

CHAPTER 6 – CONCLUSION – (22 pages)
(of six chapters)

DIGITAL TELEVISION BROADCASTING:
Perspectives on the Future

Jeffrey Bird

A minor thesis for Partial Fulfilment of the Requirements for the Degree
Master of Multimedia

Swinburne University of Technology

© 2002, 2003 Jeffrey Bird
Email: jrbird@swin.edu.au

CHAPTER SIX

CONCLUSION

CHAPTER SIX:

CONCLUSION

6.1 Conclusion

While the transition to digital television represents a broadcasting environment complicated by a raft of competing technologies, both digital and legacy analogue, it also represents a promising new direction in how content is created and delivered to the viewer. Some of these enhancements include improved signal reception, a widescreen aspect ratio, surround sound, multiview cameras, closed captioning, as well as the capacity to utilise the spectrum efficiencies inherent in the digital signal to provide greater choice through multi-channeling. In the case of the new internationally endorsed 16:9 widescreen format, program producers will need to optimise content creation for both widescreen as well as the 4:3 legacy aspect ratio. This will require new approaches to content capture and a review of existing production processes.

The prospect of multi-channeling is potentially more problematic, in that it challenges the prevailing commercial, political and viewer paradigms that have underpinned broadcasting since its inception. While the kind of multi-channel choice found in Europe would seemingly benefit both broadcasters and viewers, this paper has revealed a linkage between content choice and viewer fragmentation, resulting in diminished broadcaster revenues and greater content expenditures. The questionable business model of multi-channel choice is further highlighted by some high profile collapses in the European and British broadcasting industries in recent months. Moreover, multi-channel broadcasters still in the market have comprehensively failed to generate adequate revenues to cover their costs. It is in this light that a highly vocal campaign to permit multi-channeling in Australia should be examined; the risks are substantial.

High Definition television, a sub class of digital television, is perhaps the most promising digital television offering, potentially the greatest advancement in television since the advent of colour in the 1970's. This paper has indicated that the dramatically improved picture resolution of HDTV will not only afford 'cinema like' viewing experiences, but also provide a platform for the true convergence of information, interactivity and television, providing a range of opportunities in multimedia related applications. To a large extent, the transition to HDTV will be facilitated by a range of new home theater display technologies, including HDTV plasma and CRT screens, along with DLP/LCD HDTV projection systems. Contrary to popular opinion, HDTV display technology is now moving to the mainstream, with consumer HDTV displays falling rapidly in price as manufacturing approaches critical mass. While Europe has largely spurned HDTV, prices in the United States and Australia for HDTV CRT displays have fallen to under \$3000 Australian dollars, a level comparable to standard definition digital televisions.

Moreover, while HDTV confusion still bedevils consumer electronics retailers and consumers alike, the research also revealed that HDTV is beginning to generate traction in the U.S. market, with the take up rate of digital television now rivaling that of colour television. The increasing availability of HDTV content and programming has also been instrumental in generating HDTV acceptance, with the leading American broadcasters transmitting approximately 20 percent of their programming in HD. Recent announcements by the Hollywood studios to release HDTV content on Digital VHS package media should drive take up even further. These promising developments seem to contradict the proclamations of what can be described as Australia's anti-HDTV lobby group, indicating that much of this opposition is based on a lack of understanding, as well as vested business interests. Again, as in the case of multi-channeling, this opposition can be viewed as a wider campaign conducted by non-television media interests to gain access to Australia's television broadcasting spectrum.

In addition to HDTV and improved viewing experiences, digital television has also ushered in a comprehensive range of new interactive television applications, including applications dedicated to program enhancements, information services, t-commerce, games, interactive advertising, communications, in addition to personalised television through video-on-demand and digital personal video recorders. With these exciting new applications, viewers are able to move beyond the traditionally passive medium of television, to participate in program content, conduct transactions, gather information and generally tailor content consumption to suit their own needs.

The research conducted in writing this paper revealed that some interactive television applications are more appealing to viewers, in particular, direct program enhancements, participatory quiz shows, voting, dedicated interactive games, sports programming enhancements, and betting. Time shifting technologies, such as video-on-demand and personal video recorders have also been consistently cited by viewers as the most appealing aspects of digital television, although the underlying business models of these applications have yet to be adequately tested. In fact, similar to the problems faced by multi-channeling, interactive television has yet to establish viable commercial foundations, with gambling at present accounting for the lion's share of interactive revenue in the most developed iTV markets. Other applications, such as information based services and t-commerce have, in general, failed to meet expectations, although t-commerce tends to generate viewer interest when directly connected with programming, in particular impulse buying of program merchandise.

Research has also revealed promising viewer responses to interactive advertising applications, though it remains to be seen whether viewers maintain their enthusiasm over the longer term, should such applications become a common feature of television. The advent of user controlled advertising, along with video-on-demand and time shifting video recorders, represents a potential paradigm shift in the transmission and consumption of television content, disrupting the flow of content, and undermining the broadcasting business models that are predicated on sufficient viewer consolidation to generate adequate advertising revenues. The author maintains that somewhere in the television chain, someone must pay for quality content. It is perhaps for these reasons that traditional commercial broadcasters have resisted the push to roll out costly time shifting and

interactive applications, given that they may in fact seriously undermine profitability. However, with many cable and satellite pay TV providers aggressively developing these applications, in an effort to reduce customer churn, it is perhaps only a matter of time before traditional broadcasters are forced to address the challenge.

The ultimate determining factor in whether interactive applications play a central role in television programming, or are relegated to an inconsequential periphery position, is the needs and wishes of television viewers themselves. Initial data indicates that viewers are less than enthusiastic about interacting with their television sets, seemingly supporting the argument that television is best suited to the passive consumption of linear content. However, as this paper has revealed, viewers do demonstrate an interest in interactive applications that compliment the emotional and immediate nature of the television medium. Combined with the more involving viewing experience of High Definition television, and an increasing awareness among viewers of the capabilities of interactive applications, it is certainly possible to argue that interactive television will overcome its initial problems to deliver a successful form of television.

Finally, it is into this uncertain and rapidly evolving technological environment that program content creators must continue to operate, producing content for today, as well as for tomorrow. To that end, program makers should maximise the life span of their content by adopting high definition content acquisition, in particular digital HD, film, or at the very least, the newly emerging EDTV 24p format.

REFERENCES

Agency.com (2001). *Case Study: ROFL* [Brochure]. Agency.com, September 18. Retrieved May 22, 2002 from the World Wide Web: <http://www.broadbandbananas.com/rofl.pdf>

Alesso, P. (2000). *E-Video, Producing Internet Video as Broadband Technologies Converge*. Upper Saddle River, NY: Addison Wesley.

Austar Communications (2002). *Interactive TV, The Facts*. Sydney, Australia.

Australian Broadcasting Corporation Web page (2002). *Media Release, BBC Worldwide Asia Pacific and ABC New Media bring Australian audiences interactive Beasts*. 21/5/2002. Retrieved May 20, 2002 from the World Wide Web: <http://www.abc.net.au/corp/pubs/s560509.htm>

Baltimore (2002). Discovery Communications to launch 'high-definition' channel. April 16. *Baltimore Business Journal*. Retrieved April 27, 2002 from the World Wide Web: <http://baltimore.bizjournals.com/baltimore/stories/2002/04/15/daily19.html>

BBC News Web page (2001). *Interacting With Beasts*. November 15. Retrieved May 26, 2002 from the World Wide Web: http://news.bbc.co.uk/hi/english/entertainment/tv_and_radio/newsid_1658000/1658575.stm

Birkmaier, C (1999). *The Future of Television*, Retrieved March 5, 2002 from the World Wide Web: <http://www.digitaltelevision.com/future/index.shtml>

Birkmaier, C (2000). *High Noon At The DTV Corral, The Business of Digital Television*, Aug/Sept 2000. United Media Entertainment. Retrieved on April 19, 2002, from the World Wide Web: <http://www.digitaltelevision.com/business0800a.shtml>

Bowring, J (2002). Author conducted Interview at Lemac April 10, 2002.

Branigan, T (1999). *FACTS submission to options paper: Multichannelling* by the National Broadcasters (ABC and SBS) Review, Dept. of Communications, Information Technology and the Arts. FACTS. Retrieved April 2, 2002 from the World Wide Web: http://www.dcita.gov.au/nsapigraphics/?Mlval=dca_dispdoc&pathid=%2fsubs%2fmultichannel%2findex%2html

Brinkley, J (1997). *Defining Vision: The Battle for the Future of Television*. Orlando, FL: Harcourt Brace & Company.

Broadbandbananas Web page. (2002). *ITV Video Vault*. Retrieved May 10, 2002 from the World Wide Web: <http://www.broadbandbananas.com/videovault.html>

Broadcasting Services Act (1992/2000). Amended 2000. *Commonwealth of Australia*.

Cable Telecommunications Association for Marketing (2001). *In Video on Demand: Is Time for advertisers to take notice*. ITV Marketer, March 2002. Retrieved May 26, 2002 from the World Wide Web: <http://www.itvmarketer.com/oped/ed030602.htm>

Carton, Sean (2002). *In The Future of Interactive Television: Report From Two Alternate Universes*. March 13. [GartnerG2 Study]. Retrieved May 27, 2002 from the World Wide Web: http://www.clickz.com/tech/lead_edge/article.php/989971

CEA (2001). *CEA Applauds NBC HDTV Programming Announcement*. October 9. Retrieved April 21, 2002 from the World Wide Web: http://www.ce.org/about_cea/cea_initiatives/viewCEAInitiativesPressReleases.asp?name=269

Chippendale, M and Leach, R (2001). *Implementing an interactive campaign and the opportunities and threats to success*. Access Conferences. Retrieved May 25, 2002 from the World Wide: <http://www.broadbandbananas.com/skyiad.pdf>

Crane, John (2001). *TEN DTV – What is the Australian Television Receiver Standard?* TEN Network. Retrieved February 25, 2002 from the World Wide Web: <http://www.ten.com.au>

Cross, Richard (2000). *DTV - Creating New Revenue Opportunities*. The Business of DTV, July. Retrieved March 20, 2002 from the World Wide Web: <http://www.digitaltelevision.com/business.shtml>

Datamonitor (2001). *In Web page iTV Games and Gambling*, 1st edition. May 2001, ITVMarketer. Retrieved May 25, 2002 from the World Wide Web: <http://www.itvmarketer.com/mktres/itvgames/mrgames02.htm>

DBA (2002). *DBA Newsletter, April/May 02*. Digital Broadcasting Australia. Retrieved April 21, 2002 from the World Wide Web: <http://www.dba.org.au/newsletter/IB-apr02-full.asp>

DCITA Review (1999). *Review of Digital Television Format Standards (High Definition Television) Call for Submissions*. Dept. of Communications, Information Technology and the Arts. Retrieved April 2, 2002 from the World Wide Web: http://www.dcita.gov.au/text_welcome.html

DCITA (2002). *Commencement of high definition television quota*. Dept. of Communications, Information Technology Accessed 21/4/02 Retrieved on August 28, 2002, from the World Wide Web: http://www.dcita.gov.au/Article/0,,0_1-2_1-4_111020,00.html

DCITA Review National Broadcaster (1999). *Review into National Broadcaster Multi-channelling – Analysis of Submissions and Discussion of Options*. Dept. of Communications, Information Technology and the Arts. Retrieved April 2, 2002 from the World Wide Web: http://www.dcita.gov.au/nsapi-graphics/?MIval=dca_dispdoc&ID=3437

DCITA (2000). *What is digital television? – [Fact Sheet]*. Dept. of Communications, Information Technology Accessed 21/4/02

Retrieved on April 4, 2002, from the World Wide Web: http://www.dcita.gov.au/nsapi-graphics/?MIval=dca_dispdoc&ID=528

DCITA Review (2000). *Review into captioning standards call for submissions*. Dept. of Communications, Information Technology. Accessed 21/4/02
Retrieved on April 10, 2002, from the World Wide Web: http://www.dca.gov.au/nsapi-graphics/?MIval=dca_dispdoc&ID=3486

Department of Communications Information Technology and Arts (1999).
Digital Broadcasting and Datacasting – [Fact Sheet]. December 21. Retrieved March 12, 2002 from the World Wide Web: http://www.dcita.gov.au/nsapi-graphics/?MIval=dca_dispdoc&ID=4718

Digital Broadcasting Australia (2002). *Regular Widescreen Programming April 2002*. . Retrieved May 15, 2002 from the World Wide Web:
http://www.dba.org.au/templates/files/Widescreen_Schedule.pdf

DigitalTelevision.com (2002). Yes, But VHS Sill A Stronghold, March 2002. *United Entertainment Media*. Retrieved on March 21, 2002, from the World Wide Web:
<http://www.digitaltelevision.com/2002/march/digital.shtml>

DVB (1998). *DTTB – Why Choose DVB?* Digital Video Broadcasting organisation. Retrieved on April 21, 2002, from the World Wide Web
http://www.dvb.org/resources/pdf/dvb_whychoose.pdf

DVB (?). *Technical Issues and Concerns Facing Broadcasters As They Deploy DTV*. Digital Video Broadcasting organisation. Retrieved on April 21, 2002, from the World Wide Web
http://www.dvb.org/dvb_technology/pdf/Moving%20to%20DTV.pdf

DVB (2002). *Korean Tests Prove Superiority of DVB-T, January 17*. Digital Video Broadcasting organisation. Retrieved on April 21, 2002, from the World Wide Web: <http://www.dvb.org/news/index.html>

eBrain (2002). *Consumer Perspectives of HDTV III*. April 2002. eBrain Consumer Research, CEA.

Eakin, J (2001). *Creating For DTV*. TEN Network. Retrieved February 25, 2002 from the World Wide Web: <http://www.ten.com.au>

Encel, A (2001). *Digital TV - We're Ready When You Are*. Encel Stereo. Retrieved April 25, 2002 from the World Wide Web:
http://www.encelstereo.com.au/enchtml/newshhtml/digtvnews_nb.html

Encel, A (2002). *Digital TV Facts*. Retrieved April 25, 2002 from the World Wide Web:
<http://www.digitaltvfacts.net>

- Eng, P (2002). HDTV PDQ? Will High-Definition Digital Take Root in 2002? *ABC News*. Retrieved April 21, 2002 from the World Wide Web:
<http://abcnews.go.com/sections/scitech/DailyNews/highdeftv020107.html>
- ePulse.org (2001). *New CEA Research Shows Overwhelming Support for DTV, Great Desire For More Content*. July 31. Source: CEA. Retrieved April 25, 2002 from the World Wide Web: <http://www.epulse.org/cgi-bin/prsearch.cgi?record=2436>
- ePulse.org (April 2002). *CEA Responds to FCC Chairman Powell's Letter Regarding HDTV Transition*. April 8. Retrieved April 25, 2002 from the World Wide Web:
<http://www.epulse.org>
- ePulse.org (2002). *DTV Product Sales Lead to Strongest First Quarter in History, April 25*. Source: CEA. Retrieved April 25, 2002 from the World Wide Web:
<http://www.epulse.org/press/2879.html>
- Everitt, D (2002). *Hi-def TV takes off at last, no joke*, February 2. Media Life. Retrieved April 16, 2002 from the World Wide Web:
http://www.medialifemagazine.com/news2002/feb02/feb11/2_tues/news5tuesday.html
- Fair, Patrick (2000). Radio Interview transcript, The World Today. Sept. 22, *ABC Radio*. Retrieved May 25, 2002 from the World Wide Web:
<http://www.abc.net.au/worldtoday/s185941.htm>
- Financial Post (2002). B SkyB cuts Q3 loss on subscriber, sales gains: 'If you want access, to channels, there is only one source', May 11. *Financial Post*. Retrieved from EBSCO online database May 20, 2002.
- Fischetti, M (2001). The Future of TV, November. *Technology Review*. Retrieved March 13, 2002 from the World Wide Web:
http://www.technologyreview.com/magazine/nov01/print_version/fischetti.html.
- Forrester (2001). *Reported in 3rdSense, Why Consider Games?* Retrieved May 19, 2002 from the World Wide Web:
http://www.3rdsense.com/why_games.htm
- Forrester/iTV Marketer (2001). *In Video on Demand: Is Time for advertisers to take notice*, ITV Marketer. March 2002 Retrieved May 21, 2002 from the World Wide Web:
<http://www.itvmarketer.com/oped/ed030602.htm>
- Fraser, (2002). Austar board opt for more options, May 31. *Australian IT, The Australian*. Retrieved June 2, 2002 from the World Wide Web:
<http://australianit.news.com.au/articles/0,7204,4420968%5e15316%5e%5enbv%5e15306,00.html>
- Grotticelli, M (2001). Interactive Media: reviving ReplayTV, September 10. *Broadcasting & Cable*.

Harvey Norman (2002). Author visits Harvey Norman store at Southland, Victoria, on May 10, 2002.

Heller, L (2001). Better Pricing, DVD growth Keep HDTV Sales on the Rise, November 5, 2001. *DSN Retailing Today*. Retrieved from EBSCO online database on April 16, 2002.

Herd, N (1999). *SPAA submission to options paper: Multichannelling* by the National Broadcasters (ABC and SBS) Review, Dept. of Communications, Information Technology and the Arts. SPAA. Retrieved April 2, 2002 from the World Wide Web:
http://www.dcita.gov.au/nsapigraphics/?MIval=dca_dispdoc&pathid=%2fsubs%2fmultichannel%2findex%2ehtml

Herranen, H (2001). *How Film is Transferred to Video*. Retrieved on March 29, 2002 from the World Wide Web: <http://www.cs.tut.fi/~leopold/Ld/FilmToVideo/>

Hodgson, (2002). Digital Britain could cost 10bn, March 28. *Guardian Newspapers Limited*. Retrieved May 20, 2002 from the World Wide Web:
<http://media.guardian.co.uk/broadcast/story/0,7493,675671,00.html>

Hoffman, K (2001). The Tube Gets Smart. *Internet World*. June 15. Retrieved May 23, 2002 from the World Wide Web:
http://www.kpe.com/press/article_2_2_.jsp?articleID=53#

ISP News (2002). *MS Cuts, Reorganizes UltimateTV*, Jan 23. INT Media Group. Retrieved May 15, 2002 from the World Wide Web: http://www.internetnews.com/isp-news/article.php/8_959911

ITV Marketer (2002). *Is there a future for t-commerce*. February 11. Retrieved May 26, 2002 from the World Wide Web: <http://www.itvmarketer.com/oped/ed021102.htm>

Iisakkila, M (2000) Web site. Video Recording Formats, September 20. Retrieved on March 29, 2002, from the World Wide Web: <http://www.hut.fi/~iisakkil/videoformats.html>

Jennings, R (1997) Web site. DV vs. Betacam SP: 4:1:1 vs. 4:2:2, Artifacts and Other Controversies. *DV & Firewire Central*. Retrieved on March 10, 2002, from the World Wide Web: <http://www.dvcentral.org/DV-Beta.html>

Jensen, J.F (1999). *The Concept of Interactivity, Interactive Television*. Aalborg, Denmark: Aalborg University Press. In Van Tassel, J (2001) *Digital TV Over Broadband*. Woburn, MA: Focal Press/Butterworth-Heinemann (p. 157).

Jupiter Research (2001). *In Video on Demand: Is Time for advertisers to take notice*, ITV Marketer. March 2002. Retrieved May 26, 2002 from the World Wide Web:
<http://www.itvmarketer.com/oped/ed030602.htm>

JVC press release (2002). *In Hollywood Unveils First Wave of D-VHS Titles*, June 3. Smart TV & Sound. Retrieved June 6, 2002 from the World Wide Web:
<http://www.smarttvandsound.com>

Kagan World Media (2001). *In 'PVR's and VOD'* London, Simon Hochhauser. 20th March 2001 A Retrieved May 21, 2002 from the World Wide Web:
<http://www.accessconferences.com>

Kallender, P (2001). Panasonic sets up shop in Hollywood to provide digital cinema base. *Electronic Engineering Times*. September 4. Issue 1161, p24.

Larson, M (2002). *Media Week Feature – Cable Seeks Value in VOD*. May 13. Retrieved May 27, 2002 from the World Wide Web:
http://www.mediaweek.com/mediaweek/search/search_display.jsp?vnu_content_id=1487971

Lemac (2002). *HDTV demonstration tape*. Viewed by author April 10, 2002, at Lemac production facility in Melbourne, Australia.

Liddel, C (2001). *How Will iTV Be Delivered?* August 31. INT Media Group. Retrieved May 27, 2002 from the World Wide Web:
<http://australia.internet.com/r/article/jsp/sid/10942>

Meade, A (2002). Seven Fails to Score Single Top 20 Program. April 18. *The Australian*. Media Section, P11.

Mecklenburgh, Ian (2001). *Future of Interactive DTV in the UK*. BECTA – Expert Technology Seminar. Head of Digital Media & Broadband Solutions, BBC Technology. December 12, 2001. Retrieved May 21, 2002 from the World Wide Web:
<http://www.becta.org.uk/technology/techseminars/121201/bbctechnology2.pdf>

Miller, M (?) *Defining Interactive Television, If you build it they will come....but what is it?* In Birkmaier, C. *The Business of Digital Television*, March 2001. Retrieved March 10, 2002 from the World Wide Web <http://www.digitaltelevision.com/business/index.shtml>

Miles, P & Sakai, D (2001). *Internet Age Broadcaster*. Washington, DC: National Association of Broadcasters.

Mori (2001). *Final Report, Digital Television 2001*, Research Study Conducted for Department of Culture, Media and Sport (UK). Retrieved April 20, 2002 from the World Wide Web: http://www.digitaltv.culture.gov.uk/pdfs/digtv_final_report.pdf

Myer (2002). Author visits Myer store at Chadstone, Victoria, on May 19, 2002.

Online ITV Dictionary (2002). *Grand National Press*. Retrieved May 19, 2002 from the World Wide Web: <http://www.itvdictionary.com/dictionary.html>

- OpenTV (2002). *Applications*. [Brochure]. Retrieved May 5, 2002 from the World Wide Web: <http://www.opentv.com/solutions/applications/>
- Panasonic (2001). *Panasonic Icon Case Study*. [Powerpoint presentation]. Retrieved May 25, 2002 from the World Wide Web: <http://www.broadbandbananas.com/panasonic.pps>
- Peretz, M (2001). Study: *iTV Battles Almost Complete Lack of Interest*. Sept. 5. INT Media Group. Retrieved May 20, 2002 from the World Wide Web: http://www.internetnews.com/bus-news/article.php/8161_878511
- Prikios, K (2001). Finding the Art in HDTV. June 25. *Broadcasting and Cable*.
- Productivity Commission (2000). *Broadcasting Inquiry Report*. March 3. Productivity Commission, Canberra, Australia: Commonwealth of Australia. Retrieved March 12, 2002 from the World Wide Web: <http://www.pc.gov.au/inquiry/broadcst/finalreport/>
- Richards, D (1999). *Australian Subscription and Television and Radio Association submission to options paper: Multichannelling* by the National Broadcasters (ABC and SBS) Review, Dept. of Communications, Information Technology and the Arts. Australian Subscription and Television and Radio Association. Retrieved April 2, 2002 from the World Wide Web: http://www.dcita.gov.au/nsapi-graphics/?MIval=dca_dispdoc&pathid=%2fsubs%2fmultichannel%2findex%2ehtml
- Silbergleid, M & Pescatore, M (2000) (Ed) *The Guide to Digital Television*. Retrieved on March 5, from the World Wide Web: <http://www.digitaltelevision.com/publish/dtvbook>
- Sharp, C (1999). *SBS letter to Dept. Communications, Information Technology and the Arts*. Submission on Review of Digital Television Format Standards. Retrieved April 10, 2002 from the World Wide Web: http://www.dcita.gov.au/text_welcome.html
- Shapiro, G (2002). *DTV Update*. High Definition Highlights. DTV Update, April 2002. CEA.
- Shulze, J (2001). Seven Takes Bat to HDTV. December 10. *The Australian*. Retrieved from EBSCO online database on April 12, 2002.
- Sony (2001) *Arrival of a 24-Frame Progressive Scan HDTV Production System Implications for Program Origination*. Brochure. Sony Electronics. P18.
- Sony FAQ (2001). *FAQ's for the HDW-F900*. September. [Brochure]. Sony Electronics Inc.
- SMPTE/EBU (1998). Task Force for Harmonized Standards for the Exchange of Program Material as Bitstreams Final Report: Analyses and Results. Annex C. Geneva, Switzerland: SMPTE/ECU 1988. Retrieved on March 25, 2002, from the World Wide Web: http://www.ebu.ch/trev_tf-final-report.pdf

Smith, A (2002). BBC hijacks TiVo Recorders, May 24. *The USA Register*. Retrieved May 19, 2002 from the World Wide Web: <http://www.theregister.co.uk/content/54/25436.html>

Swedlow, T (2000). *Interactive Enhanced Television: A Historical and Critical Perspective*. ITVT. Retrieved March 23, 2002 from the World Wide Web: <http://www.itvt.com/etvwhitepaper.html>

Swedlow, Tracy (2002). *Tracy's Swedlow's InteractiveTV Today electronic newsletter*. Issue 4.45 April 12, 2002.

Swedlow, Tracy (2002). *Tracy's Swedlow's InteractiveTV Today electronic newsletter*. Issue 4.41 April 18, 2002.

Swedlow, Tracy (2002). *Tracy's Swedlow's InteractiveTV Today electronic newsletter*. Issue 4.45 April 21, 2002.

Swedlow, Tracy (2002). *Tracy's Swedlow's InteractiveTV Today electronic newsletter*. Issue 4.45 April 29, 2002

Swedlow, Tracy (2002). *Tracy's Swedlow's InteractiveTV Today electronic newsletter*. Issue 4.45 May 1, 2002.

Swedlow, Tracy (2002). *Tracy's Swedlow's InteractiveTV Today electronic newsletter*. Issue 4.46 May 5, 2002.

Swedlow, Tracy (2002). *Tracy's Swedlow's InteractiveTV Today electronic newsletter*. Issue 4.50 May 27, 2002.

TasmanAV (2002). [Sales Brochure]. [PDF file]. Retrieved April 20, 2002 from the World Wide Web: <http://www.tasmanav.com.au/pages/promotionframe.html>

Time Warner Cable (2002). Web site. Retrieved April 29, 2002 from the World Wide Web <http://www.twcentralflorida.com/services/HDTV/>

Thomas, G (2001). *Metadata for Enhanced Electronic Program Guides*. The Business of Digital Television, March 2001. Retrieved April 19, 2002 from the World Wide Web: <http://www.digitaltelevision.com/business/index.shtml>

Utz, P (?) Web site. Digital VCR Formats. Retrieved on March 29, 2002, from the World Wide Web: <http://videoexpert.home.att.net/artic3/256dvcr.htm>

Van Tassel, J (2001). *Digital TV Over Broadband*. Woburn, MA: Focal Press/Butterworth-Heinemann.

Visionik (2001). *Visionik*. [Brochure]. ROFL. Retrieved May 22, 2002 from the World Wide Web: <http://visionik.com/enhancedtv/cases/rofl/rofl.htm>

Wallis, T (2001) Web site. The Difference Between Film & Digital Video. Interview with Wallis, Tim, chief technical officer, Kodak Entertainment Division, September. Retrieved on April 4, 2002, from the World Wide Web:
<http://www.kodak.com/country/US/en/motion/news/wallis.shtml>

Weidemann, S (?). *Film Formats and HDTV: A case for the Future Proof Standard*. Henninger Media Services. Retrieved March 20, 2002 from the World Wide Web
<http://www.henninger.com/library/hdtvfilm/home.html>

Wilt, A (1998). *EBU's Evaluation of DV Formats*, November 30. Retrieved March 10, 2002 from the World Wide Web: <http://www.adamwilt.com/EBU-DV.html>

Wilt, A (2002). *DV, DVCAM, & DVCPRO formats*. Retrieved March 10, 2002 from the World Wide Web:
<http://www.adamwilt.com/DV.html>

Wink (2001). *The Power of Interactive TV Today*. Wink Interactive Advertising. Retrieved May 25, 2002 from the World Wide Web: <http://www.accessconferences.com>

Whitaker, Jerry (2001). *Interactive Television Demystified*. New York, NY: McGraw-Hill

Whitaker, Jerry (2001). *DTV Handbook: The Revolution in Digital Video*. New York, NY: McGraw-Hill

White, C (2002). *Digital Acquisition: Technology in Transition. The Big Move From Film to Video. Digital Media Online*. Retrieved May 10, 2002 from the World Wide Web: http://production.digitalmedianet.com/2002/03_mar/features/cw_digitalfilm.htm

White, C NAB (2002). *NAB 2002 Wrap-Up*. Summary of Last weeks show, with daily reports compiled. Retrieved May 15, 2002 from the World Wide Web:
http://www.digitalproducer.com/2002/04_apr/features/04_15/cw_nab_wrap2002.htm

Xinhua News Agency (2001). China Develops PDP High Definition TV Monitor. *Xinhua News Agency*, November 11. Retrieved April 8, 2002 from EBSCO online database.

May 2003 References

Alston DCITA (2002). *HDTV election commitments to be implemented, Media Release*, October 15, 2002. Senator Richard Alston, Minister for Communications, Information Technology and the Arts.

Broadbandbananas (Mar 2003). *Broadband Bananas News electronic newsletter*, March 3, 2003, Broadband Bananas.

Broadbandbananas (April 2003). *Broadband Bananas News electronic newsletter*, April 2, 2003, Broadband Bananas.

Brown, K (2003). *DVR Subs Spend More Tube Time*, 10/3/2003, Vol. 24 Issue 10, Multichannel News.

CEA (2003). *Sales of Digital Video Products on the Rise During First Quarter of 2003*, 14/4/2003, CEA. Retrieved on April 12, 2003, from the World Wide Web: http://www.ce.org/press_room/default.asp

Craig, D (2003). *Foxtel Outlines Plans*, 17 February 2003. Australian Interactive Multimedia Industry Association. Retrieved on April 20, 2003, from the World Wide Web: <http://www.aimia.com.au>

CT's Pipeline/PBI Media (2003). *HDTV: Rollin', Rollin' Rollin' We've been talking a lot about HDTV on these pages over the last few years*, 14/1/2003. PBI Media. Retrieved on April 15, 2003, from the World Wide Web: <http://www.digitalbroadcasting.com/content/news/>

DBA (April 2003). *DBA Information Bulletin, April-May 2003*. Digital Broadcasting Australia. Retrieved on April 20, 2003, from the World Wide Web: <http://www.dba.org.au/newsletter>

DBA (May 2003). *First Quarter Widescreen Sales Up 94%*. May, 2, 2003, DBA. Retrieved on May 3, 2003, from the World Wide Web: <http://www.dba.org.au>

DBA Schedule (April 2003). *Digital Broadcasting Australia Widescreen HD Program Listing for April 2003*, DBA. Retrieved on April 25, 2003, from the World Wide Web: <http://www.widescreentv.info/>

Daily Mail (April 2003). *Big Losses but Picture is Brighter for NTL*, 1/4/2003, Daily Mail.

Daily Mail (2003). *Telewest Struggles as Value Dwindles*, 28/3/2003, Daily Mail.

DTV Group (2003). *Spain Calls on Industry to Foster DTT*, 26/02/2003, Digital TV Group. Retrieved on April 8, 2003, from the World Wide Web: http://www.dtg.org.uk/news/world/-spain_foster_dtt.htm

Elrich, D (2003). *HDTV's Killer App*, HDTV Guide, Spring 2003. CEA. Retrieved on April 15, 2003, from the World Wide Web: http://www.ce.org/publications/books_references/dtv_guide/hdtv_archives.asp

Forrester, C (2002). *Europe's Time Bomb*, November 2002, p.1 TVB Europe.

Economist, The (2003). *Sky's the Limit*, 1/2/2003, Vol. 366 Issue 8309, p57, The Economist.

Economist, The (Jan 2003). *Heave ho, TiVo!*, 8/2/2003, Vol. 366 Issue 8310, p60, The Economist.

Gibson, K (2002). Will TiVo Revolutionize Television Viewing? Dec 5, 2002, CNN Headline News. Retrieved on April 20, 2003, from the World Wide Web: <http://www.cnn.com/2002/SHOWBIZ/12/04/hln.connect.tivo/index.html>

Griffiths, N (2002). *HDTV in 15% of US Homes by 2008*, October 2002, Strategy Analytics. Retrieved on April 9, 2003, from the World Wide Web: <http://www.strategyanalytics.com/press/PR00025.htm>

HDTV Info Guide (2003). *High Definition Television Defined*. Web site. Retrieved on May 1, 2003, from the World Wide Web: <http://www.hdtvinfoport.com/high-definition-television.html>

In-Stat/MDR (2003). *New Day Has Dawned For DTV Sets*, March 10, 2003. In-Stat MDR Market Alerts. Retrieved on April 12, 2003, from the World Wide Web: <http://www.instat.com/newmk.asp?ID=565>

JVC (2003). *JVC Introduces Ground Breaking Hand0Held Professional HD Camcorder*, April 7, 2003. JVC America. Retrieved on April 15, 2003, from the World Wide Web: http://pro.jvc.com/prof/Attributes/press_res.jsp?model_id=MDL101394&feature_id=08

Lieberman, D (2003). *Taking a DVR for a Spin*, 31/3/2003, USA Today.

McMahon/Flanagan (2001). *Mining TV's Interactive Potential*, 21/5/2001, Vol. 22 Issue 21, Multichannel News.

Merson, G (2003). *HDTV Insider News*, March/April 2003. The Perfect Vision.

Merson, G (2003). *High Definition Sources and Programming*, March/April 2003. The Perfect Vision.

Morton, C (2003). *Datacasting in Australia*, A paper delivered to the Australian Broadcasting Summit, February 2003.

NAB (2003). *NAB 2003*, Mar 1, 2003, Millimeter. Retrieved on April 15, 2003, from the World Wide Web: <http://www.millimeter.com>

People's Daily (2003). *China Plans Own Digital TV Standard*, 15/4/03. The People's Daily. Retrieved on April 5, 2003, from the World Wide Web: http://english.peopledaily.com.cn/200101/31/eng20010131_61347.html

Pescatore, M (2003). *How Many More Milestones? – HD Should Be Reality, Not Novelty*, Jan 14, 2003, 2-PopHD. Retrieved on April 14, 2003, from the World Wide Web: http://www.2-pophd.com/articles/article_63.shtml

Renaud, J (2000). *A Status report on HDTV in Europe*, May 2000, Vol. 9, Issue 5, TVB Europe.

Shapiro, G (CEA, 2003) *HDTV – “I’ll Take It!”*, HDTV Guide, Spring 2003. CEA. Retrieved on April 15, 2003, from the World Wide Web: http://www.ce.org/publications/books_references/dtv_guide/hdtv_archives.asp

Snider, M (2002) *Digital VHS Teams with HDTV for a Picture that Comes Alive*, 27/8/2002, USA Today. Retrieved on September 1, 2002, from the World Wide Web: http://www.usatoday.com/tech/techreviews/products/2002-08-27-digital-recorder_x.htm

Swedlow, T (Nov 2002). Tracy Swedlow's InteractiveTV Today electronic newsletter. Issue 4.78 November 4, 2002.

Swedlow, T (April 2003). Tracy Swedlow's InteractiveTV Today electronic newsletter. Issue 5.02 April 17, 2003.

Swedlow, T (Feb 2003). Tracy Swedlow's InteractiveTV Today electronic newsletter. Issue 4.95 February 18, 2003.

Taub, E (2003). *HDTV's Acceptance Picks Up Pace*, March 31, 2003. The New York Times.

Ulrich, J (2003). *HDTV Viewers: The New “Upscale” Demo*, Mar 5, 2003, UEMedia. Retrieved on April 15, 2003, from the World Wide Web: http://www.uemedia.com/CPC/printer_5735.shtm

Veldre, D (2003). *Time Not Right for iTV*, Says Optus, 12 February 2003, B&T Marketing & Media. Retrieved on April 20, 2003, from the World Wide Web: <http://www.bandt.com.au/articles/dc/0c0141dc.asp>

Figure and Table Sources

Table 3.1 Silbergleid, M & Pescatore, M (2000)

Table 3.2 Standards Australia (1999).

Figure 2.1 Bird, J (2002).

Figure 2.2 Productivity Commission, Commonwealth of Australia (2000).

Figure 3.1. Current Concepts Home Automation Specialists (2002) Web site. Home Theater Systems. Retrieved on June 6, from the World Wide Web: http://www.currentconceptshas.com/Hometheater/Home_Theater_Image_2/home_theater_image_2.html.

Figure 3.2 Cordero, R/Home Theatre Magazine (2001) Web site. Marantz PD5010D 50-Inch Plasma HD Monitor. *Home Theater Magazine*. Retrieved on June 6, from the World Wide Web: <http://www.hometheatermag.com>

Figure 3.3 Home Theatre Magazine (2001) Web site. Hitachi 43UWX10B 43-Inch Plasma HD Monitor. Retrieved on June 6, from the World Wide Web: <http://www.hometheatermag.com>

Figure 3.4 CEA (2002) Corporate Report 2001 – 2002. *Consumer Electronics Association*. P.9

Figure 3.5 Sony (2002).

Figure 3.6 Lemac (2002).

Figure 3.7 Sony (2001)

Figure 3.8 Lemac (2002).

Figure 3.8b JVC (2003).

Figure 3.9 Bird, J (2002). Measurement source: American Cinematographers Manual, 3rd Edition (2001).

Figure 4.1 BroadbandBananas (2002).

Figure 4.2 BroadbandBananas (2002).

Figure 4.3 BroadbandBananas (2002).

Figure 4.4 BroadbandBananas (2002).

Figure 4.5 BroadbandBananas (2002).

Figure 4.6 BroadbandBananas (2002).

Figure 4.7 Liberate (2002) Web site.

<http://solutions.liberate.com/demo/communication/page1.html>

Figure 4.8 BroadbandBananas (2002).

Figure 4.9 BroadbandBananas (2002).

Figure 4.10 BroadbandBananas (2002).

Figure 4.11 BroadbandBananas (2002).

Figure 4.12 BroadbandBananas (2002).

Figure 4.13 BroadbandBananas (2002).

Figure 4.14 BroadbandBananas (2002).

Figure 4.15 BroadbandBananas (2002).

Figure 4.16 BBC World Cup soccer 2002.

Pay TV & Satellite News 31/05/2002. Electronic Newsletter.

Figure 4.17 BBC World Cup 2002.

Pay TV & Satellite News 31/05/2002. Electronic Newsletter.

Figure 4.18 BroadbandBananas (2002).

Figure 4.19 BroadbandBananas (2002).

Figure 4.20 BroadbandBananas (2002).

Figure 4.21 BroadbandBananas (2002).

Figure 4.22 BroadbandBananas (2002).

Figure 4.23 BroadbandBananas (2002).

Figure 4.24 BroadbandBananas (2002).

Figure 4.25 BroadbandBananas (2002).

Figure 4.26 Forrester/iTV Marketer (2001) In Video on Demand Projected Revenues in the United States; Impact upon consumer rental habits, *iTV Marketer* 2001-2002 http://www.itvmarketer.com/deployments/vod_deployments.htm

Figure 4.27 BroadbandBananas (2002).

Figure 4.28 BroadbandBananas (2002).

Figure 4.29 Access Conferences/Chippendale, M and Leach, R (2001).

Figure 4.30 eMarketer (2002) Web page. In Is iTV Gambling a Bet Worth Taking? ITV Gambling Revenues in Europe , March 13. Source *Datamonitor* 2001. Retrieved May 20, 2002 from World Wide Web: http://www.entrepreneur.com/Your_Business/YB_SegArticle/0,4621,298124,00.htm

Figure 4.30b BroadbandBananas (2003).

Figure 4.31 BroadbandBananas (2002).

Figure 4.32 BroadbandBananas (2002).

Figure 4.33 Access Conferences/Chippendale, M and Leach, R (2001).

Figure 4.34 BroadbandBananas (2002).

Figure 4.35. BroadbandBananas (2001).

Figure 4.36 BroadbandBananas (2001).

Figure 4.37 UEC (2002) Web page. Product Guide. Retrieved March 15, 2002 from the World Wide Web: <http://www.uec.co.za/products/body.htm>

Figure 4.38 TiVo (2002)

Figure 4.39 Forrester/iTV Marketer (2001)
http://www.itvmarketer.com/deployments/vod_deployments.htm

Figure 5.1 European Broadcasting Union (1998), qtd in Wilt (1998)

Figure 5.2 European Broadcasting Union (1998), qtd in Wilt (1998)

Figure 5.3 European Broadcasting Union, qtd in Wilt (1998)

Figure 5.4 European Broadcasting Union (1998), qtd in Wilt (1998)

