



# IPTV and Internet video services

The IPTV and Internet video market in Australia

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# 1 Executive summary

The Australian Communications and Media Authority (ACMA) has completed the first of a series of reports examining the delivery of content over Internet Protocol (IP). It is important for ACMA, as an evidence-based regulator, to understand the evolving nature of the content delivery methods and convergence occurring between the media and communications industries. This report examines one aspect of these developments: Internet Protocol Television (IPTV) and Internet video. ACMA is intending to undertake further research examining broader aspects of content delivery over IP, including online content provision and emerging content business models. This report is not intended to be a definitive view of Internet video and IPTV. ACMA values maintaining an ongoing dialogue with industry on these topics and would welcome feedback on the findings of this report.

The increasing penetration of high bandwidth Internet connections and ongoing advances in information technology are driving convergence in the media and communications industries. The result is new delivery methods, new content and changing consumer behaviour. Part of this trend is the development of IPTV and Internet video services—two of several ways that film and television content is now being delivered to Australian consumers. At a basic level, IPTV is the delivery of multimedia services over a managed IP network. In the communications industry, IPTV is often seen as ‘Telco TV’, a subscription television service offered by DSL-based telecommunication carriers.

Desktop research and a series of face-to-face interviews with operators in the telecommunications, Internet and content industries were used to inform this report. The output of this study is an introductory overview of the IPTV and Internet video market in Australia.

IPTV is a catch-all term that refers to a range of services. This report does not attempt to define IPTV; rather it will focus on the ‘Telco TV’ view in its analysis of the IPTV and Internet video market in Australia. Internet video is a complex market encompassing a wide range of services including user-generated content, videos on social networking sites, and video podcasts. The discussion of Internet video for the purposes of this report is limited to websites that provide full-length, professionally produced content that is provided with content owner consent (‘professional content’). This selection excludes pirated content offered through such mechanisms as BitTorrent and clips of professional content that can be provided through websites such as YouTube. This allows a deeper examination of new content delivery methods that complement and compete with existing models of delivery, such as free-to-air (FTA) and subscription television services.

## **E.1 Findings**

### **CHANGING CONTENT ENVIRONMENT**

Interviewees were generally confident that IPTV and Internet video will become more common in Australia in the future. Estimates ranged from 18 months to three years.

Consumers are becoming increasingly discerning about how, when and in what form they consume content. As a result, more content will be provided on an on-demand basis. However, development of on-demand content services will depend on issues such as pricing, network capability and content owner attitudes.

Improved video encoding, combined with increasing bandwidth, will have an impact on the Internet's ability to provide a video content service that may rival traditional broadcasting platforms in the long term.

Subscription television providers who utilise fibre and cable may, in the long term, provide linear content over the IP portion of the service connection rather than through the transport mediums used at present. Motivations for the changeover will include potential cost savings and more informed customer decisions about channel and content.

Developments in infrastructure, both in terms of access and core networks, will also influence the development of the IPTV and Internet video market in Australia. The government's planned fibre to the node (FTTN) network tender and recent activity by Telstra in upgrading a number of exchanges to ADSL2+ potentially offer other high speed broadband networks for delivery of IPTV and Internet video.

### **AUSTRALIAN IPTV AND INTERNET VIDEO MARKET**

The Australian IPTV and Internet video market is less developed than many other markets internationally. There is yet to be a fully-fledged IPTV deployment in Australia—fewer than five IPTV providers and 15 Internet video service suppliers offered full-length professional content to consumers operating in the Australian market in 2007. Supply-side factors are seen as the main barriers to the development of these services.

IPTV is a carrier-led and controlled platform and, as such, network upgrades by telecommunications operators and Internet Service Providers (ISPs) are a critical step in the development of the service. Increasing Internet penetration and, more importantly, increasing broadband penetration has provided a third platform for the delivery of electronic media services, in addition to FTA broadcasting and subscription television.

Smaller ISPs have launched limited IPTV offerings. For example, TPG offers an IPTV over the Personal Computer (PC) service. Content providers, content aggregators, ISPs and telecoms providers are experimenting with Internet video websites, ranging from Reeltime's Video on Demand (VOD) website to selected Channel Nine television shows available for download on the ninemsn website.

### **DRIVERS FOR IPTV AND INTERNET VIDEO DEPLOYMENT**

A common theme coming out of the interviews was that the interest shown in IPTV by telecoms operators and ISPs is due more to the effect of IPTV on customer acquisition and retention rates than to potential revenues. Telecoms operators and ISPs view IPTV and Internet video services as an avenue for differentiation.

However, for content providers, who generally do not have to invest in the infrastructure to deliver the service or sell a package directly to the consumer, the IPTV and Internet video offerings of telecoms operators and ISPs represent a new delivery mechanism and consequently a potential new revenue source.

## **BARRIERS FOR IPTV AND INTERNET VIDEO DEPLOYMENT**

Interviewees were asked for their views on the impediments in the Australian market to IPTV and Internet video deployment. The existing broadband market structure in Australia is seen as the prime barrier to IPTV and Internet video deployment, particularly bandwidth, backhaul and capped broadband plans.

The following barriers to deployment for IPTV were often discussed in the interviews:

- **Capital expenditure:** The upfront costs involved in rolling out IPTV are a major barrier for deployment in Australia. Cost estimates vary and are heavily dependent on the context of the IPTV deployment—the network size and topology, technology choice and proposed service offerings.
- **ISP scale:** Due to the upfront costs involved in rolling out the service, the IPTV business case is dependent on achieving large-scale take-up of the customer base covered. Some interviewees felt that many ISPs in Australia would not have the subscriber base to satisfy an IPTV business case.

A barrier for Internet video frequently discussed in interviews was the prevalence of capped plans and the price of downloads in the broadband access market. Data quotas on broadband access plans are seen to be discouraging the use of broadband for high bandwidth applications. Some ISPs are using this situation to promote their own services by forming content provider partnerships that allow their customers to download specific content without affecting their download limit.

Commonly mentioned barriers that apply to both IPTV and Internet video were:

- **Backhaul:** The cost of backhaul is an important barrier to IPTV and Internet video development as it makes transporting and serving high bandwidth content expensive.
- **Bandwidth:** DSL data rates experienced by users in Australia differ depending on the condition and length of the copper loop. This impacts the ability to provide video services, which are bit-rate sensitive, to all subscribers.
- **Lack of experience:** IPTV and Internet video services require different business models and supplier competencies compared to Internet and phone access services. Depending on the network owners' level of involvement in IPTV or Internet video services, the lack of experience could make deploying such a service very difficult.
- **Content providers:** The cost and time investment in dealing with content providers, as well as their interest in maximum audience reach and dealing with established players is a barrier to sourcing content.
- **Piracy:** The proliferation of peer-to-peer (P2P) networks, such as BitTorrent, that allow users to illegally download professional content can inhibit take-up of IPTV and Internet video.

The recent expansion in ADSL2+ coverage and the proposed FTTN network may address some of these barriers.

## **BUSINESS MODELS**

Many international IPTV providers have taken a subscription television-like approach, where the service is virtually identical to a cable- or satellite-based subscription television provider product. In Australia, only TransACT offers such a service and it is limited to the Canberra region.<sup>1</sup>

Other IPTV providers take a more limited approach by only offering a small number of channels, sometimes with niche content, or by using a PC delivery model and different pricing arrangements. An IPTV provider may choose this option to reduce the level of investment required, because of a lack of available content, or to differentiate from existing subscription television providers.

There are a number of Internet video business models, including sponsorship, advertising-supported and pay-per-view. Full-length professional content is typically provided on a pay-per-view basis but can also be shown on a promotional or advertising-supported basis.

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<sup>1</sup> TransACT states that it delivers TV over DSL services to the areas covered by its FTTN/VDSL network and IPTV services to those suburbs covered by its Fibre to the Home (FTTH) network. This report includes all of TransACT's TransTV services under the umbrella of IPTV services for the purposes of analysing the IPTV and Internet video market in Australia.

## 2 Introduction

### 2.1 The big picture

The interplay of new delivery mechanisms, the emergence of new types of content and engaged consumers are changing the media and communications industries. Underpinning these trends is the increased penetration of high bandwidth Internet connections and advances in information technology, which result in new services, new business models and changed consumer behaviour. The changing nature of various industries is shown in Table 1.

**Table 1: New avenues for media and communications industries**

Methods of delivery	Video games	Music	Film & TV	Communications
<b>Traditional examples</b>	Game consoles	Radio, Stereo, TV, music stores	FTA and subscription television, cinemas, video/DVD stores	Fixed telephone, mobile telephone
<b>Broadband examples</b>	Massive multi-player online role-playing games (MMORPGs)	Online radio stations, online websites offering music video clips, online music stores	Various online avenues for downloading or streaming content, including IPTV, hybrid offerings, <sup>2</sup> and various types of websites	VoIP; websites offering voicemail capabilities; social networking sites
	User-generated content			

These developments have significant implications for the structure of the video game, music, film and television, and communications industries. Such changes have different implications specific to the industry and should be considered within their own context. This

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<sup>2</sup> Some operators are using IP network capabilities to enhance their existing broadcasting network services. For example, set-top boxes such as TiVO and Foxtel iQ allow storage and retrieval of content and often connect to the Internet.

report will focus on the convergence of film and television content and communications delivered on broadband IP networks.

## TECHNOLOGY ENABLERS OF CONTENT DELIVERY

Underpinning the emergence of these new content delivery methods are a number of key advances in technology. New coding schemes and compression techniques, P2P networks and streaming technologies have enabled content to be encoded and delivered to end-users more efficiently.

### New coding schemes and compression techniques

The increased efficiency of video compression standards, such as H.264 (also known as MPEG-4 Part 10, or MPEG-4 AVC) and VC-1, has enabled good quality video content to be delivered at substantially lower data rates compared with the older and more commonly used MPEG-2 codec. Alternatively, video may be delivered at the same data rate, but with increased quality.

**Table 2: Average bandwidth requirements of different video compression standards**

Encoding	MPEG-2	MPEG-4 Part 10 (H.264)	VC-1
Average Standard Definition (SD)	4 Mbits/s	1.5 Mbit/s	1.5 Mbit/s
Average High Definition (HD)	15 Mbit/s	8 Mbit/s	8 Mbit/s

Source: Kenelm D. Deen, *Contribution and distribution over IP networks*, cited in OECD Working Party on Communication Infrastructures and Services Policy, *IPTV: Market Developments and Regulatory Treatment*, 19 December 2007

### P2P networks

The emergence of P2P networks such as BitTorrent has enabled end-users to easily share multimedia content, both legal and illegal, often independently of any central entity. P2P networks represent a fundamental shift towards distributed network architectures, away from the traditional client-server model where content distribution is centrally controlled. The range of content available over these networks has increased as more users adopt broadband Internet access, enabling much larger files to be transferred between users. More recently, P2P networks have been used for the delivery of Internet TV services such as Joost.

### Streaming technologies

From a protocol perspective, streaming media has been aided by the use of connectionless transport protocols such as User Datagram Protocol (UDP). This is in conjunction with protocols designed specifically to deliver media streams such as Real-time Transport Protocol, Real-time Control Protocol and Real-time Streaming Protocol. Multicast technologies, specifically IP multicast, enable one-to-many communication, allowing more efficient use of network infrastructure by minimising unnecessary duplication of media streams. IP Multicast is commonly used by IPTV services for the delivery of linear content.

The ease with which video can be integrated into websites using Flash<sup>3</sup> technology has helped the establishment of video-sharing websites such as YouTube and Google Video. These sites allow both amateurs and professionals to publish video content in Flash video format. The video content is displayed on web pages using a dedicated multi-platform browser plug-in. Flash video is a ‘container format’ that supports the encoding of video using a variety of different codecs.

## **CHANGING CONSUMER BEHAVIOUR**

As broadband penetration increases, how consumers view and use content is changing. Consumers can now control content by making their own, sharing content over the Internet or accessing saved content from a set-top box (STB) or other devices. Not only are consumers starting to control how, where and when they access content; they are also sourcing it from different providers.

Traditionally, audiences consumed content at the time a television channel or cinema chose. Only FTA television was available and viewers had to watch a program when it aired or miss out altogether. Popular shows created an ‘appointment to view’ for audiences eager to catch the latest episode of their favourite series. The advent of video recorders and subscription television services changed the situation somewhat, although the basic premise of ‘appointment viewing’ remained.

Today, the capacity of devices like personal video recorders (PVRs) to store and retrieve content, and the availability of the same content over a variety of formats and devices has eroded the idea of ‘appointment viewing’. Consumers are now starting to choose when, where and how they access content

This new-found control over accessing content is also apparent in consumers’ interaction with content. There has been an explosion of different types of content; for example, user-generated content and ‘mashing’, whereby different content is spliced together to create a new whole.

## **NEW BUSINESS MODELS**

Content providers, ISPs, telecoms operators and new entrants are all experimenting with providing content through new delivery paths and with new business models. At the same time, consumers who create and control their own content are forcing industry players to look at their own business models and to consider how they can complement and benefit from this trend. One of their most important challenges is how to generate revenue from consumers’ interest in ‘free’ content.

These new business models can be traditional revenue streams that have been expanded and adapted to include new distribution platforms (such as advertising-supported television content on the Internet) or totally new business models. For example, Lulu TV offers users who upload content to the website and pay a monthly fee the opportunity to become

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<sup>3</sup> Adobe Flash is a set of multimedia technologies developed by Macromedia and Adobe Systems. Flash technology is used to create animations, advertisements and interactive web page components, It also supports bi-directional streaming of audio and video.

shareholders. Eighty per cent of its revenue is distributed among these shareholders, according to the number of views their video has received.<sup>4</sup>

Adapting existing business models to an IP delivery method raises several challenges for operators. Key questions include:

- How much and in what form will users accept advertising in order to watch free content, and how can this be balanced with maximising revenues?
- What positioning and type of advertising is the most effective?
- What are consumers willing to pay for different types of content compared to access through DVDs, subscription television or other means?

IP delivery also raises several opportunities; for example, user behaviour can be tracked in greater and more accurate detail, allowing better targeting of niche audiences and greater feedback on audience behaviour.

## **2.2 Purpose**

ACMA has undertaken a study of the IPTV and professional content Internet video<sup>5</sup> market in Australia as part of an ongoing research work program on the application of emerging technologies. This is consistent with ACMA's responsibility to publish information and report to the Minister on technological advances and service trends in the broadcasting, Internet and datacasting industries, as well as report on the telecommunications industry.

This report is intended to be an introductory overview of the IPTV and Internet video market in Australia. It focuses on:

- a discussion of IPTV and Internet video services;
- drivers and barriers to the deployment and adoption of IPTV and Internet video services;
- the business models of IPTV and Internet video service providers; and
- future directions of the IPTV and Internet video industries.

This report does not address any regulatory issues that relate to IPTV and Internet video services.

## **2.3 Methodology**

Information for this report has been collected from two separate streams:

- desktop research on IPTV and Internet video industry trends in Australia and internationally; and
- a series of face-to-face interviews conducted by ACMA with 12 organisations in the Australian telecommunications, Internet and content industries including major ISPs, content aggregators, FTA broadcasters, and Internet content portals.

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<sup>4</sup> Adam Thomas and Simon Dyson, *Online TV and Video: Beyond User-Generated Content*, Informa, United Kingdom, 2007.

<sup>5</sup> Discussion of Internet video in this report is limited to websites that provide full-length, professionally produced content that is provided with content owners' consent.

Interviewees included:

- Australian Broadcasting Corporation (ABC), a government-funded FTA television broadcaster.
- ninemsn, an Internet portal.
- iiNet, an ISP.
- KIT Digital, a turnkey IP video delivery provider.
- See TV, a niche IPTV provider offering Sri Lankan content.
- TransACT, a communications and TV over DSL/IPTV provider.

The analysis and conclusions contained in this report reflect the qualitative information gathered from interviews and desktop research. Appendix A contains more information on the project methodology.

## 3 IPTV and Internet video technology overview

### 3.1 Background

Consumer video content could be categorised in more simplistic terms before the Internet became a platform for media delivery. FTA and subscription broadcasters delivered what became known as linear, or non-interactive, content organised into channels. Discrete content, most notably movies, was distributed and consumed via video rental and retail, cinemas, or through end-users recording broadcasted linear content for personal use.

Increasing Internet penetration and, more importantly, increasing *broadband* penetration has provided a third platform for media delivery. Content, particularly ‘on-demand’ content, in both short clips and full-length episodes or films, can be delivered on this new platform. Broadcast quality content services delivered over IP networks are a potential new delivery method for content that is currently shown by established FTA and subscription broadcasters.

### 3.2 Internet video

Internet video covers a wide range of services and applications that use a variety of different content and business models. This can include videos embedded on social networking sites, user-generated content, videos on sites such as YouTube and news clips. As outlined previously, the discussion of Internet video in this report is limited to services offering full-length professional content and excludes user-generated content. This enables a deeper examination of the delivery of the same content on different platforms.

With Internet video, content is consumed via a PC rather than a TV. This simple difference has often been described as ‘lean-forward, lean-back’ or ‘ten-foot versus two-foot interface’. On the PC, short-form content like music video clips is typically consumed in a browser, while longer-form content such as a film is generally presented to the user in a media player application. The lean-in, active nature of web-browsing suits short-form on-demand content such as news clips or movie trailers.

Longer form content is where the ‘ten-foot versus two-foot’ problem becomes most apparent. Most consumers are used to watching such content on a TV. A key challenge for Internet video providers is achieving a uniform user experience whatever bandwidth is used to access the service.

### 3.3 IPTV

Over time, a range of fragmented IPTV definitions have emerged in the effort to explain what IPTV is and what it can offer. There is no single, established definition of IPTV, rather it is a catch-all term that encompasses a range of services.

In the communications industry, IPTV is often used interchangeably with ‘telco TV’—a subscription television service offered by DSL-based telecommunication carriers to compete with cable broadcast providers. Such a service usually consists of a broadcast-quality<sup>6</sup> television and a video-on-demand service delivered over managed and Quality of Service (QoS)-enabled IP-based networks.<sup>7</sup>

As a relatively new type of service, IPTV attracts a great deal of standardisation activity. The development of useful definitions is a key part of this activity. IPTV work has been undertaken by many industry organisations and international standards groups as well as new industry bodies like the OpenIPTV Forum.

The International Telecommunications Union Telecommunications Standardization Sector (ITU-T), drawing on a cross-section of telecommunications carriers and equipment vendors, has recently formed an IPTV Focus Group to coordinate industry standards and specifications from the aforementioned groups. Its working definition<sup>8</sup> of IPTV is:

multimedia services such as television/video/audio/text/graphics/data delivered over IP-based networks managed to provide the required level of QoS/QoE, security, interactivity and reliability.

This broad definition could be applied to a wide range of different services, provided over fixed or wireless networks, which deliver almost any kind of multimedia, not just ‘telco TV’ services. The definition also avoids limiting itself to specific content or network circumstances. While the majority of the IPTV FG’s work concerns the ‘telco TV’ view of IPTV, it is monitoring other developments. This report will also focus on the ‘telco TV’ view in its analysis of the IPTV and Internet video market in Australia.

### 3.4 Comparing subscription television, IPTV and Internet video

It is useful to compare IPTV with the established subscription television and Internet video platforms, due to its similarities with both platforms.

IPTV is often presented to consumers as an alternative to cable or satellite subscription TV, with enhanced features that are readily enabled by the IP platform. These IP-enabled services are at present mostly low bandwidth applications; for example, basic interactivity applications like voting systems. The distinction between traditional subscription television

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<sup>6</sup> Broadcast quality should be taken to mean SD (640 by 480 pixels) quality or better.

<sup>7</sup> One other aspect of IPTV not always articulated in industry definitions is *IP multicast*, which is basically an efficient way of streaming linear content to a specific subset of users on an IP network. A broader technical discussion of multicast is included in Appendix C.

<sup>8</sup> ITU-T Focus Group on IPTV, ‘IPTV vocabulary of terms’, FG IPTV-DOC-0082, ITU-T Focus Group on IPTV, USA, 22–26 January 2007, viewed 16 October 2007, <[http://www.itu.int/md/dologin\\_md.asp?lang=en&id=T05-FG.IPTV-DOC-0082!!MSW-E](http://www.itu.int/md/dologin_md.asp?lang=en&id=T05-FG.IPTV-DOC-0082!!MSW-E)>.

delivery and the ‘telco TV’ version of IPTV is often based on technical factors rather than differences in the consumer experience.

**Table 3: Basic characteristics of subscription television, IPTV and Internet video—existing services**

	<b>Subscription television (cable or sat)</b>	<b>IPTV</b>	<b>Internet video</b>
<b>Network characteristics</b>	Broadcasting (one-to-all)	IP multicast (one-to-multiple)	IP unicast (one-to-one)
	Managed	Managed	Best-effort
	Closed/private	Closed/private	Open/public
<b>Revenue</b>	Subscription-based	Subscription-based	Several, including free and ad-supported
<b>Delivered using ...</b>	Broadcast (one-to-all)	IP multicast (one-to-multiple) and unicast	IP unicast (one-to-one)
<b>Linear content</b>	Linear channel delivery	Linear channels over multicast	Tends to be on-demand rather than linear channel delivery
<b>On-demand content</b>	Limited return path—some use of ‘near on-demand’ <sup>9</sup>	‘True’ VOD over unicast	Yes—mix of short-form and VOD
<b>Delivered to... (CPE)</b>	Set-top box (STB)	Generally a STB	Generally a browser on the PC

An IPTV service involves video streams of SD or HD quality, which require data bandwidth of multiple megabits per second regardless of the transport medium. By comparison, the required bit-rate for Internet video is less than a megabit, and is often around 300 kilobits per second. As Internet video is delivered over the open Internet with no QoS guarantees, it needs to be compressed into as small a file as possible to maximise the quality of experience for the user.

IPTV combines the quality of the broadcast services with the interactivity and user choice offered by Internet video. It provides Pay-TV-like quality and additional interactive services such as voting systems. The benefits of traditional broadcasting delivery and the Internet are both present in the provision of IPTV.

### 3.5 Video service delivery models

IPTV is just one of the delivery methods of next generation television and video services, and is driven by the telecommunications industry. Both the broadcasting and Internet sectors are developing their own IPTV-like services that seek to compete with IPTV.

<sup>9</sup> ‘Near on-demand’ describes how on-demand services are sometimes provisioned using multiple movie channels, each offset by a period of time (e.g. every 15 minutes). A subscriber who elects to view a movie is able to commence watching the requested content within 15 minutes, by being directed to the appropriate channel that will next commence screening the movie from the beginning.

Broadcasters and subscription television providers utilising traditional modes of content delivery are developing a hybrid model to match the services offered by IPTV. They are enhancing the return path of their networks to combine the established offering of linear channels with broadband connectivity, enabling on-demand content from the niche to the mainstream.

The evolution of Internet video services delivered over the public Internet without any network management or QoS provisions is also a possible competitive threat to IPTV services. These ‘Internet TV’ services present content in a form that attempts to mimic a TV or STB interface. A number of such services use P2P<sup>10</sup> connections for the delivery of the content. While services such as BitTorrent and Internet TV with P2P connections—for example, Joost—are using the same delivery mechanisms, the motivations and business models are very different. These Internet TV services using P2P connections still ensure the content delivered is protected from illegal copying.

**Table 4: Emerging models for delivering both linear and on-demand content**

	Hybrid model	Telco TV model	Internet TV & P2PTV
<b>Common features</b>	<ul style="list-style-type: none"> <li>• Both linear channels and on-demand content at or near broadcast quality</li> <li>• Electronic Programme Guides (EPGs), search functionality, time-shifting</li> <li>• a return path, enabling ratings feedback and contextual advertising</li> <li>• capability for service integration like email and VoIP</li> </ul>		
<b>Basic description</b>	Evolution of subscription television service, with addition of IP connectivity to STB; delivered to the TV	Replication of a subscription television service over a managed IP network, plus VOD; often delivered to the TV	Replication of a TV-like user experience over a best-effort IP network; often still delivered to a PC
<b>Linear content delivery</b>	Via a dedicated traditional broadcast medium (FTA or subscription) <ul style="list-style-type: none"> <li>• DVB (-T, -C or -S)</li> <li>• ATSC (in US)</li> </ul>	Multicast via a managed IP connection, technically separate/distinct from the broadband Internet connection although carried on same physical copper lines	Overlay multicast via P2P network: <ul style="list-style-type: none"> <li>• more efficient than client-server unicast</li> <li>• not as efficient as broadcast or L2/3 multicast</li> </ul>
<b>On-demand content and interactivity</b>	Via an IP connection to the home network <ul style="list-style-type: none"> <li>• Ethernet/WiFi</li> </ul>	Unicast via same IP connection	As above
<b>Examples</b>	Foxtel, TiVo model	AT&T U-Verse, PCCW Now Broadband TV	Joost, LiveStation, iPlayer

To the average user, the carrier-defined version of IPTV, or an ‘Internet TV’ service viewed through a TV connected to a PC, may not appear at all different from the hybrid version.

<sup>10</sup> P2P video services such as Joost use a P2P distribution method for serving content between users. This is opposed to a client-server method where the provider serves content on a one-to-one basis (using unicast) to all customers.

However, different drivers have resulted in the deployment of these models, which all have diverse implications for the development of content delivery services.

### 3.6 Linear versus on-demand

Content delivered over linear channels and via video-on-demand services is often a complementary part of a whole package. For example, TransACT offers over 40 linear channels as well as on-demand movies and sport.

Linear channels and video-on-demand deliver similar content, although current video-on-demand offers typically focus on films. The difference is in the access method. With linear channels, consumers either watch the selected program when it is broadcast or record the program for later viewing. PVRs like Foxtel iQ allow subscribers to watch linear content on an on-demand basis by storing content on a hard drive rather than a video or DVD. With video on-demand, the consumer selects what to watch and when to watch it. Linear channels tend to be either free or paid for on a subscription basis, while video on-demand is often provided on a pay-per-view basis.

### 3.7 IPTV and Internet video development internationally

There has been significant activity in Internet video and IPTV services internationally. Telecommunications operators and ISPs are rolling out IPTV services globally. Take-up in most markets is yet to reach the mainstream due to limited rollouts of the service and the short amount of time for which the services have been offered. Notable IPTV deployments include PCCW's Now Broadband TV in Hong Kong, which has achieved a customer base of 850,000, equating to 35 per cent penetration of Hong Kong homes.<sup>11</sup> France is the largest IPTV market and had more than 1.4 million subscribers in June 2007.<sup>12</sup> In the United States, AT&T and Verizon have both rolled out major IPTV deployments.

In terms of Internet video, which is not as geographically bound as IPTV, the United States, with its strong media and entertainment industry, is a leading country. According to ComScore, the top 50 websites accessed by US consumers in August 2007 included Time Warner, Fox Interactive Media, Viacom, CBS, Disney Online and ESPN (ranked at 3, 5, 10, 24, 25 and 40 respectively).<sup>13</sup> In addition, IT start-ups such as Akimbo and Joost have begun to emerge, and some ISPs and telecommunications operators are developing their own branded sites offering Internet video content rather than fully-fledged IPTV.

### 3.8 IPTV and Internet video development in Australia

A fully-fledged national IPTV service is yet to launch in Australia. TPG has launched an IPTV service delivered to the PC that offers over 30 channels. The service is available to TPG ADSL2+ subscribers. TPG has installed ADSL2+ in selected exchanges across Australia. See TV offers Sri Lankan content. TransACT offers a subscription TV

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<sup>11</sup> Geoff Long, 'PCCW CTO talks up the role of telcos in the media world', *Communications Day*, ASEAN edition, 6 December 2007.

<sup>12</sup> Robert Briel, 'IPTV services grow 13% worldwide,' *Broadband TV News*, 6 June 2007, viewed 21 April 2008, <http://www.broadbandtvnews.com/test/?p=1202>

<sup>13</sup> comScore, 'comScore media metrix releases top 50 web rankings for August', media release, comScore, USA, 18 September 2007, viewed 24 September 2007, <<http://www.comscore.com/press/release.asp?press=1731>>.

broadcasting service with true on-demand video with coverage limited to the Canberra region.

Broadcasters, ISPs and other operators are entering the Internet video space. For example, Channel Nine offers catch-up TV through the ninemsn website. iiNet formed a partnership with Anytime and Fairfax for the provision of the now-defunct VOD website, Anytime on Volt.

Developments in hybrid services are also worth noting. The Seven Network is intending to launch TiVo PVRs in 2008. The two major subscription broadcasters in Australia, Foxtel and Austar, are also combining hybrid PVRs with their subscription services.

## 4 Drivers and barriers

There is a complex set of drivers and barriers for IPTV and Internet video development in Australia. The desire to differentiate and to attract and retain customers is a key factor driving interest in IPTV and Internet video services. At the same time, cost considerations, the structure of the Australian broadband market, and concerns regarding the acquisition and management of content are powerful barriers to the deployment and development of these services. Following is a discussion of factors, identified during interviews with industry operators, that are affecting the development of IPTV and Internet video services in Australia.

### 4.1 Drivers

#### **FOR TELECOMS OPERATORS AND ISPs**

The key reason for telecommunications operators and ISPs in Australia to deploy IPTV or Internet video services is to differentiate from the competition in order to increase customer acquisition and retention levels. Many interviewees stated that the primary benefit for telecoms operators and ISPs to deploy Internet video or IPTV services is not potential revenues but retaining customers and growing the subscriber base. IPTV is valued for its suite of services more than as a stand-alone service. In the same way, ISPs and telecoms operators are interested in forming relationships with Internet video providers for the effect on the subscriber base rather than as a revenue driver on its own behalf.

#### **Cable television**

In the United States and other markets, telecommunications operators and ISPs become involved in IPTV provision as a way to match the service offerings of their cable competitors. For example, US telecoms operators Verizon and AT&T have launched IPTV services in response to cable companies like Comcast and Time Warner Cable offering voice and high speed broadband access over their networks.

The Australian market has different drivers. Austar, which provides subscription television services to regional areas, offers dial-up Internet, wireless broadband to limited coverage areas and mobile services. Foxtel, a metropolitan subscription television provider, does not offer voice or Internet services. Both Telstra and Optus sell Foxtel<sup>14</sup> packages delivered over their cable networks. These are different commercial arrangements and drivers than those in the United States markets. Consequently, it may be smaller ISPs who do not bundle Pay TV

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<sup>14</sup> Optus retails the Pay TV package, 'Optus TV featuring Foxtel'.

services that launch IPTV services over their ADSL2+ networks. This trend is indicated by TPG launching its own IPTV to the PC service. However, their smaller scale may mean they look at other methods of content provision that require less investment than IPTV; for example, partnerships with Internet video providers.

### **Differentiation**

As ISPs and telecoms operators in Australia invest in network upgrades to provide greater bandwidth, content offers a way to differentiate from competitors without relying on price. This differentiation can also have a positive impact on customer acquisition, retention and value. Offering exclusive content, or the ability for customers to access content at a cheaper cost, can be a key attraction for consumers.

In Australia, ISPs have formed varying types of content provision strategies. BigPond offers downloadable movies and other content directly on its website, while iiNet did have links with the now defunct Anytime on Volt video download website.

## **A BALANCING ACT FOR CONTENT PRODUCERS**

IPTV and Internet video services in Australia represent a competing distribution system for audio-visual entertainment and are consequently a threat to audience share of existing modes of delivery. However, the IPTV Internet video delivery platform also represents a new revenue source for content producers and a way to reach new audiences. As a result, content producers like FTA broadcasters are exploring website delivery of content. For example, Channel Nine provides catch-up TV over the ninemsn website.

## **4.2 Barriers**

IPTV and professional content Internet video services are yet to make a real impression on the Australian market. The two services have common and separate barriers to development. Many interviewees felt that the capital costs, the prevalence of capped broadband plans and the lack of content acquisition experience would prevent many ISPs and telecoms operators from launching an IPTV service.

### **CAPITAL EXPENDITURE**

There are high upfront costs involved in rolling out IPTV, which are highly dependent on the context of the IPTV deployment. For example, a network upgrade will have different costs to a new network designed and built with IPTV capability.

Deploying an IPTV service will consequently require a large potential subscriber base to justify the costs. These costs include network upgrades, Customer Premise Equipment (CPE) provision and maintenance, as well as content licensing. The Australian population is relatively widely dispersed in comparison to high density markets such as Hong Kong, where much of the population live in high-rise apartment blocks. This further increases network upgrade costs. Many interviewees stated that the upfront costs are an issue in the deployment of IPTV, given the large coverage that would be required to achieve the necessary scale for the business case.

In addition, some interviewees suggested that potential IPTV providers in Australia, such as mid-tier ISPs, may not have the scale to satisfy an IPTV business case. One interviewee suggested that even an ISP with 300,000 subscribers would not be able to create a viable business case for IPTV based on that coverage level.

## **BROADBAND MARKET**

### **Bandwidth**

Compounding the issue of subscriber numbers, data rates experienced by DSL users in Australia vary greatly based on the length and condition of their copper local loop. Providing a bit-rate sensitive service such as video at an acceptable quality to all subscribers will therefore be problematic, given the uneven broadband speeds achievable for a subscriber base. Network deployments of higher bandwidth broadband (such as ADSL2+ or FTTN networks) may address some of these concerns.

### **Backhaul**

Many interviewees stated that the cost of backhaul is another barrier to take-up and supply of IPTV and Internet video. Backhaul is important as it transports the content between its storage place and the operators' networks. It was suggested that backhaul costs make storing, transporting and delivering content too expensive.

### **Capped limits**

A common theme in the interviews was that capped broadband access plans are a barrier to high take-up of Internet video services. However, some ISPs are using this limitation to promote their own services by offering a list of content providers that their users can download from without affecting their limit. For example, iiNet allows unmetered downloads of iTunes content. Factors such as negotiations for unmetered content and peering agreements are complex and considered likely to delay the development of Internet video business models. In addition, consumer usage may be hindered by concerns or confusion over whether their content downloads will incur additional charges from their broadband access provider.

## **CONTENT**

### **Content providers**

Many interviewees considered content providers' attitudes to Internet video sites and IPTV services a barrier to their deployment in Australia, although opinions are becoming more positive. Many commented that it is harder for start-ups to negotiate for content rights because content providers want to ensure maximum audience reach and deal with operators who have already secured a lot of high-value content.

### **Content acquisition**

The cost and time involved in negotiating with content providers is also a barrier—a typical timeframe for content negotiations is about 12 months, increasing the development time before a service can be launched.

### **Piracy**

The illegal downloading of content hinders the growth of IPTV and Internet video markets globally, and Australia is no exception. Australian consumers are able to source free professional content through P2P networks like BitTorrent. One way that content providers such as FTA broadcasters combat piracy is to compress distribution windows. For example, Australian FTA broadcasters have started showing TV shows a day or two after they are

screened in the United States; previously, the gap was months. Broadcasters hope this will reduce the number of people downloading copies of the US TV shows over the Internet rather than watching it over a broadcast channel.

### **LACK OF RELEVANT EXPERTISE**

The provision of IPTV and Internet video services requires very different business models and supplier competencies than for Internet and phone access services. For example, IPTV generally requires content acquisition skills and ongoing management of CPE. Many interviewees believed that ISPs' lack of experience in these areas will make the deployment of a viable IPTV service very difficult. Alternatively, network owners may limit their involvement in the services, effectively only acting as a conduit for the content delivery and letting other, more experienced, operators develop and deploy the content services.

## 5 Current activities in Australia

### 5.1 Consumer digital media usage

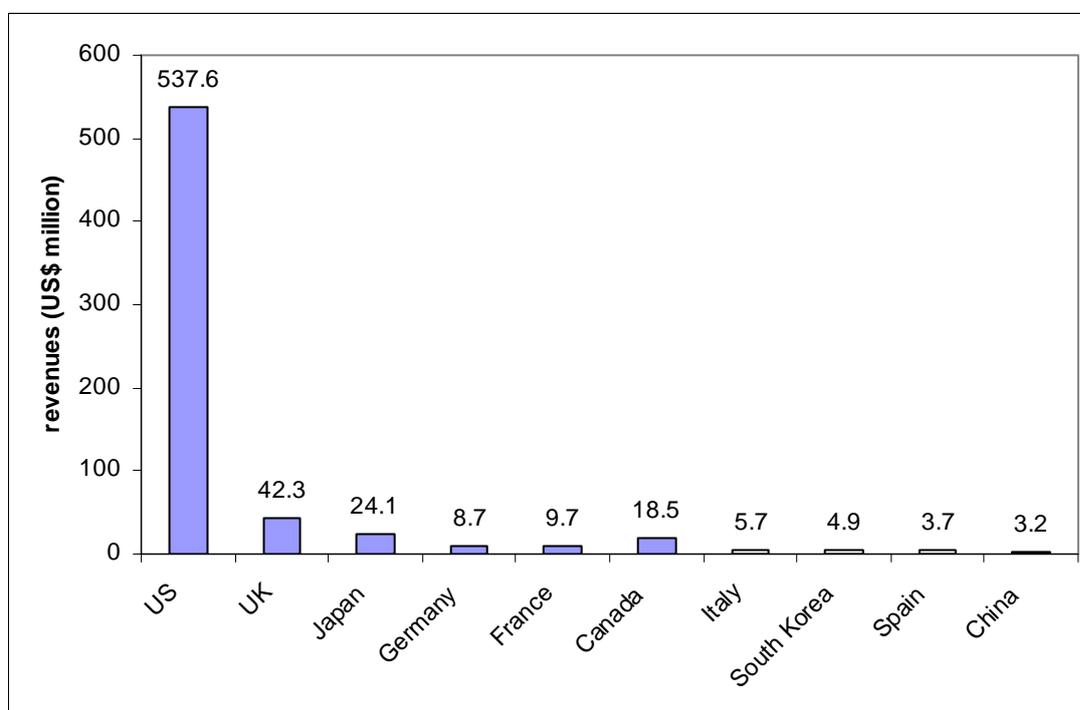
There is an emerging Internet video and IPTV market in Australia, but usage of IPTV and Internet video is dependent in part on the attractiveness of content offers.

#### INTERNET VIDEO USAGE

##### Revenues

The US is the largest Internet video revenue-generating country, followed by the UK and Japan, with Australia just outside the top ten nations.<sup>15</sup>

**Figure 1: Top 10 Internet video revenues by country, 2006**



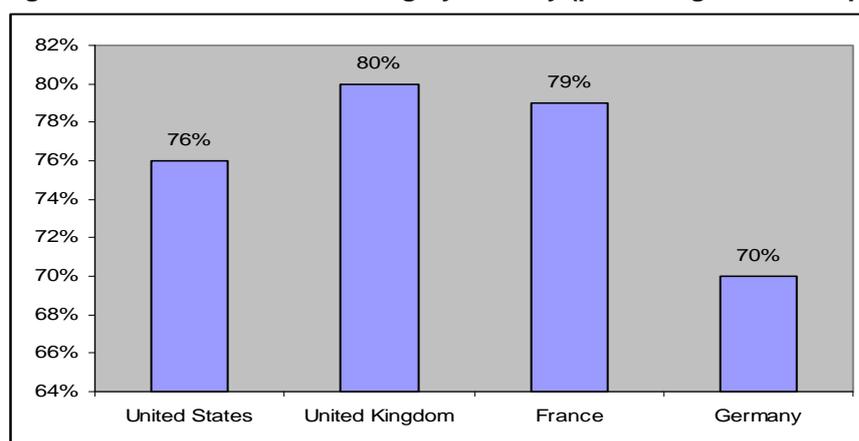
Source: *Online TV and Video: Beyond User-Generated Content*, Informa Telecoms and Media, United Kingdom, January 2007, p 5.

<sup>15</sup> Adam Thomas and Simon Dyson, *Online TV and Video: Beyond User-Generated Content*, Informa Telecoms and Media, United Kingdom, January 2007, p 5.

## Users

As bandwidth increases around the world, online video use is becoming more common. Figure 2 shows the level of online video streaming in April 2007. The United Kingdom had the most active Internet users, with eight of ten respondents streaming an Internet video in April.

**Figure 2: Online video streaming by country (percentage of online population), April 07**



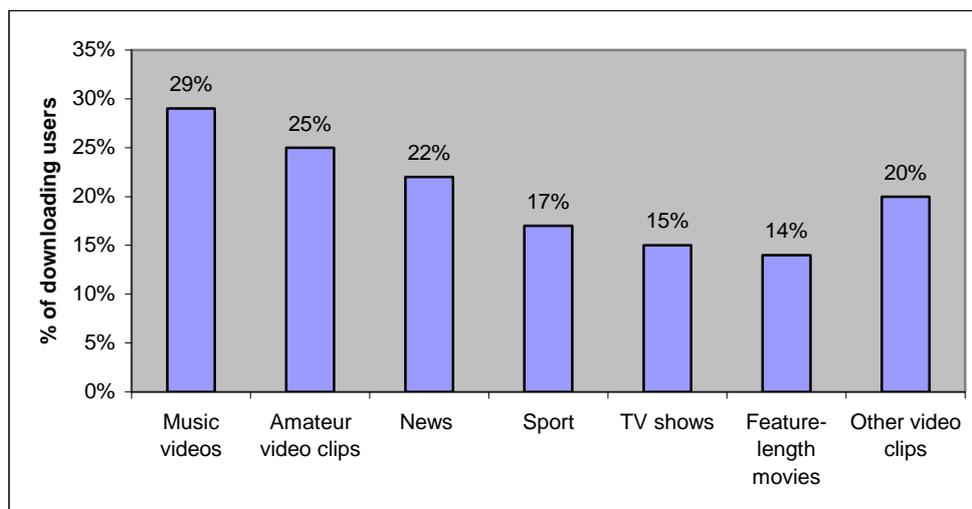
Source: ComScore Press Release, 'Internet users in France spend 13 percent of their time online streaming videos', 19 June 2007, Total unique streamers in April 2007/Total online population in April 2007.

A Nielsen//NetRatings survey for Australia found that 34 per cent of Internet users had streamed a video at least once in the entire time they have been using the Internet. Thirteen per cent of Internet users regularly stream videos over the Internet, while 39 per cent had never downloaded or streamed audio or visual content.<sup>16</sup> The Comscore and Nielsen//NetRatings surveys use different methodologies and so should not be directly compared.

## TYPES OF INTERNET VIDEO

Australian consumers who do watch Internet video are yet to embrace downloading TV shows and movies over the Internet on a mass scale. Figure 3 shows that the most popular content to be downloaded or streamed is music videos. Full-length movies and TV programs are much less popular.

<sup>16</sup> Nielsen//NetRatings, *Internet and Technology Report AU*, December 2006 cited in Nielsen//Net Ratings, *Australian Communications and Media Authority Custom Digital Content Analysis*, unpublished, July 2007. Note: downloading rates were similar to streaming rates, with 34 per cent of Internet users stating that they had downloaded video content at least once in the entire time they had been using the Internet. Eleven per cent do so regularly.

**Figure 3: Type of videos downloaded or streamed**

Source: Nielsen//Net Ratings, *Internet and Technology Report AU*, December 2006, percentage of downloading users, cited in Nielsen//Net Ratings, Australian Communications and Media Authority Customer Digital Content Analysis, unpublished, July 2007.

It is clear that, for the moment, Australian consumers still prefer to watch movies through offline channels such as the cinema. Only one per cent of Internet users nominated downloading as their most common method of accessing a movie.<sup>17</sup>

## 5.2 Current IPTV and Internet video activities

The interviewees, who included telecoms operators, ISPs, broadcasters, content providers and content aggregators, all use video distribution over IP but have very different business models. Their different motivations and aims are examined in this section.

### IPTV BUSINESS MODELS

There are two main IPTV business models evident in Australia—a subscription television-style offering and a limited content offering. The latter approach is currently favoured by providers.

#### Subscription television-style approach

International IPTV service packages often resemble a traditional subscription television deal. Content channels are tiered on a thematic basis and sold as part of a subscription bundle. Additional services, such as a PVR and VOD, are generally available. The attraction for consumers can be a pricing discount or more appealing content than that shown by competitors, and a service that is similar to a traditional subscription television offering.

<sup>17</sup> Nielsen//Net Ratings, *Internet and Technology Report AU*, December 2006, cited in Nielsen//Net Ratings, Australian Communications and Media Authority Custom Digital Content Analysis, unpublished, July 2007.

**Table 5: Attractions and drawbacks of the traditional subscription television approach**

	Attraction	Drawback
Supplier	<ul style="list-style-type: none"> <li>• Same, if not better, service as subscription television competitors</li> </ul>	<ul style="list-style-type: none"> <li>• Cost for network, management systems and content</li> <li>• Lack of experience with content acquisition</li> </ul>
Consumer	<ul style="list-style-type: none"> <li>• Alternative supplier</li> </ul>	<ul style="list-style-type: none"> <li>• Less flexible content packages</li> </ul>

TransACT has taken a subscription television-style approach.

#### **TransACT TransTV service**

TransACT is a phone, Internet and television supplier to the Canberra region. Its TransTV offering includes over 40 subscription television channels, the five FTA channels, a local community announcement/promotion channel and a VOD service consisting of movies, sport and adult entertainment.

Bundling TV with telephone and broadband services is a key selling point and customer retention tool for TransACT as it offers the convenience of one bill for multiple services. The TransTV product is only available to customers also subscribing to TransACT's telephone service. Customers can also combine their communications services with their utilities to create a bundled package and receive a discount of 10 per cent.

#### **Limited content approach**

Some IPTV providers offer a limited amount of content and different pricing models compared to a subscription television-style offering. Many providers target a special interest audience, as See TV has done with its Sri Lankan channel offering, while other providers offer a small selection of fairly general interest content. TPG mixes special interest content, such as Russia Today, with more general interest content like Bloomberg Television.

The reasons for such an approach are varied:

- it provides a low-cost way of experimenting with IPTV and testing subscriber reaction;
- there may not be enough compelling content available;
- current subscription television providers might be so well entrenched it is not worth competing against them with the same product; and
- the cost of an alternative approach could be prohibitive.

Providers of these limited IPTV services often price their offering at a significant discount to subscription television competitors.

**Table 6: Attractions and drawbacks of the limited approach**

	Attraction	Drawback
Supplier	<ul style="list-style-type: none"> <li>• It is cheaper to deploy than the subscription television-style approach</li> </ul>	<ul style="list-style-type: none"> <li>• Offer may not hold value for customers due to PC delivery or lack of attractive content</li> </ul>
Consumer	<ul style="list-style-type: none"> <li>• May be a 'free' service</li> </ul>	<ul style="list-style-type: none"> <li>• May not be interested in the content offered</li> </ul>

**TPG—IPTV to the PC**

TPG has taken a limited approach, offering free content delivered to a PC for its ADSL2+ customers. Its content offering includes over 30 channels of niche content such as Greek TV and more general content including Bloomberg Television. Currently all the content is free for TPG ADSL2+ customers, but there are plans to introduce subscription-based channels.

**INTERNET VIDEO BUSINESS MODELS**

There is no established business model for Internet video services, with various operators testing different ways of generating revenues. While full-length professional content is typically provided on a pay-per-download basis, it can also be shown for free on an advertising-supported or promotional basis.

**Sponsorship/promotional**

This model can be used with professionally produced short-form film and TV trailer clips that are often placed on user-generated content sites like YouTube, or on content owner sites such as Channel Ten. The content is often used to tie in with broadcast network programming or to promote different film distribution windows. The major value to the content owners is the promotional impact of the clip. For example, the posting of video clips on YouTube from *Late Show with David Letterman* resulted in 200,000 new viewers for the show.<sup>18</sup>

**Table 7: Attractions and drawbacks of the sponsorship/promotional approach**

	<b>Attraction</b>	<b>Drawback</b>
Supplier	<ul style="list-style-type: none"> <li>• An avenue for promoting content</li> </ul>	<ul style="list-style-type: none"> <li>• May incur substantial licensing fees</li> <li>• Issue of copyright infringement</li> </ul>
Consumer	<ul style="list-style-type: none"> <li>• 'Free' content</li> </ul>	<ul style="list-style-type: none"> <li>• Need to filter unwanted sponsorship or promotional material</li> </ul>

<sup>18</sup> CBS, 'After one month CBS content among most viewed videos on YouTube', media release, 21 November 2006, CBS, United States, viewed 21 September 2007, <<http://www.cbcorporation.com/news/prdetails.php?id=1264>>.

The ABC offers free full-length content on its website and licenses content to other websites. These new methods of content delivery provide the ABC with many new opportunities; for example, helping it reach consumers who might not otherwise have seen its programs.

#### **ABC—Full episodes**

The ABC website allows users access to a wide variety of TV programs that are available to download for a period after broadcast. Content on offer includes *At The Movies*, *The Cook and the Chef*, and *Enough Rope*.

The ABC is trialling ABC Playback, an Internet TV service that allows viewers to watch recent and archived ABC TV shows over the internet.<sup>19</sup>

### **Pay-per-download**

In this business model, video content is downloaded to rent or own, on a per use basis or by subscription. Pay-per-download is generally used for professionally produced, full-length content such as Reeltime offers or short-form content such as music video clips (iTunes Video offers both). These resemble traditional movie rental services, with a fee paid for a movie or a regular subscription allowing for a set amount of movie rentals in a fixed time period. Some services have the facility to easily record the content onto a DVD, enabling greater competition with the DVD rental market.

**Table 8: Attractions and drawbacks of the pay-per-download approach**

	<b>Attraction</b>	<b>Drawback</b>
Supplier	<ul style="list-style-type: none"> <li>• An avenue for generating revenue from content</li> <li>• A way to attract and keep customers</li> </ul>	<ul style="list-style-type: none"> <li>• It may be difficult to persuade consumers to pay for downloaded content</li> </ul>
Consumer	<ul style="list-style-type: none"> <li>• Ease and immediacy of access</li> </ul>	<ul style="list-style-type: none"> <li>• Used to downloading content for free</li> <li>• Prefers to watch content on TV rather than PC</li> <li>• Size of files may prove prohibitive</li> </ul>

#### **Reeltime—Pay-per-download**

While Reeltime has recently entered voluntary administration, its video download service appears to still be operating. Reeltime offers a selection of content available for download either to rent or own. Films, television programs and games are available. Content can be downloaded to a PC and customers are provided with instructions on how to view the content by networking the PC with the television. Reeltime does not require subscription or membership and generates revenue through the rental and purchase fees.

<sup>19</sup> [www.abc.net.au/playback](http://www.abc.net.au/playback)

## Advertising-supported

Professional content Internet video providers such as Joost are using the advertising-supported model. Internet video advertising can resemble traditional FTA TV 30-second spots or can use the interactive qualities of the Internet, enabling viewers to supply personal details for targeted ads and to click on ads they are interested in to obtain more information.

**Table 9: Attractions and drawbacks of the advertising supported approach**

	Attraction	Drawback
Supplier	<ul style="list-style-type: none"> <li>• Revenue source</li> <li>• Maximise consumer take-up by offering free content</li> </ul>	<ul style="list-style-type: none"> <li>• Split of revenues between content owners, ISPs and other partners</li> <li>• Difficulty in effectively placing the messages</li> </ul>
Consumer	<ul style="list-style-type: none"> <li>• Free content</li> </ul>	<ul style="list-style-type: none"> <li>• Advertising</li> </ul>

### ***ninemsn—Internet portal offering video content***

ninemsn offers two types of full-length television content: paid-for downloads and free ad-supported downloads. The content available over both services is fairly limited. Users can pay for downloads of *McLeod's Daughters* and *Mad Men*, while they can access free episodes of *Sea Patrol II* and *Canal Road*.

## 6 IPTV and Internet video—The future

Many of the industry interviewees estimated that IPTV and Internet video service offerings will become more common in Australia in anywhere between one and three years, subject to an array of factors. The level of consumer take-up of these services will then depend on how they are packaged and priced. The following is a summary of some of the factors that are expected to drive the development of IPTV and Internet video services—either discussed in the interviews or noted through desktop research.

### 6.1 Future video services

#### **SUSTAINABILITY**

A common theme in the interviews was that IPTV and Internet video will become a part of the Australian market in the future. As bandwidth increases, differentiation between bitstream services will become an even more important driver for telecoms operators and ISPs. At the same time, declining fixed-voice subscribers and revenues will pressure telecoms operators to offer other services to protect both their revenues and subscriber bases. However, the business model to be employed—IPTV or Internet video—will depend on a combination of market factors as well as operator size and investment capacity.

#### **LINEAR VERSUS ON-DEMAND**

Many interviewees suggested that in the future more content would be viewed on an on-demand basis rather than through the delivery of linear channels. One interviewee commented that customers often value the VOD portion of the package more than the linear channel offering. The further development of the VOD service will depend on factors such as the willingness of content providers to license content to these types of offerings, attractive pricing for consumers and the deployment of networks capable of providing acceptable product quality.

#### **VOD AND THE VIDEO RENTAL STORE**

Some interviewees were confident that in the medium- to long-term, VOD will be a strong competitor to the ‘bricks and mortar’ video rental or retail industry. However, take-up of VOD will be highly contingent on consumer access to sufficient data rates. This will ensure quality of experience, affordable data and retail pricing to attract customers, and allow the downloaded content to be viewed over the television.

## 6.2 Device convergence

### DEVICES AND HARDWARE

Home theatre or media centre PCs are expected to achieve increasing take-up by consumers in the next few years, as equipment costs reduce, performance specification issues are addressed and content becomes more widely available.<sup>20</sup> Broadcasters are attempting to retain audience share while subscription television providers are trying to grow their customer base by providing STBs that combine PVR capability with Internet functionality. Within Australia, the two services that many interviewees expected to have an impact in this area are TiVo and the next iteration of Foxtel iQ.

### SOFTWARE AND USER INTERFACES

While PCs are being developed with physical specifications and hardware suitable for a lounge room environment and the tasks of media playback, the same steps have not been taken in the desktop and web browser environment. Presentation technologies are increasingly moving away from the web browser to stand-alone media applications. This area in particular is one where intelligently designed PVR devices have established an advantage.

Another emerging feature is the ability to program remote recording on PVRs via web or mobile interfaces. This is already a feature implemented by Foxtel and IceTV with their respective EPG/PVR services, as well as by the TiVo service in the US.

## 6.3 Network developments

### ACCESS

It was noted earlier that IPTV is a carrier-led and controlled platform, and such network upgrades by telecommunications operators and ISPs are a critical step in service deployment, noting mooted developments for Australia in ADSL 2+ and FTTN networks.

Increased competition and improved prices are expected in submarine cable transit in the next 18 to 24 months. This may reduce wholesale data pricing, which is more likely to affect the use of Internet video services that involve some form of international transit.

Core network upgrades may also have an impact. Telstra and Optus have both recently moved to all-IP infrastructure. Asynchronous Transfer Mode (ATM) to Ethernet upgrades may result in greater deployment of multicast using Virtual Local Area Networks (VLANs), in contrast to the current deployments that use ATM permanent virtual circuits (PVCs). This is discussed further in Appendix B.

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<sup>20</sup> David Richards, 'Media center sales crash in Oz', Smarthouse, 1 September 2005, viewed 24 October 2007, <[http://www.smarthouse.com.au/Media\\_Centres/Industry/S8M7S9Q8](http://www.smarthouse.com.au/Media_Centres/Industry/S8M7S9Q8)> and IDC, 'Australia digital video recorder and media centre PC 2006–2010 forecast and analysis: From niche to masses', Market Research, 21 September 2006, viewed 24 October 2007, <<http://www.marketresearch.com/map/prod/1375534.html>>.

## 6.4 Internet Video developments

### IMPROVED VIDEO ENCODING

Video compression is another technological factor that will influence the future of any video content delivered digitally—from IPTV to browser-based streaming video and stand-alone Internet TV applications, as well as digital terrestrial and subscription television broadcasting.

The average bit-rate of broadband connections is slowly increasing; equally, the average bit-rate of video content of a given quality is decreasing. These two trends are slowly seeing HD content being served up over best-effort Internet. A recent Akamai HD streaming trial demonstrated 1080p video at 30 frames per second compressed to 7.8 Mbps<sup>21</sup>. Vimeo<sup>22</sup>, another streaming video website, offers up to 720p-quality video streams.

To reliably stream SD- and HD-quality video over the Web without QoS, appropriate amounts of bandwidth must be provisioned (and in some instances, over-provisioned) throughout the network. This will reduce or, ideally, remove bottlenecks that would otherwise interrupt streaming. Beyond raw bandwidth, there are also issues relating to national and international backhaul pricing, already raised in Chapter 4, which particularly affect Australia at the present time.

Broadcast quality Internet video may start to eat away at FTA and subscription television's respective shares of consumer leisure time, if it effectively frees viewers from appointment viewing or provides compelling content. Additionally, however, HD Internet video may inhibit IPTV's ability to stake its own claim for leisure time and money, and the investment required for IPTV may become harder to justify.

### OVERLAY MULTICASTING IN INTERNET TV SERVICES

P2P or overlay transport is being increasingly tested and used for Internet TV<sup>23</sup> services to provide an efficient delivery method for content to end-users. Such services are sometimes collectively referred to as P2PTV services. P2P involves downloaders sharing a portion of their upload bandwidth and collectively replacing the provision role that a network server normally performs in the traditional client-server model.

The ITU-T Focus Group on IPTV also recently included overlay multicasting into its consideration of relevant multicast frameworks,<sup>24</sup> alongside the vendor-developed, hardware-based multicast approaches that are normally used for IPTV. P2PTV applications may ultimately provide an acceptable alternative to the client-server model for delivering niche content.

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<sup>21</sup> The HD Web, accessed 31 October 2007, <<http://www.thehdweb.com>>.

<sup>22</sup> Vimeo HD FAQ, accessed 7 November 2007, <[www.vimeo.com/help/hd](http://www.vimeo.com/help/hd)>.

<sup>23</sup> Refer to Table 2 for discussion of Internet TV.

<sup>24</sup> ITU-T Focus Group on IPTV, 'Living list: IPTV multicast frameworks', FG IPTV-DOC-0142, ITU-T Focus Group on IPTV, Geneva, 23–31 July 2007, viewed 16 October 2007, <<http://www.itu.int/md/T05-FG.IPTV-DOC-0142/en>>.

## 6.5 Long-term developments

### THE CASE TO USE IPTV OVER CABLE OR FIBRE OPTIC NETWORKS

#### Current transport mediums for video

From a technical perspective, fibre optic and Hybrid Fibre Coaxial (HFC) both provide dedicated transport mediums for video that are currently cheaper and more reliable than using IP for transport. Both HFC and fibre optics have well-established technical methods for linear channel delivery. Fibre optic access networks use Radio Frequency (RF) overlays, and digital services over HFC<sup>25</sup> networks generally use Digital Video Broadcasting – Cable (DVB-C) or Advanced Television Systems Committee (ATSC) standards to deliver media.

Existing broadcasters and cable companies using fibre optic or HFC networks for service delivery might regard the IPTV platform as a competitor in the near-term. However, in the longer term, traditional subscription television operators using these networks may adopt a ‘cable IPTV’ approach to television service delivery.

In this scenario, traditional subscription television providers abandon those transport mediums used at present (RF overlays or digital HFC broadcasting). Instead, they provide linear content via multicasting over the IP portion of the service connection, as is currently done for IPTV provided over xDSL.

#### Cost savings

The capital expenditure required to essentially convert a network to using IP multicast would only be considered if the cost savings could be recovered within an acceptable timeframe—a consideration for almost all network upgrades or investment.

The advantages of adopting multicast delivery over HFC or fibre optic networks would relate to back-end cost savings and improved efficiency. The conventional model involves serving every channel to every end-point of the network, regardless of whether any subscribers are actually watching; a one-to-all approach at all times. Multicast delivery is more efficient as it serves content to a minimum subset of the total subscriber population. A reduced serving load lowers operating expenditure throughout the network.

#### Other incentives

The largest FTTH provider in the US, Verizon has suggested it will convert its current service,<sup>26</sup> FiOS, to an ‘all-IPTV platform’ within three years<sup>27</sup> and notes a number of benefits in addition to increased efficiency and associated cost-savings. For example, the use of IP for linear content as well as for VOD generally simplifies the task of merging the user experience for the two aspects of a service that may have previously been delivered in distinct ways (linear channels via RF, on-demand via IP unicast).

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<sup>25</sup> More commonly known as cable networks.

<sup>26</sup> Glen Dickson, ‘Made for TV: A tale of two telcos,’ *Broadcasting and Cable*, 6 May 2006, viewed 25 September 2007, <<http://www.broadcastingcable.com/index.asp?layout=articlePrint&articleID=CA6340687>>.

<sup>27</sup> R McConville, ‘At age 2, Verizon FiOS evolves,’ *Light Reading*, 24 September 2007, viewed 25 September 2007, <[http://www.lightreading.com/document.asp?doc\\_id=134347&site=telcotv](http://www.lightreading.com/document.asp?doc_id=134347&site=telcotv)>.

The IPTV platform also has benefits over the traditional alternatives in terms of ratings feedback for the service provider. By default, IP multicasting uses a membership system, which controls who is watching discrete channels (refer Appendix B). Consequently, a service provider is able to monitor a customer's choice of channel and content. This provides greater information on consumer behaviour than is currently possible through traditional broadcasting methods, and helps when buying content and targeting advertising.

As a result of this upgrade, Verizon will be able to enhance its service in a range of ways. These include delivering contextual advertising that is suited to particular users and having a better understanding of what niche content may work for identifiable groups of subscribers. These two features drive both advertising revenue and subscription revenue, and provide further drivers for network providers to consider an all-IPTV platform.

## Appendix A—Methodology

The first stage of information collection was completed through desk research. Information was collected on the following issues:

- the content provision environment;
- provision of services and content, both current and planned;
- business models;
- take-up; and
- barriers and drivers to service delivery.

The next stage of information collection involved a series of interviews with operators involved in the IPTV and Internet video industry in Australia. A total of twelve organisations were interviewed. The aim of these interviews was to source qualitative information on the industry, identifying current trends and future directions.

The interviews were free-flowing discussions where the topics of conversation were guided by the organisation's activities in the IPTV and Internet video value chains. Each organisation was given a targeted questionnaire taking into account their role in the value chain. Discussions included, but were not limited to, the following general questions:

1. What services do you provide? What services are you planning to provide?
2. What type of content do you currently provide? How is it delivered to consumers?
3. Is there an interactive element to any of the content?
4. What audience are you targeting?
5. How would you describe your overall business model?
6. What role do online video distribution services play in relation to the traditional broadcast television services?
7. How are you sourcing the content?
8. What factors have affected take-up?
9. Are digital video services distributed via a proprietary network, or over the public Internet?
10. How do you ensure QoS in the delivery of your content?
11. Does QoS influence content negotiations?
12. What are the consumers' access network requirements to be able to use your service?
13. What CPE or software does the consumer need to access your service?
14. Are there network or technical issues which affect deployment?
15. Do you have any peering or caching relationships in place with ISPs or content delivery networks, e.g. Akamai?
16. How does current regulation impact the delivery of your services?

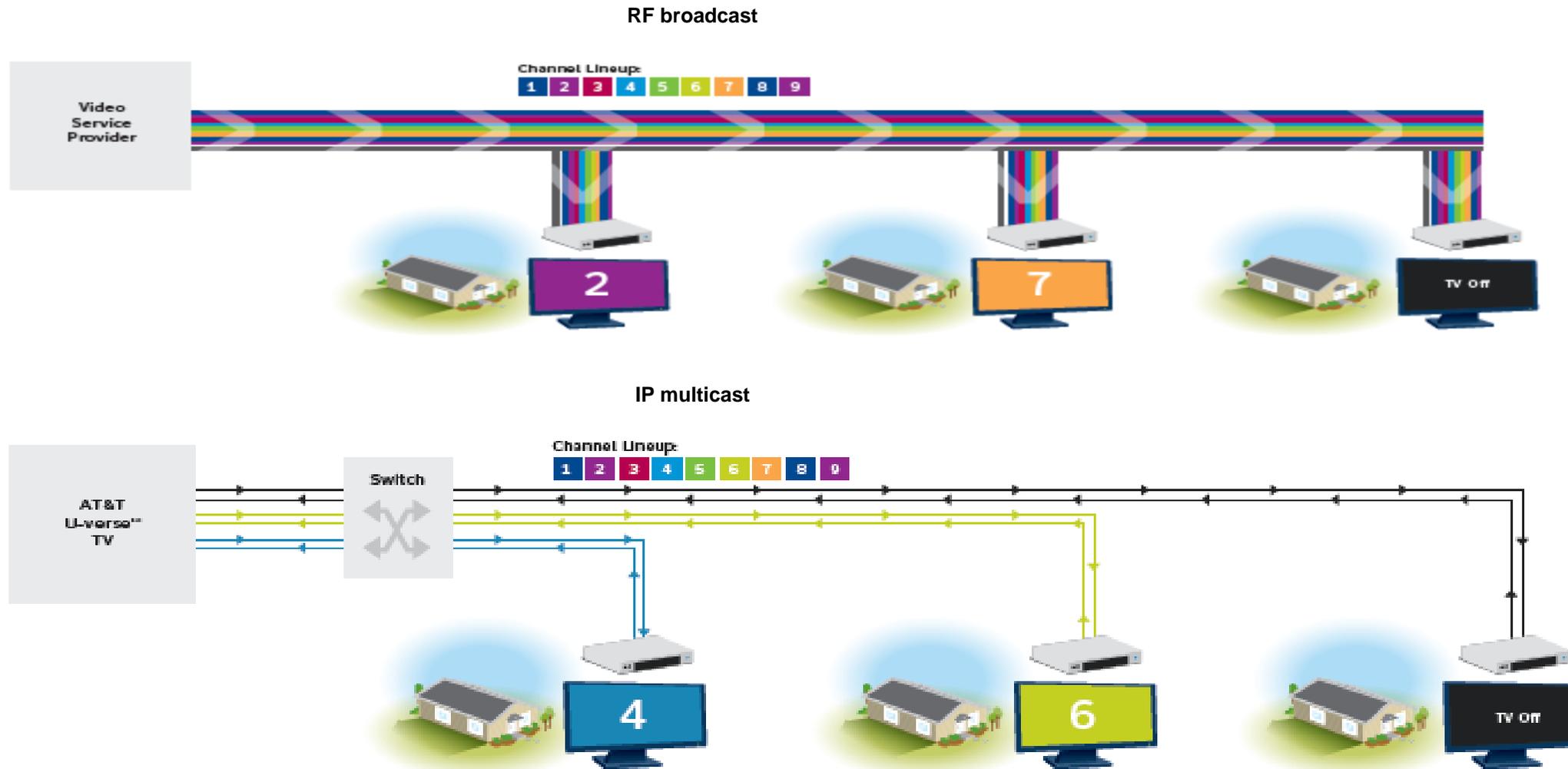
17. How do you see the IPTV market evolving in Australia? How will regulation impact this?
18. How do you see the Internet video market evolving in Australia? How will regulation impact this?
19. How would you define IPTV?
20. What do you see as the defining aspects of IPTV compared to:
  - a. Subscription television
  - b. Video download-to-rent/own services, e.g. iTunes, BigPond, Anytime
  - c. Free video over best effort public Internet e.g. YouTube?

## Appendix B—IPTV technical aspects

The unicast model to date has been a practical solution for the delivery of low quality video provided over the Internet. The lack of scalability with unicast is problematic when providing broadcast quality video.

IP multicast is considered more efficient when compared with the broadcast alternative which, due to its one-to-all nature, transmits every channel to every endpoint or end-user. Implementing such an approach on IP platforms would be wasteful and inefficient. IP broadcast is mostly used for signalling and service discovery, and again is not practical for high bandwidth video.

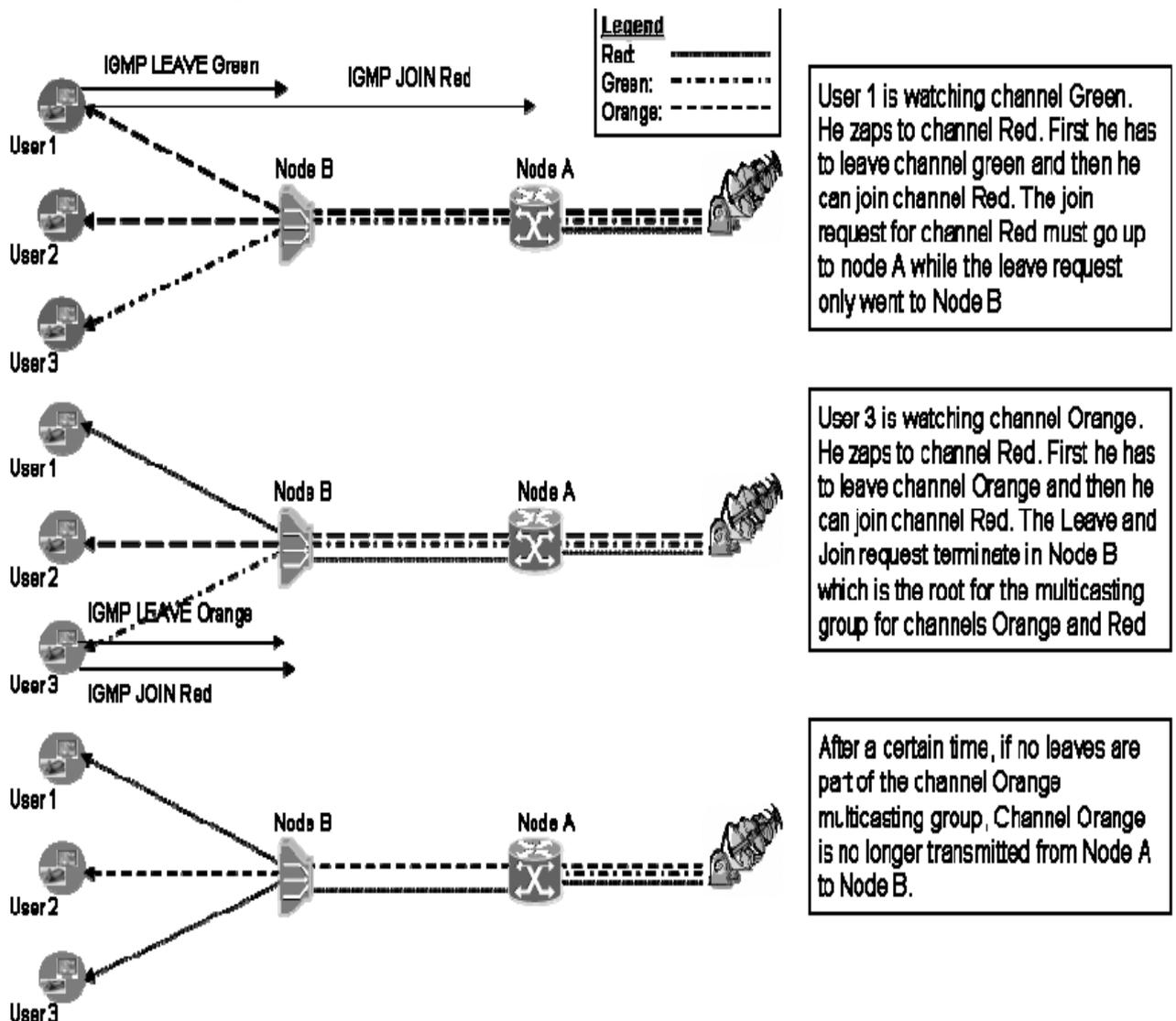
**Figure C.1: The comparison between RF broadcast and IP multicast**



Source: AT&T, *IP Video Distribution*, <[http://www.att.com/Uverse/files/IPVideoDistribution\\_2-22.pdf](http://www.att.com/Uverse/files/IPVideoDistribution_2-22.pdf)>.

Multicast recognises that efficiencies can be gained in those instances when end-users may be requesting the same data; for example, when watching video streams. In the unicast model, network routers and DSLAMs are required to act as dumb devices and simply forward packets onto the next network node in the chain. In a multicast model, routers request multicast data once and then replicate it for those endpoints that require it. The requests made to join and leave multicast groups are implemented using Internet Group Management Protocol (IGMP).

**Figure C.2: A multicast stream served once from its source and replicated by different network nodes throughout the network**



Source: IPTV: Technology and Development Predictions, IEC Newsletter, Aug 2006, <[http://www.iec.org/newsletter/aug06\\_2/](http://www.iec.org/newsletter/aug06_2/)>.

## MULTICAST GROUP MANAGEMENT

With IPTV, it is useful to understand how the concept of channels transfers to the IP platform. Superficially, devices that are ‘tuned’ to a particular channel are actually members of multicast groups. Group membership is managed by the IGMP through join and leave requests sent from end-users to network nodes. All group members listen to a specific IP

address. As such, each ‘channel’ has its own IP address. One example of an IPTV provider’s list of channels may be as follows:

224.123.20.11—Channel 1

224.123.20.12—Channel 2

224.123.20.13—Channel 3.

## **MULTICAST MODELS**

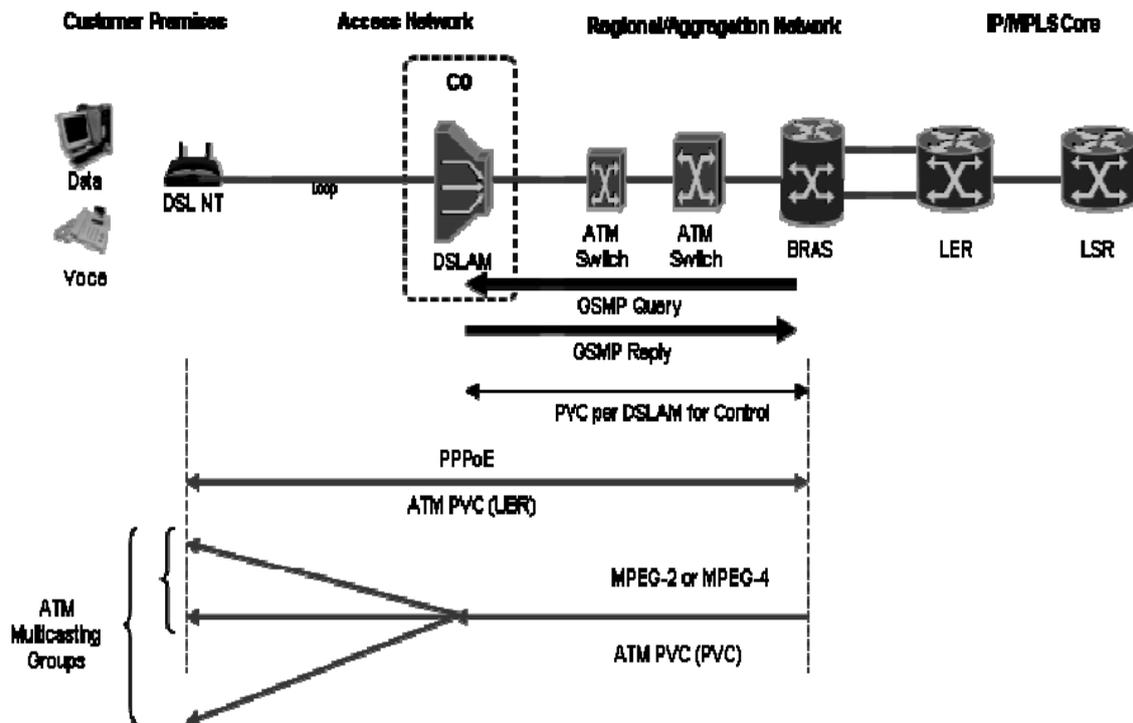
There are a number of options for deploying and operating a multicast-enabled IPTV network. Often the choice a carrier makes depends on its current network capabilities and future plans for network upgrades. Two possible models for the deployment of IPTV in a DSL-based broadband access network are described below.

### **Multicast using ATM PVCs**

IPTV and Internet access are segregated at layer two using separate ATM PVCs. IPTV content is encapsulated inside ATM cells of a reserved ATM PVC provisioned between the DSLAM and end-user. Effectively, these are two discrete services independently utilising the same physical infrastructure. One provides access to the Internet and the other provides access to a private network of content servers.

Upgrading ATM infrastructure to all-IP Ethernet-based network equipment is an ongoing task that many carriers have undertaken to improve efficiency of their core network. In this multicast model, stream replication may occur within the regional/aggregation network (at a Broadband Remote Access Server in this example) rather than the access network. A potential impact of this is that channel switching from a user perspective may be slower, as DSLAMs and other network nodes closer to the end-user must forward the leave and join requests further back into the network until they reach a node that is capable of processing them.

Figure C.3: Layer two multicast over an ATM-based network using separate PVCs for IPTV and broadband services

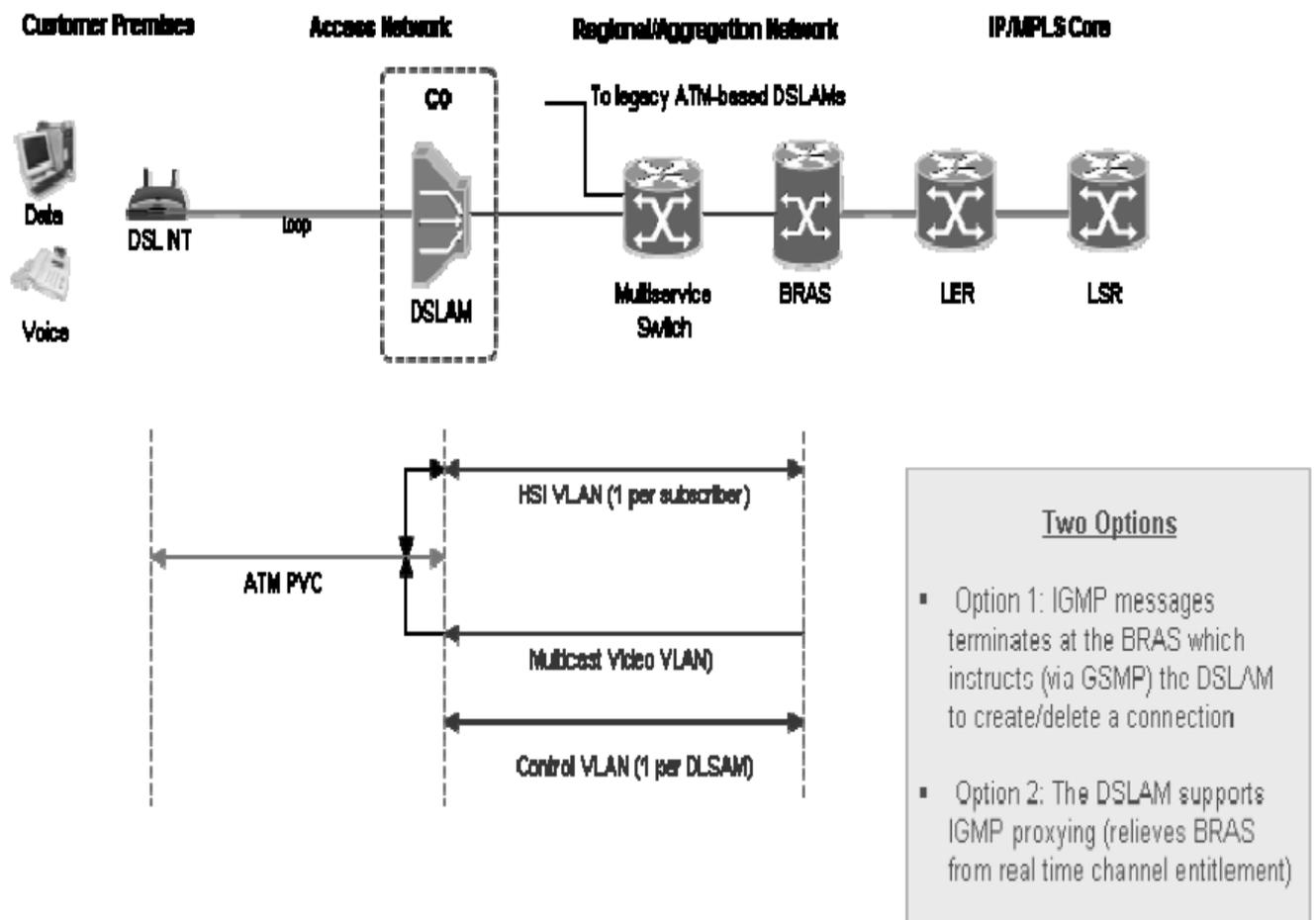


Source: IPTV: Technology and Development Predictions, IEC Newsletter, Aug 2006, <[http://www.iec.org/newsletter/aug06\\_2/](http://www.iec.org/newsletter/aug06_2/)>.

### Multicast using VLANs

This method of multicast involves the division of IPTV and Internet access by implementing VLANs and carrying these services over a single ATM PVC from the DSLAM to the end-user. The IPTV VLAN may be regarded as a private network that provides end-user devices with access to the linear IPTV streams, and likely walled garden of VOD content.

Figure C.4: Multicast over a network where the DSLAM is able to take on some of the replicating tasks



Source: IPTV: Technology and Development Predictions, Detecon Consulting, IEC Newsletter Aug 2006, <[http://www.iec.org/newsletter/aug06\\_2/](http://www.iec.org/newsletter/aug06_2/)>.

# Glossary

<b>ACMA</b>	Australian Communications and Media Authority
<b>ATM</b>	Asynchronous Transfer Mode
<b>ATSC</b>	Advanced Television Systems Committee
<b>CPE</b>	Customer Premise Equipment
<b>DSL</b>	Digital Subscriber Line
<b>DSLAM</b>	Digital Subscriber Line Access Multiplexer
<b>DVB-C</b>	Digital Video Broadcasting-Cable
<b>EPG</b>	Electronic Programme Guide
<b>FTA</b>	Free-to-Air
<b>FTTH</b>	Fibre to the Home
<b>FTTN</b>	Fibre to the Node
<b>HD</b>	High Definition
<b>HFC</b>	Hybrid Fibre-Coaxial
<b>IGMP</b>	Internet Group Management Protocol
<b>IP</b>	Internet Protocol
<b>IPTV</b>	Internet Protocol Television
<b>ISP</b>	Internet Service Provider
<b>ITU-T</b>	International Telecommunications Union Telecommunications Standardization Sector
<b>MPEG</b>	Moving Picture Experts Group
<b>P2P</b>	Peer-to-peer
<b>PC</b>	Personal Computer
<b>PVC</b>	Permanent Virtual Circuit
<b>PVR</b>	Personal Video Recorder

<b>QoS</b>	Quality of Service
<b>RF</b>	Radio Frequency
<b>SD</b>	Standard Definition
<b>STB</b>	Set-top box
<b>UDP</b>	User Datagram Protocol
<b>VLAN</b>	Virtual Local Area Network
<b>VOD</b>	Video on Demand