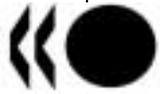


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Working Party on Telecommunication and Information Services Policies

BROADBAND AUDIO-VISUAL SERVICES: MARKET DEVELOPMENTS IN OECD COUNTRIES

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FOREWORD

In June 2003, this report was presented to the Working Party on Telecommunications and Information Services Policy (TISP). It was recommended to be made public by the Committee for Information, Computer and Communications Policy in October 2003.

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MAIN POINTS

The advent of broadband Internet access has produced a plethora of innovative interactive multimedia services and created a new distribution platform for audio and visual content and information. Broadband Internet is providing not only text, data and images, but also entertainment content, resulting in a process whereby Internet (telecommunications) and broadcasting applications are starting to converge. This convergence, pushed by technological innovation, implies that similar services can be provided on a variety of platforms. In other words, it has enabled telecommunications operators to offer services that had previously been restricted to broadcasters.¹ The blurring boundaries between traditional media provide a challenging, as well as uncertain milieu, for the market and regulation of related services. The advent of 'broadband audio-visual services', making available audio and video 'broadcasting' similar to traditional broadcasting to a large number of people at the same time over high-speed Internet, raises fundamental issues that need to be addressed in the context of convergence.² Television via ADSL is one of the typical examples of this service.

The main triggers of the progress in broadband audio-visual services are the development of broadband infrastructure deployment, digitalisation, and Internet Protocol technology. In particular, the recent progress in upgrading the speed of broadband networks is salient as demonstrated by the increasing deployment of fibre-optic networks in some OECD countries such as Japan and Korea. The expected evolution of Internet Protocol Version 6 (IPv6) is also likely to boost the uptake of broadband audio-visual services because the function of multicast technology, which will facilitate broadband audio-visual services by allowing one-to-many communication and will ensure quality of services, is embedded in this standard, unlike IPv4.

While broadband audio-visual services are becoming very similar to traditional broadcasting and can be a promising alternative to it, some special features of broadband audio-visual service highlight the market implications. For instance:

- The level of market entry (*i.e.* license, investment cost etc.) is lower for broadband audio-visual services than in over-the-air broadcasting.
- Broadband audio-visual services can be accessed from anywhere in the world while the reach of conventional broadcasting is usually limited to the geographic areas for which they have a licence.³
- Broadband audio-visual services have increased the number of programmes which feature interactivity.

Although broadband audio-visual services have many of the same characteristics as broadcasting, there are, at present, some specific differences between them, which are increasingly disappearing with the help of digitalisation in over-the-air broadcasting that brings about such platforms as interactive TV and pay-TV.

- Broadcasting provides a high bandwidth downlink and is thus suitable for distributing information to a large audience (*i.e.* interactivity is less widely available), whereas broadband Internet essentially offers interactivity to the users to receive information that suits their own personal interests.
- Traditional broadcasting essentially follows a programmed schedule of presentations over which users have no control, whereas broadband audio-visual services are inherently not subject to a programmed schedule.

- The social impact of broadcasting is high and is important in reflecting cultural values in the country, whereas the flow of audio-visual content and information over the Internet is not limited to a single country, but borderless.⁴

Although there are features which are complementary between the two services, there are also similarities which may mean that terrestrial broadcasting and broadband audio-visual service could compete against each other. Some viewers of terrestrial broadcasting might prefer to access broadcasting programming over the Internet. In addition, broadband audio-visual services have the potential to rival cable television by providing an equivalent platform. It is expected that there will be stiffer competition among terrestrial, satellite, and cable broadcasting and broadband audio-visual services. In a digital era, further enhanced competition is expected because of compatibility and interoperability of digital content. A number of terrestrial television service providers deliver the same content both over the air and over the Internet. At the programming level, there is a move towards interactivity in over-the-air broadcasting which enables individual control rather than passive reception of programmes.

Broadband audio-visual services will impinge upon the telecommunications market as well. These services will provide an incentive to increase the speed of broadband connections because high speed is necessary in order to ensure the quality of programming. They will also encourage new investment in broadband infrastructure and accelerate the uptake of broadband in households. The emergence of audio-visual broadcasting via 3G/UMTS telephones might also impact the broadcasting industry.

Despite the fact that broadband audio-visual services are a typical example of convergence that has greatly enhanced the capabilities of multimedia services, they are also at difficulties. These have resulted in the recent downturn in the market where a number of service providers ceased operations. These difficulties include:

- Internet based audio-visual services are still not universal enough to replace existing media.
- Image quality is still not at the level of traditional television.
- Since the digitalisation of content presents challenges to copyright and intellectual property rights regimes in general, broadband audio-visual services are directly affected and in many cases inhibited by the lack of resolution of these issues.⁵

The process of broadband audio-visual service convergence is being led by players from both the telecommunications and broadcasting sectors. Telecommunication operators have used broadband as a means of getting a foothold in the audio-visual service sector, while broadcasters are using broadband to complement existing services, and as potential “buffer” to ensure control of their market.⁶ In addition, the provision of broadband audio-visual services is viewed as an indispensable tool for both sectors in terms of their marketing strategies. An increasing number of players in the communication market (usually the telecommunication operators and cable television operators) are viewing broadband as an opportunity to provide customers with voice, video and data services – so called “triple play”. The ability to bundle these services in a single package is seen as an opportunity to increase average revenue per customer, reduce potential customer churn and attract new customers. In turn such triple play opportunities are leading to an increasing number of joint venture or strategic partnerships across telecommunications and broadcasting industries which, as an example, allow content to be offered by a broadcaster to the customer of a telecommunication operator through broadband networks. It is important to note that this form of alliance might sometimes strengthen the dominant positions of incumbent telecommunication operators and broadcasters.

The future development of broadband audio-visual services will depend mainly on continued rapid growth in the number of broadband users, increased broadband speeds, reasonable pricing structures which allow for affordable access, elimination of pricing structures which penalise users by imposing download caps, and a legal and regulatory framework that allows the continued growth of broadband audio-visual services.

I. INTRODUCTION

The rapid upgrading in Internet access speeds, the increase in residential computer use as well as the development of mobile Internet has diversified the use of the worldwide web. One example of multiple Internet use is the development of broadcasting-type services over high-speed Internet, which is referred to in this paper as 'broadband audio-visual services'.⁷ It is technically feasible to transmit a variety of media through different platforms. For instance, video can now be delivered by high-speed Internet, such as ADSL, and through wireless networks. This trend can be seen as a form of so-called 'convergence' of services between telecommunications and broadcasting.⁸

The advent of broadband Internet access, which has increased bandwidth, has made it possible to provide services competing with over-the-air broadcasting based on the Internet platform. In the OECD area the number of broadband subscribers more than doubled from 14 million in 2000 to just over 40 million by mid-2002⁹, reaching over 55 million by the end of 2002. In Japan, for example, the number of DSL subscribers increased from 1 787 598 in January 2002 to 8 541 340 in July 2003.¹⁰ In addition, data for countries such as the United States indicate that the average daily time spent online continues to increase, approaching one hour per day. Nevertheless, the penetration rate for broadband in the OECD is still low at five subscribers per 100 populations.

The process of convergence is also taking place through digitalisation in terrestrial television broadcasting, although at a slower pace than had been foreseen several years ago. A number of OECD countries, however, have set targets for digitalisation. In Austria, for example, digital television will have completely replaced analogue signals by 2012.¹¹ In Japan, digitalisation of terrestrial television will start in December 2003 and it is expected to be completed by 2011.¹² Indeed, some OECD countries have dramatically increased the coverage and sales of digital television in recent years. The United States is a leader in this area, and there are 1 230 stations in at least 192 television markets transmitting a digital signal as of September 2003.¹³ Factory-to-dealer sales of digital television products in the United States in 2002 totalled 2 487 502 units and USD 4.2 billion, which surpassed 2001 sales by 73% in volume and 61% in revenue terms.¹⁴ Some estimates indicate a reduction by 24% in the number of households worldwide which use analogue terrestrial broadcasting as their primary television service by 2008 as digital television grows.¹⁵ This 'digital revolution' not only expands the number of channels carried on traditional over-the-air broadcast but also enables the delivery of a variety of content, some of which was only seen in the telecommunications arena previously. While terrestrial digital television may compete directly with broadband audio-visual services, it also allows for sharing a variety of digital content between different platforms.

Digital interactive broadband audio-visual services are in particular bringing broadband telecommunications and television broadcasting closer together. Using high-speed Internet for broadcasting, online services, such as video-on-demand (VOD) and live streaming, is generating a new market. Broadband audio-visual services can also expand accessibility to content, by which it might even increase traditional television audiences. There has been a shift in the role of Internet from a text medium to 'broadcasting' for audio-visual information and entertainment, both over the traditional television and the Internet.

This paper focuses on recent progress in broadband audio-visual services. It presupposes that broadband audio-visual services have emerged by means of development of convergence and thus can be a good model to consider the impact and implications of convergence in ICT sectors. Some of the important questions are:

- What is happening in the field of broadband audio-visual services, particularly in light of convergence?
- How do telecommunications and broadcasting operators enter into the market of broadband audio-visual services?
- What should be done to diffuse, enhance and facilitate the provision of broadband audio-visual services?
- What is the impact of broadband audio-visual services on telecommunications operators?
- What is the impact of broadband audio-visual services on over-the-air and cable broadcasters?

It is not easy to predict with certainty the way in which broadband telecommunications and broadcasting will converge and what the impact of this will be on consumer behaviour. However, there are sound arguments to support a review of existing policy and regulatory frameworks to take into account the trend in convergence and to ensure that new services can grow.

II. DEVELOPMENT OF BROADBAND AUDIO-VISUAL SERVICES

2.1. Progress in broadband audio-visual services

In this paper, the term “broadband audio-visual services” is used to refer to a group of services that deliver content to users via high speed Internet access. In this context, the history of broadband audio-visual services is not a long one. While it has been said that radio took 30 years and television took 13 years to reach an audience of 50 million, Internet seems to have achieved this threshold within only a few years. It was in 1995 that the first audio was streamed over the Internet. Early pioneers of audio-visual service over the Internet did not expect audio developments to be as rapid since the network at that time, initially developed for the military, was not meant to be a broadcast medium. Another initial problem was the fact that most users of this service had to make a contract with companies to deliver the content with a limited amount of bandwidth. Due to the short supply of bandwidth, initial providers of the service had to consider the solution to shorten the time to download the content over a telephone line. Some companies tried to establish their own software as the best way for users to view audio-visual broadcasts or multimedia files on the Internet.

Three main factors helped to substantially ameliorate the situation: development of broadband Internet access, digitalisation, and Internet Protocol technology. Seemingly, all these factors have mingled together to push the development of broadband audio-visual services as a whole.

Development of broadband Internet access

The development of broadband Internet access with increasing access speeds, together with innovation of appropriate software, has been the most significant factor encouraging innovation of broadband audio-visual services. Broadband audio-visual services involve ‘streaming media’ technology, which is a means of delivering motion and sound from the source to the receiving end. Streaming media technology makes it possible to deliver multimedia files including audio and video over the Internet. Using this technology requires an Internet connection of at least 30 Kbps, and often more to ensure the reception of streamed content. This requirement is provided by broadband Internet access. However, it is necessary to obtain speeds of 10-100 Mbps to establish subscription-based business models on broadband audio-visual service. With the increasing deployment of high-speed broadband networks, users have been able to gain access to a variety of digital programmes not only over terrestrial broadcast but also over broadband networks including ADSL, satellite, and cable.

Recently there has been progress in enhancing the speed of broadband networks in some OECD countries, especially through the deployment of fibre-optic cable networks that allow much faster speeds than DSL networks. There are approximately 70 consumer fibre access networks operating in the United States as of March 2003. A study estimates that total fibre-to-the-home subscribers will reach 315 000 by the end of 2003.¹⁶ In Japan, NTT East is planning to cover 80% of households passed by fibre-to-the-home networks by the end of 2004, providing speeds between 10-100 Mbps to customers.¹⁷ In Korea, Hanaro Telecom has deployed fibre-optic cable networks covering about 100 cities by the end of 2002.¹⁸ In Iceland, Iceland Telecom (Siminn) is deploying fibre-optic cable networks across the country.¹⁹

Since broadband audio-visual services are far from mature in terms of market penetration, further development in broadband market supported by deployment of broadband infrastructure is necessary before the full effects of new developments have an impact. In this regard, some optimistic estimation might demonstrate the future growth of broadband audio-visual services: Estimates predict that the European broadband market will expand at an annual rate of 68% over the next few years and be worth USD 18.9 billion in 2006. These estimates foresee that a total of 41 million households will be connected via all high-speed Internet services by the end of 2006.²⁰

Development of digitalisation

The digitalisation of content distribution is one of the most influential developments impacting on broadcasting in recent years. While many of the radio and television programmes are based on analogue transmissions in most OECD countries, the conversion to digital transmission is taking place. In Sweden, for example, digital terrestrial television first started in 1999 and has already reached 90% penetration as of March 2003. The Swedish parliament decided in May 2003 that the switch over to digital television will be completed by February 2008.²¹ In Australia, digital television broadcasting began in major cities in January 2001 and will be extended to regional stations by 2004.²² In the United Kingdom, digital television penetration is estimated to have increased to 41.4% of households at the end of 2002.²³ In the near future, digital television will be the main distribution standard. Some OECD countries are actively trying to increase the penetration of digital television. For instance, Germany is seeking to address relatively poor digital television penetration rates through calls for 15 federal media authorities to create a joint digitalisation fund to finance a nationwide roll-out of digital television.²⁴ A study predicts that there will be a worldwide total of 96.7 million households with access to digital television by the end of 2003.²⁵

Digitalisation will bring better picture quality as well as high-quality sound to television. The number of channels will increase up to 100 times including twice the current number of over-the-air services. More importantly, digitalisation is changing the way radio and television programmes are produced and distributed. Digitalisation enables convergence between telecommunications and broadcasting by allowing the same content produced for the Internet to be used for digital broadcasting services.²⁶ In other words, the recent development of digital technology has paved the way for the use of common infrastructures for broadcasting and telecommunications. It also allows such services as pay-per-view or pay-per-channel for customer. Given that a number of broadband audio-visual services are adopting pay-per-view type programmes, this feature will increase competition between over-the-air broadcasting and broadband audio-visual services.

Currently, however, digital television still serves a very limited market and suffers from a lack of suitable standardisation, even though cable and satellite digital television is rapidly expanding in some countries. Hence efforts towards convergence by allowing a combination of television sets and Internet access terminals have not yet proven very suitable for users.

Development of Internet Protocol technology

The development of Internet Protocol (IP) technology has given an impetus to the development of high-speed broadband audio-visual service. Unlike conventional audio-visual services over the Internet, which deliver programmes on a point-to-point basis, IP Multicast technology has enabled service providers to reach mass audiences at lower costs. This technology sends out the signal to several domains of Internet Service Providers (ISPs) simultaneously, allowing the distribution of audio content over the Internet to a mass audience while substantially lowering distribution costs. Applications that take advantage of IP multicast include videoconferencing, distance learning, and distribution of live news. The problem remains, however, that the vast majority of Internet routers installed during the late 1990s do not support this IP multicast protocol.

For the future, the ‘next generation’ Internet is expected to enhance the quality of broadband audio-visual services. In particular, Internet protocol Version 6 (IPv6) technology designed by the Internet Engineering Task Force (IETF) may contribute to further progress of broadcasting over the Internet. IPv6 is expected to add a number of improvements to IPv4 in areas such as routing and network configuration.²⁷ IPv6 has more affinity with IP Multicast technology and would facilitate upgrading the quality of broadband audio-visual services in two dimensions. First, the function of multicast is installed as a default in IPv6, through which the same content can easily be provided to a large audience at the same time. Second, it ensures quality of service in telecommunications with a configuration in which data communication has a lower priority whereas voice or image has a higher priority. A number of projects using IPv6 are currently ongoing. In the European Union, for example, a three-year project called 6NET, started early 2002, plans to deploy pan-European IPv6 backbone infrastructure stimulating European research and industry to play a leading role in next generation Internet.²⁸

2.2. Typology of broadband audio-visual service

Broadband audio-visual services provide audio and video content via high-speed Internet access. There are several ways to categorise these services. From the perspective of what is delivered on the Internet, broadband Internet radio (audio) and broadband Internet television (video) are two different forms. Digital audio content delivery specifies a system for the transmission of high quality audio via a digital radio channel. It is especially designed for wireless broadband Internet. Broadband Internet radio will be able to rival terrestrial radio in delivering better than CD quality sound to worldwide audiences at competitive rates. Digital video content delivery is another type of service, which is based on streaming technologies for the transmission of video and synchronised audio content.

In terms of content delivery mechanisms, there are two types of broadband audio-visual services: the first is the download type that plays the audio and video content after they have been downloaded to the customer’s terminal; the second is through streaming which delivers the data without waiting for viewers’ terminals to download all the data. The majority of current broadband audio-visual services rely on streaming technology.

Streaming type broadband audio-visual services can be divided into two categories: live services and archived services represented by video-on-demand (VOD). Live streaming media enables delivering high-profile content to a global audience, such as over-the-air television. Video or audio file is encoded live at the server and delivered instantly over the Internet according to a pre-determined schedule by the provider. Live services are mainly used for such applications as concerts and sports. On-demand streaming media are not limited to particular times and can be viewed by users at their convenience. The stream is recorded and hosted on a media server so that the user can gain access anytime. Archived services are mainly used for news and weather forecasting programmes. While it places a large load on networks, access by users could be distributed to different time zones.

Focusing on streaming technologies themselves, broadband audio-visual services include both basic streaming and advanced streaming. Basic streaming simply makes audio and video available through the Internet. This is almost the same as television or radio except that the content is coming over the Internet. Advanced streaming adds more features to enrich the experience for both user and presenter. With advanced streaming, for example, it will be possible for providers to track users, which will provide useful information to meet user requirements and compete. It also enables pay-per-view content by accepting and processing credit cards for payment. Furthermore, it allows audiences to communicate interactively with the presenter during a live content delivery.

This categorisation will lead to classification between ‘supplement-type content delivery’ and ‘original-type content delivery.’ Supplement-type content delivery refers to broadband audio-visual services which deliver programmes as a replacement for over-the-air programmes. Original-type content delivery means that the applications used in the broadband audio-visual services are specially designed for Internet, not for the replacement of the terrestrial programmes, e.g. business communications.

It is also possible to classify broadband visual services into subscription-based content and free content. The former is represented by pay-per-view content delivery where viewers pay for access to programmes. Basically, the service is charged separately from a basic Internet subscription. Free content is often supported by advertising. With regard to broadband audio services, subscription-based type services are not yet common. However, live pay-per-view streams of sporting events have become a way to gain profit from broadband audio-visual services. In the United States, for example, RealNetworks made a deal to stream live college football games in partnership with FOXSports.com in August 2002.²⁹

The following table summarises the typology of broadband audio-visual services.

Table 1. Typology of broadband audio-visual services

		Audio	Video	
Download type		Supplement-type	Supplement-type with free access	Supplement-type with subscription
		Original-type	Original-type with free access	Original-type with subscription
Streaming type	Live	Supplement-type	Supplement-type with free access	Supplement-type with subscription
		Original-type	Original-type with free access	Original-type with subscription
	Archived	Supplement-type	Supplement-type with free access	Supplement-type with subscription
		Original-type	Original-type with free access	Original-type with subscription

2.3. Benefits of broadband audio-visual services

Broadband audio-visual services use existing technology at both the service provider and customer sites, and create a wider market without significant investment in equipment. This aspect has two implications. First, the ability of the Internet to provide an unlimited number of information channels for users, which are more than those of traditional broadcasting. In addition, broadband audio-visual services provide a way to deliver real-time information, which can be easily downloaded, to a group of users.³⁰ As an entrepreneurial management solution, broadband audio-visual services can also be an effective tool to lower costs of delivering information and administering selected programmes. Second, broadband audio-visual services provide a way to take advantage of market interest within a subscriber base. For the service providers, broadband audio-visual services can be a means to use extra channels and available bandwidth to generate revenue through new services.³¹

For consumers, broadband audio-visual service would be attractive in that delivery of content on live events in real time over the Internet can be offered without a television set. With streaming technologies, audio and video content can be available for viewers at their convenience without being downloaded. In addition, as the coverage of broadband audio-visual services is global with virtually no channel limitations, content can be available from any of the millions of host sites over the Internet unless the programme is a subscription-based one. Consumers can also enjoy interactivity, such as participation in programmes.

Box 1. Consumer benefits from broadband audio-visual services

Traditionally, broadband audio-visual services have enabled users to obtain some increased benefits in comparison with over-the-air broadcasting as represented by the following examples. However, these advantages are now available with digital broadcasting which is linked to the Internet.

(a) A programme overview

Users will be able to access a guide to offer an overview of programmes. The guide will be an easy means to navigate between programmes.

(b) Background Information

Users will be able to view background information relative to programmes. This information will remain accessible for the whole programme.

(c) Information search

Users will be able to search for more information on the Internet in addition to the background information search.

(d) News flashes

Users will be able to receive news flashes and other real-time information while watching a programme.

(e) Programme interactivity

The programmes over the Internet can be interactive. For example, users will be able to vote in programme polls.

Source: SAMBITS.

From the ISP business perspective broadband audio-visual services enable the use of accumulated web-log information at the server for marketing information for products and services.³² It is also easy to monitor responses from users by making the most of the internet's interactivity.

From the content providers' point of view, broadband audio-visual services can be a great promotional tool. According to Arbitron, for example, online music fans who listen to Internet radio programmes on a weekly basis buy 21 CDs each year in the United States compared to 13 CDs for other consumers. Apple has a business model to offer music online to broadband users based on a pay-per-track model instead of subscriptions with low costs (USD 0.99 per track).³³

From the advertisers' point of view, broadband audio-visual services provide an effective pipeline to deliver their message to a targeted audience with reduced costs and without time constraints. In addition, unlike television commercial messages, advertising in broadband audio-visual services can easily target consumers taking into account their specific tastes. It is also possible to update advertising information quickly as well as to collect questionnaires from consumers, which enables easy processing of information owing to the interactivity.

One indication that broadband audio-visual services are growing in popularity is the fact that more than 100 000 copies of free streaming players are downloaded over the Internet daily.³⁴ Broadband audio-visual service is growing as a tool for training, events, conferences, news and instant delivery of corporate messages as well.

Box 2. Examples of content over broadband audio-visual services

(a) News

- Part of the news broadcast on the television is re-broadcast on the Internet.
- Newspaper publishing companies provide news on the Internet with videos.

(b) Films

- Broadband audio-visual service is used as an opportunity of giving a preview or the first run of a film.
- Film show with audience participation is provided on the Internet.

(c) Entertainment

- Broadband audio-visual service is used to promote well-known entertainers.
- Programmes of local broadcasting companies are broadcast live on the Internet.

(d) Sports

- Live broadcast of a sports game can be made either free or by pay-per-view.

(e) Education

- Internet broadcast of live seminars or conferences.

(f) Business

- Broadband audio-visual service is used as an advertisement of the providers' own services and products.

(g) Music

- Live broadcast of a concert is broadcast over the Internet.
- Broadband audio-visual service is used for promotion of music designed for online sales.

(h) Others

- Discussions in Parliament are broadcast on the Internet.

2.4. Comparison between broadband audio-visual services and over-the-air broadcasting

At present broadband audio-visual services are still at the development stage rather than replacing over-the-air broadcasting.³⁵ But, because of the trend in convergence between Internet and traditional broadcasting, it is important to review the differences between the two in order to understand the implications of broadband audio-visual services on regulatory policy as well as on the market.

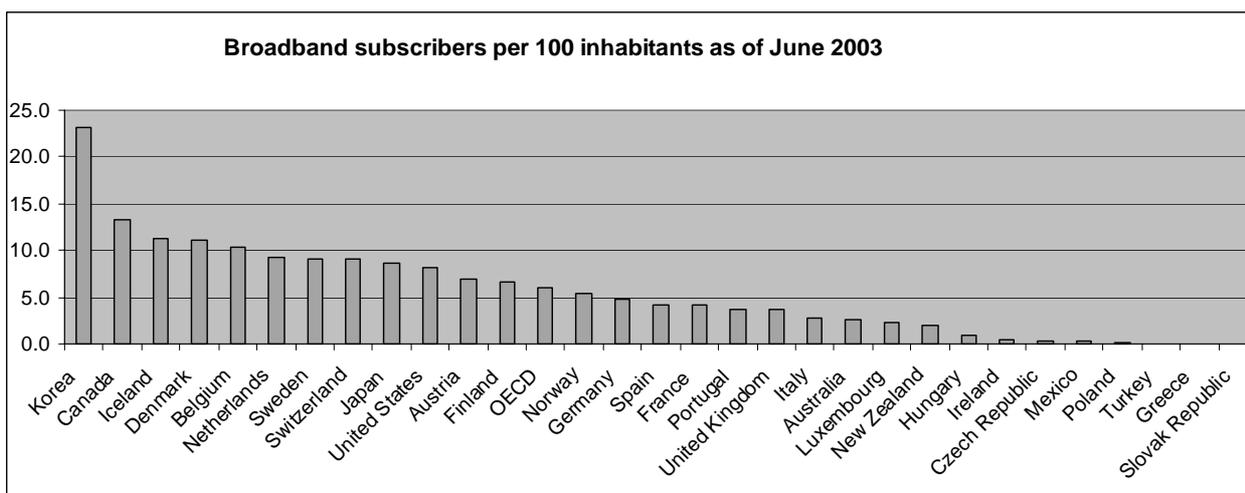
The first difference concerns regulations on market entry. While traditional over-the-air broadcasting has a number of regulatory ‘barriers’ to meet for market entry, in particular the requirement to obtain a licence, media ownership issues and direct regulation of content (programming quality and range etc.), broadband audio-visual services are not constrained by any entry obligations. Since most of the regulatory obligations on over-the-air broadcasting derive from controls of the radio spectrum as well as political and cultural requirements, broadband audio-visual services are essentially free from these obligations. For traditional over-the-air broadcasting markets the limited spectrum made available and consequently the limited number of licences issued has meant that there is limited market competition in most countries.

At the same time, it is increasingly salient in some countries that whether broadband audio-visual services are constrained or not by entry regulations depends on the way in which they are delivered to the user more than on the platform on which they are delivered. In Italy, for example, providers of broadband audio-visual services would require a licence if the services are delivered on a programming basis in which the user is merely passive and may not freely select the programme or the timing, irrespective of the platform.³⁶

The second difference is in terms of cost structure. While over-the-air broadcasting generally has high fixed costs and low variable costs, broadband audio-visual services have much lower fixed and variable costs. It means that the financial barriers to market entry are relatively low in the case of broadband audio-visual services. Apart from the investment in the deployment of broadband networks and transmission costs³⁷, broadband audio-visual services need relatively limited capital resources. In many cases, however, audio-visual content such as music or video content requires copyright permission and incurs copyright payments and this may change the economics of service provision.

The third difference is the proportion of penetration. While almost all households currently have a television set and use terrestrial television frequently in most OECD countries³⁸, use of broadband audio-visual service is still limited (Figure 1). The relatively low penetration rate in broadband Internet access, except in the case of Korea, means that broadband audio-visual services are still far from universally on a par with terrestrial television.

Figure 1. Number of broadband subscribers per 100 inhabitants in OECD countries



Source: OECD.

The fourth difference is in terms of the structure of the services. Over-the-air television broadcasting, whether it is analogue or digital transmission, is fundamentally a one-way delivery of programmes to an audience. On the other hand, broadband audio-visual services, whether download or streaming, were originally a point-to-point communication (often called uni-cast) using Internet protocol, even though they have increasingly become similar to 'broadcasting' with the development of IP multicast technology. Therefore, broadband audio-visual services are inherently interactive and not subject to any 'programming' whereas traditional over-the-air broadcasting essentially follows a programmed schedule of presentations, over which users have no control. This feature might imply that broadband audio-visual services will not reduce new kinds of over-the-air broadcasting services.

The fifth difference is the number of channels. In most OECD countries, there are currently only a few channels in over-the-air broadcasting for analogue TV, each of which can show one programme at one time for a mass audience. Broadband audio-visual services are not limited by the number of channels. They are usually provided on the basis of the concept of a 'library', which will imply a higher degree of control by the user. However, digitalisation of over-the-air broadcasting has the potential to dramatically change the number of channels. Digital broadcasting can create 'server-type broadcasting', which enables viewers to search for specific programmes or scenes they wish to watch by using electronic programming guides (EPG). It is also possible to search the hard discs of other servers connected to the Internet if the target programme is not on the hard disc of the viewer's server.³⁹ In Japan, for example, the legal framework has been formulated by the government in order to allow for the introduction of server-type broadcasting to all digital broadcasting. Thus, digital broadcasting will allow a user to view a programme at a convenient time, a function similar to that available to broadband audio-visual services.

A further difference would be the fact that broadband audio-visual services are different from both broadcasting and telecommunications services in the way intellectual property rights are managed and protected. This has profound implications on the business model of broadband audio-visual services.

III. THE BROADBAND AUDIO-VISUAL SERVICE MARKET

Broadband audio-visual services are becoming a key part of the ICT industry. The demand for streaming video is in particular growing. Research shows that among broadband users 34% are thought to stream video from the Internet and 31% to download it.⁴⁰ Behind this fact, there have been gradual shifts from both the telecommunication and broadcasting sides to the market side of broadband audio-visual service. This would be an example of convergence between telecommunications and broadcasting services. It is important to note that the mutual entering between the two industries is, in some cases, being made from both sides rather than by 'invading' the other field directly by gathering in a 'grey zone'⁴¹, *i.e.* broadband audio-visual service,. This reflects the reality of convergence and the difficulty of assigning firms to boxes such as 'telecommunications operators' and 'broadcasters.' In this context, convergence is a diversification process in the broadband communications arena rather than a simple unification process of the traditionally separated telecommunications and broadcasting sectors.

3.1. Market entry by telecommunications operators

With the increase in bandwidth, a number of telecommunications operators are entering into the market for broadband audio-visual services. In comparison with entry into the broadcasting market, in which there are scarce resources (spectrum frequencies) and high entry barriers, it is much easier for telecommunications operators to enter the market of broadband audio-visual services.

A major motivation for market entry is to expand their revenue base, in particular to increase average revenue per customer, and to maintain their existing customers. By bundling telephony, broadband Internet access and programming services (broadband audio-visual services) together, telecommunication operators can provide a comprehensive package of services to their customers, and benefit from economies of scope. Broadband audio-visual services are becoming an important way not only to attract new customers but also to retain existing customers since it is likely that customer churn will be reduced if a customer is subscribing to voice, Internet access and content services from a single supplier. Such bundling of services often results in lower prices for consumers compared to subscribing to separate services. A number of enterprises are offering integrated services, often by finding strategic partners. In Italy, for example, Fastweb, a fibre-optic cable provider, launched integrated television on-demand, high-speed Internet and telephony services and in October 2001 reached an agreement with TELE+, an Italian pay-TV company, to deliver film and sport from TELE+ using its fibre television.⁴²

Another possible motivation for market entry seemingly comes from their desire to enhance their brand names. With provision of value-added services, telecommunications operators can show that they are leading and competitive companies in the field of broadband communication. The fact that a number of companies initiated 'free' broadband audio-visual services such as Internet radio stations, which are not necessarily aimed at reaching wider audiences, is an example.

There are some examples of market entry by telecommunications operators in OECD countries, which sometimes takes place in the form of strategic partnerships with broadcasting or content creating companies. In the United Kingdom, for example, BT Openworld, the broadband content arm of British Telecom (BT), moved into broadband audio-visual services in November 2002 by creating a new sports channel called Sportal OnDemand in partnership with other companies. The provision of this channel will enable broadband subscribers in the United Kingdom to watch a wide range of VOD sports programming

covering major sports events worldwide.⁴³ In Japan, NTT East began to broadcast Internet radio programmes experimentally with streaming delivery system from December 2002 to March 2003.⁴⁴ NTT is also planning to launch a new service during 2003, which delivers programmes of the terrestrial and satellite television companies via its fibre-optic networks. A satellite broadcasting company Sky PerfecTV and Japan's public broadcasting company NHK are showing their interests to use this plan. For NHK which has an obligation of universal programme provision by law⁴⁵, this kind of service is expected to play a complementary role to cover local areas where radio signal is difficult to reach.⁴⁶ KDDI also announced in May 2003 that it would launch broadband audio-visual services using fibre-optic networks during 2003.⁴⁷ In Spain, a telecommunications operator Auna is offering integrated services of television, telephony and Internet by using its broadband network.⁴⁸ Auna also announced in March 2003 that it would incorporate interactive middleware and products of OpenTV, interactive television company, in order to provide new interactive services. In June 2003, the incumbent operator Telefonica signed an agreement with Kreatel Communications, a provider of solutions for TV-centric services in IP networks, to launch TV and video services over ADSL.⁴⁹ In Austria, the incumbent Telekom Austria launched a new broadband audio-visual service in June 2003, which allows AonSpeed users to receive live broadcasts via the Internet.⁵⁰

Telecommunications operators have tended to give priority to video-type services, but there has been an increasing emphasis on broadband audio service as well. In the United Kingdom, for example, British Telecom (BT) launched a range of broadband-related products in March 2003, which include a portable radio that can be used anywhere in the house and allows users to tune in to a number of Internet radio stations. It is likely that this service will be bundled with a BT Internet connection based on BT's strategy to stimulate demand for access to its broadband networks.⁵¹

Market entry by Internet service providers⁵²

Entering the broadband audio-visual service market has been a strategy for some ISPs as well. Since broadband users tend to expect a variety of attractive services that narrowband users can not enjoy, provision of broadband audio-visual services may be necessary to avoid losing customers by offering them exclusive information and entertainment. For example, America Online (AOL) began to offer high-speed free access to CNN's video news services to its subscribers in February 2003.⁵³ This collaboration reflects their business plan to hold on to Internet users switching to broadband from dial-up connections by offering them exclusive audio-visual information. Loudeye Corp., a leading digital media service provider, announced new versions of broadband audio-visual service applications designed to meet the growing demand for broadband audio-visual services across vertical markets including training, marketing, and corporate communications in November 2002.⁵⁴ BellSouth, Internet (DSL) service provider, entered into an agreement with Movielink, an online movie download service provider, in August 2003 to offer its DSL users a customised version of Movielink's movie rental service.⁵⁵ In Japan, Japan's Softbank Corp (Yahoo BB) started to provide television service on its ADSL network. Users of this service will pay a monthly fee of USD 21.35 (JPY 2 500) for a basic package in addition to an ADSL subscription fee (JPY 3 143-3 543). In the United Kingdom, the first internet-only television channel, which is only available via broadband networks or ISDN, was launched by Worldart Media Television in October 2002.⁵⁶

Like some telecommunications operators, there are some ISPs who are broadening the types of their services. For example, Loudeye launched Loudeye Radio V2.0, which includes a plug-and-play encoder and P2P streaming, in order to provide a broadband audio-visual service solution to terrestrial radio channels in September 2002.⁵⁷

Some ISPs are putting stress on corporate broadband audio-visual service, targeting at corporate communications. Corporate communications broadcasts to individual employees and consumers could be one of the most profitable areas of broadband audio-visual services as well as digital television services. An increasing numbers of corporations are discovering that broadband audio-visual service is a powerful and cost-effective way to communicate with employees and customers, especially with those who do not always have time to attend company events. For example, Corporate Communications Broadcast Network (CCBN) has been offering broadcasting on the Internet for communications between companies and investment community.⁵⁸

3.2. Market entry by broadcasters

Convergence by over-the-air broadcasters is also taking place via the Internet market. Providing broadband audio-visual services can be a good target for them to approach the telecommunications market and to expand the variety of services. This type of market entry is viewed as supplementing existing services rather than replacing them. It can be expected that terrestrial broadcasting, as some analysts argue, will remain an important sector providing important services to the society it serves.⁵⁹

Broadcasters in the Internet broadcast audio-visual market are either providing the same content over broadband as that provided on terrestrial broadcasting, such as live concert shows, or they are providing the same content but in an enhanced way, such as archived news on the Internet. In some cases broadcast content is specific to broadband audio-visual services. It is increasingly salient that broadcasters are seeking to offer combined services with broadband. As one example, in the United Kingdom satellite broadcaster BSkyB is looking at introducing a broadband Internet access package to rival cable network operators such as NTL and Telewest. In addition to this broadband offering, BSkyB is also planning to introduce a broadband-enabled digital set-top box to enhance its interactive digital television services.⁶⁰

In some OECD countries, an increasing numbers of over-the-air television broadcasters are getting into the market for broadband audio-visual services. In the United States, for example, large broadcasting companies such as NBC, ABC News, and CNN, started providing limited broadband audio-visual services as early as the late 1990s. Among these, ABC television network, a subsidiary of Walt Disney Co., plans to launch a 24-hour news service that will be available to subscribers to the existing ABC News on Demand broadband service.⁶¹ In the Netherlands, Dutch television broadcaster SBS6 decided to start broadcasting parallel versions of some of its popular programmes on the Internet in December 2002.⁶² In the United Kingdom, the BBC, which has operated broadband audio-visual service as well, launched a new Website in January 2003 that enables browsers to access past BBC news reports in the form of video or audio, which can drawn from archived media.⁶³ In France, a national broadcaster, TF1, is to test broadband television services over a six month trial in Paris. This test involves 200 users receiving TV and video, together with high-speed Internet access, over broadband networks.⁶⁴ Another project of TF1 is called 'Dream TV', which encompasses 200 households located in Boulogne Billancourt and in the 15th arrondissement of Paris who can receive an array of 24 television channels over ADSL networks.⁶⁵

However, it appears that broadcasters in some countries lag behind telecommunications operators in entering broadband audio-visual service markets. This may be because the incentive for broadcasting operators to enter the market is primarily motivated by the will to keep the market under control instead of favouring its growth. In addition, for many of the above examples, companies are setting-up different departments so that there is little institutional convergence taking place. For example, there is often different editorial responsibility for Internet and over-the-air television.

There has been some criticism of over-the-air public broadcasters for their broadband audio-visual service trials. In Germany, for example, a private broadcasting company, VPRT, criticised public broadcasters who tried to increase their online activities. This criticism was particularly aimed at a deal between the public channel ZDF and Internet service provider T-Online, which enabled Internet users to watch the news service Heute on a special common Heute/T-Online site.⁶⁶ In Japan, NHK, the Japanese public broadcasting company, was criticised by private broadcasters as well as the newspaper industry when it announced commencement of a form of broadband audio-visual services in January 2000.⁶⁷ The complaint was based on the argument that broadband audio-visual services by NHK would hamper private activities even if the programmes were ‘recycled’ ones (*i.e.* already broadcast on terrestrial television/radio).⁶⁸

It is important to differentiate between services offered which are equivalent to free over-the-air broadcasting and those offered which are equivalent to pay-TV. For the over-the-air broadcasting arena, it has traditionally been recognised that consumers can receive their television programme for free at the point of consumption. However, with the proliferation of cable television a myriad of new television channels gave broadcasters in some OECD countries, such as the United States, more power as gatekeepers of content. As a consequence, an increasing number of people are willing to pay for television in these countries. Providers of broadband audio-visual services, who originally focused on free broadcasting, have increasingly turned toward offering pay-TV type Internet broadcasting.

Operators of a pay-TV type services will be able to offer a more comprehensive range of programming including popular movies and sport. In some OECD countries such as the United States, pay-TV seems to be flourishing in recent years. However, some providers of pay-TV type services are facing some difficulties due to high programming cost and the difficulty of accessing high-quality content. This situation encourages them to form new partnerships or create joint ventures, which will be dealt with in a following section. The acquisition of Italian pay-TV operator Telepiu Spa and Stream Spa by an Australian company News Corporation Limited, approved by the European Commission in April 2003, is an example in line with this direction.⁶⁹

Market entry by cable television broadcasters

Cable television broadcasters differ from over-the-air broadcasters in terms of entry into the market of broadband audio-visual services. They already provide a wide range of programming and often provide access to high-speed broadband Internet services as well as digital content over their systems. Thus, they have less motivation than over-the-air broadcasters to enter the market. It is possible over time that the distinction between traditional programming and content they provide over their broadband service would blur. With increasing competition from DSL in the broadband Internet access market, however, a number of cable television companies will find provision of broadband audio-visual services via cable an appropriate means to keep their customers, as is the case of traditional telecommunications operators. In addition, as broadband telephony services develop it can be expected that many cable companies will begin offering telephony, broadband, and programming, as a package to attract customers. In Japan, for example, a cable television company Jupiter Telecommunications Co., which also operates J-COM Broadband, is offering CATV programming, telephony and broadband services as a package with a reduction rate within certain areas.⁷⁰ In the United States, the merger between AT&T and Comcast was decided by the FCC in November 2002, and the newly formed AT&T Comcast, as the largest cable company in that country, will offer a combined service including CATV, telephony, and broadband Internet.⁷¹

3.3. Market entry by other industries

There have also been trials in the market for broadband audio-visual services from other industries in recent years. The most relevant example would be market entry from the software industry and content providers that are taking advantage of relatively low entry costs. In the United States, for example, in March 2003 Microsoft began a service that lets users with broadband Internet access send live video to each other at rates as high as 15 frames per second, which approaches the quality of television.⁷² Yahoo has been involved in corporate broadband audio-visual services since acquiring Broadcast.com in 1999 and launched a new broadband audio-visual service that lets companies produce their own multimedia events in April 2002.⁷³ Yahoo also launched a broadband audio-visual service named Yahoo Platinum in March 2003.⁷⁴ One of the main marketing features for this service is the deal which Yahoo has signed with the annual National Collegiate Athletic Association (NCAA) college basketball competition in the United States, where early games will be broadcast over the Internet. In France, a software company called Nexedi launched an Internet-based system called TVBrick that will allow connection with TV and with the Internet via a broadband link in June 2003.⁷⁵ This system is targeted at Japanese people overseas who want to keep up with their favourite TV shows on the broadband Internet. In Spain, a provider of adult entertainment services Private Media Group announced in January 2003 that it would offer high-quality VOD services on its broadband audio-visual site.⁷⁶ In Japan, Sony, jointly with Sony Communication Network, began to offer a broadband audio-visual service called So-Net Broadband Mega-Channel to registered subscribers in February 2002. The content covers movie, music, sports, shopping, and live drama. Sony foresees that Internet and television will merge in the future and that television will be reborn as a digital entertainment centre in the home.⁷⁷

Market entry from an industry which is not directly relevant to broadband audio-visual services is also increasing. In the Netherlands, for example, Jamby, a Dutch online entertainment company, began testing out two Internet television sites in August 2001. The aim of the experimental sites was to interest advertisers in new online methods of entertainment.⁷⁸ In the United Kingdom, EMI Record Music, a division of U.K.EMI Group, launched an online streaming music service with Streamwaves, an Internet-based subscription music provider, in November 2000.⁷⁹ Matching Hat, a magazine publisher, also launched a new interactive financial information service distributed over the Internet and TV-on-demand in May 2001. Its 'Your Money Interactive Television' offers 40 kinds of three-minute streaming video clips about specialised personal finance subjects.⁸⁰ In France, a French regional newspaper, Ouest-France, was to launch a local Internet television service named Maville TV in July 2002 despite the failure of Internet television at a national level.⁸¹

Some mass-media companies strategically use broadband audio-visual services to extend their customer reach. For example, Reuters, the financial news group, started to launch a streaming video service ranging in March 2003 providing news video clips for free aimed at extending its coverage from financial to consumer content.⁸²

3.4. Organising alliances

With the growth of the broadband audio-visual service market, a large number of mergers or alliances were being formed at various levels in recent years. This is one of the by-products of convergence, and corporate strategy appears to be aimed at finding a strategic partner rather than at vertical integration. This relates to the reality that many markets have rules which constrain some kinds of alliances. For example, rules and laws sometimes require separation between telecommunications operators and cable operators. In addition, it is often the case with the OECD countries that there are ownership rules which apply and might constrain some alliances. Depending on the market, these types of rules may be the reason to promote the trend of strategic partnerships.

A typical type of partnership is between ISPs and broadcasters. In the United Kingdom, for example, AOL teamed up with BSkyB to provide Sky Digital's subscribers with increased interactive TV functionality. BBC Worldwide will create Internet-based programming for the RealNetworks service to the US market after a deal is signed between the two companies.⁸³ In Ireland, Hitouch entered into a strategic partnership with Interactive1 and they will set up a joint venture called WebChannels to provide video and audio broadband audio-visual services.⁸⁴ In Japan, Yahoo BB announced in April 2003 that it would enter into a partnership with a private broadcaster, Fuji Television, and offer video programmes of Fuji News Network (FNN) free. While broadband audio-visual service provided by Yahoo BB had previously been restricted to its ADSL subscribers, this new service will enable other users to view the programmes with special software.⁸⁵ Mergers are also taking place between ISPs and content providers. In the United States, for example, the merger between AOL and Time Warner approved by the FCC in January 2001 has combined AOL's far-reaching Internet audience with Time Warner's vast entertainment content.

Telecommunications operators are also giving increasing attention to strategic partnerships with broadcasters⁸⁶, especially pay-TV companies, in order to position themselves in content markets.⁸⁷ In Australia, for example, Telstra sought to bundle its telephony service with Foxtel's subscription-based television service. Under this deal Telstra offers Foxtel's pay-TV services at a discount rate to retail residential users who also buy fixed line telephony services from Telstra. While there was some opposition to this alliance on competition grounds, the regulator ACCC decided not to intervene on this deal in November 2002.⁸⁸ In Japan, NTT Broadband Initiative (NTT-BB) began to offer FNN news programmes of Fuji Television to subscribers of its broadband network BROBA in April 2003.⁸⁹

Cross-industrial collaboration is also active. In the United States, for example, the Consumer Financial Network (CFN), a leading provider of financial and life planning solutions, and Internet Broadcasting Systems (IBS) announced a major joint marketing initiative in June 2000. IBS provides CFN's YouDecide.com with prominent placement throughout their local broadband audio-visual service channels, while also promoting the services of YouDecide.com on television through IBS-affiliated television stations.⁹⁰

At the same time, the development of alliances among broadband audio-visual service providers is also a growing trend. In Europe, for example, a major European Information Society Technology (IST) project, SAMBITS, was launched in January 2000 to bring together key broadcasters, researchers, academics and industrialists across Europe to drive convergence based on broadband audio-visual services.⁹¹ A group represented by some of the major DSL providers announced in March 2003 that they would develop, standardise and support an open model for interactive entertainment services over broadband DSL. The initiating group consists of Alcatel, Belgacom, Philips Consumer Electronics, Bluewin/Swisscom, Telecom Italia, Telefonica, Telecom Austria and Thomson.⁹² In the United States, major broadband audio-visual service providers had a new forum in October 2002 with the launch of the Webcaster Alliance following the legislation of HR. 5469 (Small Webcasters Amendment Act).

With the growing numbers of partnerships, some conflict of interest between service providers sometimes occurs. For example, Echostar Communications Corp., a satellite television provider, filed a lawsuit against Microsoft-owned WebTV Networks, alleging that the company neglected their collaborative relationship and built equipment for rival operator DirecTV.

If these movements of organising alliances go through a consolidation process, they need to be examined by the relevant antitrust authorities who may impose conditions on the operation if a dominant position is strengthened. Alternatively, if there is no consolidation process, the incumbent telecommunications operators are still bound by regulatory requirements in relation to their traditional markets (voice and data) which ensure a level playing field among players.

3.5. Problems of broadband audio-visual services

The emergence of broadband audio-visual services is raising some problems. The first is to ensure that revenues can be generated to support a business. Without advertising revenues, free access to broadband content cannot be sustained unless supported by other paying services. There is a need for all the players involved in the industry, including content providers, to find an appropriate business model.

Quality could also be a problem unless sufficient bandwidth is delivered in that, unlike traditional television, it seems more likely that broadband audio-visual services cannot at present maintain a sufficient level of high quality especially for images. The failure to deliver a constant level of service can slow diffusion and lose customers. In order to enhance the quality, higher network bandwidth is required.

There is also a 'high bandwidth problem'. At present broadband telecommunications is characterised by asymmetric communications that is high data rates downstream to subscribers but relatively low data rates upstream from subscribers. In broadband audio-visual service, however, symmetric communications are often required to support interactivity. Further development of broadband Internet networks may in certain cases be a precondition for growth of the broadband audio-visual service market.

Nevertheless, recent progress in broadband audio-visual service technologies has substantially benefited broadband audio-visual service providers. In the area of audio compression technologies, for example, RealNetworks and Microsoft each have made strides in providing the same quality sound in smaller packages. RealNetwork's new technology has reduced file sizes by 30% while keeping the same sound quality, and Microsoft's test version of Windows Media 9 released in September 2002 offered a 20% gain over its previous version. These smaller file sizes lead directly to lower costs as broadband audio-visual service providers are paying to send less bits over the broadband network.⁹³ Some broadband audio-visual sites adopted this high-quality image. For example, Major League Baseball (MLB) will use compression schemes from RealNetworks that give users a full-screen picture, which is better than VHS quality at a streaming rate.⁹⁴

Another problem is allegedly insufficient user-friendliness. Normally, each audience must have a media player (format) downloaded and installed on his or her own computer in order to receive broadband audio-visual service programmes. In addition, the media player must be compatible with the format used by the broadband audio-visual service providers. This lack of standardisation can also slow growth although there are now only a handful of popular options including Real Player, MPEG, Shock Wave, Windows Media Player, and Quick Time.⁹⁵ Interoperability between different standards should also be ensured, and thus competing, open and industry-led interoperable systems should be agreed upon. Additionally, it will be important to develop user-friendly terminals so that anyone can easily gain access to programming on broadband Internet.

A further problem is intellectual property rights represented by copyright. Since digital content is very easy to copy, copyright issues have become extremely important for the broadband audio-visual service industry. Business models may only be adopted by the industry if policy addresses the issue of copyright by balancing the interests of all the stakeholders involved. The copyright problem is associated with issues of online distribution of content. Broadband audio-visual services should be based on commercially viable distribution models that take into consideration and adequately remunerate all segments of the value chain in a networked environment.

Box 3. Examples of software to view broadband audio-visual services**(a) RealPlayer**

Developed by RealNetworks Inc., it enables access to image and sound in real time. It comes pre-installed on many computers and the Mac and Windows versions can be downloaded for free.

(b) MPEG

Developed by Moving Picture Experts Group, it is used for coding audio-visual information in a digital compressed format. A number of MPEG players are available for Macintosh and Windows platforms, most of which are free.

(c) Shock Wave

Developed by Macromedia Inc., it enables users to watch animation, entertainment, and interactive multimedia.

(d) Windows Media Player

Developed by Microsoft, plays music and video and has roughly the equivalent quality as RealPlayer. It is bundled with Microsoft's Internet Explorer Web browser.

(e) QuickTime

Developed by Apple Computer, it was one of the first widespread digital-video technologies and enables playing and editing of a variety of media including images, sound, and virtual reality. It is given away free of charge and is bundled with all Macintosh computers and some Windows PCs.

Source: Electronic Musician.

The present conjuncture in the telecommunication industry relative to intellectual property rights is having a great impact on market growth for broadband audio-visual services resulting in some service providers exiting the market. The number of broadband audio-visual service channels as of September 2002 was estimated at about 4 000, significantly lower than the 5 700 stations in 2001.⁹⁶ In the year 2001 alone, the number of broadband audio service providers reportedly declined by 31%, with US stations accounting for the major steep decline. Some of these closures resulted from threats to take action against copyright infringement where Internet radio stations were playing music without paying copyright. Over 1,000 US stations and Internet-only broadband audio-visual service providers reportedly quit streaming online in 2001.⁹⁷ For example, in June 2002 Yahoo decided to close down several of its broadcast services including FinanceVision and Yahoo Radio because of the continual 'lacklustre' performance. Further analysis of this issue is beyond the scope of this paper.

The fact that broadband audio-visual services have no national boundaries in content delivery, unlike over-the-air or cable television, is also viewed as a problem area. Broadband audio-visual service can be a potential way of bypassing the existing regulatory frameworks of broadcasting such as licence and content regulations. This is because it is technologically possible for broadband audio-visual service providers to download terrestrial television signals and to re-transmit them via their broadband networks.⁹⁸ In Canada, for example, iCraveTV streamed the programming of US broadcast TV stations online 24 hours a day without receiving permission from broadcasters or copyright holders in 1999. Although the Internet is not regulated in Canada the legal position of iCraveTV was not clear. A number of US programmers filed a lawsuit against iCraveTV and the company decide to shut down the service.

Also in Canada JumpTV wanted to re-transmit over-the-air television signals in 2002. In Canada cable TV companies have the right to retransmit over-the-air signals by paying an appropriate copyright fee. JumpTV wanted the same right as CATV companies using broadband. Their initiative led to a change in the Canadian Copyright Act and JumpTV was given, subject to paying an appropriate copyright fee, permission to retransmit signals. However, they also needed to guarantee that only Canadian users would have access to the content they retransmitted. Although JumpTV decide not to develop their service and withdrew from the market, their case helped in laying the policy groundwork for potential new market entrants in the provision of broadband Internet video services in order not to leak the content out of the

country. While JumpTV claim to make sure that online visitors are coming exclusively from Canada, it would be difficult to find out to what extent the border-control technology works. They point out that their act is legally admitted under compulsory licensing law in Canada that prescribes companies can re-transmit any television broadcast on the air.⁹⁹ If these movements increase in the future, regulators might be obliged to further loosen the existing regulations.

Although broadband audio-visual services have the potential to increase competition by providing a new platform for programming, there is also the possibility that they decrease competition if major companies in the industry offer bundled services which include broadband audio-visual and telephony. This issue will be dealt with further in the next section.

3.6. Finding an appropriate business model

The uncertainty as to the future profitability of the broadband audio-visual service industry, linked for a large part to the question of copyright fees, is holding back market entry by many companies. In the Netherlands, for example, XS4ALL, a Dutch ISP, is taking a 'wait and see' approach. In 2002, about 15 000 subscribers to XS4ALL's broadband service participated in the Dutch ISP's six-week trial in Internet television broadcasting. In spite of an enthusiastic response, XS4ALL is analysing the results from this experiment before deciding its next move.¹⁰⁰ The DSL-TV Foundation, which was set up by some Internet service providers, is to begin broadcasting six international channels via the Internet for free in a trial of broadband audio-visual service in March 2003, which can only be viewed by users in the Netherlands. Yet, it has currently no plans to commercially offer broadband television services.¹⁰¹

The issue of new business models for broadband audio-visual services should be addressed mainly by the industry based on the concept of a new form of distribution in a networked environment with high levels of usage and low costs of distribution. One of the keys to create a steady business model in the field of broadband audio-visual service is content. The increase of broadband Internet users is likely to be content driven, which means that the content broadcast over the Internet should be designed to convince more users that broadband is worth the 'extra money.'

Box 4. Government initiatives to stimulate broadband content development in the United Kingdom

There are some government initiatives to stimulate the development of broadband content among OECD countries, one example is in the United Kingdom. The UK government view is that these initiatives will result in productivity and competitiveness gains both in the content industry and for the wider economy. In 2003, the feasibility study on broadband content pilots, commissioned by the Department of Trade and Industry (DTI), was completed. The pilots concentrated on business models for broadband content development and their contribution to competitiveness and productivity, both to the UK content industry and to the wider economy. The study made a strong case that the pilots represented a significant opportunity for UK business, and that the DTI and industry should take them forward. The report included a full evaluation of the rationale of each pilot together with a recommendation on the proposed structure for the pilots and implementation plan. Two of the AKC recommendations are directed towards helping SMEs enhance their productivity and competitiveness through the use of broadband content. These are:

- Developing broadband marketing to provide consumers with compelling broadband experiences, initially within the Tourism industry.
- Making tools available for more effective collaborative working within a creative industries cluster.

Another project called the Broadband Channel would involve creating a central body commissioning high quality broadband content for access by distributors. It is different in nature and size from the other projects and is more of a market maker than a pilot.

However, some argue that there is currently no 'killer application' in broadband Internet access.¹⁰² In terms of content delivery, there already exist a number of rival media such as over-the-air TV, satellite, and cable broadcasting as well as rental video, DVD, and CD. The one area where broadband has an advantage over other media is the ability to obtain information content on demand and access to archive content.

There are basically two types of potential business models for online content delivery. One model is advertising-based relying solely on revenue from advertisements without levying subscription fees, and another type is subscription-based levying a fee for content use from subscribers. In addition, there could be a pay-per-view model for broadband audio-visual services on different platforms. This model can exist by itself without a subscription and service providers can favour this kind of model in the future in order to sell their services outside their subscription customer base and thereby extend their market share. Given that traditional broadcasting is in many countries supported by advertisements and that the likelihood of higher advertisement budgets is small, the future of broadband audio-visual services may be on a subscription-based or pay-per-view business model providing personalised content linked with the opportunity for interactivity.

In this context, it is noteworthy that some broadband audio-visual service providers have sought to improve upon terrestrial broadcasting business by increasing interactive elements, such as to rate songs, or to participate in contests. With regard to MTV, a worldwide broadband audio-visual service company, for example, interactive application has enabled MTV viewers to vote for their favourite stars before and during the MTV Europe Music Awards.¹⁰³

A potentially profitable content targeted at specific groups would be sports coverage. Broadband audio-visual services currently account for only about 1% of sports industry revenues and most of it is either recent highlights or archived material, since the rights to the content are either not available or held by over-the-air television broadcasters. Nevertheless, some estimates predict that this rate is set to grow as sports rights holders begin to support emerging channels more actively. A variety of business models being tested in recent years would demonstrate this estimate. For example, Major League Baseball (MLB) and RealOne are said to be the most successful examples of subscription-based services, with 1 000 users paying up to USD 14.95 per month for access to archived material.¹⁰⁴

In an effort to attract viewers, some companies are also seeking to make their Internet-only content and services available via television. In Germany, for example, T-Online is planning to offer customers such services as video-on-demand and an electronic programme guide starting in late 2003. A special set-top box, connecting the television, the antenna cable and broadband provider, will be required to access the package.¹⁰⁵

Some broadband audio-visual service providers are increasing the number of subscription-based programmes. For example, the United Kingdom-based 'Ministry of Sound' announced in February 2003 that it would begin to offer subscription-based online content. The company is reportedly planning to create an interactive community on the Internet where radio and video broadcasting are combined with chat rooms allowing users to interact with each other on a pay-per-track basis.¹⁰⁶

In addition, the economics of concurrent video streams in terms of the business model would be highlighted in the wake of the development of broadband audio-visual services. For example:

- Hosting and distribution costs for broadband content items can be 100-1 000 times higher than that for an equivalent number of narrowband text and graphics content.
- There is a markedly different business model for broadband content between a public and private broadcaster, and the associated geographical implications for access.
- Issues of the geography of users versus rights management need to be addressed. For example, a question can be raised as to whether it is right that an Australian who pays no license fee or UK tax can watch video streams for free while costing the UK taxpayer.
- The scalable, affordable network capacity needs are vast.

3.7. Peer-to-peer content delivery services

The increase in the number of content distribution networks, such as Akamai Technologies and Seedra Networks, has lessened the need for large bandwidth. Furthermore, newer services to distribute content at a lower cost have sprung up in recent years. Instead of using large server infrastructures that handle all user traffic, peer-to-peer content delivery services direct new users to other users that are already hosting a particular piece of content. This is working as a delivery method for content, such as streaming media, at much lower cost and more efficient bandwidth usage. Sound quality is not yet equal to that of traditional content delivery network services.¹⁰⁷ While peer-to-peer streaming is still in its infancy, some content delivery companies, such as Kontiki or AllCast, have employed this technology.¹⁰⁸ Radio Free Virgin, one of the free broadband audio-visual service providers, was also one of the first to take advantage of peer-to-peer streaming technology. The technology uses individual listeners' computers as relay points so that one listener can draw a stream of music from another listener's PC instead of from central servers.

While peer-to-peer technology would not totally replace the content delivery networks, it would be able to replace up to 80% of the traffic for a substantially lower price.

3.8. Examples of broadband audio-visual services

Besides the broadband audio-visual service providers noted above, there are a myriad of other providers in OECD countries. The following table shows some examples of broadband audio-visual services currently broadcast and accessible.

Table 2. Examples of broadband audio-visual services

Provider	Country	Features	URL
Metropolitan Cemeteries Board	Australia	The programme is mainly designed for private funeral broadband audio-visual services.	http://www.mcb.wa.gov.au/webcasting/main.htm
Radio Australia	Australia	It is an Internet radio whose main target programme is news.	http://www.abc.net.au/ra/rahome.htm
Finnish Webtelevision	Finland	It offers both online and recorded broadband audio-visual services.	http://www.nettitelevisio.com/
Clicvision.com	France	A variety of programmes are being offered.	http://www.clicvision.com/fr/
Station Rose	Germany	It features net art and online conversation.	http://www.stationrose.com/
DW-WORLD.DE	Germany	News is broadcast over the Internet.	http://www.dw-world.de/english
J-Stream	Japan	A variety of programmes are offered with main marketing target of residential household.	http://www.stream.co.jp/
ODN Broadband	Japan	It is a hosting service of a variety of content.	http://bb.odn.ne.jp/index1.html
impress TV	Japan	Content includes entertainment, drama, music, education and business.	http://impress.tv/
SK C&C	Korea	All kinds of programme are being offered.	http://ibs.skcc.com/index.jsp
Liveto.com	Korea	The programme includes live and on-demand special events, music, shows and so forth.	http://www.liveto.com/english/c2.htm
Parliamentlive.tv	UK	It offers live broadband audio-visual service from parliament.	http://www.parliamentlive.tv/
InternetWebcaster.co.uk	UK	It offers a variety of broadband audio-visual programmes.	http://www.internetwebcaster.co.uk/
You-niversity.com	US	The programme is mainly education oriented.	http://www.you-niversity.com/
Sequoiacom	US	Corporate communications and e-commerce applications are major programmes.	http://www.sequoiacom.com/
Messenger Mortuaries	US	The programme is mainly designed for private funeral broadband audio-visual services	http://www.messingermortuaries.com/fbs.htm
Wisconsin Public Radio	US	The programme is audio oriented.	http://www.wpr.org/webcasting/serviceerrors.cfm
NPR	US	Radio news programme is provided over the Internet.	http://www.npr.org/
Streamguys	US	Examples of applications are live streaming, on-demand streaming, and subscription-based streaming.	http://www.streamguys.com/streaming/solutions/livestreaming.html
CAM NET	US	Live events coverage and hosting of audio and video files are major applications.	http://www.cam.net/en/webcasting.php
Blastsurf.com	US	Satellite broadband audio-visual service is a major profile.	http://www.blastsurf.com/index_c.asp?AID=1485016&PID=1156199
Direct Webcast group	US	Broadband audio-visual service for technology and finance-related conferences around the world is a major application.	http://www.directwg.com/arthurandersen/default.HTM
CCBN.com	US	Conference broadband audio-visual service on a per-presentation basis is provided.	http://www.ccbn.com/
AudioVideoweb.com	US	It offers live broadband audio-visual service on a payment basis.	http://www.audiovideoweb.com/
Citv.com	US	The programme, both by radio and audio, covers news, movies, music and so forth.	http://citv.com/
GenCast	US	It is broadband audio-visual service of live and on-demand events.	http://www.gencast.net/

Source: OECD.

IV. IMPACT OF BROADBAND AUDIO-VISUAL SERVICES ON THE MARKET

4.1. Impact on the telecommunications market

Developments in the broadband audio-visual service market can help stimulate the demand for broadband access. In turn, the growth in this market and its potential will help stimulate the deployment of higher speed networks. In a number of OECD countries operators are already upgrading the speed of DSL as well as creating new broadband networks and extending the geographic coverage of high speed networks. In Belgium, for example, 98% of the population had access to Belgacom's ADSL networks with 3 Mbps speed in December 2002.¹⁰⁹ In the United Kingdom, Telewest, broadband communications and media group, began a trial for a new broadband service in March 2003 by offering free upgrades at a connection speed of 2 Mbps to 1 500 of its customers currently subscribed to its 1 Mbps cable broadband package.¹¹⁰ BT has reportedly also attempted to test a new broadband project which will provide a 1 Mbps ADSL home connection.¹¹¹

Broadband audio-visual services are also stimulating the mobile telecommunication industry. Some mobile operators are seeking to offer audio-visual broadcasting via high-speed 3G telephones. In Korea, for example, a mobile operator KTF is to start broadcasting television channels direct to 3G mobiles via the CDMA2000 1xEV-DO system.¹¹² In France, Alcatel and TNO Telecom announced in March 2003 that they launched a technical project with RTV television for the development of 3G/UMTS mobile broadcasting services. They will provide a live television broadcasting service from RTL on mobile handsets, using Alcatel's 3G technology as well as TNO's 3G Internet video gateway.¹¹³ In Portugal, Vodafone Telecel, together with TV1, enabled their subscribers to watch an entire football game on their mobile phone in March 2003.¹¹⁴

Technological developments to facilitate mobile operators to provide broadband audio-visual services have grown in recent years. For example, PacketVideo and Musiwave announced in April 2003 that their empowered technologies and services, using PacketVideo pv3 Mobilemedia System software solution, would allow users to easily receive audio-visual content over existing GPRS (2.5G) networks.¹¹⁵ In Australia, researchers unveiled a chip that lets mobile users receive high-quality face-to-face video and other streaming media at rates faster than most broadband connections at home in February 2003.¹¹⁶ Some expect that the chip could compete with wireless LANs, which have been increasingly popular among OECD countries.¹¹⁷ Broadband audio-visual service is also stimulating telecommunications operators to initiate new types of services. For example, BT (BTopenworld) will begin services to remind viewers of TV shows they wanted to watch via their mobile phones.¹¹⁸

4.2. Impact on broadcasting market¹¹⁹

Arguments have been made that broadband audio-visual service will not affect the broadcasting market because it has not achieved the universal coverage of traditional television and radio. Yet there is evidence that the growth of broadband audio-visual services has the potential to stimulate market competition in the broadcasting sector from two perspectives: first as an alternative to at-home entertainment and access to information, and second, as a platform providing direct competition. A report from comScore networks, for example, on Internet usage shows that among 45.1 million adults that have a television set and PC in the same room 47% reported they frequently use the Internet while watching

television.¹²⁰ Competition for the time of viewers is expected to become important and surveys in several OECD countries have shown that time spent viewing television has declined as more people spend longer periods using the Internet.

Traditional television broadcasters are facing some changes in market structures with the development of broadband audio-visual services. Asynchronous communications, that is the ability to cache information for future access, as opposed to real time broadcasting, is viewed by some as an important way for broadcasters to enhance their existing programming by using Internet technology and bandwidth to increase interactivity with customers.¹²¹ For example, broadcasters could offer a range of information on broadcast programmes which viewers could access on demand. Such developments would change the way terrestrial broadcasting offers its programming. However, two-way, interactive channels or viewer-participation-type programmes are likely to increase in the future only if appropriate domestic terminals are available to consumers.

'Web-TV' or Internet via television, which enables users to receive Internet content, including broadcast audio and video over the Internet, via television (or PSTN), has fallen into decline with the growth of broadband audio-visual services. This service was originally developed in 1996 by US-based WebTV Network Inc., which was taken over by Microsoft in August 1997. The development of broadband audio-visual services has enabled users to use Internet and television simultaneously without installing a special television set. However, new types of Web-TV services have emerged recently. For example, Monaco Telecom, in partnership with Alcatel and Moviestream, launched 'SesameTV', VOD service on television via ADSL.¹²² In Japan, Matsushita Electric Industrial Co. is going to equip all digital television sets provided in Japan with high-speed Internet access by connecting them with broadband networks. It will also launch a service allowing viewers to access the Internet from television sets at home.¹²³

The process of digitalisation of terrestrial television, along with the increase in content that can be shared with broadband audio-visual services, is resulting in hybrid like services which may in the longer term result in little differentiation between terrestrial broadcasting and broadband broadcasting. For example, the recent development of 'interactive television', which combines traditional television viewing with the interactivity enjoyed by a telecommunications network, might narrow the scope of broadband audio-visual service activities, although some estimates indicate that interactive television will generate only USD 18 billion for service and application revenues in Europe by 2007.¹²⁴

Broadband audio-visual services may begin a process resulting in the trans-border provision of broadcasting services. In many OECD countries, entry by foreign firms in domestic broadcasting markets is constrained by foreign investment limitations and other licensing limitations.¹²⁵ However, using high speed Internet audio-visual services provision can take place across frontiers. For example, the Norwegian Internet browser developer, Opera, began to provide service to the Japanese digital television market in March 2003. According to Opera, Japanese set-top box manufacturer Plat Communication Components will include the company's system for an interactive television browser in its broadband terminal box, which delivers television over IP networks.¹²⁶ At the same time, it is important to note that the trans-border provision of broadband audio-visual services can result in problems from differences in legal or social norms. An example is the case where Yahoo was ordered by a French court to bar French Internet users from its Websites selling Nazi memorabilia in November 2000.¹²⁷

The process of trans-border service provision is most noticeable for broadband radio broadcasting. Access to Internet radio, and to several stations dedicated to providing specialised music or information, has helped bolster the radio sector and has allowed people from different countries to access a wide range of different cultural and information material. Internet radio has also allowed ethnic minorities and immigrants in those countries that have large immigrant populations to develop their own cultural radio stations. Radio has often been viewed by the music industry as the best way to ensure the success of a new

recording. The wider, and global, reach of broadband radio can play a significant role in this regard by allowing global audiences to hear new recordings.

Broadband audio providers have been viewed by some as posing a 'threat' to conventional radio stations. There is a greater variety of programming and versatility in broadband audio service than in conventional radio. Moreover, setting up a broadband audio service operation is cheaper. Commercial radio stations may have little interest in initiating broadband audio services because the potential to expand their listener base may not add to their revenues. It is also unlikely that there will be much demand for pay-radio. However, many commercial radio stations have set up Internet radio operations and many have allowed access to archived programming through the Internet. This is viewed as a means of consolidating their customer base and competing in their local area for customers while enhancing their brand name.

Broadband audio service has been viewed as a threat to the recording or music industry in some countries such as the United States. While commercial radio and the music industry in general are close partners, the high quality of transmission over the Internet has also been viewed by some as seriously undermining the recording industry's ability to sell recordings.¹²⁸ Recording artists, trade associations and regulatory agencies are continuing to examine the competing interests between the delivery of content and the protection of intellectual property rights in a digital environment.

Work is underway to develop appropriate technology and standards for multiple radio platforms to deliver services to mobile, cordless and fixed access users. It will therefore be important for existing commercial radio operations to become familiar with the different technological platforms and be able to offer appropriate content for these platforms.

At the same time, broadband audio-visual service demonstrates how the traditional relationships between service providers and customers have changed. Traditionally, broadcast viewers have been accustomed to access broadcast channels for free or for a fixed fee. Over-the-air broadcasters have had their services financed by advertisements as well as public contributions, while telecommunications services have been charged for access and actual use by subscribers. However, subscription-based programmes and the new business model based on them are likely to increase with the influence of broadband audio-visual services.

Research shows that broadband subscribers are more open to paying for online content than narrowband users. The research found that 25% of broadband users were willing to pay for music compared to 18% of narrowband users whereas 18% of broadband users were willing to pay for movies compared to 11% of narrowband users.¹²⁹ Since broadband audio-visual service is fundamentally based on broadband Internet access, this fact might imply that broadband audio-visual service is much easier to attract users to subscription-based broadcasting.

One of the seemingly negative impacts on the broadcasting market is 'dominance' over certain types of broadcasting programmes.¹³⁰ Exclusive contracting of popular programming may prevent competing services and broadcasters from gaining access to such valuable content, restricting competition in service provision. In particular, issues surrounding broadband broadcasting of sports have given rise to significant concerns about market competition. In a number of OECD countries, certain companies make a contract with a major sports team and dominate the right to broadcast the event on the Internet. In Japan, for example, Bitway, provided by Toppan Printing Corporation, began to offer 'Web Stadium HANSHIN Tigers Live' in August 2000, whereby the live game events of a famous Japanese baseball team are delivered on the Internet.¹³¹ In the United States, MLB Advanced Media (MLB.com; the official Website of Major League Baseball) began to offer live video and audio webcasts of baseball games in August 2002. Currently, these are limited only to viewers outside their favourite team's television-coverage area. In March 2003, however, MLB Advanced Media announced a paying service allowing baseball fans around

the world the ability to watch live full-game broadcasts online of 45 games each week throughout the 2003 season on MLB.com.¹³²

Exclusive provision of content also occurs in the music arena. For example, ArcoStream, a streaming and webhosting provider, was selected in November 2002 as the service provision partner of RollingStones.com, the official Rolling Stones fan club Website. AcroStream delivers audio and video content from the band's concert tour exclusively.¹³³

Advertising

While advertising is a primary source of revenue for many terrestrial broadcasters, the development of broadband audio-visual service is changing the focus of advertising. Many broadband audio-visual services are trying to target advertising to the specific tastes and interests of individual customers. This tool is gradually being adopted in terrestrial broadcasting as well by some advertising companies. In Japan, for example, Hakuhodo has developed a new technology to change the content of advertisements according to the taste of viewers. The technology allows advertisers to send several types of commercials in advance to the server and to deliver them to different viewers. Hakuhodo began a trial of this commercial delivery in programmes of a satellite broadcasting company ep Broadcasting Corporation, in March 2003.¹³⁴

Convergence of terminals

The development of broadband audio-visual service also encourages convergence of terminals. Originally broadband audio-visual services were based on a PC platform. In other words, the PC has taken on the function of a television set in this service. Likewise, some television sets can also access the Internet in the wake of the development of broadband audio-visual service. Users will therefore be able to use one terminal to access different platforms to access content.

4.3. Impact on the cable television market

Before the advent of broadband audio-visual service, cable television companies had already established an early lead in offering both high-speed Internet access and television packages. In a number of OECD countries, however, the number of DSL subscribers has surpassed that of cable subscribers, following the unbundling of the local loop.¹³⁵ The increase in DSL subscribers relative to cable modems could be viewed as a competitive 'threat' for cable television companies relative to the market positioning of telecommunications operators that are attempting to enter the broadband audio-visual market.

Unlike over-the-air television, cable television is not usually accessible without subscription charges. Broadband audio-visual services that are free or are based on low subscription charges can compete directly with cable television. There is no evidence that this has happened yet given that broadband access is still relatively premature in the majority of OECD countries. However, many CATV companies are trying to compete with telecommunication companies to provide broadband Internet access by increasing bandwidth or through price competition. As for terrestrial broadcasting, cable companies will also be encouraged to implement digitalisation by the development of broadband audio-visual services. A study predicts that digital cable will increase from 28.6 million by the end of 2002 to 37.3 million by the end of 2003.¹³⁶

The cable television industry has started over the last few years to develop VOD services. It has been suggested that VOD via cable television rather than Internet is seen in the industry as more practical and user-friendly, because the cable infrastructure is already in place and its implementation simply requires the deployment of updated set-top boxes and server equipment. Another argument suggests that subscription-based VOD has been identified as the most important short-term factor in developing revenue streams for cable television companies. Some research findings predict that the market of subscription-

based VOD via cable television will grow from USD 293 million in 2003 to USD 1.4 billion in 2007.¹³⁷ Worldwide cable-based VOD subscribers are expected to grow from just over 3 million regular users at the beginning of 2003 to more than 11 million by 2006.¹³⁸ In the United States, for example, Time Warner Cable is offering up to 100 digitised 'movies on demand' and 'subscription video on demand' services to about half a million digital cable subscribers.¹³⁹

Online gaming via cable television might possibly be another focus of the cable industry. In the United Kingdom, for example, the former managing director of Telewest urged the cable industry to move forward in making online gaming attractive to the masses in March 2003. He also contended that a flat-rate charge for CATV would be ultimately unsustainable with the growing popularity of data intensive services such as streaming media.¹⁴⁰ In the same vein, a cable company, NTL, announced in March 2003 that its broadband service would support Xbox gamers who want to use Microsoft's multiplayer online gaming service, Xbox Live.¹⁴¹

V. IMPACT OF BROADBAND AUDIO-VISUAL SERVICES ON REGULATIONS

Since the progress of convergence will change the landscape of many traditional media and telecommunications businesses, the development of broadband audio-visual services might lead to regulatory uncertainty which may inhibit investment. It is important to ensure that regulatory frameworks do not hamper the development of broadband audio-visual services and that private investment in this field is not hindered by regulatory frameworks.

One example of the recent improvement of regulatory frameworks in light of the development of broadband audio-visual services is Japan's new law (Laws Concerning Broadcast on Telecommunications Services) implemented in January 2002¹⁴², which allows broadcasters to offer broadcasting services on telecommunications services provided by telecommunications operators. For instance, BB CableTV (former Broadmedia TV) offers multi-channel broadcasting as well as VOD services using ADSL provided by Yahoo BB to Yahoo BB's subscribers in the wake of the implementation of this law.¹⁴⁵

One of the major concerns in the regulation of broadband audio-visual services would be that the regulation should ensure technological neutrality between platforms. This neutrality, however, should take into consideration the level of commercial and technical maturity of the different specific platforms. At the same time, it would be necessary to consider that different converging platforms should not necessarily be subject to different degrees of regulation (for instance, part of the telecommunications world is highly regulated) in a convergent world. Different levels of regulation might hamper the general pace of development of broadband audio-visual services and penalize one platform against another.

Historically, governments often have rules or laws governing ICT industry structure, such as ownership rules for telecommunications as well as for media and general competition and antitrust laws. At the same time, there are also rules or laws governing industry conduct, either on the conduit side or on the content side. On the conduit side, for example, there may be policies related to transmission of telecommunications, such as those impacting law enforcement, or cable services as well as those related to spectrum. On the content side, in addition to rules specific to cable, satellite and terrestrial television, there are also general copyright and intellectual property right regimes which apply to all types of content. Given that broadband audio-visual services are still in the early stages of development, the policies most likely to be affected are those related to conduct on the content side. As broadband audio-visual services grow, they may have more impact on the policies related to industry structure.

The development of broadband audio-visual services will result in a number of policy challenges in that these services, although in many cases similar to broadcasting services, can be provided on platforms which are not generally regulated. These services are eroding the traditional boundaries between telecommunications and broadcasting, and changing the communications landscape, thus existing regulations may be inappropriate or even harmful to dynamic ICT markets. In addition, the fact that broadband audio-visual services are not bound by geographic borders might also result in pressures for change in traditional policy frameworks. It is important, therefore, to review whether, and how, changes can be made in order to ensure existing market dynamism continues while safeguarding important broadcasting policy objectives. At the same time it is important that any new regulatory frameworks imposed on Internet services are not unduly restrictive and do not overly restrict the development of new services.

NOTES

- 1 While in some OECD countries the term ‘broadcast’ refers only to terrestrial broadcast, ‘broadcast’ encompasses terrestrial, cable and satellite broadcasting in this paper.
- 2 It is possible that some of the questions which arise may not need to be addressed directly. Keeping informed about them may be sufficient, and some of these issues may resolve themselves. For example, as regulatory regimes change to allow the development of broadband, some rules may become self-evidently obsolete.
- 3 Broadcast signals often cross borders and licence boundaries.
- 4 There may be some debate as to whether the social impact of broadcasting is high. The point is that many broadcasting markets have regulations which reflect national cultural values. However, the trans-national nature of the Internet makes it less amenable to national definition than other kinds of audio-visual services.
- 5 It is not just the fact that there are high copyright fees but also due to the application to online distribution of commercial terms that are related to physical distribution of content. Thus, broadband audio-visual services should be based on commercially viable distribution models that take into consideration and adequately remunerate the segments of the value chain in a networked environment.
- 6 It appears that broadcasters are restrained in entering the broadband audio-visual service market in some countries.
- 7 Another example of multiple Internet use is telephony over the Internet at flat monthly fees. With the increasing use of DSL it is expected that telephony over DSL will expand rapidly. Some companies are also developing technologies to provide Internet calling over wireless LANs. These movements will eventually put competitive pressure on traditional telephone companies.
- 8 The advent of broadband audio-visual services can bring about convergence at various levels. First, convergence between services in that content can be accessed through different types of platforms, *i.e.* broadband Internet networks and broadcasting networks. This trend also leads to the convergence between the telecommunications and broadcasting industries. Some telecommunications operators might establish their own television broadcasting activities. In Denmark, for example, the incumbent TDC sought to set up its own television channel in the mid 1990s. Convergence in equipment production is also taking place resulting in multiple usage terminal equipment. This paper focuses on convergence between services.
- 9 See OECD, “Broadband Access for Business”, DSTI/ICCP/TISP(2002)3/FINAL.
- 10 See http://www.soumu.go.jp/joho_tsusin/whatsnew/dsl/index.html
- 11 See <http://www.europemedia.net/shownews.asp?ArticleID=14784>
- 12 Ministry of Public Management, Home Affairs, Posts and Telecommunications, Jyohou-tsuushin-hakusho, p.246
- 13 See, <http://www.fcc.gov/mb/video/files/dtvonairsum.html>

- 14 See <http://www.europemedia.net/shownews.asp?ArticleID=14781>
- 15 See <http://www.europemedia.net/shownews.asp?ArticleID=14863>
- 16 See http://telephonyonline.com/ar/telecom_fiber_home_networks/index.htm
- 17 See <http://www.ntt-east.co.jp/release/0302/030228.html>. The fibre will be deployed up to the feeder point.
- 18 See <http://www.point-topic.com/scripts/directory/profile.asp?company=64>
- 19 See <http://www.siminn.is/control/index?pid=6736>
- 20 See <http://www.europemedia.net/showfeature.asp?ArticleID=15537>. These are estimates by the Yankee Group.
- 21 See <http://www.rtvv.se>
- 22 See <http://www.itu.int/osg/spu/ni/broadband/workshop/presentations/john.pdf>
- 23 See <http://www.europemedia.net/showfeature.asp?ArticleID=15516>
- 24 See <http://www.europemedia.net/showfeature.asp?ArticleID=15518>
- 25 See <http://www.europemedia.net/showfeature.asp?ArticleID=15649>. This study was undertaken by Informa Media Group.
- 26 This is not just terrestrial broadcasting but also cable and satellite broadcasting. In some OECD countries, digital television is progressing more rapidly in cable and satellite than it is in terrestrial broadcasting.
- 27 See <http://www.ipv6.org>
- 28 For details, see <http://www.ripe.net/ripe/meetings/archive/ripe-40/presentations/6net.pdf>
- 29 See <http://www.internetnews.com/ec-news/article.php/1455241>
- 30 See http://www.businessweek.com/technology/content/dec2002/tc20021210_4342.htm
- 31 See <http://currentissue.telephonyonline.com/magazinearticle.asp?magazinearticleid=21995&magazineid=7&siteID=3&releaseid=3248&mode=print>
- 32 In case of the use of web-log information, ISPs will be required to meet the 1980 OECD Privacy Guidelines. See <http://cs3-hq.oecd.org/scripts/pwv3/pwhome.htm>
- 33 This business has been in operation since April 2003.
- 34 See <http://www.directwg.com/arthurandersen/default.htm>
- 35 Some argue that broadband audio-visual services and broadcasting services have different social roles. From this perspective, how these services can be provided with synergy effect should also be considered.
- 36 The services on broadband are usually offered based on the concept of ‘a library’ from which to download or stream content, which will imply a degree of control by the user that the user does not have when the services are delivered on a programming basis.

- 37 As mentioned later, broadband audio-visual services are ‘point-to-point’ communication as opposed to ‘point-to-the public’ communication in over-the-air broadcasting. The point-to-point technology is not designed for simultaneous access of a large population of users as the transmission costs can be much higher than for broadcasting networks whether it is over-the-air or via satellite.
- 38 In the United States, for example, 106 700 households have a television set out of 108 620 total households, and hence the penetration rate is 98.2% as of January 2003. See http://www.tvb.org/rcentral/mediatrendstrack/tvbasics/02_TVHouseholds.asp
- 39 For more details, see http://ne.nikkeibp.co.jp/english/2001/05/0517nhk_dtv.html
- 40 See <http://www.europemedia.net/showfeature.asp?ArticleID=14814>
- 41 For some OECD countries, broadband audio-visual services are not necessarily within the ‘grey zone.’ For example, Japan clearly classifies a service either broadcasting or telecommunications in accordance with the intentions of providers, *i.e.* broadband audio-visual services as telecommunications service (not broadcasting) if the service is to deliver information to be received by the specified party.
- 42 See http://www.ebiscom.it/news/comunicati_i/pdf_i/telepiu_ing.pdf
- 43 See <http://www.btplc.com/pda/Mediacentre/Agencynewsreleases/2002/an136.htm>, <http://www.eurocomms.co.uk/news/story.epml?news.REF=546>
- 44 See <http://neasia.nikkeibp.com/wcs/leaf?CID=onair/asabt/news/223028>
- 45 Article 7 of Japan’s broadcasting Law stipulates this obligation.
- 46 *Nihonkeizaishimbun*, January 1 2003, p.1
- 47 <http://internet.watch.impress.co.jp/www/article/2003/0508/kddi.htm>
- 48 See <http://www.europemedia.net/shownews.asp?ArticleID=15265>
- 49 <http://www.europemedia.net/shownews.asp?ArticleID=16808&Print=true>
- 50 Fastweb is a telecommunications service provider that delivers so-called ‘triple play’ services (voice telephony, TV, and broadband Internet access) to corporate and residential users. Also see http://www.telekom.at/Content.Node2/de/index_frameset.php
- 51 See <http://www.europemedia.net/showfeature.asp?ArticleID=15401>
- 52 While in some countries Internet service providers (ISPs) are considered telecommunications operators, they are not in other countries. Balancing this situation, this paper included an independent sub-section of ‘market entry by Internet service providers’ as a part of the section entitled ‘market entry by telecommunications operators.’
- 53 See http://www.activedayton.com/coxnet/headlines/0212_aol.html
- 54 See <http://www.cnet.com/investor/news/newsitem/0-9900-1028-20667168-0.html>
- 55 http://www.lightreading.com/document.asp?site=lightreading&doc_id=38451
- 56 See <http://www.europemedia.net/showfeature.asp?ArticleID=13328>

- 57 See <http://www.europemedia.net/showfeature.asp?ArticleID=12639>
- 58 See <http://www.ccbn.com/>
- 59 For example, see Kim, D-H., *Broadcasting policy in the digital age* (Seoul, Communications Books, 2000), p.99.
- 60 See <http://www.europemedia.net/showfeature.asp?ArticleID=11760>
- 61 *Wall Street Journal*, March 12 2003.
- 62 See <http://www.europemedia.net/showfeature.asp?ArticleID=14139>
- 63 See <http://www.europemedia.net/shownews.asp?ArticleID=14567>
- 64 For example, see http://www.ibcnews.com/2002/12_dec/news/cw_imagic_paris.htm
- 65 See <http://www.europemedia.net/shownews.asp?ArticleID=15177>
- 66 See <http://www.europemedia.net/shownews.asp?ArticleID=3240>
- 67 NHK does not deliver content using broadband networks but makes content available to viewers using a media player over broadband Internet.
- 68 See <http://www.mainichi.co.jp/digital/housou/200202/08-3.html>
- 69 For details, see http://europa.eu.int/comm/competition/mergers/cases/decisions/m2876_en.pdf
- 70 See <http://japan.internet.com/busnews/20030117/print5.html>. The household subscribers of Jupiter's CATV reached 159 800 as of December 2002, a 23.2% increase compared to the figure as of December 2001.
- 71 See <http://www.europemedia.net/shownews.asp?ArticleID=13659>
- 72 See *USA Today*, March 16 2003.
- 73 See <http://news.com.com/2100-1023-884646.html?tag=mainstry>
- 74 See <http://www.europemedia.net/showfeature.asp?ArticleID=15418>
- 75 http://www.nexedi.com/en/news/pr2/newsitem18_print. This system has a potential to raise copyright concerns.
- 76 For details, see <http://www.europemedia.net/shownews.asp?ArticleID=14677>
- 77 See <http://news.bbc.co.uk/1/hi/technology/2644589.stm>
- 78 See <http://www.europemedia.net/shownews.asp?ArticleID=5123>
- 79 See <http://www.cnn.com/2000/TECH/computing/11/21/emi.streamwaves.idg/index.html>
- 80 See <http://www.europemedia.net/showfeature.asp?ArticleID=3007>
- 81 See <http://www.europemedia.net/shownews.asp?ArticleID=11686>

- 82 See <http://www.europemedia.net/shownews.asp?ArticleID=15480>
- 83 See <http://www.europemedia.net/shownews.asp?ArticleID=15859>. Content made by the BBC is broadcast by RealNetworks for free in Europe.
- 84 See <http://www.tvmeetstheweb.com/news/shownews.asp?ArticleID=5973>
- 85 See http://www.zakzak.co.jp/top/t-2003_04/3t2003041413.html
- 86 It is not only the incumbent telecommunications operators who attempt to enter into a partnership with broadcasters. In Italy, for example, a new entrant Fastweb has a partnership with a pay-TV company TELE+ as mentioned in a previous section.
- 87 Commercial agreements with content providers may be undertaken by any telecommunications operator whether it is an incumbent or not.
- 88 See <http://www.aimia.com.au/>
- 89 See <http://bb.watch.impress.co.jp/news/2002/03/08/fnn.htm>
- 90 See <http://www.ibsys.com/pressbox/press-101438820011012-151042.html>
- 91 For example, see <http://www.darmstadt.gmd.de/delite/Projects/SAMBITS/>, <http://www.brunel.ac.uk/faculty/tech/PressHighlightResearchSAMBIT.htm>
- 92 See <http://www.europemedia.net/shownews.asp?ArticleID=15536>
- 93 See <http://www.telegeography.com/press/coverage/2002/10-22-2002.html>
- 94 *USA Today*, March 16 2003.
- 95 See http://emusician.com/ar/emusic_webcasting_made_easy
- 96 See <http://www.europemedia.net/showfeature.asp?ArticleID=12562>
- 97 See <http://www.europemedia.net/showfeature.asp?ArticleID=12562#>
- 98 Downloading and re-transmitting terrestrial television signals are not generally permitted in terms of broadcasting and copyright laws.
- 99 See http://www.techdirt.com/articles/20020612/0919248_F.shtml
- 100 See <http://www.europemedia.net/shownews.asp?ArticleID=14765>
- 101 See <http://www.europemedia.net/shownews.asp?ArticleID=15202>
- 102 See OECD, "Broadband Infrastructure Deployment: The Role of Government Assistance", DSTI/DOC(2002)15, p.9, [http://www.oelis.oecd.org/olis/2002doc.nsf/linkto/dsti-doc\(2002\)15](http://www.oelis.oecd.org/olis/2002doc.nsf/linkto/dsti-doc(2002)15)
- 103 See <http://www.europemedia.net/shownews.asp?ArticleID=13485>
- 104 See <http://www.europemedia.net/shownews.asp?ArticleID=12875>
- 105 See <http://www.europemedia.net/shownews.asp?ArticleID=14701>

- 106 See <http://www.europemedia.net/shownews.asp?ArticleID=15171>
- 107 See http://emusician.com/ar/emusic_webcasting_made_easy
- 108 See <http://www.cedmagazine.com/ced/2002/0402/id5.htm>
- 109 See <http://www.point-topic.com/scripts/directory/profile.asp?sample=true>
- 110 See <http://www.europemedia.net/shownews.asp?ArticleID=15565>
- 111 See <http://www.europemedia.net/shownews.asp?ArticleID=15589>
- 112 See <http://www.europemedia.net/shownews.asp?ArticleID=14933>
- 113 See <http://www.europemedia.net/shownews.asp?ArticleID=15356>
- 114 See <http://www.europemedia.net/shownews.asp?ArticleID=15668>
- 115 See <http://www.europemedia.net/shownews.asp?ArticleID=15689>
- 116 See <http://www.wired.com/news/wireless/0,1382,57641,00.html>
- 117 OECD, Development of Wireless Local Area Networks in OECD Countries, DSTI/ICCP/TISP(2002)10/FINAL, see <http://www.oecd.org/pdf/M00040000/M00040494.pdf>
- 118 See <http://www.europemedia.net/shownews.asp?ArticleID=15577>
- 119 While most issues in this section might also apply to cable television, this paper has separate sections dealing with over-the-air broadcasting and cable television industries given some specific features of the latter.
- 120 See <http://www.europemedia.net/shownews.asp?ArticleID=12645>
- 121 For example, see Craig Birkmaier, *Broadcast Engineering*, September 1, 2002, Internet broadcasting: R.I.P., argues this point.
- 122 See <http://www.europemedia.net/shownews.asp?ArticleID=15132>
- 123 *Nihonkeizaishimbun*, March 5 2003, p.11
- 124 See <http://www.europemedia.net/shownews.asp?ArticleID=15269>
- 125 Some may argue that ownership questions in general are more at stake than foreign ownership issues. In the United States, for example, the domestic questions related to media ownership are more immediate.
- 126 See <http://www.europemedia.net/shownews.asp?ArticleID=15666>
- 127 There are also other issues related to protection of privacy and personal data.
- 128 The problems with intellectual property rights will complicate the problem.
- 129 See <http://www.europemedia.net/shownews.asp?ArticleID=14338>

- 130 This leads to intellectual property right issues. The public policy question would be ‘do major events such as an important sports games belong to the public, and can any entity transmit it?’ or ‘do they belong to an owner such as the sports club or the tournament sponsor?’
- 131 See http://www.bitway.ne.jp/B_bus/Release/j000816b.html
- 132 See <http://www.europemedia.net/shownews.asp?ArticleID=15354>
- 133 See <http://www.europemedia.net/shownews.asp?ArticleID=13813>
- 134 *Nihonkeizaishimbun*, March 3 2003, p.11.
- 135 OECD, “Developments in Local Loop Unbundling”, DSTI/ICCP/TISP(2002)5/FINAL, <http://www.oecd.org/dataoecd/25/24/6869228.pdf>
- 136 See <http://www.europemedia.net/shownews.asp?ArticleID=15649>. This study was made by Informa Media Group.
- 137 See <http://www.europemedia.net/shownews.asp?ArticleID=15263>
- 138 See <http://www.instat.com/newmk.asp?ID=474>
- 139 See <http://boston.internet.com/news/article.php/1482711>
- 140 See <http://www.europemedia.net/shownews.asp?ArticleID=15280> html
- 141 See <http://www.europemedia.net/shownews.asp?ArticleID=15310>
- 142 ‘Broadcast on Telecommunications Services’ that the law stipulates is treated as a form of ‘broadcasting’ in Japan. See <http://www.johotsusintokei.soumu.go.jp/whitepaper/eng/WP2002/2002-whitepaper.pdf>
- 143 <http://www.bbcable.tv/old/service/service1.html>