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Working Party on Telecommunication and Information Services Policies

MULTIPLE PLAY: PRICING AND POLICY TRENDS

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FOREWORD

This report was presented to the Working Party on Telecommunication and Information Services Policies in December 2005 and was declassified by the Committee for Information, Computer and Communications Policy in March 2006.

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TABLE OF CONTENTS

Tables

Figures

Boxes

MAIN POINTS

The rollout of broadband Internet connectivity has allowed telecommunication, cable and satellite operators to offer an increasingly similar service blend of video, voice and data to subscribers. This paper sets out to provide an overview of developments across OECD countries in multiple play services and some of the policy issues which may appear as more operators offer converged services.

Multiple play offers represent the first stage in a two-part evolution of converged ICT service delivery. This first stage has seen video, voice and data services consolidated on a given infrastructure (*e.g.* cable networks). The second stage will include consolidation of access platforms on one IP network, allowing users to seamlessly access content while moving over a variety of wired and wireless networks.

An analysis of 87 providers in the 30 OECD countries finds multiple play offers of video, voice and Internet access (triple play) are available from 48 providers in 23 OECD countries in September 2005. These offers are on all main types of wired infrastructure: telecommunication lines, cable and fibre. A further 29 firms in 21 countries offer double-play services of voice and data over ADSL. A different double-play package of video and data is available from another 10 providers in 9 countries over cable networks. So-called "quadruple-play" offers (including mobile voice) are available in 10 OECD countries.

Cable and fibre providers are more likely to offer triple-play services than ADSL providers. Nearly 66% of the 29 cable networks examined offered triple-play services. In contrast, only 44% of the 50 surveyed telecommunication networks have triple play offers. Of the eight fibre optic providers, seven (88%) had multiple play offers.

Multiple-play offers in the OECD are increasingly allowing users to make unlimited fixed-to-fixed phone calls for a flat monthly rate. Some operators are now also offering unlimited international phone calls to fixed lines in their bundle.

In markets where they offer video services, telecommunication operators typically have been able to offer a similar number of video channels as cable television and satellite providers. Fixed line operators in some markets have also been able to offer video services through strategic alliances with satellite television providers. However, the simple number of channels available from an operator tells nothing about the quality or desirability of the channels in the package. Indeed, in many markets the lack of one dominant channel in an offering could severely disadvantage an operator.

Asymmetric bandwidth could become a bottleneck for some multiple-play services such as virtual private networks (VPN) and video conferencing that require fast upload speeds. The move towards more symmetric bandwidth may be important as multiple play services increase usage of the upstream path.

Set-top boxes and other devices will play an increasingly key role in the provision of multiple play services over broadband.

Regulatory issues

This paper briefly identifies a range of issues and potential bottlenecks in the market for multiple-play services. The identified issues will likely require more in-depth study in the future.

Prices should fall as competition for multiple-play subscribers increases in a market. Regulators and competition agencies will still need to be vigilant against anti-competitive behaviour from firms with significant market power, particularly in cases where there is no competitive infrastructure available to consumers and where unfair pricing could occur through service bundling. Consumer protection agencies could also play a role in helping subscribers make informed decisions about complex telecommunication bundles in the marketplace.

Bit caps (data usage restrictions on broadband connections) could be used to provide an unfair competitive advantage for infrastructure operators, provided the services obtained from independent service providers count towards traffic limits but services from the network operator do not.

Today, some operators block ports for security or marketing reasons. Others have left open the possibility of blocking outside services in the future as a way to increase security and control bandwidth usage. By blocking ports or Web sites, multiple play providers could potentially create a "walled garden" where only the operator's own services would be available to subscribers. Regulators will need to ensure that consumers retain the ability to access competitive services from outside service providers, either through competitive market forces or regulation.

Regulators will need to address "must carry" regulations (*e.g.* requiring cable operators to carry local broadcast channels in addition to their own channels) and decide how and if they will be applied in the future. If broadband networks remain network-neutral for outside content then the future need for must-carriage may diminish, provided content providers and consumers have sufficient access to alternative networks and content providers can efficiently host their own content.

Regulators will need to re-examine how and if existing regulations should apply to linear (traditional broadcast) and non-linear (streamed, time shifted) video delivery. Existing regulations have typically been applied to linear broadcasters but there has been some fear that the emergence of non-linear broadcasters could create an unequal regulatory structure for traditional broadcasters. The increased availability of video content using both delivery mechanisms could signal a more competitive market in need of adapted regulation.

Multiple-play services such as video and voice that were traditionally regulated at the national level will become increasingly provided over IP from international providers. Regulators will be faced with the difficulty of deciding what, if any, requirements should be placed on foreign-based service providers whose offerings may be accessible from within their jurisdiction. Regulators will also be faced with deciding the extent to which service providers based in their own country will be required to comply, if at all, with regulations in other countries.

Multiple-play quality of service will become an increasingly important issue for regulators and service providers since degradation tends to increase as more services are included on the network. Technical solutions such as packet prioritisation are available for time-sensitive services but they could also raise anti-competitive questions if their implementation creates an unfair competitive advantage for the services of the infrastructure provider.

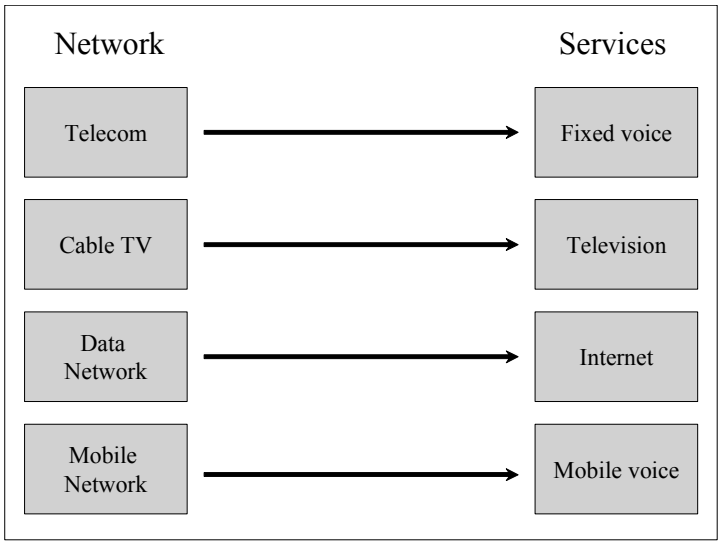
INTRODUCTION

The communication industry is facing an identity crisis. In the past, fixed telephone lines were what their names implied, a conduit for voice telecommunications. Cable TV networks only carried television signals to households. However, with the development of ADSL and cable modem Internet access, both networks now transmit a much larger range of services over their copper and fibre infrastructure. Telecommunication and cable operators are moving into one another's markets by offering data, voice and video services over their networks.

This transition has taken time due to technical, economic and regulatory limitations. However, there are so-called "triple-play" offers (data, voice, and video) in 23 countries of the OECD, with nearly all other remaining countries well on the path to offering multiple-play services. In fact, the multiplicity of services available in the OECD also is beginning to extend beyond fixed voice, video and data to mobile telephony. Operators in 10 OECD countries including Finland, Germany, Iceland, Japan, Korea, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States now include mobile services in multiple-play offers.

Historically networks were built to provide a certain type of service. Cable and telecommunication networks each provided one distinct service and users in some OECD countries had subscriptions to both. Leased lines and mobile telephone networks also were originally designed to provide specific services (see Figure 1).

Figure 1. Traditional segmentation of networks and services and multiple play



This complete compartmentalisation of network services began to break down in the early 1990s with the evolution of dial-up Internet services. The growth of the Internet and the maturing of dial-up connections for the mass market created a new use for telephone lines beyond simple voice. As more users

came on line and the amount of content increased, cable companies developed technologies to provide high-speed access to the Internet over their own lines. These initial moves towards multiple-use of the same infrastructure proved to be very successful and were the beginnings of the current move towards "triple" and "multiple-play" offers.

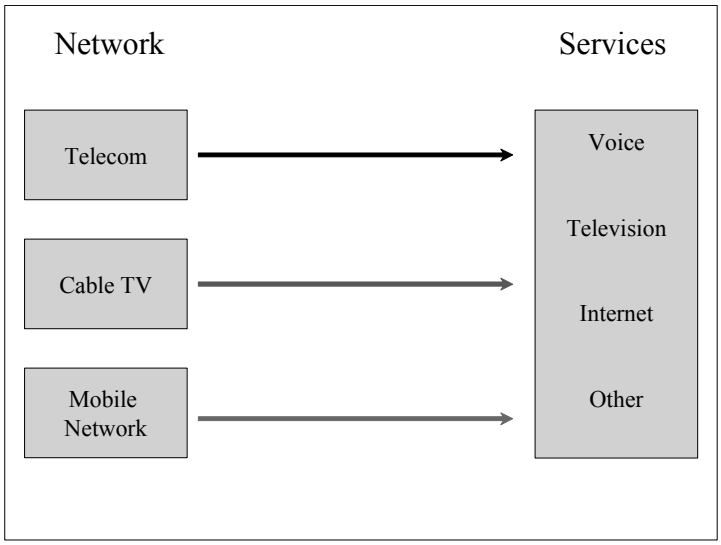
First consolidation: Multiple services via one provider

The introduction of data connectivity over existing infrastructure has increased the number and types of services which operators can offer. Broadband has further increased bandwidth to users and enabled even more complex services enabling operators throughout the OECD to launch combined data, video and voice services.

There is no one definition of what constitutes "multiple-play" since data connections can be used for such a broad range of services. However, multiple play definitions have traditionally been limited to services previously provided over a dedicated network (*e.g.* voice, television and Internet connections). This distinction has become less relevant as new services appear that typically did not have their own dedicated networks. Examples include instant messaging, video-conferencing and podcasting.

While the introduction of these new services has had a tremendous impact on communication, the crossing-over of television and telephone markets has offered some of the biggest challenges and opportunities for incumbent operators. Broadband has allowed cable and telecommunication firms to mimic each other's core services. Now nearly all major telecommunication and cable television operators are offering or planning to offer triple-play services over their networks (*i.e.* video, voice and data). For consumers, this has drastically reduced prices and increased their service choices. Figure 2 shows how multiple-play offerings allow consumers to choose one provider for a combination of video, voice and data. In markets with strong fixed-line competition there may be offers from several telecommunication firms (via unbundling), a cable operator and even utilities such as power companies. To a lesser extent, mobile operators are starting to offer multiple-play services as well, although the data speeds and video quality are lower than over fixed-line infrastructure.

Figure 2. Multiple play services on various networks

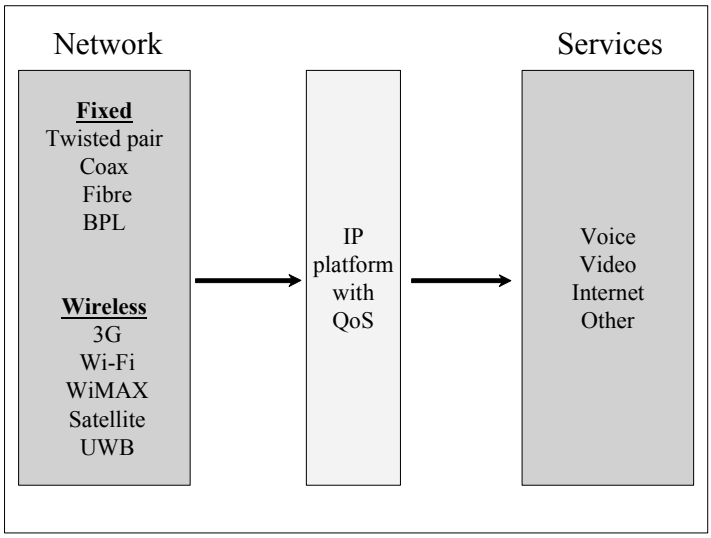


Second consolidation: Any network for any service

While multiple-play service offerings such as "triple-play" are appearing in many OECD markets, they are likely part of a middle-term business model – the important first step of consolidating services on a given network infrastructure. In the longer term there will likely be a second consolidation of various access technologies into one IP network for each operator.

These two consolidations are core elements of any future next-generation (ubiquitous) network that would allow users to access the same content and services from one company over a variety of technologies. Figure 3 shows how a single subscriber could connect over a range of access technologies to access any services that were available over IP. Subscribers may eventually be able to watch the same video streams via broadband connection at home, WiMAX connection in a car or via their mobile phone/PDA in a train using one flat-rate subscription from a single provider. This multi-device connectivity will be possible since an all-IP network allows operators to mix and match different access technologies on the same network. In addition, voice services will be available using the same handset at home through the fixed-line network and away though mobile networks.

Figure 3. Evolution towards next-generation networks



The outcome of service consolidation will be tied closely to a country's regulatory regime, both for telecommunications and broadcast television. In most OECD countries the two networks have evolved separately with different regulatory requirements and indeed, separate regulatory agencies. However, policy makers are beginning to re-examine the roles of broadcast and telecommunications regulators to decide whether they should be consolidated into one agency. In countries such as the United Kingdom and Australia, the regulatory oversight for telecommunications and broadcasting has been moved from two separate agencies into a converged regulator and under a single legal framework. In other countries, the broadcast and telecommunication regulators meet once a month to discuss issues common to both. Indeed, an OECD roundtable on communications convergence in June 2005 found that there is increasing need for communication between telecommunication and broadcast regulators as once distinct services begin to flow over multiple platforms.[1]

The move towards multiple-play service offerings is thus the first step towards the development of the next-generation network and policy makers will be faced with important decisions that could have an impact on how quickly and smoothly the transition takes place.

EVOLUTION OF MULTIPLE-PLAY

The economics of multiple-play

One of the driving forces behind the introduction of multiple-play services is the desire of telecommunication and cable operators to offset revenue losses from increased competition to their core services. Cable television companies are facing stiff competition from satellite broadcasters and telecommunication firms are struggling to replace falling revenues from voice and dial-up Internet access with new revenue streams. Telecommunication operators have found that the introduction of high-speed Internet access via ADSL has helped offset declines in other market segments. For example, KPN's loss of dial-up and voice revenues have so far been offset by ADSL revenue gains.[2] For some companies such as Telefonica, the revenues from new services such as ADSL have contributed to quarterly revenue growth despite increasing price pressures in traditional market segments.[3] Cable television firms have found that offering data and voice services in addition to television has helped differentiate their product offerings from satellite providers.

For telecommunication firms, increasing competition from new entrants and VoIP providers has led to a steep decline in voice prices and associated revenues. ADSL has temporarily helped offset these declines but broadband prices are also under increasing pressure due to increased competition in the market. This competition is typically coming from new entrants using unbundled local loops, wholesale bit-stream access or from cable Internet providers.

In cable TV markets, pricing pressure has come from increased competition from satellite television operators. Cable operators were thus eager to introduce new broadband Internet services by making use of the return path capabilities of copper and fibre where they have an advantage compared to satellite operators. This also creates new revenue streams for operators.

Competition has been very good for broadband markets and has resulted in lower prices for consumers. However, this competition also threatens the existing revenue streams from ADSL and cable modem Internet connections to providers. As a result, operators are introducing new services to provide new revenue and reduce churn.

Multiple-play offerings not only increase average revenue per user (ARPU) but consolidate billing services for the provider. These cost savings may then lead to lower prices for consumers in a competitive market. Consumers may also benefit from multiple play as operators leverage their unified IP networks to introduce new and innovative services. Consumers may also benefit if they can pay for all their communication services with one bill. At the same time, service bundles could also pose difficulties for consumers. Operators know that if consumers subscribe to more than one service their responsiveness to competitive offers from other providers may also be diminished. Indeed, consumers may hesitate to change broadband service providers if they are happy with the television portion of the services from that operator. The introduction of bundled services could also make it difficult for consumers to adequately separate out prices for individual services to compare with new stand-alone offers in the market. Research has shown that consumers don't necessarily make the most economical choices when confronted with complex service offers.[4]

Operators also benefit from branding economies of scale when they offer triple-play services. Advertisements can cover an entire bundle of services and companies can place more emphasis on building brand recognition than explaining the characteristics of their products. New telecommunication services can be categorised as "experience goods" where quality is difficult to gauge before purchase.[5] Therefore, operators who already have an existing relationship and quality judgement from consumers have an advantage when offering new services alongside a lesser-known competitor. This advantage allows companies with known brands to either sell their services at a premium or reduce the amount spent to market specific characteristics of the services. As long as the service levels are acceptable, all new services offered by the known brand could have an advantage over competitors.

Operators can benefit from moving all their services onto an IP-based network, particularly as they begin to offer digital triple-play services. Transmitting digital video, voice and data over IP can drastically reduce network cost and some operators, such as BT, have made this an integral part of their business strategies.[6] Traditional voice, video and data channels require separate, dedicated circuits but IP networks serve as a conduit for any digital traffic. This has large implications for future services since they can be introduced quickly without the need for new network infrastructure.

At the same time, moving all services to IP can also introduce new and significant security threats. For example, denial-of-service attacks could disrupt television programming or voice services delivered over IP networks. There are also threats of VoIP spam, Trojan horses and other malware that could be introduced into equipment such as set-top boxes which are connected to the Internet. Operators are cognizant of these issues and are working to address these threats.

Infrastructure

Multiple play services can be provided over a variety of infrastructure. Some types of infrastructure lend themselves better to certain services but the rate of innovation is high and all are capable of basic multiple play functionality. There can be, however, significant differences in the availability of the various technologies in a given geographic region. DSL has the most extensive wired coverage with over 90% coverage in 19 OECD countries.[7] Cable networks offer the best coverage in Canada and in the United States. In the United States for example, 88% of homes passed by cable could subscribe to cable modem Internet services.[8] Fibre optic coverage to homes also varies greatly across the OECD. IDATE estimates there are nearly 650,000 FTTx subscribers in the EU15, Norway, Iceland and Switzerland combined. The take-up rates of fibre have also been very high in several countries when a household is passed. In Denmark, nearly two-thirds of all households passed by fibre subscribe to services on the network[9]. When evaluating the status of multiple play offers it is important to consider the coverage and availability of various infrastructure throughout the country.

Wired

The majority of multiple play offers throughout the OECD are being made by DSL and cable Internet providers. Consumers typically have copper telephone or cable wires that provide their connections back to the DSLAM in a telecommunication exchange or cable head-end. Many operators then use fibre optic cables to provide back-haul connectivity to these exchanges. DSL and cable modem connections offer high bandwidth to consumers and usually can offer speeds fast enough for simultaneous data, video and voice connections. The drawback to some DSL technologies for multiple-play services is that the available services will largely depend on the distance users are from the exchange and the quality of the copper line. Telecommunication operators may not be able to provide a satisfactory level of service if users are located more than several kilometres from a central exchange. ADSL, by its design, allocates more bandwidth to downloads than uploads. It has proven very successful for traditional Web browsing trends but asymmetric

bandwidth could become a bottleneck as users start using new services such as video telephony that require fast upload speeds.

Cable modem subscribers may have slightly different issues with triple play. Cable modem connectivity is shared by all subscribers attached to a single cable node. This results in varying bandwidth speeds during peak and non-peak hours on most networks. DSL networks provide a steadier, more predictable amount of bandwidth that at times could be below or above that which is available over cable. If bandwidth demands for a certain area are high then cable operators can push fibre deeper into the network and effectively reduce the number of users connected to a given node. Cable modem networks are also not limited to slower upstream speeds, although some ISPs have introduced technologically imposed upload "speed limits". However, these could be removed or worked around at the router level if services appeared that needed more upload bandwidth.

Fibre optic connections are becoming more popular from companies wishing to offer high-bandwidth, multiple-play services. Fibre optic networks that provide fibre-to-the-home (FTTH) services can provide much higher speeds than are typically available over copper networks. In some countries, operators use fibre throughout large portions of the network but copper for the last 100 metres of the connection (*e.g.* HFC, VDSL). Some telecommunication companies such as Verizon in the United States have made the replacement of copper with fibre an integral part of their business plans. Fibre optic connections are optimal for services with the highest bandwidth demands and offer the fastest connection speeds currently available. However, their drawback is cost. Installing fibre over existing copper networks to homes or to the street is expensive and the short-term gains to firms are disputed. However, in the longer term fibre will replace copper lines as it is starting to do in so-called "green-field" rollouts. Fibre connections are increasingly popular in some OECD countries such as Japan where the net increase of fibre-to-the-home subscribers exceeded that of DSL for the first time in the first quarter of 2005.[10]

Wireless

Fibre and copper connections typically offer faster speeds than wireless connections but lack the mobility that has made wireless technologies so popular. Wireless technologies such as Wi-Fi, 3G, WiMAX and satellite could extend the reach of multiple-play services beyond traditional wired networks and should be vital components of next-generation networks. Mobile network operators are just starting to offer multiple play services over their 3G networks and new wireless technologies could extend the range of these connections and the amount of bandwidth they can offer.

New longer-range wireless technologies such as WiMAX may be the closest competition to fixed broadband. WiMAX proponents claim that fixed versions of the technology will allow up to 15 Mbit/s of capacity within a cell radius of 3 kilometres.[11] This capacity would be shared by all users in a cell and thus the bandwidth per user could be considerably lower than ADSL and cable Internet, which may offer 15 Mbit/s to an individual user. WiMAX connections for triple play services will likely be in rural or remote areas without sufficient fixed-line infrastructure or as a mobile substitute for Wi-Fi type services.

Wi-Fi and similar WLAN technologies have allowed users to access triple-play content within a range of nearly 100 metres in a residential setting. However, the growth of hotspots in cities has created Wi-Fi "blankets" or areas where Wi-Fi signals could be continuously available. The benefits of Wi-Fi could compound if matched with WiMAX-type services as a backhaul connection.

Box 1. Mesh networks that can deliver triple-play services

Many cities around the OECD have proposed creating "Wi-Fi clouds" of Internet connectivity across their geographic area that would allow users to connect wirelessly to the Internet. However, these mesh networks may prove to be the most effective means of spreading the Internet connectivity required for multiple-play services over a wide, rural area. As an example, EZ Wireless provides a Wi-Fi cloud over 1 800 square kilometres over a rural area of Oregon in the United States using both Wi-Fi and WiMAX-based technologies.[12] Users can access VoIP, video and data services over the connection in addition to other specialized services tailored for local governments. In an area covered by the signal, the Hermiston Police Department use Wi-Fi laptops in their cars to file reports and a nearby chemical depot has an evacuation warning system in place using the network in the case of a leak.[13]

Mobile phone networks

Mobile phone operators are also increasingly offering multiple-play services on their networks. Much of the emphasis of late has been placed on delivering video to mobile users and mobile operators want to take advantage of the fact that users almost always have their mobile phones with them. Operators are hoping that users will still be willing to pay for subscription video services on a mobile even if a mobile phone screen will not be a perfect substitute for fixed-line or satellite broadcasts viewed on a large screen. Mobile subscribers have already shown their willingness to forgo some voice quality of the fixed line networks in exchange for the mobility of a cell phone and mobile providers hope subscribers will react the same way to video over a mobile phone.

The success of mobile multiple-play services throughout the OECD will depend on how willing users in a particular country will be to subscribe to, and watch programmes on, a mobile handset. Users in different countries may have different price points for such services. For example, in Finland, 41% of the participants in a pilot project would be willing to purchase mobile TV services and half thought that a fixed monthly fee of 10 euros (USD 12.24) was a reasonable price to pay.[14] On the other hand, in the United States, preliminary surveys suggested that only one in eight consumers were interested in paying for live TV or video content on mobile platforms.[15] It is likely too early to judge how successful mobile television services will be but mobile networks will continue to move towards multiple-play provision of services. As mobile and fixed services converge it is likely that bundled packages will also offer video services which can be accessed by a customer using a range of devices.

Hardware gateways/set-top boxes

Set-top boxes and other devices will play a key role in the provision of multiple play services over broadband connections. The IP architecture behind multiple-play services simplifies the transmission of various service streams over the same line. However, the simplified nature of the network requires more "intelligence" to be built into the modems, set-top boxes and hardware gateways that are located at the subscriber's premises. As DSL and cable modem subscribers require dedicated modems, many operators have integrated new service features into the modem/set-top box that subscribers receive.

These multi-purpose gateways have been very popular with consumers and operators have increasingly adapted them to suit consumer demand. For example, users often had to buy a second phone to plug into the gateway to make calls over the multiple-play VoIP line. Operators such as AOL in Europe have since responded by offering a cordless phone that is integrated into the gateway.[16]

The next logical step for multiple-service providers will be to integrate personal video recorder functionality into their devices to secure the position in the home as the media hub. Personal video recorders (PVR) are video recorders that use a hard drive to record and store programmes for later viewing.[17] They merge the functionality of a VHS tape player with intuitive scheduling applications and have been very popular with consumers as they can "pause" live television, time-shift programmes and fast-forward through advertisements. New PVR devices allow broadcasters to "push" programs

automatically to a subscriber's PVR where they are saved and can be accessed later for a fee. Consumers in some OECD countries have enthusiastically adopted PVR devices for the added viewing control they offer. However, the ability to fast-forward easily through ads has raised concerns that alternative methods of financing programming may be needed, particularly for public interest programmes.

As hardware gateways become more sophisticated they will allow the interoperability of services through the same device. For example, the VoIP services could be integrated into television and data products in such a way that the phone number of an incoming call could be displayed on the screen of the television or appear as an instant message on a computer when the phone rings. Under such a scenario, the hardware gateway would be a tool that could connect and link disparate devices to each other throughout the home.

Bandwidth requirements for triple play

The amount of bandwidth available on a broadband connection partially determines which services could be available to consumers. Low bandwidth connections can typically handle VoIP traffic but not when there is other data traffic on the line. Good quality video typically requires more bandwidth than is available from lower-speed connections. Higher-speed connections open the possibilities for new data-intensive services such as video conferencing, high-quality voice transmission and TV over IP. At the same time, not all high-speed data connections can support all services.

Bandwidth speeds are typically quoted as the theoretical maximum speed of the line, not the speeds that users can commonly expect. This is because the actual speed of a given connection can be influenced by the average IP bandwidth provided to consumers by the operator, line quality, distance from the exchange of the copper loop (DSL) or the number of other users connected to the same node using their connection simultaneously (cable). Operators sometimes offer new services but cannot guarantee the line can support it. In these cases the service may be offered as "best effort" only.

Best effort

"Best-effort" data transmission means that equipment passes data over the network with no guaranteed quality of service. Packets and transmissions may get lost or severely delayed but the provider gives its best effort to get the data to the user in a timely manner. These best effort transmissions have historically worked well when there is sufficient available bandwidth but can cause problems in times of peak traffic usage. In these cases, VoIP phones may cut off calls, video signals may degrade or disappear and data traffic can slow or stop. The problems could exacerbate as more subscribers move to multiple play offers which use more network bandwidth.

The IP protocol introduces additional bandwidth problems for certain applications. Since IP is based on best-effort transmissions, the simultaneous use of multiple Internet services means that all services compete for given bandwidth at a particular time. The resulting simultaneous demand can severely disrupt services such as VoIP and live video which are time sensitive. A user may be simultaneously watching Internet television, making a VoIP phone call, downloading podcasts and software updates while another family member surfs the Web on a second computer. All services request data at the same time and bandwidth available to each service will fall significantly. One of the technical solutions has been to assign priority to certain services in the same way an emergency room in a hospital assigns priority to patients by the urgency of their condition. During quiet times in a hospital emergency room, patients can typically see a doctor immediately. However, during busier periods patients with the most need are treated first, even if they arrived later than others. Prioritizing data traffic over broadband works in a similar way. When plenty of bandwidth is available services can essentially take as much as they need, as soon as they request it. However, during peak periods priority is given to services with the most pressing need for time-specific

data (*e.g.* phone calls). Other non-prioritized traffic is given "best-effort" class of service on the remaining available bandwidth.

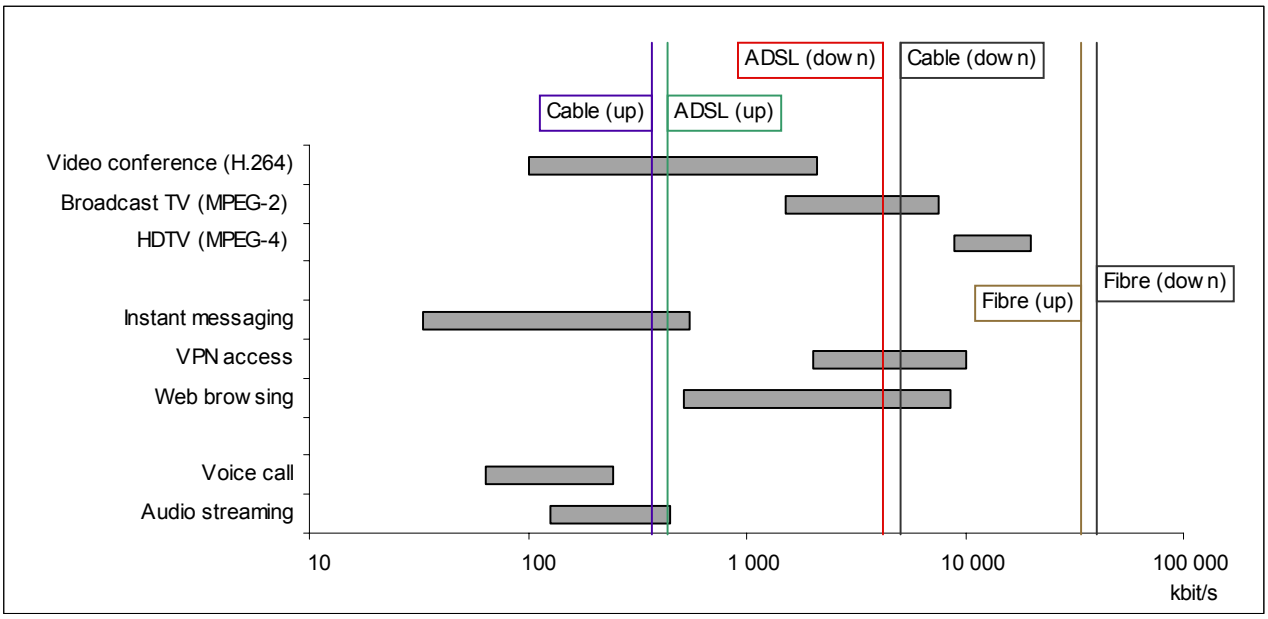
Upload speeds

Another bandwidth issue is the speed of the upload connection. ADSL and cable broadband data streams are commonly advertised by their download speeds, without much mention of the associated upload bandwidth users receive. In the past, the asymmetric upload and download paths corresponded well with typical Internet surfing behaviour. However, the upload bandwidth becomes much more important for applications such as VoIP that require both fast download and upload speeds. VoIP calls can be interrupted if the upload path isn't sufficient for transmission even though a user may have large amounts of download bandwidth available.

As a result, there is renewed interest in Internet connections that allow users the same speeds for uploads and downloads and new standardisation work has focused on symmetric bandwidth. For example, a new ITU-T recommendation for VDSL2 (ITU-T G.993.2) provides connectivity over existing copper lines at 100 Mbit/s symmetrically.[18] The new VDSL2 standard will most likely be used in conjunction with a fibre to the premise connection as a way to extend the connection over copper for the last few hundred metres. The cable Internet industry is also working towards a new standard (DOCSIS 3.0) that will offer 100 Mbit/s symmetrically.[19] In addition, broadband providers that connect users directly with fibre typically offer symmetrical bandwidth. Mstar in the United States offers 15 Mbit/s symmetric connections to users connected via fibre. The move towards symmetric bandwidth will likely be important as upstream bandwidth needs intensify with multiple play.

Figure 4 gives estimates of typical bandwidth requirements for IP services provided with multiple play. The horizontal bars represent estimates of bandwidth needs for different services. The average speeds of triple-play broadband connections are given by the vertical lines on the chart. At the far right, the average fibre optic connection in the OECD is capable of downloads at 56 Mbit/s and uploads at 53 Mbit/s. All the listed services on the chart are available from the upload and download speeds offered by fibre. Cable and ADSL modem connections averaged roughly 7 Mbit/s for downloads and 0.7 Mbit/s for uploads. The download speeds are too low to supply HDTV video using MPEG-4 compression. However, they can support streams of broadcast analogue television, video conferencing and VPN access at those speeds.

Figure 4. Multiple-play bandwidth requirements and OECD average bandwidth, September 2005



Voice services are easily supplied by the download portion of all three types of Internet connections. However, the upload speeds of both cable and ADSL can become bottlenecks if users are making voice calls and using other Internet services at the same time. The average ADSL upload speed in the OECD of 700 kbit/s can support very high quality audio for voice calls. However, if a user is also making use of other services the voice quality could deteriorate or the call could be cut all together.

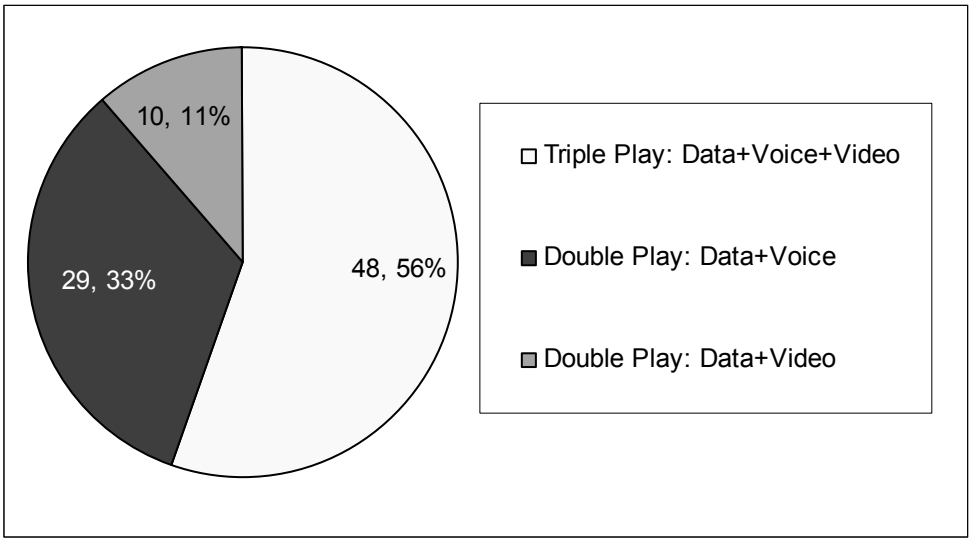
MULTIPLE-PLAY SERVICE OFFERINGS

The wide variety of multiple-play offerings across the OECD makes it difficult to compare countries. While providers in one country may offer higher speeds, a provider in another country may have more video channels available. Therefore, any reading of country comparisons must be done with caution. The data are not always comparable.

In order to facilitate comparisons throughout the OECD it is necessary to start with a set of standard criteria that will determine which offer from a provider is used in the analysis. Since most providers offer a range of packages it is important to have a stable and clear set of rules to determine which package was selected. These criteria are given in the Appendix.

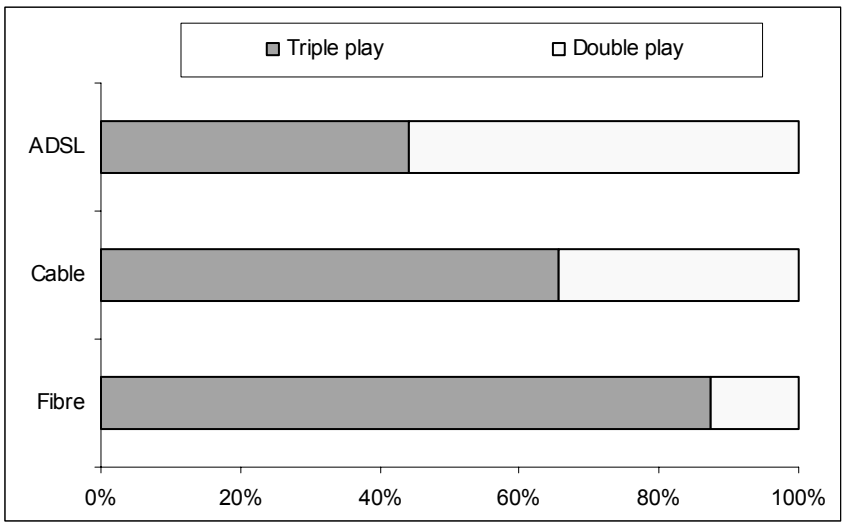
The analysis examines 87 providers in the 30 OECD countries and finds that triple-play offers were available in 23 countries of the OECD and from 48 of the providers surveyed in September 2005. These triple-play offers are available on all main types of wired infrastructure: telecommunication lines, cable and fibre. A further 10 providers in 9 countries offer double-play packages of broadband and video over cable television networks. The remaining 29 firms in 21 countries offer double-play services of (voice and data) over ADSL.

Figure 5. Multiple play availability among surveyed firms, September 2005



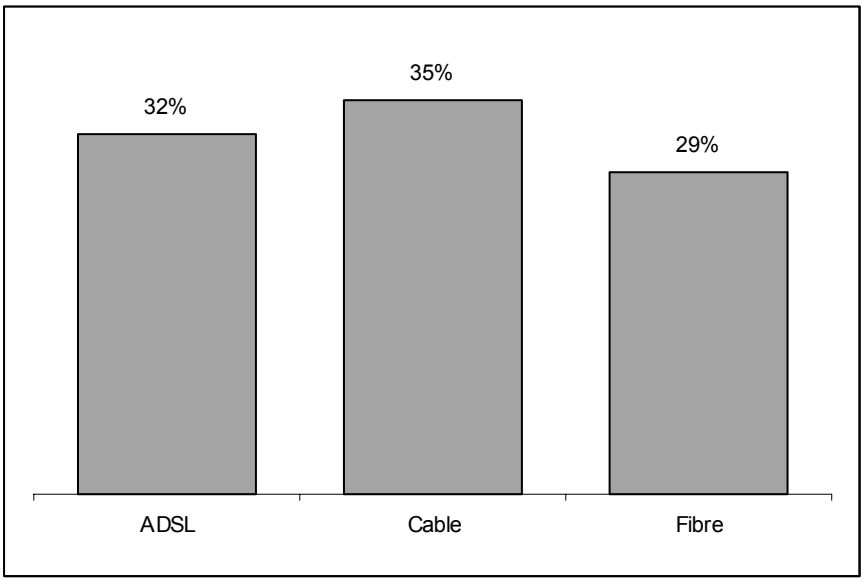
Triple-play services are available on over half of the cable and fibre networks examined. Nearly 66% of the 29 cable networks examined offer triple-play services. In contrast, only 44% of 50 telecommunication networks offer triple play. Triple play is most prevalent on fibre where seven out of eight (88%) providers have a multiple play offer (see Figure 6).

Figure 6. Multiple play offerings, by technology, September 2005



Roughly 30% of operators who provide voice services give subscribers the option of unlimited nationwide voice telephony to fixed-line telephones for a flat rate. Flat-rate services are more prevalent among cable operators than traditional telecommunication operators. This is likely because cable operators do not risk cannibalising existing revenues with the provision of flat-rate voice services as incumbent telecommunication operators may. However, the percentage of ADSL providers with flat-rate voice plans (32%) is only slightly lower than the proportion of cable operators (35%). The trend of operators moving to flat-rate calling plans is likely to continue.

Figure 7. Percentage of operators offering unlimited nationwide calling to fixed lines, by technology, September 2005



The triple-play offers throughout the OECD are broken down into two categories: those that offered unlimited calls to the fixed line network and those that do not. This separation is necessary in order to

compare the prices across countries. The assumption is that users would be willing to pay more for a service with unlimited calling, all other things held constant, than a plan where calls were charged on a per-minute basis.

Among providers offering unlimited PSTN calling plans, the French ADSL operator "Free" has the lowest priced offer in both nominal terms and using purchasing power parities, one of the highest download speeds (20 Mbit/s) and a comparatively large number of video channels (93) for a flat monthly rate (see Table 1). Interestingly, subscribers do not have the option to buy just broadband or voice from Free. They must take the entire package of video, voice and data for USD 36.72 (PPP) per month. The lowest-cost cable plan with unlimited PSTN calling is from Germany's Kable Deutschland. The cost is more than double the price for Free's triple-play service but broadband speeds and number of channels available are lower than the Free offer.

Table 1. Triple-play pricing with unlimited PSTN calling plans, September 2005

Company	Type	Country	Price USD (PPP)	Price USD	Down (kbit/s)	Bit Cap (MB)	TV Chan
Free Telecom	ADSL	France	32.50	36.72	20 000		93
Casema	Cable	Netherlands	48.43	53.75	10 000		42
Versatel	ADSL	Netherlands	60.62	67.28	20 000		1
Kabel Deutschland	Cable	Germany	68.77	78.40	6 200		38
Cablecom	Cable	Switzerland	71.83	102.72	2 000		87
TeliaSonera	ADSL	Sweden	75.00	92.25	24 000		23
Dansk Bredbånd	FTTB	Denmark	78.87	112.78	10 000		30
France Telecom	ADSL	France	78.98	89.25	8 000		34
Lyse	Fibre	Norway	80.86	120.48	4 000		23
Mstar	Fibre	USA	90.26	90.26	15 000		24
Smart Telecom	Fibre	Ireland	91.38	122.44	2 000		70
Noos	Cable	France	91.89	103.83	10 000		100
Telenor	ADSL	Norway	98.54	146.83	4 000		25
TDC	ADSL	Denmark	100.68	143.97	4 096		18
Telewest	Cable	UK	106.50	119.28	1 000		100
Belgacom	ADSL	Belgium	113.54	124.89	4 000	30 000	42
SBC	ADSL	USA	124.97	124.97	3 000		60
Homechoice	ADSL	UK	129.89	145.47	8 000		55
Cogeco	Cable	Canada	144.05	151.25	10 000	30 000	88
Comcast	Cable	USA	149.79	149.79	6 000		70

Note: Video services may be provided over a different technology than the broadband or voice component listed in the table. The technologies used for each service are given in the country-specific section of the Annex.

Many triple-play providers still charge users by the minute for calls to the PSTN. The least expensive offer for triple-play services in this category is Yahoo!BB in Japan, which offers 100 Mbit/s connectivity and 24 television channels over a fibre optic connection for roughly USD 30 (purchasing power parity – PPP) (see Table 2). 100 Mbit/s is the fastest speed of connected offered for triple-play services in the OECD and is available in both Japan and Korea. NTT (West), the incumbent in the Japanese market also offers 100 Mbit/s connectivity and 21 television channels for USD 44.93 (PPP). Calls are then billed on a per minute basis.

Table 2. Triple-play pricing with per-minute call charges, September 2005

Company	Type	Country	Price USD (PPP)	Price USD	Down (kbit/s)	Bit Cap (MB)	TV Chan
Yahoo! BB	Fibre	Japan	29.27	39.22	100 000		24
NTT West	Fibre	Japan	44.93	60.20	100 000		21
Welho	Cable	Finland	48.59	61.71	6 000		12
Elisa	ADSL	Finland	50.62	64.28	8 000		12
Auna	Cable	Spain	54.40	51.13	2 048		50
KT	Fibre	Korea	62.81	54.01	100 000		44
J:COM	Cable	Japan	73.28	98.20	30 000		100
Com Hem	Cable	Sweden	73.49	90.39	8 000		35
Simmin	ADSL	Iceland	78.29	126.05	6 000		10
Sonera	ADSL	Finland	87.54	111.18	24 000		12
Aliant	ADSL	Canada	90.14	94.65	5 000		70
Bell Canada	ADSL	Canada	92.17	96.77	5 000		53
Bigpond	ADSL	Australia	92.54	99.01	1 500	10 000	33
AON	ADSL	Austria	93.78	105.03	2 048	15 000	13
TCNZ	ADSL	New Zealand	95.50	101.23	2 000	10 000	36
Telefonica	ADSL	Spain	95.84	90.09	1 000		48
Telenet	Cable	Belgium	99.33	109.26	10 000	30 000	43
UPC	Cable	Netherlands	105.32	116.91	20 480		38
Bredbandsbolaget	Fibre	Sweden	105.93	130.30	100 000	300 000	39
Optus	Cable	Australia	107.16	114.66	2 880	12 000	32
UPC	Cable	Austria	110.95	124.27	16 384		90
AR Telecom	ADSL	Portugal	111.11	92.22	5 120	20 000	21
Coditel	Cable	Luxembourg	115.68	128.41	4 000	20 000	50
KPN	ADSL	Netherlands	118.10	131.09	8 000		24
Cabovisao	Cable	Portugal	120.53	100.04	8 000	60 000	48
UPC Norway	Cable	Norway	136.13	202.83	26 000		38
Telstraclear	Cable	New Zealand	137.08	145.31	10 000	10 000	30
EPT	ADSL	Luxembourg	140.20	155.63	3 000	25 000	51
UPC	Cable	Hungary	275.85	182.06	5 120	60 000	54

Note: Video services may be provided over a different technology than the broadband or voice component listed in the table. The technologies used for each service are given in the country-specific section of the Annex.

One of the trends emerging throughout the OECD is operators charging a monthly flat rate for PSTN calls. Telecommunication and cable operators have found one way to keep users from dropping fixed lines in favour of mobile phones is to offer flat-rate services. Many of these flat-rate plans are available separately from a broadband connection while others, such as the offer from Free in France and Homechoice in the United Kingdom, must be taken with a bundle of services.

There are other interesting trends for voice pricing appearing in the OECD. Companies in Sweden have moved away from charging users by the minute for calls and instead charge a connection fee when a call is answered. With TeliaSonera this service costs USD 3.20 (PPP) per month and users pay roughly USD 0.05 (PPP) per call. Telenor in Norway and TDC in Denmark also have inexpensive flat-rate calling plans but restrict users to call durations of one hour. Versatel in the Netherlands had the least expensive,

unrestricted offer for flat-rate telephony, costing USD 5.52 (PPP) per month. Table 3 provides pricing on flat-rate calling plans available from multiple-play providers in the OECD.

Table 3. Unlimited fixed-line calling, USD, September 2005

Company	Country	Type	Cost USD PPP	Cost USD	Notes
TeliaSonera	Sweden	ADSL	3.20	3.94	Connection fee per call
Telenor	Norway	ADSL	5.16	7.69	Max. 1 hour per call
Versatel	Netherlands	ADSL	5.52	6.12	
Glocalnet	Sweden	ADSL	6.19	7.61	
Homechoice	UK	ADSL	8.07	9.04	
TDC	Denmark	ADSL	9.18	13.13	Max. 1 hour per call
Dansk Bredbånd	Denmark	Fibre	9.76	13.95	
France Telecom	France	ADSL	10.84	12.24	
Versatel	Belgium	ADSL	11.13	12.24	
Vivodi	Greece	ADSL	12.84	11.56	
Eircom	Ireland	ADSL	14.45	19.36	
Lyse	Norway	Fibre	14.74	21.96	
Cablecom	Switzerland	Cable	16.58	23.70	
Arcor	Germany	ADSL	21.43	24.43	
Noos	France	Cable	21.67	24.49	
Belgacom	Belgium	ADSL	22.21	24.43	
Casema	Netherlands	Cable	27.47	30.49	2 000 minutes/month
Mstar	US	Fibre	31.88	31.88	
Free Telecom	France	ADSL	32.50	36.72	Includes broadband, TV
Kabel Deutschland	Germany	Cable	38.45	43.83	
BT	UK	ADSL	41.15	46.09	Max. 1 hour per call
Telewest	UK	Cable	41.15	46.09	
Cogeco	Canada	Cable	46.48	48.80	
SBC	US	ADSL	53.07	53.07	
Comcast	US	Cable	58.38	58.38	

Some operators only offer double-play services as they prepare for more offerings. Traditional telecommunication firms offer voice and data services (see Table 4) while cable companies offer video and data services (see Table 5).

Table 4. Double-play pricing (voice and data), USD, September 2005

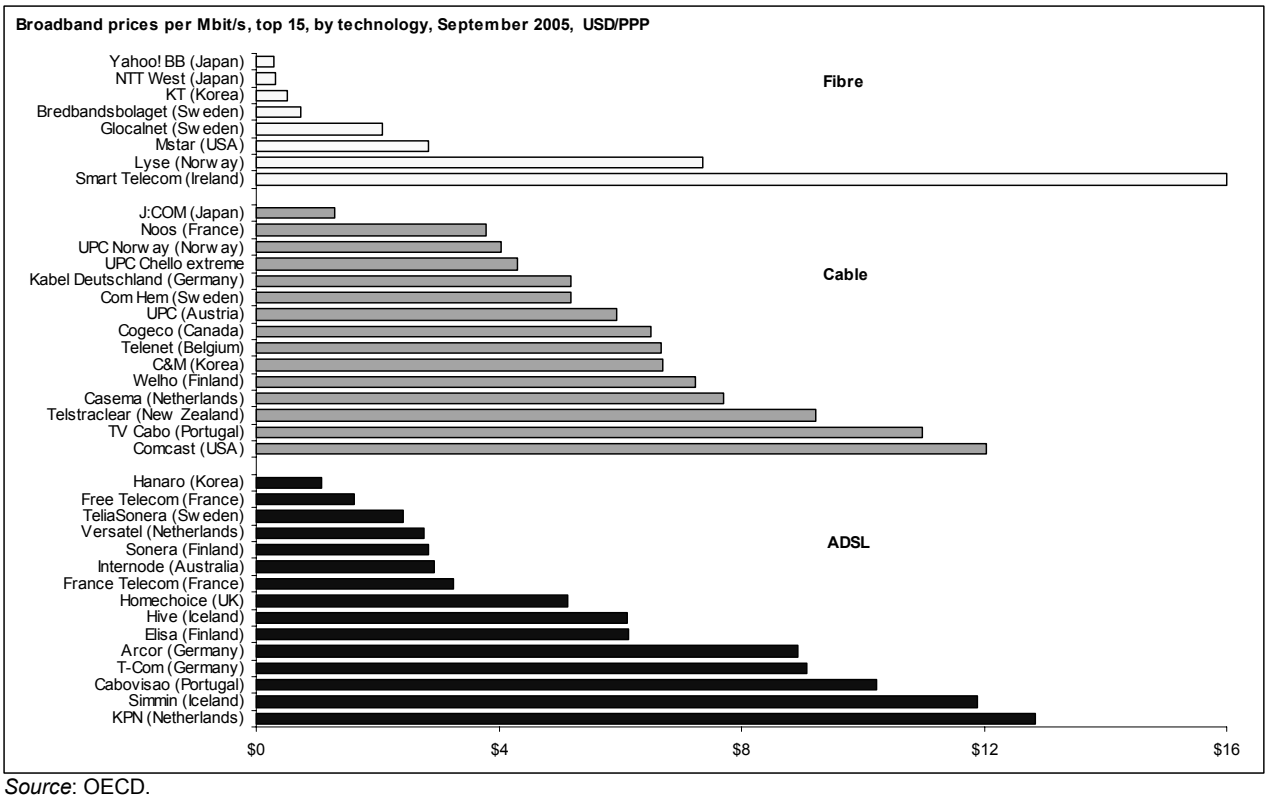
Company	Type	Country	Price USD (PPP)	Price USD	Down (kbit/s)	Bit Cap (MB)
Arcor	ADSL	Germany	48.23	54.98	6 000	
Og Vodafone	ADSL	Iceland	49.89	80.33	6 000	2 000
Dial Telecom	ADSL	Slovak Rep.	50.44	29.76	512	
T-Com	ADSL	Germany	54.66	62.31	6 016	
Hanaro	ADSL	Korea	55.74	47.94	50 000	
Glocalnet	ADSL	Sweden	56.11	69.02	24 000	
Versatel	ADSL	Belgium	63.50	69.85	1 000	500
Jazztel	ADSL	Spain	70.08	65.88	4 000	
Internode	ADSL	Australia	70.40	75.33	24 000	30 000
OTE	ADSL	Greece	71.92	64.73	1 024	
Bluewin	ADSL	Switzerland	72.47	103.63	2 400	
Hive	ADSL	Iceland	73.34	118.08	12 000	
Tele2	ADSL	Switzerland	74.12	106.00	2 400	
Cybercity	ADSL	Denmark	74.28	106.22	3 072	
BT	ADSL	UK	81.48	91.25	2 200	15 000
Cegecom	ADSL	Luxembourg	85.16	94.53	2 000	25 000
Eircom	ADSL	Ireland	86.30	115.64	2 048	16 000
inode	ADSL	Austria	111.40	124.77	4 096	20 000
Telmex	ADSL	Mexico	113.59	80.65	1 024	
Slovak Telecom	ADSL	Slovak Rep.	118.05	69.65	1 024	
Nextra	ADSL	Czech Rep.	125.97	75.58	4 096	40 000
GTS Datanet	ADSL	Hungary	136.93	90.37	3 008	
Vivodi	ADSL	Greece	149.14	134.23	4 096	
TP	ADSL	Poland	196.41	117.85	6 144	50 000
T-Com	ADSL	Hungary	200.00	132.00	2 048	
Dialog	ADSL	Poland	221.86	133.12	2 000	
Portugal Telecom	ADSL	Portugal	243.19	201.85	8 000	8 000
Turk Telecom	ADSL	Turkey	265.29	185.70	2 048	
Cesky Telecom	ADSL	Czech Rep.	276.00	165.60	1 024	

Table 5. Double-play pricing (data and video), USD, September 2005

Company	Type	Country	Price USD (PPP)	Price USD	Down (kbit/s)	Bit Cap (MB)	TV Chan
NTL Ireland	Cable	Ireland	50.26	67.34	3 000	40 000	100
C&M	Cable	Korea	52.15	44.85	5 000		78
Telia Stofa	Cable	Denmark	85.99	122.96	4 096		40
Turk Telecom	Cable	Turkey	121.02	84.71	512		66
TV Cabo	Cable	Portugal	122.09	101.33	8 192	8 000	38
Megacable	Cable	Mexico	132.16	93.83	1 500		62
UPC	Cable	Czech Rep.	161.72	97.03	4 096		31
UPC	Cable	Poland	174.20	104.52	12 000		25
UPC	Cable	Slovak Rep.	179.70	106.03	3 072		24
Cablevision	Cable	Mexico	256.79	182.32	1 024		162

The price of bandwidth in September 2005 varies greatly across the OECD with prices ranging from USD 0.29 (PPP) per Mbit/s in Japan to over USD 150 (PPP) from several operators in the OECD. Figure 8 provides Mbit/s pricing for the 15 lowest-price providers for each technology. It seems that the level of competition in the market is a much stronger determinant of price than the underlying technology. Japanese, French and Korean broadband connections are the least expensive per Mbit/s for cable, ADSL and fibre.

Figure 8. Broadband prices per Mbit/s, top 15 firms, by technology, September 2005, USD/PPP



Source: OECD.

REGULATORY AND POLICY ISSUES

Regulations, and indeed regulatory agencies need to be adaptable in evolving markets. The emergence of video, voice and data service offerings over networks commonly regulated by different agencies highlights how quickly telecommunication and broadcast markets are changing. Regulators must constantly be re-evaluating the efficiency and scope of regulations in the market.

The OECD Workshop on Communications Convergence in June 2005 brought together broadcasters, telecommunication firms, regulators from both these industries, content providers and government ministries. There were several themes to emerge from the discussions and presentations but one was that regulation could play less of an all encompassing role but should instead target specific bottlenecks in the market.

This section will examine some of these potential bottlenecks that could appear in the market as multiple-play expands throughout the OECD. There may be no need for regulatory action on specific items but regulators should be aware of potential problem spots and have safeguards in place should they need to take quick, decisive action. Many of the issues discussed below will likely require more in-depth consideration as multiple play markets evolve.

Price regulation

Regulatory control of retail telecommunications services has commonly been carried out via rate-of-return or price-cap regulation. These two regulatory tools have also been linked with universal service obligations in many OECD countries. However, some regulators in the OECD have determined that price-floor regulation is needed to prevent anti-competitive predatory pricing. Canada has recently moved in this direction by explicitly setting regulatory constraints on how low operators may sell certain services via a price-floor mechanism.[20]

While some regulators have found a need for price-floor regulation, others may find a continuing need for price-cap regulations until markets are sufficiently competitive. Telecommunication operators have traditionally resisted drastically lowering the prices of fixed services in an effort to gain or maintain market share. In some markets, the threat of price increases due to lack of competition may still necessitate price-cap regulation.

However, determining the cost of providing additional multiple-play services will be very complex since telecommunication and cable firms face different incremental costs when adding multiple-play services to their subscriber offerings. Cable firms have been able to implement data and voice services relatively more easily than telecommunication firms have been able to roll out television services. One of the key factors is the bandwidth required for television signals is typically so much higher than is required for data and voice.[21] Prices of non-bundled service may provide an estimate of the cost of providing stand-alone services but they may not always be reliable or available. Some providers will simply not offer their services unbundled.

In other markets, strong competition between traditional fixed telephone services and VoIP has led to drastic declines in calling prices over both types of networks. In these competitive markets,

telecommunication prices will be set much closer to marginal cost and the need for price regulation should diminish or disappear.

There have also been instances of price/margin squeeze in the OECD, particularly in the market for broadband DSL services. Price "squeeze" is a situation where the incumbent operator sells retail DSL services at prices that are lower than an efficient competitor could charge. Margin squeeze is a similar abuse of market power but at the wholesale level. With a margin squeeze, an incumbent operator may charge higher interconnection and access charges to an efficient, competitive provider than it charges its own subsidiary. The resulting price gap can squeeze the margins of the competitor until the company can no longer compete in the market.

In cases of price and margin squeeze, existing competition or telecommunication-specific legislation has been used to facilitate fair and efficient markets. Actions involving competition law have generally focused on the firms using their dominant market position for unfair gain while telecommunication laws often stipulate the regulation of wholesale prices.

In general it could be expected that prices of multiple play packages would fall as competition for subscribers increases in the market. However, the net effect on overall multiple-play pricing could be ambiguous if one of the key components (*e.g.* channels) in a multiple play package increases in price due to high demand. Certain OECD countries are currently examining the prospect of requiring operators to provide *a la carte* channel pricing for channels. Regulators and competition agencies will need to watch for anti-competitive behaviour from firms with significant market power.

Competition

In general, the services offered by multiple play providers are subject to sector-specific regulation as determined by telecommunication and broadcast regulators. Competition authorities can also take action in these service areas, although there may be an exemption for broadcasting in some countries.

The bundling of services is not, in itself anti-competitive. Bundled services can indeed signal that a vibrant market is responding to consumer demand. However, competition law could be applied in circumstances where a dominant operator takes advantage of a dominant position in a market to tie or bundle additional services that consumers may not want but are required to purchase as a package. Tying and bundling could also be deemed anti-competitive if a dominant operator offers service bundles that competitors have no means of matching.

Competition laws also typically outlaw behaviour such as price fixing, bid rigging, non-compete agreements (market division), and group boycotts of certain suppliers. Typically these laws prohibit broad categories of behaviour while providing authorities with a wide range of *ex post* enforcement discretion.[22]

In terms of multiple-play offerings, some countries have imposed regulations that are intended to prevent firms with dominant positions from abusing their dominant market share in one service to move into another. Some countries have regulations in place that do not allow firms to have both telecommunication and broadcasting operations. Japan's incumbent operators NTT East and NTT West are not allowed to enter the broadcasting market. At the same time, Japan's sole public broadcasting entity, NHK (Japan Broadcasting Corporation) is not allowed to enter the telecommunication market. The efficacy of these line-of-business restrictions is dependent on how services are defined in the context of multiple play. For example, regulators would need to decide if video provided to mobile terminals is considered broadcasting or whether VoIP is a complete substitute for analogue voice services.

In other OECD countries there are converged devices coming that bring together previously separate network services. BT is promoting a converged fixed/mobile phone service in the United Kingdom called

BluePhone. The service allows users to make calls on the BluePhone at home via their fixed line and via the cellular network when outside. BT's strategy in bundling the services is to ensure users stay with BT for both fixed and mobile telephony. This type of strategy is becoming more appealing for fixed line operators as their fixed-line revenues continue to decline.

Korea Telecom (KT) has a similar converged service called OnePhone which allows users the same ability to use one phone on both the fixed-line network at home and the CDMA mobile network when outside. However, one of the differences in the two national services is that Korea's offering is subject to stricter regulation regarding the billing of services. KT must charge separately for the fixed and mobile network access. Other mobile operators in Korea must also be allowed to use KT's fixed line service if they want to provide similar services.

The regulator's decision on whether to allow the bundling of various network services will depend largely on the state of competition in the market and the market power of the operators involved. Countries with efficient telecommunication and broadcast sectors could find fewer competitive problems in the move towards multiple-play service offerings than countries with significant competition issues in a particular sector.

Bit caps

One potential bottleneck in multiple-play markets is the anti-competitive potential of bit caps in a few OECD markets. Bit caps are limits on the amount of data traffic that subscribers can use in a given month. Once a subscriber reaches a bit cap they either pay an additional fee per megabyte transferred or have their connection reduced to dial-up speed. The potential problems arise because providers typically do not include video streams from their own servers in the calculation of bit caps but the caps would apply on content such as videos from other sources. For example, TV quality video streaming would require roughly 2 Mbit/s for standard definition television. That equates to 256 KB per second of video or roughly 15.4 MB per minute of television viewing. A subscriber with a 2 GB bit cap would run over their monthly allotment in only 129 minutes of television viewing from a competitive provider (see Table 6).

Table 6. Bit caps and corresponding service limits from off-network sources, September 2005

Country	Company	Bit Cap	Video	Voice call	Podcasts	DIVX Video
			2064 kbps	64 kbps	30 min	1.5 hours
		MB	Minutes	Minutes	Downloads	Downloads
Belgium	Versatel	500	32	1 042	17	1
Iceland	Og Vodafone	2 000	129	4 167	67	3
Portugal	AR Telecom	6 000	388	12 500	200	9
Portugal	Portugal Telecom	8 000	517	16 667	267	11
Portugal	TV Cabo	8 000	517	16 667	267	11
Australia	Bigpond	10 000	646	20 833	333	14
New Zealand	TCNZ	10 000	646	20 833	333	14
New Zealand	Telstraclear	10 000	646	20 833	333	14
Australia	Optus	12 000	775	25 000	400	17
Austria	AON	15 000	969	31 250	500	21
UK	BT	15 000	969	31 250	500	21
Ireland	Eircom	16 000	1 034	33 333	533	23
Luxembourg	Coditel	20 000	1 292	41 667	667	29
Austria	inode	20 000	1 292	41 667	667	29
Luxembourg	Cegecom	25 000	1 615	52 083	833	36
Luxembourg	EPT	25 000	1 615	52 083	833	36
Australia	Internode	30 000	1 938	62 500	1 000	43
Belgium	Belgacom	30 000	1 938	62 500	1 000	43
Canada	Cogeco	30 000	1 938	62 500	1 000	43
Belgium	Telenet	30 000	1 938	62 500	1 000	43
Czech Rep.	Nextra	40 000	2 584	83 333	1 333	57
Ireland	NTL Ireland	40 000	2 584	83 333	1 333	57
Poland	TP	50 000	3 230	104 167	1 667	71
Hungary	UPC	60 000	3 876	125 000	2 000	86
Portugal	Cabovisao	60 000	3 876	125 000	2 000	86
Sweden	Bredbandsbolaget	300 000	19 380	625 000	10 000	429

Note: The bit caps provided are the limits where either users are charged for additional data traffic or speeds are reduced to levels below what is considered to be broadband.

The effect of these bit caps will also be largely determined by how television over an Internet connection evolves. Currently, there are two separate camps emerging for video provision, IPTV and Internet television. IPTV is typically a closed, geographically-based video delivery system offered by telecommunication providers. It is meant to be a substitute for cable and satellite television. Video content will likely only be available while on the telecommunication company's own network.

Internet television is evolving in a different way. Internet television involves companies that serve as content aggregators and provide video on a subscription basis over any Internet connection. Examples include Google's video service (http://video.google.com) and Brightcove (http://www.brightcove.com)[23].

Bit caps should not be an issue in competitive broadband markets since providers could differentiate their products and attract subscribers by removing bit caps. This market pressure would then offer strong incentives for companies with bit caps to either raise them or remove them altogether. For example, the

new entrant Hive in Iceland has been able to attract new customers from the two established providers by offering unlimited data traffic. Smart Telecom in Ireland and Homechoice in the United Kingdom have also been attracting customers away from incumbents with unlimited data offers.

Where bit caps could pose a problem is in markets where no unlimited data offers are widely available. For example, all firms surveyed in Australia, Belgium, Luxembourg, New Zealand, and Portugal had bit caps or limitations on speed imposed after certain data thresholds.

Bit caps could possibly provide an unfair competitive advantage for incumbent cable and telecommunication companies over independent Internet television providers if the market lacks sufficient broadband choices for consumers. There could also be incentives for anti-competitive signalling among cable and telecommunication firms. For example, one firm may introduce bit caps, hoping the other firm would match the caps, essentially disadvantaging independent television operators without any net change in competitiveness between the two infrastructure providers.

At present IPTV and Internet television are nascent markets but regulators should follow the development of both services and watch for anti-competitive behaviour in the market from infrastructure providers.

Walled garden

Bit caps can serve as a deterrent to accessing content from outside the provider's network but incumbents can also create "walled gardens" where outside content is actually blocked. Telecommunication and cable operators are investing heavily in multiple-play infrastructure with the expectation that many of their subscribers will choose the incumbents services over those offered by independent service providers. However, some customers will still want to use the bandwidth they pay for from the operators to subscribe to independent services such as Skype for phone calls or emerging providers for video-on-demand.

There has been some concern of late that consumers subscribing to certain broadband providers could find themselves in a walled-garden of services. Some reports have suggested that telecommunication operators could block competitive services on their networks as a way to enhance security and quality[24]. At the same time, these traffic structuring technologies could limit subscriber access to outside content and services such as on-demand movies or independently provided VoIP phone calls.

The threat of blocked services is real as incumbent telephone operators already have blocked services from independent VoIP providers. For example, in February 2005 a local phone company in the United States was accused of blocking the ports used by Vonage, a popular competitive VoIP service provider. The ports were subsequently unblocked but the entire event highlights how the business models of competitive telecommunication providers rely on good network access to subscribers.

Policy makers in many OECD countries are working to address these issues. In September 2005, the FCC of the United States released a three-page policy statement in which it adopted network neutrality principles intended to provide "guidance and insight" into [the FCC's] approach to the Internet and broadband[25]. The principles enumerated in the policy statement by the FCC are not enforceable but instead reflect the preferences and concerns of the commissioners who signed it with respect to Internet conduct.

This research did not find any examples of blocked competitive services among the firms we examined. However, many firms reserve the right to do so in the future as a way to protect the integrity of their network and ensure more bandwidth for their own services. If firms did decide to block services there could be huge consequences for independent content producers and service providers. There could also be worrying implications for content diversity. The results would almost surely be anti-competitive in markets

with little or no infrastructure choice. As a result, regulators will need to carefully plan in the event that firms decide to block traffic to competitive services.

While port blocking is an obvious form of anti-competitive behaviour by firms, traffic structuring could have a similar effect but be more difficult to identify and remedy. Instead of blocking an outside service, Internet providers could simply give bandwidth priority to their own services at the expense of all other traffic on the network. Such techniques are justifiably used for time-sensitive services but leave the remaining outside traffic with less bandwidth. Services from outside the network would then be carried via "best effort" network transmission while the carrier's services received preferential transmission. True network neutrality would imply equal access to all services, regardless of the provider. There are good arguments for giving video and voice traffic priority on the network but regulators will be faced with the decision of whether to require infrastructure operators to offer the possibility of quality of service enhancements for services from competitive providers.

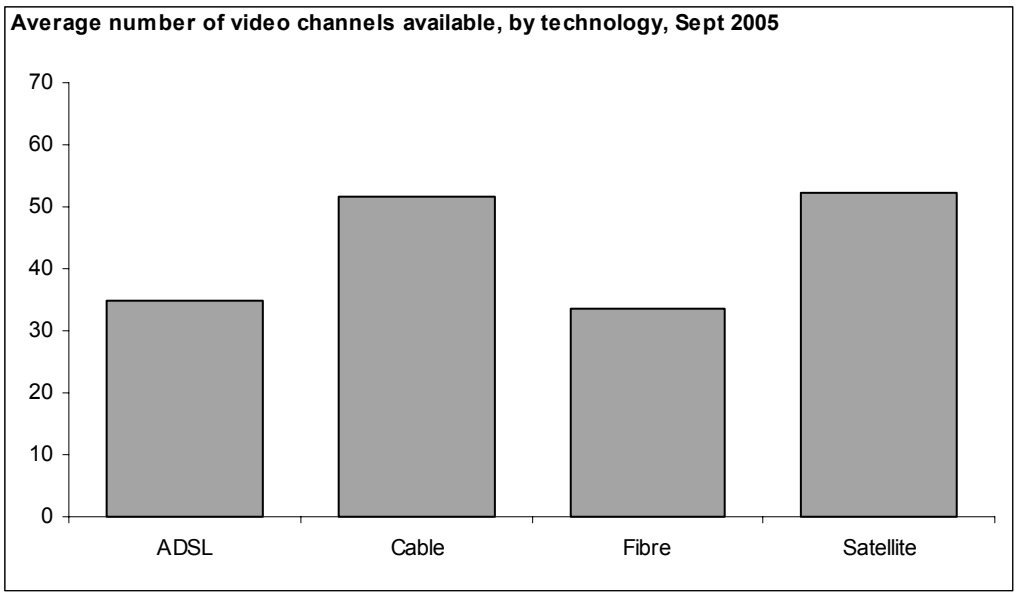
Access to content

Multiple play service providers know that they need good access to video content in order to attract users. In many ways, access to video content could determine the success of television over IP in a given market. Cable companies clearly have the advantage when it comes to acquiring video rights in their markets given their existing relationships with content providers, some of which are exclusive. Telecommunication operators are now trying to match cable video offerings with varying degrees of success. Cable's competitive advantage for video is also enjoyed by satellite television operators who are themselves moving towards offering integrated multiple-play services. Companies such as BSkyB in the United Kingdom have been able to leverage their existing video content relationships with the purchase of an existing ISP in order to complete a triple-play offering[26]. Regulation has also addressed access to content in some OECD countries. In the United States, the FCC's program access regulations prohibit vertically integrated, satellite delivered service companies from entering into exclusive programming agreements.

In some OECD countries, telecommunication firms have been able to offer a wide number of television channels, enough to compete with cable television operators. The survey of multiple-play offers examined two to three providers from each country and compared the number of channels available in the basic video package available to subscribers. There are 14 offers of video over ADSL with an average of 37 channels available. Of the 33 firms offering video over cable, there is an average of 54 video channels in the basic package. Video over fibre optics is available from 6 companies with an average of 37 channels available. Finally, three of the wired broadband companies offered video services via satellite. Among these three companies the average number of channels on offer was 68, the highest over any of the technologies.

Figure 9 show that telecommunication operators in countries with video services available can offer nearly as many video channels as cable and satellite. However, the analysis makes no judgements on the quality of the channels available, including those that may be considered vital for a video offering in a particular market.

Figure 8. OECD average number of video channels available, by technology, September 2005



The data collected only shows operators who have been able to successfully provide video offerings. However, in some parts of the OECD telecommunication operators have had less success offering video. For example, Korean telecommunication firms must obtain a broadcasting license and acquire content from their potential competitors before they can sell video. In the United States, telecommunication firms typically must make arrangements with thousands of franchising authorities to secure the ability to sell video services in each municipality. However, recent legislation passed in Texas, and a proposed national bill, aims to streamline the licensing process for US telecommunication firms, allowing them to apply for either a state-wide or national license to provide video services.[27]

Must carry

One of the key issues that broadcast and telecommunications regulators will face in the coming years is the issue of "must-carry" regulations on cable television networks. Must-carry provisions traditionally mandate that cable television networks carry a certain number of public interest or local channels, particularly those they would not carry otherwise. In countries such as the United States, must-carry rules were designed to protect viewers who rely on terrestrial television from a loss of service that could be caused by a weakening of the financial base of terrestrial television stations. In some OECD countries must-carry provisions also apply to satellite television providers. With must carry, operators are required to "carry" a certain number of channels on their networks that could have otherwise been used for possibly more lucrative channels or as additional Internet bandwidth to consumers. For example, cable operators may choose to reallocate video channels to subscriber Internet bandwidth to boost broadband speeds in the case that must-carry regulations were eased. Most OECD member countries impose must-carry regulations on cable TV operators but these have not been extended to telecommunication firms.[28]

As telecommunication firms enter the market for video it will be important for policy makers to re-examine the role of must-carry regulations on cable networks. The matter will become more urgent as the move towards high-definition television accelerates. Higher-definition programming would require much more bandwidth than current analogue signals and require more space on cable television networks.

The current imposition of must-carry rules on cable networks but not on telecommunication firms may indicate the lack of a level playing field for the operators. As a result, some policy analysts argue that the need for must-carry provisions is diminishing as local content becomes something that telecommunication and cable firms are willing to pay for and that users can watch via broadband from other sources. Analysts also point to the increased number of paths into a household for video and argue that imposing must-carry restrictions only on cable networks and not telecommunication firms will create an unfair situation. Others argue there could still remain a need for must carry if operators choose not to transmit public service broadcasting even when bandwidth, and associated channel space increases. It is important to note that any analysis of must-carry restrictions must also evaluate the availability of public service content located outside the network and the ability of consumers to reach that content efficiently. As mentioned earlier there is the possibility that off-network content could be restricted by infrastructure operators in the future.

The rules applied to cable companies must also be compared with those applied to satellite operators. Satellite provider BSkyB's recent ISP acquisition has shown that even satellite firms are increasingly interested in providing triple-play services.[29] In their preparation to compete with cable and telecommunication providers, satellite providers have steadily increased the number of channels they offer. *Screen Digest* reports that in Europe, 295 new satellite channels were launched in 2003 and 277 in 2004.[30]

At the same time, other analysts and policy makers may feel that the preservation of culture (or language) and diffusion of public service programming is justification for the continued existence of must-carry rules or even their extension to new delivery platforms. For example, in the context of the European Commission, broadcasters are required to reserve more than 50% of their broadcast time for European works.[31] Additionally, at least 10% of broadcasting time must be reserved for works created by independent producers.[32] Recently, the European Court of Justice for the European Communities also ruled that telecommunication providers offering linear content would also be subject to the same regulations[33]. However, how and if these rules would be applied to content providers located outside the country's jurisdiction is a difficult question that any policy makers will need to address.

The need for must carriage in some OECD countries may diminish over time if content providers can make use of alternative distribution methods for their content and consumers have access to various distribution channels. Public radio broadcasters have found a large demand for time-shifted podcasts of their programmes and the development of new portable video players could have the same effect for video programmers as well. In addition, as fibre connectivity comes closer to residences the amount of bandwidth available on the network will increase. With more bandwidth to fill, multiple-play operators will likely have more space (and demand) for all broadcasting, including public service programming.

Linear and non-linear content

Much of the debate over regulation of IPTV-type services will focus on the differences between broadcast television and streaming content. Terrestrial and satellite broadcasters send out signals in a one-to-many configuration. Essentially, one signal is broadcast over radio waves which individual receivers can receive and play. Cable networks typically adhere to the same principle. Programmes are broadcast simultaneously over a cable past all the homes in a node. Individual tuners then receive broadcasts and display them on the television in a linear fashion.

The streaming video model of television distribution commonly used in triple play works is different from traditional broadcast models. Bandwidth constraints on telecommunication networks prohibit sending all available programmes to consumers simultaneously as is done on traditional one-to-many networks such as cable television. Instead, distribution methods that stream individual channels, when requested, are typically used in IPTV as a way to greatly reduce bandwidth usage.

In some cases the act of streaming video changes the regulatory requirements on providers. Outside of the European Union most OECD member countries do not regard streaming content as "broadcasting" in the regulatory sense.[34] Video streams are typically treated as data services and thus avoid some of the regulations of traditional broadcasters.

The regulatory environment could become more complex however as more users have access to fibre-optic based broadband connections. Fibre connections have the potential capacity to carry a large number of channels simultaneously over one connection, including high-definition programmes. If video content providers decided to follow the existing content distribution models of cable, terrestrial and satellite providers, their services would likely fall under existing broadcast rules. Providers may thus decide to provide streaming or non-linear services in an effort to avoid regulation.

It seems feasible then that cable television providers could also move towards a streaming video model for high-definition programmes that could fall outside existing broadcast regulations in countries outside the European Union. For example cable operators might restructure their content delivery mechanisms to stream content over broadband, instead of broadcasting it over the cable as they have done in the past.

Within the EU there has been discussion about the distinction between linear and non-linear programming within the "Television without Frontiers" directive. Linear programming refers to the traditional television model where programmes are broadcast at certain times in a linear fashion. Non-linear video provision encompasses services such as video-on-demand where programmes can be viewed at any time the user chooses. Existing regulations have typically been applied to linear broadcasters but there has been some fear that the emergence of non-linear broadcasters could create an unequal regulatory structure for traditional broadcasters.[35] There are also continuing discussions on how regulations regarding European content may be applied to non-linear services.[36]

The debate is important because non-linear services are gaining popularity, particularly the new video services available through the Apple iTunes portal. The US broadcaster ABC and Apple came to an agreement to make popular television programmes available for download to the iTunes for USD 1.99 per episode. Apple announced they had sold 1 million music videos and television programs in less than 20 days of launching the service.[37]

Adding to the complexity of the debate is the evolution of the set-top box. Hardware provided by companies such as TiVo allows users to time-shift programming easily. Users can select programmes from a menu and they will automatically be recorded on the set-top box's hard drive when they are broadcast. Cable and satellite providers have already begun integrating set-top boxes with PVR functionality into their offerings. However, as the speed of broadband connections increases, video providers are beginning to send television programmes directly to PVRs over the Internet in less time than it would take to watch the programme. The shows are "pushed" to the PVR and saved automatically on the subscriber's hard drive in an encrypted state. Then, users can pay to "unlock" programmes for immediate viewing. The US broadcasters NBC and CBS announced their programmes will be pushed to "DirectTV Plus" PVRs and can be unlocked and viewed without commercials for USD 0.99 per episode[38]. This shows that traditional broadcasters themselves are moving towards non-linear distribution methods for programming that is not broadcast live.

Co-operative distribution tools such as BitTorrent could also become an efficient way of distributing video and highlight the role of network architecture in the debate on video distribution.

Clearly the problems are complex and there has been no consensus among OECD countries. However, as multiple-play services emerge from traditionally different market segments the desire for harmonised regulatory regimes will grow.

Franchise obligations and geographic restrictions

As mentioned earlier, franchise obligations in OECD countries such as the United States could potentially create an uneven playing field for telecommunication and cable operators offering multiple-play services. Cable television companies in the United States have traditionally had to negotiate contracts with local municipalities before they can offer services. However, telecommunication firms have said that making separate agreements with all the municipalities across the US presents too large a barrier to entry in the market. Cable firms have then responded that they had to make all the agreements and thus so should the new entrants to the market.

Some states in the United States such as Texas have agreed that the licensing procedure is too complicated and have moved towards offering state-wide licenses.[39] There are also bills before the US congress that would streamline the process nationwide, allowing new entrants to receive one license for the entire country[40]. One thing that is unclear is the future of municipal-level regulations on video providers. For example, many municipalities in the United States require cable companies to offer services to everyone in a given area in exchange for a license. Telecommunication firms offering video would likely not be subject to these same conditions.

Franchise obligations have been discussed in terms of national broadcasting policy but the evolution of both linear and non-linear programming over IP has sparked discussion on how existing national regulations will apply to foreign content providers. One contentious issue is extra-territorial jurisdiction. For example, if a content provider in one country sold video services over IP to subscribers in another there is a question of what regulations, if any, would be applied to the transaction. Such restrictions could prove very difficult to enforce and could discriminate against foreign operators who may be bound as well to regulations in the country where they are based.

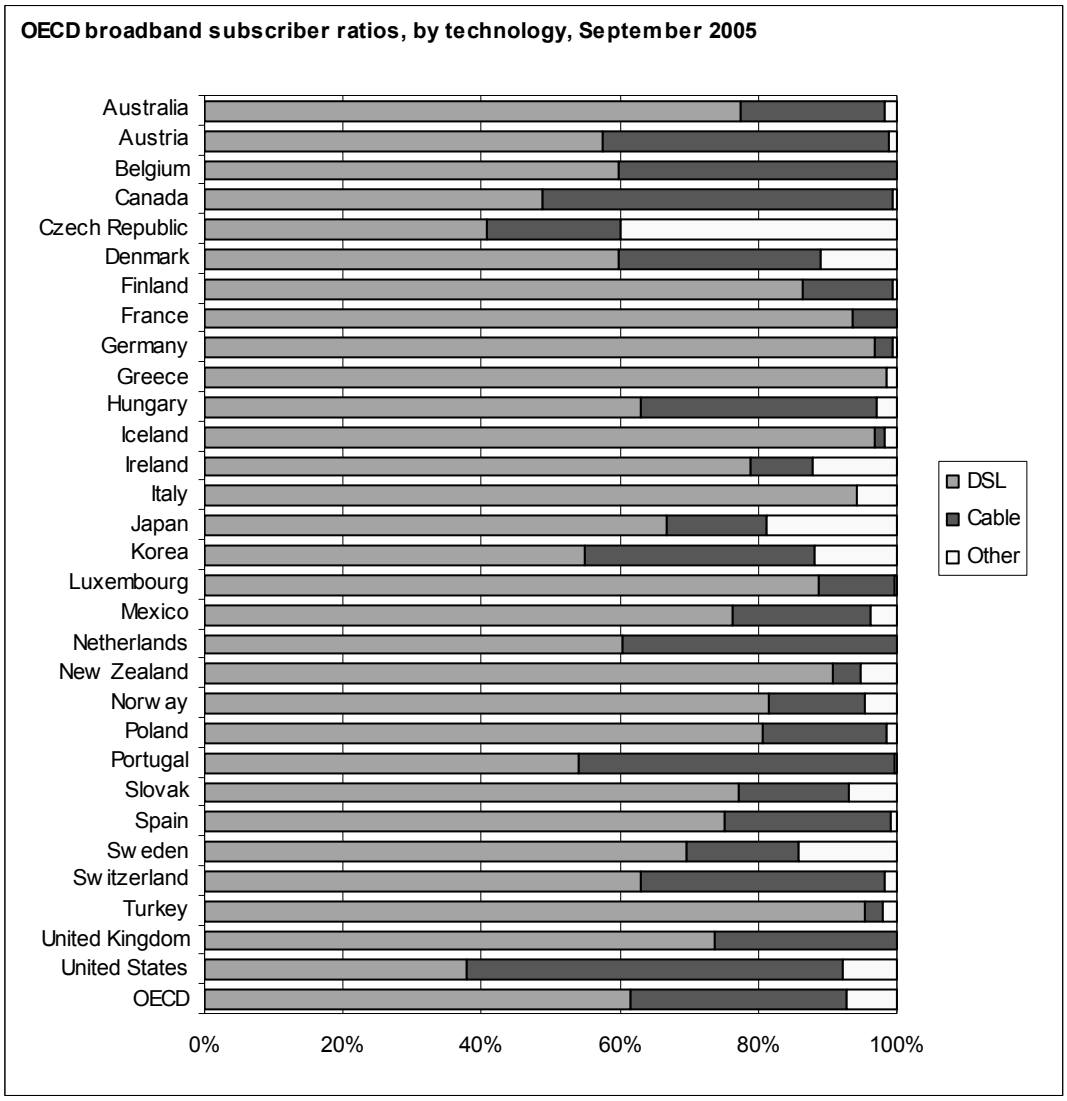
Quality of service

The level of quality of service subscribers receive will become an increasingly important issue for regulators and providers since degradation increases as more services are included on the network. Subscribers may experience low voice quality or the dropping of VoIP calls on broadband networks during periods of high traffic.

The ability to make emergency phone calls will also be an important issue as a form of quality of service. If IP traffic stops working on the network then users lose the ability to make emergency calls. In addition, IP networks facilitate users making phone calls from different locations with the same service. This makes routing emergency calls much more difficult since there may be no efficient way of locating the physical area of an IP phone at any given time.

APPENDIX

Figure 9. OECD broadband subscriber ratios, by technology, September 2005



Australia

Bigpond, the ISP of Australia's incumbent operator Telstra, offers data and voice services over both ADSL and cable infrastructure. Instead of categorising broadband offers by speed, Bigpond instead has users select among different bit-cap limits. Subscribers can choose between 0.2 and 20 GB bit caps. Users with the 0.2 GB bit cap are offered connections at 256 kbit/s while high-data users with the 20 GB cap connect at 1 500 kbit/s. Bigpond also offers an unlimited data plan where users can download at 1 500 kbit/s until they reach 10 GB of data. At that point the connection is slowed to 64 kbit/s for the remainder of the month. Voice services are provided by Telstra and there are currently no flat-rate calling plans available. Video services are available from Bigpond for streaming to a PC but not to stand-alone televisions. However, Telsta is a part owner in the cable company Foxtel which does offer video services. The basic video package includes 33 channels and *à la carte* selection is available for some channels. Video on demand is not currently available. Telstra does not offer any current discounts for users who subscribe to ADSL for broadband and cable for television.

Optus is a leading cable provider in Australia and offers broadband over both cable and ADSL. Broadband is sold according to bit caps rather than speeds available. Subscribers can choose between bit caps of 200 MB and 20 GB of traffic. On the "unlimited" plans, users can continue using the Internet after they have reached their bit-cap limit but speeds are reduced to dial-up levels until the next billing period. Voice services are also available on the network but no flat-rate plan is available. Optus does have a plan where users can combine their mobile and fixed lines on one account. The plan, called OptusOne allows users to waive their line rental charges and still have 150 local calls per month on the fixed line. They are then billed per-minute on both the fixed and mobile lines. Optus also has video plans available, with the basic package consisting of 32 channels. *À la carte* pricing for channels is available but there is currently no video on demand.

Internode is a competitive carrier in the Australian market which offers faster broadband speeds than Telstra and Optus. Internode has invested in ADSL2+ equipment and offers broadband speeds of up to 24 Mbit/s. Internode's bit-cap limit is much higher than Telstra and Optus at 60 GB. Internet does offer a voice over IP solution called NodePhone. There is no flat-rate, nationwide calling offer but users pay a per-call charge for calls to large cities instead of per-minute charges. Calls to other areas are timed and billed on a per-minute basis. Phone calls among NodePhone members are all free, although the data that is used as part of the service for voice will count towards the user's monthly bit-cap limit.

Table 7. Multiple-play prices in Australia

Australia		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Bigpond										
	Multiple-play	ADSL	99.01	1500	128	10000	N	0.23	33	Y(a)	N
	Data	ADSL	45.87	1500	128	10000					
	Voice	ADSL	14.16				N	0.23			
	Video	Cable	38.99						33	Y(a)	N
Cable provider	Optus										
	Multiple-play	Cable	107.01	2880		12000	N	0.23	32	Y(a)	N
	Data	Cable	57.35	2880		12000					
	Voice	Cable	19.09				N	0.23			
	Video	Cable	38.22						32	Y(a)	N
Alternate provider	Internode										
	Multiple-play	ADSL	61.18	24000	1000	30000	N	0.08	N	N	N
	Data	ADSL	61.18	24000	1000	30000					
	Voice	ADSL					N	0.08			
	Video	ADSL							N	N	N

Note: These services need additional payments.

Austria

Telekom Austria's AON Broadband offers video, voice and data services over its network. Broadband is available at speeds from 384 kbit/s to 2 Mbit/s. The broadband offers vary in price according to the level of the bit cap and the speed of the connection. The 2 Mbit/s offer includes an implicit bit cap at 15 GB of traffic as stated in the acceptable use policy. Phone service is available over the PSTN using Telekom Austria's existing network but there is currently no unlimited calling plan available. Video services over ADSL are available with the basic package consisting of 13 channels. *À la carte* video and video on demand services are not yet available on the network.

UPC offers a quadruple play of services including video, data, fixed and mobile voice in Austria. Broadband subscribers can select broadband speeds between 400 kbit/s and 16 Mbit/s over the cable line. The 16 Mbit/s connection is the most cost effective per Mbit/s. Fixed phone service is also available, although there is no flat-rate option as of yet. UPC offers 90 channels in its basic digital TV plan. There are *à la carte* ordering options but no video on demand. UPC also offers combined mobile and fixed-line service through an offering called "Take Two". Fixed line calls are handled over UPC's cable network with mobile calls using ONE's network in Austria. Finally, UPC offers multiple play packages through its Website in Austria. Users can buy package deals for triple and quadruple play services. However, the fastest broadband connections are not advertised as part of the triple-play packages. The packages are instead promoted to medium and low data intensive users.

The Austrian provider inode offers voice and data services over DSL. Broadband speeds range from 384 to 4 096 kbit/s, with the 4 096 kbit/s connection providing the most economical price per kbit/s. Bit caps range from 500 MB at the lower speeds to 20 GB for the 4 096 kbit/s offer. Inode will also allow users to upgrade the terms of their fair-use policy and receive an extra 10 GB of transfers for an additional USD 24 per month. Inode also provides voice services over its connections using VoIP. There is no flat-

rate offer but users can select plans with up to 2 000 minutes included that can be used for calling to fixed lines in Austria. There are no video services available currently from inode.

Table 8. Multiple play prices in Austria

Austria		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	AON										
	Multiple-play	ADSL	105.03	2048	384	15000	N	0.04	13	N	N
	Data	ADSL	67.22	2048	384	15000					
	Voice	ADSL	19.57				N	0.04			
	Video	ADSL	18.24						13	N	N
Cable provider	UPC										
	Multiple-play	Cable	124.27	16384	1024	0	N	0.02	90	Y(a)	N
	Data	Cable	108.98	16384	1024	0					
	Voice	Cable	19.57				N	0.02			
	Video	Cable	31.71						90	Y(a)	N
Alternate provider	inode										
	Multiple-play	ADSL	124.77	4096	512	20000	N(b)		N	N	N
	Data	ADSL	96.73	4096	512	20000					
	Voice	ADSL	28.04				N(b)				
	Video	ADSL							N	N	N

Notes:

(a) *A la carte* services need additional payments.

(b) 2000 minutes are included.

Belgium

Belgium's fixed line incumbent Belgacom began offering triple-play services in June 2005. Broadband speeds are available from 512 kbit/s to 4 Mbit/s. The 4 Mbit/s connection has a 30 GB cap on data traffic. Belgacom also offers unlimited calling to the fixed line network for a flat monthly rate with the "No Limit National Anytime" plan. Belgacom's television offering (Belgacom TV) is provided over its ADSL network and offers viewer 42 channels, *a la carte* channel selection and video on demand. Channel availability can vary slightly in different areas of Belgium. In terms of content, Belgacom has rights to football matches and they are a main selling point of the service.[41] In September 2005 there were no discounted packages for triple play. It is also worth noting that Belgium's ADSL coverage is among the highest in the OECD.

Telenet provides video, voice and data services in Belgium over its cable television network. Broadband data is available with speeds from 512 kbit/s to 10 Mbit/s. The fastest connection has a 30 GB bit cap on data usage. Voice services are available over Telenet's network but there is no unlimited calling plan available to subscribers. Telenet currently provides analogue video signals to its subscribers but is in the process of developing a digital television offering. The basic television package provides 33 channels and this number will increase to 43 with the shift to digital transmission. Telenet provides *à la carte* channel selection and video on demand. Presently there are no specific triple play packages.

The competitive ADSL provider Versatel provides double-play services of data and voice in Belgium, although its Dutch affiliate provides a triple play offering in the Netherlands. Data services range from 512 to 1024 kbit/s, with the fastest service restricted to a 500 MB bit cap. Versatel also offers a non-

subscription ADSL service where users only pay by the minute for the time they use. The non-subscription service is available at 512 kbit/s. Versatel does offer an unlimited phone package but free calls are restricted to the networks of Versatel and Belgacom. Calls to Telenet voice subscribers are charged by the minute.

Table 9. Multiple-play prices in Belgium

Belgium		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Belgacom										
	Multiple-play	ADSL	103.89	4 000	256	30 000	Y		42	Y(a)	Y(a)
	Data	ADSL	67.28	4 000	256	30 000					
	Voice	ADSL	24.43				Y				
	Video	ADSL	12.18						42	Y(a)	Y(a)
Cable provider	Telenet										
	Multiple-play	Cable	109.26	10 000	512	30 000	N	0.06	43	Y(a)	Y(a)
	Data	Cable	73.41	10 000	512	30 000					
	Voice	Cable	20.75				N	0.06			
	Video	Cable	15.10 (b)						43	Y(a)	Y(a)
Alternate provider	Versatel										
	Multiple-play	ADSL	48.86	1 000	256	500	Y		N	N	N
	Data	ADSL	36.61	1 000	256	500					
	Voice	ADSL	12.24				Y				
	Video	ADSL							N	N	N

Notes:

(a) These services need additional payments.

(b) This is cable subscription fee. In addition, Digital TV subscription needs to buy other equipments with additional fees.

Canada

Bell Canada offers triple play services using a combination of ADSL and satellite. Data speeds range from 256 kbit/s to 5 Mbit/s. Voice services are available with unlimited calling within the subscriber's local area. National and long distance calls to the PSTN are charged at per-minute rates. Video services are available from a basic package of 53 channels to over 400. The video services are not delivered over an ADSL connection but rather via satellite. There are video-on-demand services available for an additional fee.

The Canadian cable company Cogeco also offers video, voice and data services over its network. Broadband data speeds are available from 300 kbit/s to 10 Mbit/s, although the fastest connection has a 30 GB bit cap. An unlimited voice package is available from Cogeco as long as users also subscribe to broadband services. The calling plan allows unlimited calls within Canada and the United States to both fixed and mobile phones. Cogeco's basic television package has 88 channels available and more expensive

packages can offer up to 200. Video on demand programming and *à la carte* channel selection are available. There is a discount of roughly 5% for subscribers who choose all three services.

Aliant, an alternative Canadian ADSL provider, offers quadruple play services. Broadband data is available at speeds from 1.5 Mbit/s to 5 Mbit/s, where the 5 Mbit/s connection is the most cost effective per Mbit/s. Voice services are available and like other providers in Canada, offer untimed local calls. There is no national flat-rate calling plan so long distance and international calls are billed by the minute. Video services from Aliant are broken into two categories, "TV on My PC" and satellite television services. Ten channels are available to be streamed via broadband to the PC while the basic satellite offers 70 channels. Aliant offers mobile phone service that can be added to a bundle for an existing fee. The mobile phone service is available with 220 weekday minutes included or a flat-rate option available for calls within Atlantic Canada. Aliant offers discounted packages for subscribers who choose multiple services.

Other leading cable operators such as Rogers and Shaw communications have also started providing triple-play services and it has become a core driver for their businesses.[42]

Table 10. Multiple-play prices in Canada

Canada		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Bell Canada										
	Multiple-play	ADSL	96.77	5000	800	0	N		53	N	Y(a)
	Data	ADSL	48.81	5000	800	0					
	Voice	ADSL	21.60				N				
	Video	Satellite	26.36						53	N	Y(a)
Cable provider	Cogeco										
	Multiple-play	Cable	151.25	10000	1000	30000	Y(c)		88	Y(a)	Y(b)
	Data	Cable	68.29	10000	1000	30000					
	Voice	Cable	48.80				Y(c)				
	Video	Cable	43.92						88	Y(a)	Y(b)
Alternate provider	Aliant										
	Multiple-play	ADSL	94.65	5000	640	0	N		70	N	Y(a)
	Data	ADSL	43.88	5000	640	0					
	Voice	ADSL	21.48				N				
	Video	ADSL	29.29						70	N	Y(a)

Notes:

(a) These services need additional payments.

(b) VoD services are included.

(c) Unlimited in Canada and the United States.

Czech Republic

Czech Telecom, the incumbent fixed-line provider, offers voice and data services over its network. Broadband speeds range from 256 kbit/s to 2 Mbit/s. These connections come without bit caps, although lower-priced plans do exist that reduce effective download speeds by incremental steps after users reach 1 and 2 GB of traffic per month. Voice customers receive a significant discount on per-minute charges (typically 10 to 15%) if they subscribe to broadband Internet access at the same time. This provides an incentive for subscribers to buy one of Czech Telecom's packages. There are no flat-rate calling plans available. Czech Telecom does not offer video over ADSL services that can be watched on a traditional

television set. However, Czech Telecom's data subscribers have access to films which can be downloaded and watched on a PC Starzone.cz offers movie downloads to a PC with digital rights management that either allows the movie to be watched once or an unlimited number of times in a 24 hour period. Prices are between USD 2-3 depending on the film and the duration of the rental. The downloads are only available to current Czech Telecom ADSL subscribers.

UPC offers both television and data over their cable network in the Czech Republic. Speeds range from 256 kbit/s to 6 Mbit/s and the 4 Mbit/s connection is the least expensive per kbit/s. Phone services are not currently available but could be in the future. UPC offers a discount to users who subscribe to both data and television programmes. For example, a subscriber taking the package "UPC Mix Plus" would save 10% over buying each of the services separately.

The competitive fixed-line provider Nextra offers data and phone connections over ADSL. ADSL data speeds range from 512 kbit/s to 4 Mbit/s, where the 4 Mbit/s connection is the least expensive per kbit/s. The 4 Mbit/s connection has a bit cap of 40 gigabytes and speeds drop to symmetric 256 kbit/s after the 40 gigabyte limit is reached. Nextra does offer voice-over-Internet services for a per-minute charge but does not offer video services at this time.

Eurotel in the Czech Republic offers a converged broadband service of voice and data via either ADSL, Wi-Fi or mobile (GPRS/EDGE/UMTS). Prices are typically lower than the incumbent and subscription plans can include ADSL connections from home and wireless connectivity when away.

Table 11. Multiple-play prices in the Czech Republic

Czech Republic		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Czech Telecom										
	Multiple-play	ADSL	165.60	2048	256	0	N	0.07	N	N	N
	Data	ADSL	149.23	1024	256	0					
	Voice	ADSL	16.37				N	0.07			
	Video	ADSL							N	N	N
Cable provider	UPC										
	Multiple-play	Cable	97.03	4096	512	0	N		31	Y(a)	N
	Data	Cable	83.50	4096	512	0					
	Voice	Cable					N				
	Video	Cable	24.33						31	Y(a)	N
Alternate provider	Nextra										
	Multiple-play	ADSL	75.58	4096	384	40000	N	0.05	N	N	N
	Data	ADSL	59.21	4096	384	40000					
	Voice	ADSL	16.37				N	0.05			
	Video	ADSL							N	N	N

Note: These services need additional payments.

Denmark

Denmark's incumbent telecommunication operator, TDC, offers voice, video and Internet connectivity over ADSL. Broadband offers range from 512 kbit/s to 4 Mbit/s. The entry-level plan offers a very low subscription fee but an additional charge per megabyte downloaded. The other plans do not have transfer limits. The 4 Mbit/s connection has the lowest monthly cost per kbit/s.[43] TDC offers VoIP service over

broadband but the service is initially only available to cable Internet subscribers. However, TDC does offer a phone service with unlimited calls to fixed lines. TDC launched TV over broadband in May 2005 to 18 municipalities, with coverage set to extend to other areas at a later stage. There are two video packages available. The offers consist of either 5 or 18 channels.

Telia Stofa offers data and video services via their cable modem network. As with TDC, Telia Stofa offers access on dual platforms, ADSL and cable. The company's StofaNet service offers both flat-rate and metered/bit-capped Internet connections. The metered connection costs USD 25 for the first 50 MB of traffic. After that, users are charged USD 0.16 for each MB of traffic up to a maximum cost of USD 68. Once users have spent USD 68 on per MB charges they are entitled to 20 GB of traffic before charges are reintroduced. Video services are available over the network with a typical bundle of 40 channels. Prices and the number of channels available vary according to geographic area. There are no specific discounts offered for combining video and data services.

Some of the most innovative multiple-play offerings in Denmark are based on fibre/LAN connections to residents in multi-tenant units. Two of the largest providers are Dansk Bredbånd and Com-X. Both offer faster download speeds than cable and DSL providers. Power utilities in Denmark are also moving into multiple-play services. A majority of the largest power utility companies in Denmark including NESA Fibernet, NVE, TRE-FOR, EnergiMidt and MidtVest Bredbånd have such services.

Table 12. Multiple-play prices in Denmark

Denmark		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/ min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	TDC										
	Multiple-play	ADSL	124.44	4 096	256	0	Y		18	N	N
	Data	ADSL	81.92	4 096	256	0					
	Voice	ADSL	13.13				Y				
	Video	ADSL	29.39						18	N	N
Cable provider	Telia Stofa										
	Multiple-play	Cable	122.96	4 096	512	0	N		40	N	N
	Data	Cable	81.92	4 096	512	0					
	Voice	Cable					N				
	Video	Cable	41.04						40	N	N
Alternate provider	Dansk Bredbånd										
	Multiple-play	Fibre	93.25	10 000	10 000	0	Y		30	N	Y
	Data	Fibre	70.43	10 000	10 000	0					
	Voice	Fibre	13.95				Y				
	Video	Fibre	11.33						30	N	Y

Finland

TeliaSonera offers video, voice and data services in Finland using a combination of ADSL and cable television networks. Data services are available with speeds ranging from 256 kbit/s to 24 Mbit/s. The broadband service offering of 24 Mbit/s is the most cost effective per Mbit/s. Voice services are available through the PSTN but there is no unlimited calling plan offered. Video services are provided through a digital cable network and the basic package includes 12 public video channels. There are additional video packages available for an additional payment. There are no discounts offered for users subscribing to multiple services.

Welho is one of the leading cable operators in Finland and offers video, voice and data. Data speeds range from 256 kbit/s to 6 Mbit/s without bit caps. The 6 Mbit/s offering is the most economical per kbit/s. Voice services are available over the cable network but there are no unlimited PSTN calling plans available. Callers are also billed a connection fee in addition to per-minute charges for calls. Video services are available on the network and the 12 public channels are available for free. Packages of additional channels are available for an additional monthly charge.

Elisa is one of the incumbent telecommunication operators in Finland and offers video, voice and data using both ADSL and cable networks. Data and voice services are provided over the telecommunication network and video services are delivered over cable in Helsinki. Broadband is available at speeds between 256 kbit/s and 8 Mbit/s with no bit caps on usage. Unlimited voice plans are not available and there are two basic subscriptions models. One imposes connection fees for calls but has lower per-minute tariffs than the other which has no connection fees but higher per-minute charges. The 12 public channels are provided for a low subscription rate and other channel packages can be added for an additional fee.

Table 13. Multiple-play prices in Finland

Finland		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Sonera										
	Multiple-play	ADSL	111.18	24000	1000	0	N	0.05	12	Y(a)	N
	Data	ADSL	84.36	24000	1000	0					
	Voice	ADSL	2.33				N	0.05			
	Video	Cable	24.49						12	Y(a)	N
Cable provider	Welho										
	Multiple-play	Cable	61.71	6000	500	0	N	0.01	12	Y(a)	N
	Data	Cable	55.10	6000	500	0					
	Voice	Cable	6.61				N	0.01			
	Video	Cable							12	Y(a)	N
Alternate provider	Elisa										
	Multiple-play	ADSL	64.28	8000	1000	0	N	0.07	12	Y(a)	N
	Data	ADSL	54.98	8000	1000	0					
	Voice	ADSL	7.35				N	0.07			
	Video	Cable	1.96						12	Y(a)	N

Note: These services need additional payments.

France

France Telecom, France's incumbent operator, offers a multiple play service with data, voice, video and mobile service. France Telecom has quickly deployed ADSL2+ at exchanges allowing for users to connect at up to 18 Mbit/s. Metered connections also exist at speeds of 512 kbit/s. France Telecom offers two different types of unlimited phone packages, one via the PSTN and the other using VoIP. For USD 96 per month, France Telecom subscribers get unlimited calls from home to fixed and mobile numbers in Western Europe and North America. France Telecom's ISP, Wanadoo, allows unlimited calling to French fixed lines for USD 12 per month using a second, non-geographic telephone number. Video services over ADSL are also available. Wanadoo subscribers pay a fee per month to make the line capable for TV over ADSL and then can subscribe to cut-priced packages from outside providers TPS and Canal+. There is no discount when subscribers sign up for multiple services.

Free Telecom was the first company in France to introduce multiple-play services, particularly video, voice and data over ADSL. Subscribers do not have the option to buy the services separately and pay EUR 29.99 for all three. The availability of services depends on the status of unbundling at the local exchange although much of France has already been upgraded. Unbundled users have access to nearly 100 free video channels, unlimited telephone calls to fixed lines in France (via an assigned non-geographic telephone number) and data access at speeds up to 20 Mbit/s. Free telecom offers *à la carte* video services where users can add channels separately to their services for a small fee.

In France, the cable operator Noos offers a multiple play package of three services, video, voice and data. Data services are available at speeds up to 10 Mbit/s in upgraded areas and Noos offers a wide variety of television programming. The basic television service *Découverte* offers over 50 channels. Subscribers can also choose from two voice packages, one with unlimited calling to fixed lines in France. Noos offers significant discounts on their multiple play packages for the first year. A package of 10 Mbit/s Internet access, unlimited voice calling and 100 video channels costs 29% less than the standard price for the first year of the subscription.

Table 14. Multiple-play prices in France

France		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Wanadoo										
	Multiple-play	ADSL	72.12	8000	1000	0	Y		34	N	N
	Data	ADSL	48.86	18000	1000	0					
	Voice	ADSL	12.24				Y				
	Video	ADSL	31.84						34	N	N
Cable provider	Noos										
	Multiple-play	Cable	103.83	10000		0	Y		100	N	N
	Data	Cable	42.73	10000		0					
	Voice	Cable	24.49				Y				
	Video	Cable	36.61						100	N	N
Alternate provider	Free Telecom										
	Multiple-play	ADSL	36.72	20000	1000	0	Y		93	Y(a)	N
	Data	ADSL	36.72	20000	1000	0					
	Voice	ADSL	36.72				Y				
	Video	ADSL							93	Y(a)	N

Note: These services need additional payments.

Germany

DT, the PSTN incumbent, currently offers a multiple-play that consists of fixed voice, data and mobile. DT's fixed-line unit T-Com offers broadband at three different speeds, (1, 2 and 6 Mbit/s) and sells it separately from actual Internet access. Subscribers choose a speed for the DSL connection and then must purchase Internet access to go with it. The cost of just the DSL portion of the copper line depends on the speed. Then, users have the option of selecting T-Online as the ISP and paying on the basis of usage time or a flat rate. T-Online introduced a flat-rate VoIP calling plan in November 2005. Video is not currently offered for T-Com subscribers but that should change with the rollout of a new fibre optic network that will aid multiple play. One element of this plan is the "dual phone" which can make calls on both fixed and

mobile networks. The dual phone functions as a fixed-line cordless phone inside the house but can easily switch to mobile or Wi-Fi networks outside.

Kabel Deutschland is the largest cable network operator in Europe with 10 million TV subscribers in Germany[44]. Kabel Deutschland offers television and Internet connectivity over its network and launched a service called "Kabel Phone" in autumn 2005[45]. Kabel Deutschland is the largest cable operator but many smaller cable companies are upgrading their networks for multiple-play services as well. The German Cable Association reports that cable network upgrades throughout 2005 should enable 4.1 million households to have access to voice, video and data by late 2005[46]. Kabel Deutschland has three tiers of broadband service available, from 2.2 to 8.2 Mbit/s. The 6.2 Mbit/s service is the most cost effective per kilobit per second. Kabel Deutschland provides discounts of up to 25% to users who subscribe to both Internet and phone offers.

Arcor is a competitive DSL provider that offers a voice and data combined offer. Data speeds are available up to 6 Mbit/s but the company has plans to upgrade to ADSL 2+ in the near future, allowing for speeds of up to 16 Mbit/s. Arcor offers several phone packages including a flat-rate calling plan to fixed lines. As an incentive to subscribe to multiple services, the cost of flat-rate calling falls 25% for subscribers of flat-rate DSL service. There are no television offers available from Arcor at present but the planned upgrade to ADSL 2+ would make the transition much easier.

Table 15. Multiple-play prices in Germany

Germany		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	T-Com										
	Multiple-play	ADSL	62.31	6016	576	0	N	0.05	N	N	N
	Data	ADSL	42.78	6016	576	0					
	Voice	ADSL	19.53				N	0.05			
	Video	ADSL							N	N	N
Cable provider	Kabel Deutschland										
	Multiple-play	Cable	78.40	6200	420	0	Y		38	N	N
	Data	Cable	36.60	6200	420	0					
	Voice	Cable	43.83				Y				
	Video	Cable	17.30						38	N	N
Alternate provider	Arcor										
	Multiple-play	ADSL	54.98	6000		0	Y	0.10	N	N	N
	Data	ADSL	36.67	6000		0					
	Voice	ADSL	24.43				Y	0.10			
	Video	ADSL							N	N	N

Greece

The Greek incumbent telecommunications operator OTE provides data and voice services over their network. Broadband offers range from 385 kbit/s to 1 Mbit/s, where the fastest offer is also the most cost-effective per kbit/s. Traditional voice services are available from OTE but there are no flat-rate fixed line telephone offers available. There are also no video services available from OTE and the current bandwidth speeds would likely not support them.

The Greek competitive ADSL operator Vivodi offers faster ADSL speeds than those available from OTE. Subscribers can choose from speeds between 256 kbit/s and 4 Mbit/s. The 4 Mbit/s offer is the most cost effective per kbit/s. Broadband prices from Vivodi can vary depending on whether the loop is partially or fully unbundled. Fully unbundled connections are slightly more expensive but save the subscriber from paying an additional line-rental charge to OTE. Vivodi also offers flat-rate calling to the Greek fixed-line network for a flat monthly rate. Video services over ADSL are not currently available.

Table 16. Multiple-play prices in Greece

Greece		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	OTE										
	Multiple-play	ADSL	64.73	1024	256	0	N	0.04	N	N	N
	Data	ADSL	47.54	1024	256	0					
	Voice	ADSL	17.19				N	0.04			
	Video	ADSL							N	N	N
Alternate provider	Vivodi										
	Multiple-play	ADSL	134.23	4096	640	0	Y		N	N	N
	Data	ADSL	122.67	4096	640	0					
	Voice	ADSL	11.56				Y				
	Video	ADSL							N	N	N

Hungary

T-Com, formerly Magyar Telecom, offers voice and data services over its network in Hungary. Data services are available between 1 and 2 Mbit/s with faster speeds available for business users. There are no unlimited voice plans available. However, subscribers to the "T-DSL Komplex" package that combines data and voice can choose one day a week when local calls are free during off-peak hours. T-Com does offer unlimited calling to fixed line phones outside of 10:00 – 16:00 on weekdays through its "Favorit" package. There are no video services available currently from T-Com.

UPC's cable network in Hungary provides users with data, voice and video services. Broadband speeds range from 512 kbit/s for the "Chello Light" package and 5 Mbit/s for the fastest, "Chello Plus". Chello Plus is the best value per kbit/s. Telephone services are also available for an additional fee per month. Calls among UPC cable telephone subscribers are always free with other calls charged on a metered basis. There is no unlimited calling plan for fixed line telephones in Hungary. Television services are available over two different networks from UPC, cable and satellite. Cable coverage and content varies among cities while the satellite option offers nearly uniform coverage across the country. Basic television packages such as the "Family Pack" on cable offer 54 channels. On the satellite network, 60 basic channels are available. There is no video on demand or purchasing of channels *à la carte.* UPC offers discounts to subscribers of multiple services through reduced telephone subscriptions. Triple play subscribers pay 50% less for the voice services than if they bought the tree services separately. UPC also offers discounts on service prices to users who commit to longer-term contracts. Monthly fees are lower for customers who sign up for 24 month contracts than those who pay month by month.

GTS-Datanet offers voice and data services in Hungary. ADSL broadband connections are available for speeds between 512 kbit/s and 3 Mbit/s. Users do not have bit caps. Phone services are also available from GTS-Datanet as a dial-around number (1514) on a standard T-Com line. Video services are not available at this time via GTS-Datanet. As ADSL service is the only monthly subscription service there are no multiple-play discounts available.

Table 17. Multiple-play prices in Hungary

Hungary		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	T-Com										
	Multiple-play	ADSL	132.00	2048	192	0	N	0.05	N	N	N
	Data	ADSL	110.61	2048	192	0					
	Voice	ADSL	21.39				N	0.05			
	Video	ADSL							N	N	N
Cable provider	UPC										
	Multiple-play	Cable	182.06	5120	512	60000	N	0.04	54	N	N
	Data	Cable	149.51	5120	512	60000					
	Voice	Cable	12.46				N	0.04			
	Video	Cable	26.37						54	N	N
Alternate provider	GTS Datanet										
	Multiple-play	ADSL	68.99	3008	384	0	N	0.05	N	N	N
	Data	ADSL	68.99	3008	384	0					
	Voice	ADSL					N	0.05			
	Video	ADSL							N	N	N

Iceland

The three telecommunication operators surveyed for Iceland were all preparing for multiple-play offerings but were still in trial stages as of mid 2005.

Iceland's incumbent operator Simmin provides three tiers of ADSL service, 1,2, and 6 Mbit/s. Users do not encounter bit caps on national traffic and limits on downloads only take effect for international downloads on the two lower-speed connections. Subscribers of the 6000 service do not have international bit caps. Simmin is preparing a full triple-play offering but the components are also currently available. As the incumbent telecommunication operator, Simmin offers voice services over the traditional PSTN. ADSL subscribers can also subscribe to TV over ADSL, with 10 channels available. TV over fibre also exists in some areas and subscribers have access to roughly 57 channels that will soon become available to ADSL subscribers as well. Simmin plans on upgrading its network to ADSL 2+ in the near future and this would allow for faster speeds and more channels to viewers. Simmin provides a discount for multiple-play subscribers who select phone service and DSL together.

Iceland's largest competitive telecommunication operator is Og Vodafone, which also offers a traditional fixed-line phone service, broadband over ADSL and GSM mobile telephony. The broadband speeds offered are comparable to Simmin but have a 2 gigabyte cap on international traffic. Og Vodafone does not have any television over ADSL services available currently. Consumers subscribing to both voice and data receive 500 minutes of calls from their home phone and 120 minutes of international calls from the home phone if they subscribe to all services.

One of Iceland's new entrants Hive has started offering ADSL 2+ connections to users in the country and enticing them away from the largest two providers by eliminating bit caps on international traffic for their "Hive MAX" subscribers. By using ADSL 2+, Hive is able to offer faster speeds than both Simmin and Og Vodafone. Subscribers of the fastest services have access to 12 or 20 Mbit/s with a 1.2 Mbit/s upstream data rate. Hive also offers VoIP via a software client. The costs for local calls are comparable to Og Vodafone and more expensive than Simmin. However, users typically take advantage of the service for the discounted international rates. The company does have plans to offer more traditional telephony using a

handset in the future. TV over ADSL services are currently in a trial stage and subscribers should be able to watch 10 channels when the service becomes available.

Table 18. Multiple-play prices in Iceland

Iceland		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Simmin										
	Multiple-play	ADSL	126.05	6000	800	0	N	0.03	10	N	N
	Data	ADSL	93.21	6000	800	0					
	Voice	ADSL	21.65				N	0.03			
	Video	ADSL	27.29						10	N	N
Cable provider	Og Vodafone										
	Multiple-play	ADSL	80.33	6000	832	2000	N	0.06	N	N	N
	Data	ADSL	144.72	6000	6000	2000					
	Voice	ADSL	21.57				N	0.06			
	Video	0							N	N	N
Alternate provider	Hive										
	Multiple-play	ADSL	96.43	12000	1200	0	N	0.05	N	N	N
	Data	ADSL	96.43	12000	1200	0					
	Voice	ADSL					N	0.05			
	Video	ADSL							N	N	N

Ireland

Ireland's incumbent telecommunications operator Eircom provides data and voice services over its network. Data services are available at either 1 or 2 Mbit/s and there is a 16 GB bit cap on the fastest service. The 2 Mbit/s service is also the most cost efficient in terms of price per Mbit/s. Eircom does offer unlimited voice calling to fixed line telephones through its "Eircom talktime anytime" plan. Calls within Ireland and to Northern Ireland are included for a flat monthly rate. Video services are not available via Eircom and there are no discounts given for subscribers who take both voice and data packages.

NTL is the largest cable provider in Ireland and offers a double-play set of services (data and video). Broadband data via NTL's network is available at speeds ranging from 1 Mbit/s to 3 Mbit/s. The bit cap on NTL's packages are larger than Eircom's and the 3 Mbit/s service has an allotment of 40 GB per month. Video services are available over the cable infrastructure and the basic service includes 100 video channels. NTL did provide voice services in the past but stopped the service when there was a safety issue raised with some of the household telephone equipment. Despite this setback, NTL has expressed interest in re-launching voice services in the future.[47] United Global Com (UGC) announced in May 2005 that it would purchase NTL Ireland and it already owns Ireland's other major cable operator, Chorus.

Smart Telecom is an alternative provider that offers data, voice and video services over fibre. Data services are available at 2 Mbit/s. In contrast to both Eircom and NTL, there are no bit caps on data connections via Smart Telecom. Unlimited voice calling plans are available to any fixed-line phone in Ireland. Smart Telecom offers 70 video channels and video-on-demand services should be available soon. The voice and video packages are not priced individually.

Other providers in Ireland are also offering multiple play services. For example, Meath-based Ildana Teoranta provides wireless multiple play services to subscribers. Magnet Networks is building out multiple services to new housing developments in Dublin as well.[48] Magnet Networks offers 4 Mbit/s data,

unlimited fixed line telephony (up to 60 minutes per call) and 50 television channels over its fibre optic network.

Table 19. Multiple-play prices in Ireland

Ireland		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Eircom										
	Multiple-play	ADSL	86.03	2048	128	16000	Y		N	N	N
	Data	ADSL	66.67	2048	128	16000					
	Voice	ADSL	19.36				Y				
	Video	ADSL							N	N	N
Cable provider	NTL Ireland										
	Multiple-play	Cable	67.34	3000	300	40000	N		100	Y(a)	N
	Data	Cable	55.10	3000	300	40000					
	Voice	Cable					N				
	Video	Cable	12.24						100	Y(a)	N
Alternate provider	Smart Telecom										
	Multiple-play	Fibre	122.44	2000	128	0	N	0.06	70	N	N
	Data	Fibre	42.86	2000	128	0					
	Voice	Fibre	(b)				N	0.06			
	Video	Fibre	(b)						70	N	N

Notes:

(a) A la carte service needs additional payments.

(b) Standalone prices are not provided.

Italy

Telecom Italia, the incumbent telecommunications operator in Italy, provides video, voice and data services over its ADSL network. Broadband data connections are available at speeds from 640 kbit/s to 4 Mbit/s. There are no bit caps on the 4 Mbit/s connection. A flat-rate voice plan called "Alice Mia Voce" offers unlimited calls to the fixed-line network in Italy. Video service are available from Telecom Italia but not as standard television channels. Instead, subscribers can only watch video on demand and pay-per-view offerings including films, sporting events, news and music videos. It has been reported that an IPTV service will be launched at the end of 2005 and that there is interest in a combined fixed/mobile phone service as well.[49] A planned converged fixed and mobile service would reportedly allow users to make calls on the mobile handsets that would be routed through the fixed line network when they were at home.

Fastweb is an alternative multiple-play provider in Italy that offers video, voice and data over fibre infrastructure where available, and over ADSL in other areas. The maximum data speed via fibre is 10 Mbit/s while ADSL can offer a maximum speed of 6 Mbit/s. There are also lower usage plans where users can subscribe to 10 or 30 hours of broadband connectivity per month. Unlimited voice calling to fixed lines throughout Italy is available for a flat rate. Video services are available with 10 broadcast channels in the basic offer as well as video on demand and *à la carte* channel selection.

Tiscali offers voice and data connectivity in Italy via ADSL. Broadband data is available at speeds up to 12 Mbit/s. The fastest offer is also the most cost effective per kbit/s. Tiscali also offers unlimited voice

calling plans to the PSTN for a flat rate with its service "Tiscali Voce". In addition, Tiscali subscribers can call other Tiscali subscribers across Europe for free. Tiscali does not currently offer video services in Italy.

Table 20. Multiple-play prices in Italy

Italy		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Alice										
	Multiple-play	ADSL	74.57	4000	256	0	Y		N	N	Y
	Data	ADSL	51.30	4000	256	0					
	Voice	ADSL	18.37				Y				
	Video	ADSL	4.90 (a)						N	N	Y
Cable provider	Tiscali										
	Multiple-play	ADSL	66.06	12000		0	Y		N	N	N
	Data	ADSL	42.79	12000		0					
	Voice	ADSL	23.26				Y				
	Video	ADSL							N	N	N
Alternate provider	Fastweb										
	Multiple-play	Fibre	83.26	10000	10000	0	Y		10	Y (b)	Y(b)
	Data	Fibre	48.98	10000	10000	0					
	Voice	Fibre	24.49				Y				
	Video	Fibre	9.80						10	Y(b)	Y(b)

Notes:

(a) Tariff is basic monthly fees for film viewing. Additional cost depends on viewing.

(b) These services need additional payments.

Japan

NTT West, one of Japan's incumbent operators provides video, voice and data services over both ADSL and fibre. NTT West is one of a few companies that offers the fastest broadband speeds in the OECD at 100 Mbit/s for both downloads and uploads. Voice services are available but there is no flat-rate calling plan available. NTT holdings (NTT East, NTT West) have not been permitted to provide television services directly so video offerings are made through one of three subsidiaries (On Demand TV, 4th MEDIA and OCN Theater). Billing is also done separately. All three video companies use the fibre connections provided by NTT to deliver video content. Since users who select fibre do not need to pay the copper line charge the same bundle of services could be cheaper over a fibre connection than using ADSL. There has also been recent news that NTT holdings is working on a joint venture with SKY Perfect Communications, a satellite operator with 270 channels of video content.[50]

Jupiter Communications (J:COM) is one of the leading cable companies in Japan and started offering video, voice and data services in 1999. Broadband connection speeds range from 256 kbit/s to 30 Mbit/s. The 30 Mbit/s connection is the most cost efficient per Mbit/s. Voice services are provided over IP but no flat-rate calling plan is available. There are 100 video channels available in the basic package. Users can also select additional bundles of channels or use video-on-demand services. Subscribers that combine all three triple-play services receive a 12% discount on the overall price of the package. J:COM also will reportedly add mobile services to its bundle in March 2006 through using a mobile virtual network operator license.[51]

Yahoo!BB is an competitive provider in Japan that offers video, voice and data connections over ADSL and fibre. Data speeds are identical to the incumbent NTT West at 100 Mbit/s for both uploads and downloads. Voice services are billed on a per-minute basis but calls to other Yahoo!BB subscribers are free. Yahoo!BB offers 24 video programmes in their basic package but there is the possibility to subscribe to extended video packages and video on demand. Yahoo!BB is reportedly planning to extend the channels and video-on-demand packages in the near future.[52] Yahoo!BB's packaged prices for triple play are significantly less expensive than comparable offers from the incumbent operator.

KDDI is another alternative provider that offers video, voice and data in the Japanese market. It has reportedly been in talks with Tokyo Electric Power (TEPCO) to offer services over TEPCO's existing fibre optic network. The tie up with KDDI could also allow TEPCO to expand the rollout of fibre more quickly to consumers.[53] Such a joint venture could help ensure significant competition in the provision of high-speed multiple play services in Japan. In addition to fixed voice, video and data, KDDI also offers mobile services via its brand name "au".

Table 21. Multiple-play prices in Japan

Japan		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/ min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	NTT West										
	Multiple play	Fibre	60.20	100000	100000	0	N	0.03	21	N	Y(b)
	Data	Fibre	36.58	100000	100000	0					
	Voice	Fibre	4.73				N	0.03			
	Video	Fibre	18.90(a)						21	N	Y(b)
Cable provider	J:COM (c)										
	Multiple play	Cable	98.20	30000	2000	0	N	0.02	100	Y(b)	Y(b)
	Data	Cable	51.98	30000	2000	0					
	Voice	Cable	12.57				N	0.02			
	Video	Cable	47.07						100	Y(b)	Y(b)
Alternate provider	Yahoo! BB										
	Multiple play	Fibre	39.22	100000	100000	0	N	0.03	24	Y(b)	Y(b)
	Data	Fibre	39.22	100000	100000	0					
	Voice	Fibre	14.64				N	0.03			
	Video	Fibre	18.71						24	Y(b)	Y(b)

Notes:

(a) In the case of On Demand TV.

(b) These services need additional payments.

(c) Cable modem and set top box rental fees are included.

Korea

Korean cable and fixed line operators have not introduced multiple-play service offerings as fast as other countries in the OECD despite leading the world in broadband penetration. Currently cable operators are required to apply for VoIP licenses and telecommunication companies planning on offering IPTV could be regulated identically to traditional broadcasters. The treatment of IPTV is currently under deliberation in the National Assembly and related agencies.

Korea's incumbent operator KT offers multiple play services over both its copper and fibre networks. Broadband speeds range from symmetrical 4 Mbit/s service over ADSL to 100 Mbit/s over fibre. The price differences between 4 and 100 Mbit/s are very small. Service at 100 Mbit/s is only 20% higher than a connection at 4 Mbit/s, where it is available. Korea's fibre and VDSL connections are not available to all users since subscribers must live in buildings with an upgraded exchange. As the incumbent operator, KT offers voice telephony via the PSTN and call charges are billed at three minute intervals. Traditional television services are not offered over KT's fibre or copper network but rather through a strategic alliance with the satellite TV company Skylife, of which KT is the largest shareholder. This allows KT to bundle video, voice and data to consumers, albeit over separate networks. Subscribers who take KT broadband and Skylife television receive a 5% discount on the Skylife subscription. KT has also introduced a "OnePhone" service which uses one handset for both PSTN and mobile calls, effectively allowing for quadruple-play.

C&M is the largest digital cable company in Korea and is an umbrella company for smaller cable franchises so prices vary between C&M service areas. Broadband speeds are available with 5 Mbit/s of connectivity in most areas. VoIP services are not currently available but the major cable companies have all applied for voice licenses from the government. The licenses are expected to be awarded in early 2006 and would allow cable companies to complete a triple-play offering. Video services are available over the traditional cable TV network. A basic package includes 78 channels and *à la carte* channels are available.

Hanaro is the largest alternative DSL provider in Korea and offers data and voice over its copper and fibre network. Broadband is available at speeds up to 50 Mbit/s over a variety of technologies. Hanaro also offers a pure VoIP solution for phone service and users do not need a KT phone line for DSL. However, this is no flat-rate calling plan. Hanaro does not offer traditional video over their network and had been unable to secure a strategic partner that could offer video. However, Hanaro and the largest cable network operator Thrunet received approval to merge in December 2005. This merger will not enable Hanaro to provide video immediately since Thrunet owns infrastructure but under current regulations has not found it profitable to supply television content in the market.

Table 22. Multiple-play prices in Korea

Korea		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	KT										
	Multiple-play	Fibre	54.01	100000	100000	0	N	0.01	44	N	N
	Data	Fibre	38.35	100000	100000	0					
	Voice	Fibre	5.54				N	0.01			
	Video	Satellite	10.65						44	N	N
Cable provider	C&M										
	Multiple-play	Cable	44.85	5000		0	N		78	Y(a)	N
	Data	Cable	28.87	5000		0					
	Voice	Cable					N				
	Video	Cable	15.98						78	Y(a)	N
Alternate provider	Hanaro										
	Multiple-play	ADSL	47.94	50000	6000	0	N	0.04	N	N	N
	Data	ADSL	45.81	50000	6000	0					
	Voice	ADSL	2.13				N	0.04			
	Video	ADSL							N	N	N

Note: These services need additional payments.

Luxembourg

The incumbent telecommunication operator in Luxembourg, P&T Luxembourg, offers data, voice and video services over its network. Data services are provided over the fixed line network using ADSL. Connection speeds range from 1 Mbit/s to 3 Mbit/s. P&T's offer of 3 Mbit/s is the most economical per Mbit/s. P&T's offers all have bit caps and the fastest connection has an allowance of 25 GB per month. No flat-rate calling plan exists for the fixed line network but calls to the PSTN and P&T's mobile service LUXGSM are free during nights and weekends. Video services are also available on the network. There are 51 channels available in the basic package but *a la carte* channel selection and video-on-demand are not available.

Luxembourg's cable operator Coditel offers video, voice and data services. Broadband speeds are higher than those offered by the incumbent operator but the bit caps are lower. Broadband is available at 4 Mbit/s but with a bit cap of 20 GB per month. Voice services are available but they are billed by the minute. There is no flat rate calling plan to the PSTN. Video services are also available with 50 channels in the basic package. There are no discounts for users who select all three services.

Alternative ADSL provider Cogecom in Luxembourg offers data and voice services. Broadband data speeds start at 1 Mbit/s and go up to 3 Mbit/s. The least expensive per Mbit/s is a middle-range offering of 2 Mbit/s. The bandwidth cap on the 2 Mbit/s connection is 25 GB per month. Voice services are not flat-rate and the basic per-minute charge is slightly more expensive than Coditel's rate. Video services are not available.

Table 23. Multiple-play prices in Luxembourg

Luxembourg		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	EPT										
	Multiple-play	ADSL	133.10	3000	192	25000	N	0.04	51	Y(a)	N
	Data	ADSL	110.81	3000	192	25000					
	Voice	ADSL	11.02				N	0.04			
	Video	Cable	11.26						51	Y(a)	N
Cable provider	Coditel										
	Multiple-play	Cable	128.41	4000	256	20000	N	0.03	50	Y(a)	N
	Data	Cable	82.04	4000	256	20000					
	Voice	Cable	15.77				N	0.03			
	Video	Cable	30.60						50	Y(a)	N
Alternate provider	Cegecom										
	Multiple-play	ADSL	72.00	2000	192	25000	N	0.03	N	N	N
	Data	ADSL	51.79	2000	192	25000					
	Voice	ADSL	20.20				N	0.03			
	Video	ADSL							N	N	N

Mexico

There are no triple play offers currently available in Mexico but the incumbent Telemex is planning on introducing services soon.[54] Telemex does provide data and voice services over its network. The baseline data service is 512 kbit/s and the fastest connection available is 2 Mbit/s. The best value per Mbit/s comes from a mid-range offer at 1 Mbit/s which does not have a bit cap on usage. Voice service is available but not with a flat-rate calling plan. Mexican subscribers do receive 100 free local calls each month as part of their subscription.

Megacable provides video and data services over cable in Mexico. Broadband connectivity is available at speeds from 512 kbit/s to 2048 kbit/s. The most cost effective plan is an upper-middle range connection at 1500 kbit/s. Voice services are not currently available from Megacable. The basic video package has 62 channels and additional channels are available *à la carte* or via packages. There are also channels dedicated to pay per view but no video-on-demand programming.

Cablevision is another cable provider that offers data and video services over its network. Broadband speeds range from 256 kbit/s to 1 Mbit/s without bit caps. Cablevision's broadband speeds are lower than the other two companies compared in Mexico but it has the one of largest basic cable television packages of the companies surveyed across the OECD. Subscribers to the basic digital package receive 162 channels with their monthly subscription. There are no phone services available from Cablevision at this time.

Recently the Mexican domestic long-distance carrier Marcatel announced that it is planning a triple-play offer of cable television, voice and Internet access through agreements with local cable operators.[55]

Table 24. Multiple-play prices in Mexico

Mexico		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Telmex										
	Multiple-play	ADSL	80.65	1024	256	0	N		N	N	N
	Data	ADSL	63.94	1024	256	0					
	Voice	ADSL	16.71				N				
	Video	ADSL							N	N	N
Cable provider	Megacable										
	Multiple-play	Cable	93.83	1500	512	0	N		62	Y(a)	N
	Data	Cable	63.94	1500	512	0					
	Voice	Cable					N				
	Video	Cable	29.89						62	Y(a)	N
Cable provider	Cablevision										
	Multiple-play	Cable	182.32	1024	512	0	N		162	Y(a)	N
	Data	Cable	116.67	1024	512	0					
	Voice	Cable					N				
	Video	Cable	65.65						162	Y(a)	N

Note: These services need additional payments.

Netherlands

The Dutch telecommunication incumbent KPN offers video, voice and data over its network. Data services range in speed from 800 kbit/s to 8 Mbit/s. Voice services are available but there is no flat-rate calling plan available from KPN. Video services are a wholesale offering of content from the terrestrial digital broadcasting company Digitenne, which uses DVB-T technology and a small living-room antenna. Subscribers can also add mobile phone service to their multiple-play bundle. KPN also offers a naked DSL triple-play offering with mobile, video and data service. KPN is reportedly planning to upgrade its network to ADSL2+ which could offer speeds of up to 20 Mbit/s by the end of 2005.[56] The company is also looking into IPTV services[57] as a way to provide its own video services.[58]

UPC offers video, voice and data over cable in the Netherlands. Broadband speeds are available up to 20 Mbit/s. The fastest connection is also the most cost-effective per kbit/s for subscribers. Voice services are available over cable but there is no flat-rate calling plan to fixed lines. However, subscribers who select the "Digitale Telefonie FreeTime" package pay a slightly larger monthly subscription but have free PSTN calls on evenings and weekends. UPC's basic video package consists of 38 channels and there is *a la carte* programming available. In addition to a traditional triple play, UPC also offers mobile services.

The Dutch cable company Casema offers triple play services in the Netherlands. Its data services range in speed from 850 kbit/s to 8 Mbit/s. The 8 Mbit/s connection is the best value per Mbit/s. Casema offers a large basket of voice minutes each month for an additional fee. Users receive 2 000 minutes but are charged for any usage over and above that amount at per minute rates. The basic video package includes 40 channels and there are an additional 25 that are available for a fee. Casema sells a triple-play bundle but the speeds are low (at 850 kbit/s) and phone calls are billed on a per-minute basis.

Versatel provides video, voice and data services in the Netherlands over unbundled ADSL connections. Broadband speeds range from a basic offer of 256 kbit/s to 20 Mbit/s on the top end. The 20 Mbit/s connection offers the best value per Mbit/s of connectivity and comes without bit caps. Voice services are available. Subscribers can have unlimited calls to the fixed network throughout the country for

an additional fee. The video services include only one channel of football but all live Eredivsie matches are shown.[59] Tele2, a pan-European telecommunications operator has shown interest in acquiring Versatel as a way to more effectively compete against KPN in the market.[60]

Table 25. Multiple-play prices in the Netherlands

Netherlands		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	KPN										
	Multiple-play	ADSL	131.09	8000	1024	0	N	0.02	24	N	N
	Data	ADSL	91.77	8000	1024	0					
	Voice	ADSL	22.24				N	0.02			
	Video	DVB-T	17.08						24	N	N
Cable provider	Casema										
	Multiple-play	Cable	53.75	10000	1050	0	Y		42	Y(a)	N
	Data	Cable	85.65	10000	1050	0					
	Voice	Cable	30.49				Y				
	Video	Cable	17.14						42	Y(a)	N
Alternate provider	Versatel										
	Multiple-play	ADSL	67.28	20000	1000	0	Y		1	N	N
	Data	ADSL	61.16	20000	1000	0					
	Voice	ADSL	6.12				Y				
	Video	ADSL							1	N	N
Cable provider	UPC										
	Multiple-play	Cable	116.91	20480	2048	0	N	0.03	38	Y(a)	N
	Data	Cable	97.89	20480	2048	0					
	Voice	Cable	18.31				N	0.03			
	Video	Cable	19.02						38	Y(a)	N

Note: These services need additional payments.

New Zealand

Telecom New Zealand provides data, voice and video services over its telephone network. Data offers span from 256 kbit/s to 2 Mbit/s for the top speed connection. The fastest connection at 2 Mbit/s is also the most economical in terms of price per Mbit/s. Telecom New Zealand's offers all have bit caps, with the fastest connection limited to 10 GB of traffic per month. as part of its universal service requirements Telecom is required to offer unlimited local calls but there is no nationwide unlimited calling plan. Video services are provided by satellite through a partnership with Sky Network Television Limited. There are 36 channels available in the basic package offered to Telecom customers. Telecom New Zealand is actively looking into providing triple-play services wholly over its own network as network upgrades progress.[61]

New Zealand cable operator TelstraClear provides data, voice and video services in a triple-play offering. Subscribers can choose broadband packages between 256 kbit/s and 10 Mbit/s and the fastest connection has a 10 GB monthly cap on data transfers. TelstraClear offers unlimited local calling but there is no package for unlimited national long-distance available. Video is provided by a partnership between TelstraClear and SKY and there are 30 channels available in the basic package. Subscribers who take a bundled offering receive a 36% discount compared to the prices of the services on their own. TelstraClear recently announced that management will focus its attention on areas in New Zealand with existing network infrastructure rather than attempting to become a national competitor to Telecom New Zealand.[62]

Woosh Wireless offers data and voice services over a TD-CDMA network in New Zealand. The TD-CDMA network is IMT-2000 compliant and thus falls into the category of 3G wireless systems. Broadband data is available to subscribers at 500 kbit/s with a 10 GB bit cap on monthly usage. After users reach the cap their speeds are reduced to 56 kbit/s. Woosh also provides voice services with flat-rate local calling. Long distance and international calls are charged at per-minute rates. There are no video services provided by Woosh and no bundled package discounts are available.

Table 26. Multiple-play prices in New Zealand

New Zealand		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	TCNZ										
	Multiple-play	ADSL	101.23	2000	128	10000	N		36	Y(b)	N
	Data	ADSL	48.90	2000	128	10000					
	Voice	ADSL	27.86				N				
	Video (a)	Satellite	24.47						36	Y(b)	N
Cable provider	Telstraclear (c)										
	Multiple-play	Cable	145.31	10000	1024	10000	N		30	Y(b)	N
	Data	Cable	97.84	10000	1024	10000					
	Voice	Cable	27.23				N				
	Video	Cable	104.17						30	Y(b)	N
Alternate provider	Woosh										
	Multiple-play	Wireless	62.88	500	120	10000	N		N	N	N
	Data	Wireless	48.90	500	120	10000					
	Voice	Wireless	13.98				N				
	Video	Wireless							N	N	N

Notes:
(a) This video service is no longer offered to new customers.
(b) These services need additional payments.
(c) Prices are applied in Wellington.

Norway

The Norwegian incumbent telecommunication operator Telenor provides video, voice and data services over its network. Data connections are available from 1 to 4 Mbit/s, where the fastest connection is also the most cost-effective per kbit/s. Telenor offers an unlimited voice plan for calls to the fixed-line network. Video services are provided by Canal Digital which provides 25 channels in its basic package. Subscribers have the option of *a la carte* channel selection and video on demand services.

UPC Norway is one of the leading cable operators in Norway and provides video, voice and data over its network. Data speeds are higher than those offered by Telenor with speeds ranging from 512 kbit/s to 26 Mbit/s. The fastest broadband connection from UPC is also the most cost effective per kbit/s. Voice services are available over the cable network but there is no flat-rate calling plan to fixed-line phones. UPC provides a range of video packages including the basic "Total Digital" video package that includes 38 video channels. Video on demand and *à la carte* channel selection are available.

The Norwegian energy provider Lyse Energy provides data, voice and video services through its subsidiary Lyse over fibre. Data speeds are available from 4 to 10 Mbit/s. Voice services are available over the fibre and there is a flat-rate calling plan available to fixed-line phones in Norway. The only restriction is that calls must be shorter than one hour. If a user calls for over 1 hour then per-minute charges are

applied from the 61st minute. Video services are also available with 23 channels and video on demand is an option for subscribers. Lyse does offer packaged deals but they do not include a discount for multiple services.

Table 27. Multiple-play prices in Norway

Norway		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Telenor										
	Multiple play	ADSL	121.89	4000	400	0	Y		25	Y(a)	Y(a)
	Data	ADSL	86.12	4000	400	0					
	Voice	ADSL	7.69				Y				
	Video	Cable	28.08						25	Y(a)	Y(a)
Cable provider	UPC Norway										
	Multiple play	Cable	202.83	26000	1500	0	N	0.03	38	Y(a)	Y(a)
	Data	Cable	156.56	26000	1500	0					
	Voice	Cable	21.33				N	0.03			
	Video	Cable	24.94						38	Y(a)	Y(a)
Alternate provider	Lyse										
	Multiple play	Fibre	120.48	4000	4000	0	Y		23	N	Y(a)
	Data	Fibre	109.65	10000	10000	0					
	Voice	Fibre	21.96				Y				
	Video	Fibre	28.08						23	N	Y(a)

Note: These services need additional payments.

Poland

Poland's incumbent telecommunications carrier TPSA offers data and voice services. Broadband is available at speeds up to 6 Mbit/s with a 50 GB cap on data transfers. Voice services are available on the PSTN but there are no unlimited calling plans. Video is not available and there are no discounts for combined voice and data services.

UPC Telewizja Kablowa offers a double play of voice and video over its cable network in Poland. Data connections range from 256 kbit/s to 12 Mbit/s, double the highest speed available from TPSA. Video services are available with 25 channels included in the basic package. There are currently no voice services in the Polish market from UPC, although the company has introduced them in other European countries.

Dialog is an alternative ADSL provider that offers voice and data services in Poland. Subscribers can choose among broadband speeds between 256 kbit/s and 2 Mbit/s. There are no bit caps on the 2 Mbit/s connection and it is the most cost effective per kbit/s. Voice services are available and call charges vary based on the whether users select a high or low usage monthly plan. Dialog currently only offers a double-play service but is thought to be anticipating a triple-play offering in the near future.[63]

Table 28. Multiple-play prices in Poland

Poland		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	TP										
	Multiple-play	ADSL	117.85	6144	256	50000	N	0.04	N	N	N
	Data	ADSL	91.25	6144	256	50000					
	Voice	ADSL	26.60				N	0.04			
	Video	ADSL							N	N	N
Cable provider	UPC										
	Multiple-play	Cable	104.52	12000	1024	0	N		25	N	N
	Data	Cable	93.57	12000	1024	0					
	Voice	Cable					N				
	Video	Cable	10.95(a)						25	N	N
Alternate provider	Dialog										
	Multiple-play	ADSL	106.52	2000	512	0	N	0.06	N	N	N
	Data	ADSL	95.06	2000	512	0					
	Voice	ADSL	11.45				N	0.06			
	Video	ADSL							N	N	N

Note: The basic package is free, so the most inexpensive one has been chosen.

Portugal

Portugal's incumbent telecommunications provider Portugal Telecom offers voice and data services over both ADSL and cable networks. Broadband subscribers can choose from data speeds up to 8 Mbit/s but the fastest connection has a bit cap of 8 GB per month. Voice services are available via the PSTN as a VoIP offering although there are no flat-rate calling plans available to the fixed-line network. Video services are not available over ADSL.

The Portuguese cable operator TV Cabo provides data and video services. Data services start at 256 kbit/s and the fastest connection is available at 8 Mbit/s. Similar to the offer from PT, the 8 Mbit/s connection has an 8 GB monthly bit cap. Voice services are not available at the current time. TV Cabo offers 38 video channels in its basic package.

Another Portuguese cable provider, Cabovisão, offers a combination of video, voice and data on its network. Broadband speeds range from 512 kbit/s to 8 Mbit/s. The 8 Mbit/s connection offers the best value per 100 kbit/s. The speeds available on Cabovisão's network are comparable to both Portugal Telecom and TV Cabo. However, the bit cap on Cabovisão's offer for 8 Mbit/s is over 7 times as large. Cabovisão offers voice services over cable but does not have an unlimited calling plan to fixed lines. There are 48 video channels provided with the basic television package and users receive a 12% discount on the package price if they subscribe to all three services.

AR Telecom (formerly Jazztel) provides video, voice and data services over ADSL in Portugal. Data speeds are available between 512 kbit/s and 5 Mbit/s, although the most cost effective plan per kbit/s is an upper-middle connection at 4 Mbit/s. The 5 Mbit/s connection has a bit cap of 20 GB while the 4 Mbit/s connection is limited to transfers of 6 GB per month. Voice service is available using the unbundled line but there are no flat-rate calling plans available. AR Telecom also offers 21 video channels. There are significant discounts for subscribers who sign up for multiple services. In September 2005, the cost of

stand-alone 4 Mbit/s broadband was 72% of the cost of a bundled service with faster broadband (5 Mbit/s), voice, and video.

Table 29. Multiple-play prices in Portugal

Portugal		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Portugal Telecom										
	Multiple-play	ADSL	183.09	8000	384	8000	N	0.04(a)	N	N	N
	Data	ADSL	73.45	8000	384	8000					
	Voice	ADSL	109.64				N	0.04(a)			
	Video	ADSL							N	N	N
Cable provider	TV Cabo										
	Multiple-play	Cable	101.33	8192	384	8000	N		38	Y(c)	Y(b)
	Data	Cable	74.69	8192	384	8000					
	Voice	Cable					N				
	Video	Cable	26.64						38	Y(c)	Y(b)
Alternate provider	AR Telecom										
	Multiple-play	ADSL	73.47	5120	512	20000	N	0.04(d)	21	Y(c)	N
	Data	ADSL	53.34	4096	256	6000					
	Voice	ADSL	24.49				N	0.04(e)			
	Video	ADSL							21	Y(c)	N
Cable provider	Cabovisao										
	Multiple-play	Cable	100.04	8000	2000	60000	N	0.10	48	Y(c)	N
	Data	Cable	67.86	8000	2000	60000					
	Voice	Cable	19.05				N	0.10			
	Video	Cable	26.58						48	Y(c)	N

Notes:
(a) Each call needs 0.0847 euros (USD 0.10) for an initial connection.
(b) VoD is included in the tariff.
(c) These services need additional payments.
(d) Each call needs 0.0833 euros (USD 0.10) for an initial connection.
(e) Each call needs 0.085 euros (USD 0.10) for an initial connection.

Slovak Republic

Slovak Telecom is the incumbent telecommunications operator in the Slovak Republic and offers a double-play package of voice and data on its network. Data speeds begin at 512 kbit/s and go up to 2 Mbit/s. The most cost-effective plan per Mbit/s is at 1 Mbit/s. Voice services are provided over the traditional PSTN and are charged on a per-minute basis. There are no flat-rate offers available. However, the standard tariff plan includes 30 free minutes per month for local and national calls to other phones in the Slovak Telecom network.

UPC offers data and video services over cable in the Slovak Republic. Broadband speeds range from 256 kbit/s to 4 Mbit/s. However, the most cost-effective plan per kbit/s is 3 Mbit/s. Voice services are not currently available over the cable network, although UPC has rolled out voice services in other European markets. UPC's basic video offer includes 24 channels and *a la carte* programming.

Dial Telecom also provides voice and data services in the Slovakian market. Speeds are lower than Slovak Telecom and UPC with broadband at 512 kbit/s and access is free only between 17:00-7:00 on

weekdays, all through weekends and all public holidays. At any other time users are charged per MB for their transfers. Voice services are billed on a per-minute basis with no flat rate calling plan available.

Table 30. Multiple-play prices in the Slovak Republic

Slovak Republic		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Slovak Telecom										
	Multiple-play	ADSL	69.65	1024	128	0	N	0.07	N	N	N
	Data	ADSL	60.21	1024	128	0					
	Voice	ADSL	9.44				N	0.07			
	Video	ADSL							N	N	N
Cable provider	UPC										
	Multiple-play	Cable	106.03	3072	256	0	N		24	Y(a)	N
	Data	Cable	90.91	3072	256	0					
	Voice	Cable					N				
	Video	Cable	15.12						24	Y(a)	N
Alternate provider	Dial Telecom										
	Multiple-play	ADSL	18.53	512	128	0	N	0.06	N	N	N
	Data	ADSL	14.78	512	128	0					
	Voice	ADSL	3.75				N	0.06			
	Video	ADSL							N	N	N

Note: These programmes need additional payments.

Spain

Telefonica is the incumbent telecommunications operator in Spain and provides video, voice and data services over ADSL. Broadband data speeds are available up to 1 Mbit/s. Telefonica does not offer a flat-rate national calling plan to fixed lines but local and community calls are included in the monthly subscription. Video services are available over DSL and subscribers receive 48 channels as part of the basic television package. Telefonica offers significant discounts to subscribers who take a combination of individual services. For example, a subscriber to Telefonica's triple play offering would save 35% over buying each of the services separately.

The Spanish operator Auna offers triple play services over cable. Broadband services are available at either 1 or 2 Mbit/s. Voice services are available and include 1 000 minutes of calls per month. There is no national flat-rate, unlimited calling plan available. As a cable operator, Auna offers a range of video services including 50 channels in its basic package and *à la carte* pricing. Auna recently merged with another Spanish operator, Ono, and the combined company should pose more direct competition to Telefonica.[64]

Jazztel provides data and voice services over ADSL in Spain. The fastest broadband offer is 4 Mbit/s and it is also the most cost-effective per kbit/s. There is no subscription fee for the phone services and calls are charged at a per-minute rate for all fixed lines throughout Spain. There are currently no video services provided by Jazztel.

Table 31. Multiple-play prices in Spain

Spain		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Telefonica										
	Multiple-play	ADSL	71.02	1000	300	0	N	0.03	48	N	Y(a)
	Data	ADSL	55.49	1000	300	0					
	Voice	ADSL	9.94				N	0.03			
	Video	ADSL	17.04						48	N	Y(a)
Cable provider	Auna										
	Multiple-play	Cable	51.13	2048	300	0	N	0.02	50	Y(b)	N
	Data	Cable	59.65	2048	300	0					
	Voice	Cable	20.74				N	0.02			
	Video	Cable	25.57						50	Y(b)	N
Alternate provider	Jazztel										
	Multiple-play	ADSL	46.80	4000	400	0	N	0.01	N	N	N
	Data	ADSL	46.80	4000	400	0					
	Voice	ADSL					N	0.01			
	Video	ADSL							N	N	N

Notes:

(a) These services are included in the subscription.

(b) These services need additional payments.

Sweden

The Swedish incumbent Telia offers multiple-play services of video, voice (fixed and mobile) and data. Broadband speeds are relatively high as users are able to connect at 24 Mbit/s of connectivity. Lower-speed connections (256 kbit/s) are also available although the 24 Mbit/s connection is the most cost-effective per kbit/s. Several voice plans are available. Traditional per-minute charges are still available but Telia recently introduced an untimed call charge (per call charge) rather than per-minute tariffs. Users that pay USD 8.50 per month can make individually untimed calls for USD 0.06 each. Telia also offers a broadband phone service where users can make unlimited calls to any other Telia mobile or Telia fixed subscriber[65]. Finally video services are available from Telia as well over their network. The basic package includes 23 channels and video on demand services are also available.

Com Hem is a cable company that offers triple-play services of video, voice and data over their cable network. All services are packaged into three categories: small, medium and large. Users who subscribe to all three services (video, voice and data) in the same "size range" receive the least expensive of the three for free. For users buying the most expensive data, voice and video packages, the savings work out to be roughly 12%. Data speeds available from Com Hem are slightly slower than other firms in the market. The fastest ADSL offer is for 8 Mbit/s. Subscribers who sign up for a 12 month contract receive a 13% reduction in price. Voice services are available in a plan where the flat-rate price of the call depends on how much money the user has paid up-front for the subscription. Finally, three television packages are available, ranging from 5 channels (small) to 35 (large).

Bredbandsbolaget offers triple-play services over traditional ADSL as well via municipal fibre optic cables. Broadband connections over ADSL are available up to 24 Mbit/s and basic services begin at 2 Mbit/s. Prices for lower-tier broadband are lower if users subscribe to both broadband and telephone services via Bredbandsbolaget. The 2 Mbit/s offering drops 23% if the user also subscribes to phone

service. On the fibre side, Bredbandsbolaget offers 10 Mbit/s and 100 Mbit/s symmetrical connections. The 100 Mbit/s service is the least expensive per kbit/s. This service has a 300 GB bit cap on the 100 Mbit/s connection but there are no bit caps on any of the other services. In November 2004, Bredbandsbolaget started offering video services over their network. There are 39 channels available in the only package currently available. Video-on-demand is available for films and other content. *À la carte* channel selection is not available at the time of writing but should be in the future.

Competitive ADSL provider Glocalnet offers broadband and voice to subscribers. Broadband subscriptions are available from 512 kbit/s to 24 Mbit/s. The price for service falls if subscribers pre-select Glocalnet for local calls. Prices are also higher when subscribers use physical lines from the incumbent Telia instead of Telenor or Song Networks. An unlimited calling plan is also available from Glocalnet where users pay a subscription charge each month for the subscription and a flat rate for calls to fixed lines. There are currently no television services available from Glocalnet.

Table 32. Multiple-play prices in Sweden

Sweden		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/ min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	TeliaSonera										
	Multiple-play	ADSL	75.84	24000	1000	0	Y	0.03	23	N	Y(a)
	Data	ADSL	54.98	24000	1000	0					
	Voice	ADSL	3.94				Y	0.03			
	Video	ADSL	16.93						23	N	Y(a)
Cable provider	Com Hem										
	Multiple-play	Cable	90.28	8000	1000	0	N	0.02	35	Y(a)	N
	Data	Cable	51.04	8000	1000	0					
	Voice	Cable	10.50				N	0.02			
	Video	Cable	39.23						35	Y(a)	N
Alternate provider	Bredbandsbolaget										
	Multiple-play	Fibre	130.30	100000	100000	300000	N	0.02	39	N	Y(a)
	Data	Fibre	78.07	100000	100000	300000					
	Voice	Fibre	12.99				N	0.02			
	Video	Fibre	39.23						39	N	Y(a)
Alternate provider	Glocalnet										
	Multiple-play	ADSL	53.41	24000	1000	0	Y	0.06	N	N	N
	Data	ADSL	45.79	24000	1000	0					
	Voice	ADSL	7.61				Y	0.06			
	Video	ADSL							N	N	N

Note: These services need additional payments.

Switzerland

Switzerland's traditional fixed-line operator Swisscom sells Internet access through its Internet subsidiary Bluewin. Broadband speeds range from 600 to 2400 kbit/s second, with slower ISDN speeds also available. Bluewin's 2400 kbit/s connection is their most cost effective per 100 kbit/s. Traditional PSTN as well as VoIP telephone connections are available. Bluewin's VoIP phone service gives users a second line with a geographic phone number in the home. The Bluewin VoIP adapter sends calls out through the ADSL connection and users are billed at Swisscom's PSTN rates. One thing that differentiates the VoIP phone from a standard Swisscom line is the ability to use a "soft phone", essentially a computer

program to make calls from a PC from anywhere around the world. This would allow subscribers who are travelling the ability to make calls from their PCs at local Swisscom rates. Swisscom does not have a video offering at this time but has trialled a service offering, along with Microsoft, in German-speaking Switzerland.[66] A commercial launch had been scheduled for late 2005 but this has been pushed back to sometime in 2006.[67] Swisscom has also planned a network upgrade to VDSL which could cover half of Switzerland by 2007.[68]

Cablecom is Switzerland's leading cable operator and offers multiple services over its network. Broadband Internet connectivity is available for speeds up to 3 Mbit/s, although the 2 Mbit/s connection is the most cost-effective per kbit/s. Cablecom also offers telephony and allows consumers to port their existing Swisscom numbers over to Cablecom. Cablecom's charges per month for a fixed line are 20% less than through Swisscom. Along with the subscriptions, users receive unlimited off-peak calling to the national fixed network between 7 p.m. and 7 a.m. There is an option for unlimited calling during peak hours as well for an additional fee. As part of a promotion, new subscribers to simple phone service receive 6 months of free calls to the Swiss PSTN. Subscribers to both phone and Internet service receive 12 months of free calls to the Swiss PSTN. The basic cable television offering is 87 channels and pay-per-view and other language packages are also available.

Tele2 offers ADSL services in Switzerland as a wholesaler of Bluewin connectivity. Subscribers must still pay for a fixed line from Swisscom to have ADSL from any provider. Tele2 offers Internet connectivity from 600 to 2400 kbit/s, with the 2400 kbit/s offer being the most cost effective per kbit/s. VoIP phone service is also available. National calls are billed at a per-minute rate but calls to any other Tele2 VoIP subscribers in the world are free. Tele2 subscribers could also leave the country with their VoIP adapter and continue to make calls back to Switzerland for Swiss local rates.

Table 33. Multiple-play prices in Switzerland

Switzerland		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	Bluewin										
	Multiple-play	ADSL	83.68	2400	200	0	N	0.06	N	N	N
	Data	ADSL	78.22	2400	200	0					
	Voice	ADSL	5.45				N	0.06			
	Video	ADSL							N	N	N
Cable provider	Cablecom										
	Multiple-play	Cable	102.72	2000	400	0	Y		87	N	N
	Data	Cable	59.26	2000	400	0					
	Voice	Cable	23.70				Y				
	Video	Cable	19.75						87	N	N
Alternate provider	Tele2										
	Multiple-play	ADSL	86.05	2400	200	0	N	0.02	N	N	N
	Data	ADSL	74.27	2400	200	0					
	Voice	ADSL	11.77				N	0.02			
	Video	ADSL							N	N	N

Turkey

Turk Telekom offers data and voice services over its fixed-line network. Broadband speeds are available to consumers from 256 to 2056 kbit/s over ADSL. The 2056 kbit/s connection is the most cost effective per kbit/s. Volume-based plans are also available at 512 kbit/s with a 3 GB, 6 GB and 9GB limit.

Turk Telekom offers a variety of price plans where monthly subscriptions and per-minute call charges are inversely related. The more users pay for their subscription, the lower the per-minute charges. There are no TV services available over ADSL.

Turkey's single cable provider Turksat offers data and video over its cable TV network. Cable Internet subscribers can connect at speeds up to 2048 kbit/s without bit caps. Voice services among subscribers on the cable network are available for a flat monthly fee but there is no interconnection with the PSTN. Interconnection should be available in the near future however. Cable TV services are also available with basic offers including 60 channels in many areas. Currently, there are no discounts given for subscribers who choose multiple services.

Table 34. Multiple-play prices in Turkey

Turkey		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	**Turk Telecom**										
	Multiple-play	ADSL	185.70	2048	512	0	N	0.08	N	N	N
	Data	ADSL	180.86	2048	512	0					
	Voice	ADSL	4.84				N	0.08			
	Video	ADSL							N	N	N
Cable provider	**Turk Sat**										
	Multiple-play	Cable	184.93	2048	512	0	N		60	N	N
	Data	Cable	166.77	2058	512	0					
	Voice	Cable	13.45				N				
	Video	Cable	4.71						60	N	N

Notes: Prices include VAT at 18% but exclude a special communications tax of 15%.

United Kingdom

BT, the incumbent telecommunications provider in the United Kingdom offers data and voice services. Data services are available at speeds between 1 and 2 Mbit/s. The fastest connection available from BT has a 15 GB bit cap. BT offers a flat-rate calling plan to the fixed-line network but calls are limited to one hour in duration. The 61st minute is then charged on a per-minute basis. BT is planning on providing IPTV services in the future.[69] While BT does not have a video offering currently in place, it is heavily promoting a new converged fixed-mobile phone service called Bluephone that allows one handset to be used to make fixed-line calls from home and mobile calls via GSM when away.[70]

Telewest offers triple-play services over cable in the United Kingdom. Broadband data offerings range from 512 kbit/s to 4 Mbit/s. Unlike BT, there is no bit cap on broadband use. Telewest has announced that their broadband service will soon be upgraded to 10 Mbit/s. Voice services are available over cable and there is unlimited calling available to the fixed-line network. Video programming is available with 35 channels in the basic package with *a la carte* programming available. Telewest and NTL, a rival cable operator in the United Kingdom have announced plans to merge their operations to better compete with BT. The combined companies will have 5 million residential customers and will become the largest broadband provider in the United Kingdom.[71] Triple-play subscribers account for 33% of all of Telewest's subscribers and that number is expected to grow.[72]

Homechoice is an alternative provider in the UK market and offers a triple-play service of video, voice and data over ADSL. Homechoice has chosen a business model that does not separate out services. Subscribers must always purchase a bundle of services. Broadband data is available from 1 to 8 Mbit/s and there is no bit cap on broadband usage. Unlimited flat rate voice calls are available to the PSTN. Subscribers automatically receive free calls to the PSTN on evenings and weekends. However, an upgraded package of unlimited calling is available for an additional fee. Homechoice also offers video services with the basic package containing 55 channels and video-on-demand services are also available. Homechoice is also planning to upgrade its broadband speeds to 24 Mbit/s using ADSL2+.[73]

Satellite television provider BSkyB has recently announced plans to acquire Easynet, a fixed-line broadband provider. This would allow BSkyB to offer data, voice and video service from next year in the United Kingdom.[74]

Table 35. Multiple-play prices in the United Kingdom

United Kingdom		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	A la carte	VoD
Incumbent DSL	BT										
	Multiple-play	ADSL	91.25	2200	256	15000	Y		N	N	N
	Data	ADSL	45.17	2200	256	15000					
	Voice	ADSL	46.09				Y				
	Video	ADSL							N	N	N
Cable provider	Telewest										
	Multiple-play	Cable	119.28	1000	128	0	Y		100	Y(a)	N
	Data	Cable	90.37	4000	384	0					
	Voice	Cable	46.09				Y				
	Video	Cable	9.94						35	Y(a)	N
Alternate provider	Homechoice										
	Multiple-play	ADSL	99.39	8000	512	0	Y		55	N	Y(b)
	Data	ADSL									
	Voice	ADSL	9.04				Y				
	Video	ADSL							55	N	Y(b)

Notes:

(a) These services require additional payment.

(b) These services are basically included. Only movies (pay per view) and Sky TV require additional payments.

United States

SBC offers voice and data services over ADSL. There are also video services available via a partnership with Dish Networks. Data speeds are available up to 3 Mbit/s for USD 36.99. However, subscribers who take a certain number of features with their phone line (*e.g.* caller ID, call waiting) receive a 32% discount on the price of broadband. There is an unlimited calling plan available for the United States. SBC will expand fibre deeper into its network to provide high-speed VDSL connections capable of supporting high definition television. However, for now SBC has partnered with Dish Networks to provide satellite television as part of a package. The basic package includes 60 broadcast channels. *A la carte* channel selection is not available on the Dish network but video-on-demand is. Users who subscribe to video, voice and data receive discounts on the total package. In table 36 below, the price falls by 11% when the services are taken as a bundle.

Comcast offers video, voice and data services over their cable TV network in the United States. Prices vary from city to city in the United States and the collected data were sampled from New Haven, Connecticut. Comcast's prices are also dependent on the number of other services to which users subscribe. Data services are available at 4 and 6 Mbit/s. Users pay an extra USD 10 to increase to the faster data rate. Subscribers choosing the Internet-only option pay 28% more for their Internet connection than existing cable TV subscribers. Comcast also offers unlimited nationwide calling and the price falls considerably if users subscribe to multiple services. The price falls 22% for subscribers who have one other service and 38% if subscribers have two additional services. There are a variety of cable TV packages as well as video-on-demand and *a la carte* programming available to the higher-tier Digital TV packages. Comcast offers a combination of voice, video and data for a 12 month introductory period for USD 99. After the first year, the cost of the three services fall by 40% after taking into account discounts for multiple services.

MStar offers video, voice and data over UTOPIA's fibre optic municipal network in Utah. The data speed to consumers is 15 Mbit/s for both uploads and downloads (symmetric). This is in contrast to ADSL technologies that offer faster downloads at the expense of slower uploads. An unlimited phone service is also available as an add-on for an additional fee. This allows unlimited calling to the fixed and mobile networks throughout the United States. Television packages are also available and the basic package includes 24 channels. Subscribers can pay more and have up to 127 television channels. *A la carte* channel selection is not available at the time of writing but video-on-demand services are planned for the near future. There are discounts available for users who subscribe to a basket of services. For example, users who subscribe to data, voice and the basic television programming receive a 3% discount on the price of the bundle.

Table 36. Multiple-play prices in the United States

United States		Type	Monthly price (USD)	Down kbit/s	Up kbit/s	Bit cap (MB)	Unlimited voice	Price/min USD	TV Chan	*A la carte*	VoD
Incumbent DSL	SBC										
	Multiple-play	ADSL	113.61	3000	384	0	Y		60	N	Y(a)
	Data	ADSL	39.30	3000	384	0					
	Voice	ADSL	53.07				Y				
	Video	Satellite	33.99						60	N	Y(a)
Cable provider	Comcast										
	Multiple-play	Cable	149.79	6000	768	0	Y		70	N	Y(a)
	Data	Cable	72.20	6000	768	0					
	Voice	Cable	58.38				Y				
	Video	Cable	51.09						70	N	Y(a)
Alternate provider	Mstar										
	Multiple-play	Fibre	90.26	15000	15000	0	Y		24	N	N
	Data	Fibre	42.45	15000	15000	0					
	Voice	Fibre	31.88				Y				
	Video	Fibre	19.13						24	N	N

Note: These services need additional payments.

Criteria used for selecting the operators and their plans for the study

1	Include the incumbent telecommunication operator, a cable provider and an alternative provider in each country for comparison.
2	If available, choose a plan without bit caps on broadband usage. If no such plan is available, choose the plan with greater than (or closest to) 20 GB of traffic per month.
3	Choose the data plan which is the most cost effective per Mbit/s after a minimum speed of 2 Mbit/s. If 2 Mbit/s is not available then select the fastest possible broadband speed.
4	Do not include installation fees.
5	Do not include modem rental fees and exclude them when possible.
6	Do not take introductory offer pricing into account. Prices should reflect the final cost per month after the promotional period.
7	Try and use providers with national coverage if possible .
8	For television channels, the preference is for the basic digital package.
9	Attempt to exclude public broadcast fees when possible.
10	Fixed-line prices will reflect offers in a major city when prices vary across the country.
11	When possible select unlimited voice calling plans, even if they are more expensive.
12	If per-minute calling plans are the only ones available, the price per minute should reflect peak fixed-to-fixed local calls.
13	For video, try to select a plan with at least 20 channels

Exchange rates and PPP exchange rates (monthly average of September 2005)

	Exchange rates in national currency units per USD	PPP in national currency units per USD
Australia	1.31	1.40
Austria	0.82	0.91
Belgium	0.82	0.90
Canada	1.18	1.24
Czech Rep.	23.92	14.35
Denmark	6.09	8.71
Finland	0.82	1.04
France	0.82	0.92
Germany	0.82	0.93
Greece	0.82	0.74
Hungary	200.59	132.39
Iceland	62.12	100.01
Ireland	0.82	1.09
Italy	0.82	0.87
Japan	111.10	148.87
Korea	1 032.54	887.98
Luxembourg	0.82	0.91
Mexico	10.77	7.65
Netherlands	0.82	0.91
New Zealand	1.43	1.52
Norway	6.37	9.50
Poland	3.20	1.92
Portugal	0.82	0.68
Slovak Rep.	31.40	18.53
Spain	0.82	0.77
Sweden	7.62	9.37
Switzerland	1.27	1.81
Turkey	1 319 600	923 720
UK	0.55	0.62
USA	1	1

Glossary

ADSL	Asymmetric Digital Subscriber Line
ADSL2+	Asymmetric Digital Subscriber Line 2
CDMA	Code Division Multiple Access
DIVX	MPEG-4 based digital video compression format
DOCSIS	Data Over Cable Service Interface Specifications
DSL	Digital Subscriber Line
DVB-T	Digital Video Broadcasting - Terrestrial
FCC	Federal Communications Commission
FTTH	Fiber To The Home
GB	Gigabyte (roughly 1 000 megabytes)
Green fields	Term that means physical areas slated for new construction
GSM	Global System for Mobile Communication
HDTV	High Definition Television
HFC	Hybrid Fiber Coax
ICT	Information Communication Technology
IMT-2000	International Mobile Telcommunications-2000
IP	Internet Protocol
IPTV	Internet Protocol Television
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
ITU-T	International Telecommunication Union Telecommunication Standardization Sector
KB	Kilobyte
kbit/s	kilobits per second
Malware	Malicious software intended to cause harm to a computer system
MB	Megabyte (roughly 1 000 kilobytes)
Mbit/s	Megabits per second
MPEG	Moving Picture Experts Group
PDA	Personal Digital Assistance
PPP	Purchasing Power Parity
PSTN	Public Switched Telephone Network
PVR	Personal Video Recorder
Softphone	Software that provides Internet phone functionality
TD-CDMA	Time Division, Code Division Multiple Access
VDSL	Very high-bit-rate Digital Subscriber Line
VDSL2	Very high-bit-rate Digital Subscriber Line 2
VHS	Video Home System
VPN	Virtual Private Network
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network

NOTES

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