.

Therefore, should Australia:

- follow the USA recommendations of a predominantly HDTV scenario for DTTB, with multichannel for satellite or cable delivered services; or
- align with the European proposals, which promote the terrestrial, satellite and cable delivery of a range of standards of service, from sophisticated HDTV to Low Definition Television, as well as multichannel services, to a commonly available television set?

Australia's choice will need to take account of which scenario provides the greatest benefit for broadcasters and the viewers alike.

The introduction of DTTB is likely to enable improvement in picture quality in three distinct and significant areas:

- i) elimination of ghosting and other interference phenomena;
- ii) introduction of wider screens and higher resolution pictures; and
- iii) the capacity for picture resolution to be varied to suit the program being screened.

#### **TERMINATION OF PAL SERVICES?**

DTTB will need spectrum to enable it to be introduced in Australia. One possibility is to use currently unused - or unusable - parts of the terrestrial television broadcasting spectrum. Beyond this, additional spectrum for DTTB could be obtained by replacing existing television services with DTTB services. This would cause considerable upheaval in the short term so, at this stage, it is primarily seen as a possibility for the longer term.

There is a huge investment in infrastructure to support Australia's television broadcasting system, known as PAL. The current PAL television set population in Australia is about seven million and there are also several million VCRs. Television sets have a typical, useful life of between 10 and 15 years. As long as there is a sizeable population of PAL sets in viewers' homes, termination of PAL services will be very difficult. The introduction of DTTB will require a period where parallel transmission, of both PAL and

DTTB signals, is required.

The only comparable examples of introducing a new, but incompatible television broadcasting standard was the change from 405 line to 625 line<sup>2</sup> television in the UK and the change from 819 line to 625 line television in France. The changes were timed to coincide with the introduction of colour television but parallel broadcasting of both standards was maintained for 20 years in the UK, and longer in France.

How soon PAL services could be terminated, depends on how soon DTTB is introduced and how quickly a large DTTB television set population can be established. That, in turn, depends on set prices, quality of service, the number of channels and the availability of attractive programs.

In the US, it is proposed that DTTB services would start in unused or unusable channels and be broadcast simultaneously with existing NTSC services. Every existing broadcaster will be allocated a channel for DTTB delivery, and both of these channels will be required to carry the same programming material for a period of 15 years. By that time, the population of DTTB television sets is expected to have reached a level that would allow termination of NTSC services. The vacated spectrum could be used for more DTTB services, but could also be used for other, yet to be determined, purposes.

On the other hand, Canadians (who expect to follow a similar simulcast option) have indicated that an enforced termination of NTSC analog services is not desirable. They believe that the decision should be based upon competitive market forces and should be made by industry organisations on a market by market basis.

European countries have yet to decide how DTTB will be implemented.

### **VHF AND UHF?**

The decision to use both VHF and UHF television bands, or only UHF, for DTTB will be based on the technical

requirements of the DTTB standard ultimately adopted by Australia and the limitations imposed on DTTB planning by past broadcasting planning practices. The need to provide for both PAL analog and DTTB during an extended phase-in period also imposes technical constraints on the planning of DTTB.

Of the VHF television channels currently used in Australia, channels 0, 1 and 2 may not be suitable for DTTB. Channels 3, 4 and 5 are also unsuitable because they straddle the spectrum set aside, internationally, for FM radio. The remaining VHF channels (currently 6 to 11, but channel 9A and 12 may also be considered as they are expected to be available for broadcasting purposes in future years) may be suitable. On the basis of overseas studies, UHF channels 28 to 69 will be suitable for DTTB.

It is likely that the technical performance of currently used outdoor VHF and UHF antennas will be adequate for DTTB. To minimise disruption to the domestic television systems, it is desirable that DTTB services are introduced in spectrum where the existing PAL services are now found. In Europe, it is possible that DTTB will be transmitted exclusively in the UHF television bands. In the USA, the FCC has already mandated the use of UHF television bands for DTTB.

There are major economic considerations associated with DTTB. The majority of DTTB television sets will be built to receive only signals transmitted in the UHF bands, as a consequence of European and American decisions. If Australia decides to use both VHF and UHF television bands for DTTB, television sets will have to be deliberately designed to meet this need, and the costs will be higher as a consequence.

### **CHANNEL SPACING?**

The use of 8 MHz spacing between UHF television channels in Europe allows the adoption of 8 MHz-wide DTTB channels. The USA uses 6 MHz spacing between channels and is moving to

produce a standard specifying 6 MHz-wide channels for DTTB. The difference in channel spacing used in Europe and the USA is a major consideration in deciding what DTTB standards are likely to be adopted by Australia. It is unlikely that a system will be specifically developed for Australian 7 MHz channel spacing because of the limited market for specialised television sets. For Australia, then, retaining channel spacing of 7 MHz may not be a sensible solution.

In the case of the 8 MHz European system, there may be difficulties in the adoption of an acceptable Australian national television channel plan without some disruption to current channel allocations. This certainly appears to be the case in the VHF television bands but may be a less of a problem in the UHF bands. Despite these potential planning difficulties, channel spacing based on 8 MHz could lead to a DTTB system of superior performance and, in the longer term, improved spectrum productivity through the use of same channel repeaters and single frequency networks.

A USA 6 MHz based standard could be adopted for use in Australia in both the VHF and UHF bands. Australian 7 MHz channel spacing could readily accommodate the 6 MHz DTTB signal. However, there needs to be serious thought about what could or should be done with the 1 MHz of spectrum 'left over'. The merits of adopting this channel spacing include the early availability of affordable television sets and earlier introduction of DTTB services.

A modified European or USA standard, adapted to suit Australian 7 MHz channel spacing, if that option becomes technically possible, could be used in either VHF or UHF bands.

### **USA OR EUROPEAN STANDARDS?**

At the moment, the Australian television industry is aligned, at least technically, with Europe. If television broadcasting in Australia were to remain analog, then this situation would probably continue. However, the imminent

2.. The original picture in the UK was made up of 405 horizontal scan lines, while the present system uses 625 lines, which means that the lines are closer together, are less visible and improve picture quality. In France, the original system of 819 lines provided very high quality black and white pictures, but used almost twice the spectrum needed for the 625 line system.

introduction of digital technology for Australian television opens the door to interesting options unable to be considered previously, namely the ability to consider USA-based standards.

The compatibility problems created by the two standards, NTSC and PAL, and the need for expensive conversion processes are no longer major issues.

With digital technology, Australia is able to reconsider which standards to align with, not only on the grounds of technical merit, but also because there may be economic benefits in favouring one system over the other.

The availability of a reasonably priced, dual-standard PAL/DTTB television set will need to be assessed.

#### **RELEVANCE OF PAY TV STANDARDS TO DTTB?**

Section 94 of the *Broadcasting Services Act 1992* provides that the holders of subscription television licences A and B should agree an appropriate standard for full digital transmission for pay TV services. The Minister will then declare the chosen standard following consultation with OPTUS. If the two licence holders are unable to agree on a standard by 1 March 1994, the Minister must make the decision in consultation with the parties involved, having regard to any relevant international standards. However, pay TV is the only area where

procedures for determining standards for broadcasting systems have been set down in legislation.

The procedures for selecting pay TV standards is not expected to lead to complications in selecting DTTB standards. Therefore, a DTTB standard could be set which reflects evolving world standards, but is adapted to suit Australian requirements.

#### **SEPARATION OF TELEVISION SERVICES INTO DISCRETE LICENCE AREAS?**

In Australia, television operators provide services within defined areas called licence areas. There are several hundred licence areas, both large and small.

Television broadcasting in Australia has been planned to provide viewers with access to six television services through networks of terrestrial transmitters, though, in many areas, the fifth network (SBS) and the sixth network may not be operating.

Some operators provide programs across the nation. Others do not and most commercial television services make provision for local news, advertising and community announcements. The insertion of local programs is facilitated by arrangements between major metropolitan-based networks and their regional affiliates and is made possible by using translators to broadcast the

programs originating from main transmitters. Each translator broadcasts on a different frequency from the main transmitter and from each other.

One option for DTTB in Australia involves using single frequencies for each television service. In other words, the whole of Australia could become a single licence area for some services. Another possibility enables single frequency networks to cover smaller geographic areas such as a State or a Territory.

While there may be benefits in the creation of a national licence areas using a single frequency, the capacity for local programming to be inserted would be negligible. Similarly, the insertion of local advertising would not be possible. The ability to have both targeted and localised advertising has benefits for audiences and advertisers. The retention of areas that could be independently programmed within a licence area would help preserve a measure of localism, or at least regionalism, in both programming and advertising.

The commercial, economic, social, cultural and political implications of adopting the concept of national single frequency services need to be examined.

#### **GLOSSARY**

**Australian Broadcasting Authority (ABA):** The ABA is responsible for planning and regulating broadcasting services in Australia. It gets its mandate from the *Broadcasting Services Act 1992*.

**Advanced television (ATV):** US digital HDTV system.

**Analog:** Currently available radio and television services are delivered using analog technology.

**Aspect ratio:** The ratio of the width of a television picture to its height.

**Digital:** The way in which radio and television services will be delivered in the near future. Digital technology was first developed for computers, but it is being used, more and more, for other communication purposes, such as for telephones and broadcasting.

**Federal Communications Commission (FCC):** The USA's broadcasting and telecommunications regulator

**High Definition Television (HDTV):** A television system having 16:9 aspect ratio and at least 1000 lines making up the picture (about double existing systems)

**Multiplex Analog Component (MAC):** A form of analogue transmission signal coding used for satellite broadcasting.

**Multichannel:** More than one program per transmission channel.

**NTSC:** The analog television system currently used in the USA, Japan, Canada and in some other countries.

**PAL:** The analog television system currently used in Australia, Europe and in some parts of Asia.

**PAL PLUS:** An enhancement to the PAL system which provides a 16:9 aspect ratio.

**Set-top signal converter:** Similar in appearance to a VCR. A converter translates a signal, e.g. satellite, broadcast in one system, to a form suitable for use on an existing television set.

**Simulcast:** Broadcasting the same program on two or more channels.

**Signal channel networks or signal frequency networks or same channel repeaters:** A network of transmitters that all broadcast on one channel/frequency throughout the area served by the station. The three terms are used interchangeably.

