

The Broadband Future*

Interactive, Networked, and Personalised



Europe – January 2004

*connectedthinking

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The Broadband Future: Interactive, Networked and Personalised

Until now, the Internet has not been especially friendly to content providers: they've made large investments to establish online presence and received little financial payback; they've faced consumers who've shown little willingness to pay for content distributed over the Internet; and they've seen widespread copyright violations diminish their revenues.

Consumer Internet access via dial-up service is now giving way to always-on broadband connections, which improve the user experience and have a greater capability of distributing rich media types such as high-quality audio and video. The question is, how will the increasing adoption of residential broadband Internet access affect the way entertainment content gets distributed and consumed?

Broadband networks will be used to distribute content to consumers who will access that content from a multitude of networked devices in a variety of individual and social settings. The content will be accessed on demand, will be highly personalised, and will be consumed in ways that are integrated with the lifestyles of individuals rather than viewed by aggregated audiences at a time chosen by the content provider. Content providers now must create new applications and content types that take advantage of those features and must find new ways to gain revenue from their existing content assets.

In this report, PricewaterhouseCoopers analyses the opportunities, threats and challenges associated with selling content in a broadband-connected world. The focus is the European consumer market during the next three years: 2004–06. We discuss the types and characteristics of content most likely to benefit from widespread broadband adoption, and we consider the ways consumers will want to interact with that content.

We begin by framing the discussion with key findings and predictions. This section highlights the dominant issues shaping consumer broadband adoption and the business issues facing content companies that must balance the threats and opportunities posed by broadband. This section concludes with action items for maximising content profit in the broadband future.

Next, we analyse three opportunities for making money from content via the broadband Internet – through distribution of existing content, creation of adjuncts to existing content, and development of new types of content and applications – and consider some of the barriers that must be overcome to realise those opportunities. This section is followed by a description of the broadband Internet's key characteristics, a discussion of adoption patterns in Europe and an examination of how Internet use changes when consumers gain high-bandwidth Internet access. Finally, we end the report with a set of high-level recommendations to content providers, network operators and telecom equipment suppliers concerning how they should respond to the opportunities the broadband Internet creates.

In addition, our research included interviews with representatives of some of the leading companies in the Internet access and online content and applications industries. Quotations by those individuals appear throughout.

Key Findings and Predictions

The killer application for broadband Internet access between now and 2006 will not be the distribution of professionally produced content such as today's television programmes and movies. While broadcast distribution of programming using one-way channels such as cable and satellite is highly efficient at carrying multichannel video, the broadband Internet by comparison is inferior for the distribution of feature-length video programming and is unlikely to challenge the existing distribution networks until much later in this decade. Eventually, the separate distribution networks for television and data will converge to form a common backbone based on the Internet protocol.

The major impact of broadband over the next three years will be the addition of video to existing applications – including conferencing, messaging and gaming – and the development of new applications that rely on user- and community-provided video content. The European market for paid content and applications such as video messaging, video-enhanced gaming and home security could exceed €3.1 billion by 2007. E-commerce sites – especially those selling services such as travel and dating – will also add video content that provides customers with additional information to improve their online experiences.

The broadband Internet creates a modest near-term opportunity for content providers: providing video-based premium content that augments or repackages their existing media assets. Some consumers already have shown their willingness to pay for on-demand access to news, weather and sports programming. Content providers will derive revenue from subscriptions, pay-per-use, advertising and merchandising. In addition, the interactive context of the broadband Internet is facilitating a certain amount of content repurposing, such as enabling consumers to create a personal collection of songs played during a television show. We expect for the European market that 23% of Internet users will buy content and services online in 2007. Content aggregators that have existing billing relationships with consumers – including, AOL, MSN, RealNetworks, T-Online and Yahoo! – will be the main distribution channels for such content.

By the second half of the decade, the broadband Internet will be recognised as a fundamentally new mechanism for engaging audiences because of its unique characteristics – specifically, the greater interactivity made possible by its high speed and low latency. Content and applications that will generate revenue based on those characteristics are yet to be developed, but content owners should make investments now in both the reconceptualisation of the design of their content with an eye toward taking advantage of the expected improved interactivity and the testing of those new concepts with audiences.

To successfully compete with cable, digital broadcast and satellite television as a means of delivering video programming, the broadband Internet will have to deliver content those other systems are incapable of carrying – for example, video that provides the viewer with a non-linear, multipath, multiple-points-of-view programme in which a 30-minute television episode can be enjoyed for hours as an interactive experience. Other key requirements are the development of payment models, billing mechanisms and content protection systems that meet consumers' needs and expectations while preventing piracy of intellectual property.

During the next few years, broadband penetration in Europe is unlikely to achieve the level reached by such countries as Canada and the Republic of Korea (South Korea), in which deployment has been more aggressively supported and subsidised by government. Market research services predict European broadband adoption could reach 30% of households by 2008, up from 8% at the end of 2002, with significant differences between European countries. Higher broadband penetration in Canada and South Korea has been fuelled by lower prices – access fees that amount to €20–€30 per month – and by government policies and investments promoting broadband. Our analysis suggests that access charges in Europe must drop from current levels to as little as €30 per month for entry-level access, which Forrester has identified as the tipping point for mass broadband Internet adoption. This price point has already been undercut up to 50% in countries like Germany. Subscribers who initially purchase entry-level access are more likely to upgrade to higher-speed service when compelling content and applications at attractive price points become available.

Broadband penetration in Europe will be different from US and Korea. For example, Korea, with 80% broadband penetration, has a single telecom infrastructure, a homogenous language and culture and a dense population, and there has been significant government encouragement of broadband deployment. By contrast, America, with 25% broadband penetration, is also a single country, but with a complicated infrastructure, strong competition and limited government support. Europe will see rapid growth clustered in metropolitan areas, with fragmented and dispersed coverage on a pan-European basis. Broadband infrastructure and brands will therefore need to be aligned to local circumstance – with the exception of interest communities, e.g. sport and music, that transcend political and cultural boundaries. Government will play a more important role than in the US. For example, to meet its European mandate, the UK government has set an aggressive target of having an additional 28% of UK households adopt broadband by 2006.

Making Money from Content

The opportunities for content owners to make money from the broadband Internet can be divided into three basic categories:

- **Delivery** – Use the broadband Internet as a delivery mechanism to distribute existing content.
- **Extension** – Use the broadband Internet to provide extensions that enhance the value of existing content.
- **Content development** – Develop new content and applications that are delivered over the broadband Internet.

Delivery of Existing Content

From the subscriber's point of view, one of the most obvious benefits of residential broadband Internet access is the ability to access content that is too large to be effectively streamed or conveniently downloaded by a dial-up connection. High-quality, full-screen, high-resolution video falls into this category, as does CD-quality music.

From the content owner's point of view, selling and delivering conventional types of content over the Internet has a number of benefits, including the ability to eliminate the costs associated with manufacturing and transporting physical media such as CDs and DVDs and the ability to create new distribution channels that could eliminate intermediaries and give content owners a more direct relationship with their audience. However, Internet delivery also has drawbacks, the most prominent of which is the unauthorised copying of digital content that deprives the content owners of revenue. (See sidebar Piracy and Content Protection.)

Until now, online distribution of feature-length video entertainment has also been limited by the lack of an appropriate viewing experience: most consumers do not want to watch movies on their PC. However, as home entertainment devices such as personal video recorders become networked, content that gets delivered via the Internet is no longer limited to the PC as a playback device. Instead, the PC will be used for retrieving and managing content for playback on other devices.

Meanwhile, Microsoft and the PC vendors are making the PC itself better suited for video playback by using Microsoft's Windows XP Media Center Edition. The second-generation Media Center PCs introduced by vendors such as Dell and Sony in late September 2003 are equipped with TV tuners, displays as large as 42 inches (105 cm), and remote controls suited to across-the-room viewing of video entertainment.

In addition to distribution of feature-length video and CD-quality audio, broadband Internet connections also facilitate distribution of short video clips with higher quality and less delay than have been possible through dial-up connections. Such capability gives content owners the opportunity to offer high-quality video clips of news items, sporting events and entertainment as part of a fee-based service. Content aggregators such as America Online (AOL), RealNetworks and Yahoo! have already taken that approach with their premium services. The worldwide market for streaming video services is expected to increase from €800 million in 2003 to €3.7 billion in 2007, with Asia constituting the largest market [In-stat/MDR, 2003].

Online interactive games also benefit from broadband Internet adoption. Broadband allows such games to be enhanced with a variety of features, including greater use of music, video, animation and visualisation as well as player-to-player voice and even video communications. Those additions are likely to be of special value to massive multiplayer online role-playing games such as Sony's Everquest or Electronic Arts' SIMS Online.

Piracy and Content Protection

With some justification, the music industry has blamed the decline in CD sales on the widespread availability of unauthorised copies of digital music available through peer-to-peer file-sharing applications such as Kazaa. As the capacities and performance of networks improve, that threat will not be limited to the music industry. The motion picture studios recognise the threat and are reluctant to release their products on the Internet until they can be assured of content protection through technology that enforces digital rights management (DRM).

A variety of technology and regulatory initiatives are currently under way to resolve those concerns. One project is developing trustworthy computer systems that could enforce DRM even if a technically sophisticated PC owner attempted to defeat it. Design of these systems has been undertaken by Microsoft Corp. under the name Next-Generation Secure Computing Base – formerly known by the code name Palladium – and by Trusted Computing Group. Directive 98/84/EC of the European Parliament aims to provide a minimum level of legal protection against piracy for pay services within the EU. Further directives are planned by the EU in an attempt to implement the same World Trade Organisation treaties that brought about the DMCA (Digital Millennium Copyright Act) in the US, which makes it illegal to copy proprietary content for almost any reason.

The results of those efforts might be unpopular with consumers, who are increasingly demanding flexibility in how, when and where they consume content. Given the increasingly networked nature of content consumption, any DRM system acceptable to consumers must provide the flexibility to move content between multiple devices such as a PC and an MP3 player or a set-top box and a personal video recorder and must also work with multiple operating systems, not just Microsoft Windows.

The music industry first resisted the distribution of music over the Internet and then offered services with pricing and usage restrictions that were unattractive to consumers. As a result, unauthorised copying of music became firmly entrenched before the development of more recent and less restrictive services such as Apple iTunes and Musicmatch Downloads. The motion picture industry should establish authorised, consumer-acceptable channels for digital downloads of its products before unauthorised channels gain a foothold. Settling for less-than-perfect copy protection may be to the industry's advantage so it can offer downloadable content in a format that's popular with consumers and before the video equivalent of Napster becomes entrenched.

Adjuncts to Existing Content

The broadband Internet can also be used to enhance the value of content whose primary distribution takes place through traditional channels such as broadcast and cable TV and movie theatres.

One opportunity lies in the creation of Internet properties that broaden and deepen the audience's relationship with a film or TV show, thereby making the underlying media property more valuable through a larger audience. This technique can be especially effective when the property gets serialised, such as the multiyear release schedules for films including *Lord of the Rings*, *The Matrix*, and *Star Wars*. By using the Web site to hold the audience's attention between episodes, studios can improve audience retention.

For TV series, Web site content has included downloadable photos and screensavers, episode synopses, and merchandising opportunities such as customisable soundtrack CDs. Such content can be accessed through dial-up Internet connections, but broadband allows transmission of higher-quality video and is likely to increase usage by making access more convenient. Some of the reality TV shows, such as *"Pop Idol"* have been especially creative in increasing audience engagement by means of supplemental content, voting, chat rooms and other interactive experiences, and merchandising.

In some cases, broadband is essential to the delivery of supplemental content that can generate incremental revenue streams. For example, the DVD versions of most films include extras such as omitted scenes, scenes filmed from different camera angles, director's commentary, and "making of" special features. However, availability of that extra content is currently linked to the release of the DVD version of a film, which occurs months after the theatrical release. The same supplemental content could be delivered via broadband on a pay-per-use basis, thereby generating incremental revenue and deepening audience loyalty at the same time.

New Content and Applications

Initially, cable TV was a way to provide better signal quality for broadcast TV. Only later was its potential to create new channels recognised, making it a mechanism through which to distribute a wide variety of content. Likewise, the most important forms of content distribution via the broadband Internet may be as yet unforeseen, but a much wider array of content is possible. Successful new applications are likely to be those that take advantage of the unique features of the broadband Internet.

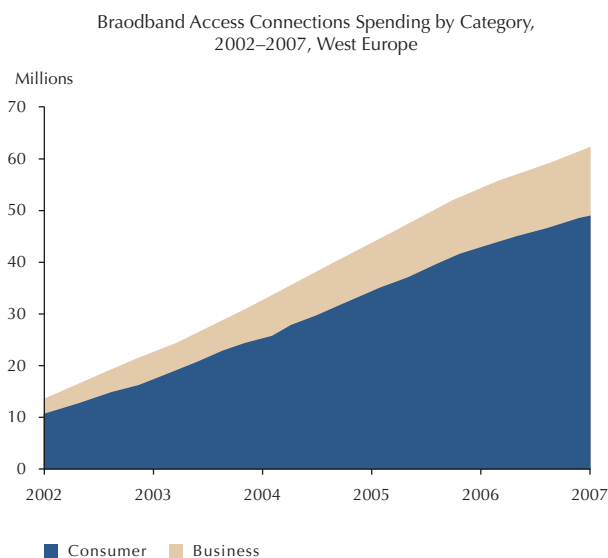
Video benefits most from the faster data rates of broadband. However, new video-based applications for the broadband Internet will not be limited to those using professionally produced video content. A variety of other applications using video may be important, including person-to-person or person-to-group video – either real-time interactive (videoconference or video messaging) or store and forward (video e-mail) – and self-published content (video blogging and the addition of video content to personal and organisational Web sites). The European market for paid content and applications could exceed €3.1 billion by 2007.

The addition of video content to applications is also likely to encourage the development of new user-created content. In the case of video games, for example, gamers' experiences will be recorded for subsequent replay, and collaborative role-playing games will incorporate video content created by the participants. In both cases, the result is an archive of hybrid professional and consumer-created content.

In online communities and collaborative applications, the addition of video is likely to play a significant role. The combination of presence-based services such as buddy lists; profiling, personalisation and collaborative filtering; search engines and intelligent agents; and videoconferencing, will help create a new world of collaborative activities and applications as well as new sources of amateur and semi-professional media content. Some of the new or enhanced applications might include introductions and dating services, video highlights of family and class reunions, online virtual parties, and shared viewing and discussion of traditional entertainment such as TV programming and sporting events.

The majority of that content will not be commercially valuable, although services that rely heavily on user-contributed content constituted the largest single segment of revenue-generating online content in the U.S. market, according to a 2003 study by the Online Publishers Association. Further, although that amateur content may not have commercial value, it nonetheless may have sentimental value to the producers and participants and therefore command a price for production, storage and transmission.

Exhibit 1. Consumer and business sector growth will be similar.



“WHEN TARGETING A NEW GENERATION OF MARKETING-SAVVY CONSUMERS, THEY KNOW THE GAME, AND THEREFORE THE RULES PARTICULARLY ONLINE HAVE CHANGED. THEY CRAVE AUTHENTICITY AND EXCLUSIVITY, BUT ABOVE ALL THEY WANT TO GET SOMETHING THEY CAN’T GET ELSEWHERE.”

Source: Rob Noss, *mOne Europe*

The challenge is for content owners to find ways of making money from new applications, especially ones that are based on user-contributed content rather than professionally produced content. Some of the potential opportunities are:

- **Licensing** – Content owners could license their content for inclusion in videos, such as a cartoon character appearing in a home movie; they could also allow an individual’s image to be inserted into one of their films as a character. Such licensing is more likely to be acceptable to content owners if the licence is limited to controlled distribution – such as sharing within a family – rather than allowing public distribution such as posting on a public Web site.
- **Links** – Much of the value of Web logs is their ability to link to other content on the Web and comment on it, and that circumstance is likely to be true of video blogs as well. By creating the video equivalent of hypertext links and allowing video links to their Web sites, content owners can increase the traffic to those sites.
- **Production tools** – Companies could create production tools that can be sold. Such tools might be the equivalent of high-end desktop publishing packages, but for video.
- **Online communities** – Organisations could sponsor and host online communities, especially when there’s a connection between the focus of the community and the content provider.

Barriers to Making Money from Content over Broadband

Content owners currently face a substantial constraint on their ability to make money from broadband: only 8% of European households have a broadband connection to the Internet, with significant differences between European countries (e.g., France 6%, UK 7%, Germany 10%, Benelux 16%). This market is expected to grow significantly in the next few years, however. In comparison, 78% of households in Korea, 56% of households in Hong Kong, 31% of households in Japan, and 20% of US households already have a broadband connection to the Internet.

In addition, the relative immaturity of broadband applications, enabling technologies and business models means content providers must confront a number of other obstacles. Some of them are:

- **The need for content protection** – The music industry's experience has vividly demonstrated the threats to content providers because of the lack of effective copy protection and digital rights management schemes. However, limited acceptance of some of the early, legitimate online music services has shown that consumers are unwilling to sign up for services that place too many restrictions on when, where and how they use downloaded music. The content industry needs business models and technologies that provide effective copy protection while still giving consumers the flexibility they want.

Is Content Really King?

There are numerous ways content providers can take advantage of broadband Internet connections to generate revenue from both current and new types of content. However, the notion that access to professionally produced content will be the killer application for broadband has been disputed by some analysts.

The case that "content is not king" has been stated most forcefully in an article with that title written by Andrew Odlyzko, director of the Digital Technology Center at the University of Minnesota. He argues that communication between people, rather than access to professionally produced content, has always been the major generator of revenue for communications networks. As an example, Odlyzko points to contemporary mobile telephone networks, in which person-to-person text messaging via the Short Message Service has been wildly popular in Europe, while access to Web site content via the Wireless Application Protocol has generally been a failure.

If Odlyzko's analysis is correct, the most significant result of the broadband Internet may be the addition of video to existing forms of personal communications, as well as the creation of new applications based on the exchange of video content. For example, families might use video communications over the Internet to keep in touch with relatives, such as grandparents using it to develop closer ongoing relationships with their grandchildren.

Such an outcome would have major implications for network operators as they build their networks. The asymmetric nature of most residential broadband connections, which have greater bandwidth in the downstream direction, is well suited to a network delivering content to the subscriber. However, a network built for person-to-person communications would need bandwidth that is more symmetric, because the outgoing data traffic would be closer in volume to the incoming traffic. In a two-person videoconference, for example, the traffic in both directions is likely to be equal in size.

If content is not king, then content providers will need to develop strategies for generating revenue from person-to-person interaction and from user-contributed content.

■ **Lack of a single integrated platform for content consumption** – The current world of content is split between two very dissimilar platforms: the PC and the TV. The PC is highly interactive and flexible, but it is not well suited to some of the traditional characteristics of watching TV. On the other hand, TV has historically provided mostly passive entertainment, and consumer electronics products such as TVs and even most cable and satellite set-top boxes lack the hardware and software that would enable them to take advantage of the broadband Internet. The success of broadband Internet as a platform for content distribution depends partly on marrying the positive characteristics of those two platforms so that video can be distributed over the broadband Internet, can be viewed in a living room setting, and can be combined with the interactivity of the PC experience.

■ **Limited network capacities** – Today’s broadband connections, with data rates typically slower than 1.5 Mbps – and often significantly less – are limited to VHS-quality video transmission. These connections are asymmetric: the upstream connection usually is significantly slower than the downstream connection. Certain applications such as videoconferencing cannot succeed until upload and download speeds become more symmetric. In addition to higher bandwidth, better quality of service such as reduced latency and reduced jitter will also be required to facilitate delivery of more types of content over the Internet.

■ **Consumer resistance to paying for Internet content** – The early years of the Web conditioned consumers to receiving free content. Consumer sentiment that Internet content is of low value and therefore should be free represents a significant barrier to the success of business models based on charging for online content. Content owners face a challenge: they must extend to the Internet the expectation that high quality programming uninterrupted by advertising will be paid for by the consumer. Some signs show this sentiment is changing, as more sites make premium content available on a paid subscription or pay-per-use basis only and gain consumer acceptance of these arrangements. Once consumers are willing to pay for content, finding the appropriate payment mechanism will be an additional challenge. (See sidebar Payment Mechanisms and Micropayments.)

■ **Threat of disintermediation** – Although content providers such as studios and record labels have many opportunities to benefit from the broadband Internet, they also face the threat of disintermediation if content creators such as film producers or recording artists are able to bypass them and sell content directly to consumers. The broadband Internet lowers a barrier to entry in the area of content distribution by providing an alternative to traditional distribution channels such as retail stores. However, selling content via the broadband Internet does not magically attract a large audience. For filmed entertainment, disintermediation is most likely to occur initially with content that appeals to niche audiences that are too small to attract typical distributors. However, in the music industry, well-known artists who’ve already developed a large audience certainly could adopt a direct distribution strategy.

“RECENTLY, BROADBAND APPLICATIONS SUCH AS REAL-TIME MULTIMEDIA SERVICES AND COMMUNITY NETWORKING HAVE BEEN SURGING ... THE ADVANCE OF TECHNOLOGIES INCLUDING DIGITAL CAMERAS HAS TURNED INDIVIDUAL USERS FROM PASSIVE RECIPIENTS OF SERVICES AND INFORMATION INTO ACTIVE CREATORS AND PROVIDERS OF INFORMATION.”

*Source: Chin Dae-Je
Minister of Information and
Communications
Republic of Korea*

Why Does Broadband Matter?

The interactive, networked and personalised world of tomorrow will be very different from the passive, standalone and aggregated world of yesterday and will require very different business strategies on the part of content providers and network operators. Those strategies should take advantage of the unique characteristics of the broadband Internet as well as the usage patterns of broadband users.

Payment Mechanisms and Micropayments

Developing the right payment mechanisms for the sale of digital content is an outstanding challenge in providing new services over the Internet. The problem is exacerbated when the transaction cost is small – for example, paying a dollar or less to download a short video clip. In those cases, the transaction fees paid by the merchant make acceptance of credit card payments uneconomical. In addition, if consumers must register and open a separate account with each content source they want to access, the inconvenience of doing so is likely to act as a barrier that limits sales.

Several alternative mechanisms for handling small transactions are in use or have been proposed.

- **Payment via a content aggregator** – Commercial online services have had the ability to bill for premium content since the early 1990s. Today aggregators can create a master billing relationship with the customer that lets them bill for content from multiple sources on a pay-per-use basis. However, that arrangement limits consumers' choices to content available through their chosen aggregator.
- **Payment via a phone bill** – Telephone companies have historically billed for large volumes of small transactions. As a result, they're well positioned to handle the billing of small content purchases. One reason for the tremendous success of NTT DoCoMo's i-mode service in Japan, which provides access to content and transactions from mobile phone handsets, is the fact that DoCoMo acted as the billing agent for many of the Web sites accessible through i-mode, thus freeing the subscriber from separate billing relationships with each site.
- **Payment via online currency** – Newly developed technology could be used for micropayments based on some form of online currency. A series of Internet-based micropayment systems, including Digital Equipment Co.'s Millicent and DigiCash's eCash, have been tried, but so far none have gained widespread customer acceptance, and all of them have been discontinued.

One of the problems facing any pay-per-use billing arrangement is that consumers want their costs to be predictable; they don't want to be surprised by the size of their bill. Unpredictability could be overcome by a prepaid service, similar to the one used by many of the cellular service plans, whereby customers are notified when their deposits are exhausted. So far, the most successful arrangements have been in the form of fixed monthly subscription charges, such as Yahoo!'s Premium Services and RealNetwork's RealOne SuperPass in the US.

Exhibit 2: The interactive, networked, and personalised future

Value Chain	Content	Network	Devices	Consumers
Past	Passive	Separate	Standalone	Aggregated
Future	Interactive	Converged	Networked	Personalised
Past	Professionally created, designed for one-way broadcast	Mail, retail, broadcast, one-way cable	Standalone devices such as TVs, stereos, DVD players, PCs, phones, PDAs	Passive consumption of content distributed via broadcast physical media
Present	User-generated content beginning to compete with professional content; interactivity on the rise	Content distribution via Internet supplements broadcast and cable but the two networks remain separate. Internet connections moving to broadband but still asymmetric	Expanding pool of digital devices becoming more interconnected, but still have limited ability to deliver content to consumer's preferred device	Two separate content consumption experiences: passive TV viewing for broadcast, interactive PC use for Internet. Only TV viewing can be a group experience
Future	Increased competition from user- and community-created content; more content is designed for interactivity	Fibre-based networks will provide symmetric broadband in a variety of service packages	Home media servers will act as staging areas, fed by content providers over broadband connections and delivered to many devices	Consumers will have personalised channels allowing on-demand content consumption. Consumption experiences include individual, group and online communities
Representative Vendors	Music labels, studios, content aggregators – AOL, BMG, Disney, EMI, MSN, Sony, T-Online Universal, Warner, Yahoo!	Cable MSOs and telcos – BellSouth, BT, Deutsche Telekom, France Telecom, Kabel Deutschland, NTT, Telecom Italia, Telefonica, Verizon, Vodafone	Device providers – Apple, Dell, HP, IBM, Microsoft, Philips, Samsung, Siemens, Sony Ericsson	

Broadband Internet: Key Characteristics

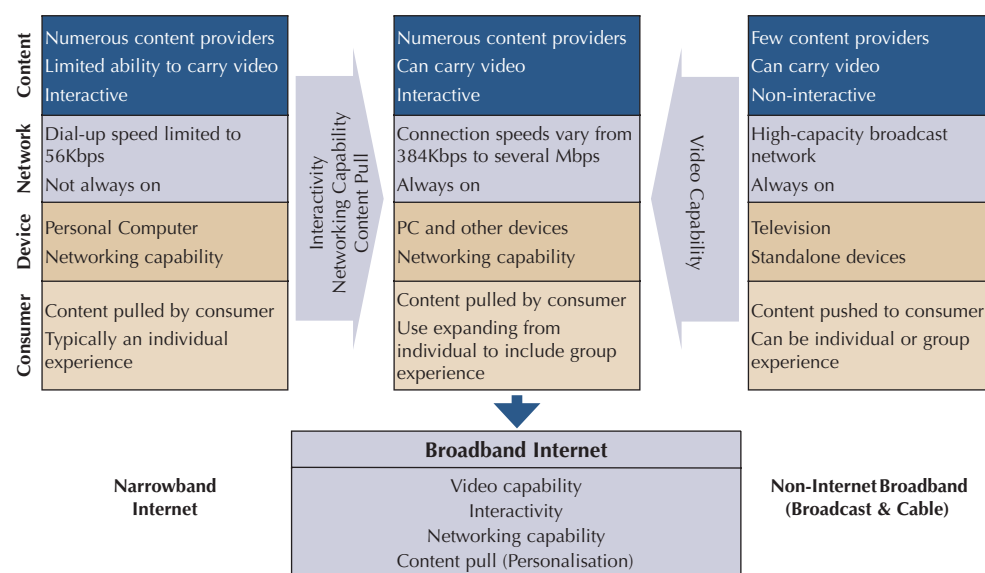
Residential broadband Internet access in Europe is provided primarily by wireline local telephone carriers using digital subscriber line (DSL) and by cable network operators using data over cable, although it can also be provided over high-speed wireless networks and through fibre-to-the-home (FTTH). Most residential broadband connections are asymmetric, providing bandwidth from the network to the subscriber (downstream) that is three to six times greater than the bandwidth from the subscriber to the network (upstream).

The broadband Internet incorporates characteristics of the non-broadband Internet (narrow-band dial-up connectivity) and of non-Internet broadband (broadcast and cable TV) (exhibit 3). Broadband connections are always on and have faster throughput than dial-up connections. Unlike broadcast and cable TV, the broadband Internet provides interactivity and can serve as a platform for a variety of applications.

Although broadband capabilities will be used initially for the same set of applications as dial-up, a much broader range of applications and services will become available as the market matures and connection speeds increase. Among the most significant benefits of broadband's faster throughput is the ability to transmit entertainment-quality video. Many of the opportunities for generating greater revenue from broadband will be based on its ability to carry video. Furthermore, the addition of networking capabilities to consumer electronics devices will allow content delivered over the broadband Internet to be consumed not only through a PC but also through other devices at other locations inside a home.

Most broadband connections currently are limited to VHS-quality video, but the ability to handle better quality video – including S-video, DVD-quality video, and, eventually, high-definition television – will improve as connection speeds increase. Eventually, the broadband Internet is likely to become the dominant mechanism for the transport of digital content – including TV programming, movies and news – but broadcast and cable networks' dominance will continue through the end of this decade.

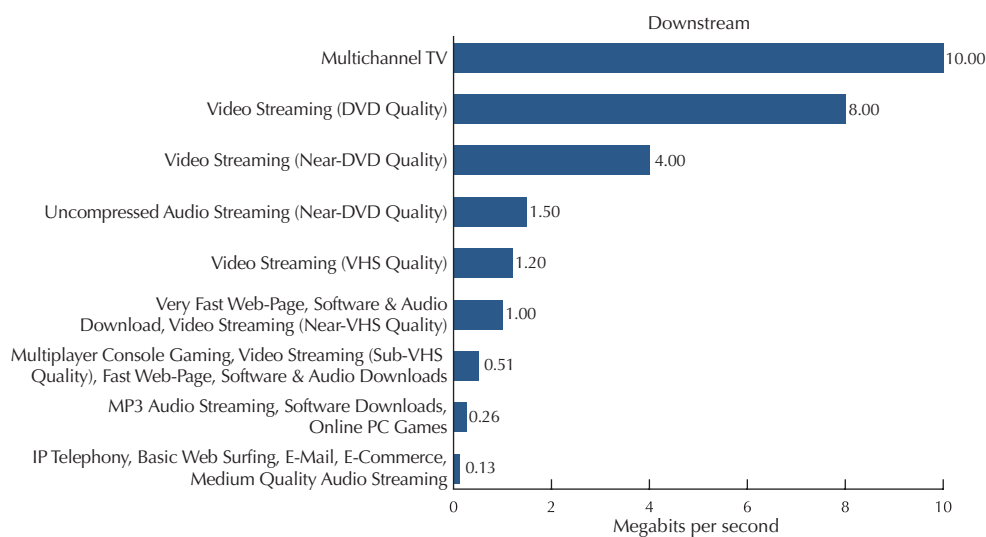
Exhibit 3. Broadband Internet combines characteristics of Internet and broadcast networks.



Increasing broadband connection speeds will allow a larger share of existing content as well as a broader range of content and applications to be delivered over the broadband Internet (exhibit 4). Distribution of high quality premium content – whether for interactive applications such as playing games or for non-interactive applications such as watching a movie – requires a high-bandwidth, high-performance network so as to ensure a satisfactory consumer experience.

A number of network operators are taking steps to accelerate the deployment of higher-speed broadband connections. Examples include Verizon's announced plans to invest in FTTH infrastructure in much of its service territory and Comcast's rollout of 3 Mbps connection speeds as part of its standard service, with subscribers in 14 service areas already able to take advantage of the higher speed.

Exhibit 4. Higher network speeds widen the range of applications.



Source: The Yankee Group, 2003

The Interactive, Networked, Personalised Future

The basics of content distribution and consumption are changing. Digital content is easy to copy, transfer and consume via a variety of devices. Consumers, motivated by their desire to consume content when, where and how they want, are demanding flexibility in accessing content. Meanwhile, broadband Internet connections combine high-bandwidth, always-on capabilities with interactivity and personalisation. As a result, content distributed and consumed through broadband Internet connections will be interactive, accessed via networked devices, and personalised.

Interactive Content – The Internet is inherently two-way and interactive, and both content providers and consumers will benefit from the greater interactivity possible through broadband technologies. Content aggregators can learn about their customers and can tailor relevant content and applications to them, thereby improving consumer satisfaction. Content owners also can transform content into additional sources of revenue by using merchandising, targeted advertising and direct marketing. In addition to interacting with content and applications from established media companies, consumers can interact with content provided by other organisations. Even individuals can be content providers through personal Web sites and Web logs (blogs).

Networked Devices – As the cost of electronic components continues falling and as most content becomes available in digital form, the computer and consumer electronics industries have created a variety of new devices for storing and accessing that content – including media centre PCs, personal video recorders and MP3 players – while adding media capabilities to other devices such as personal digital assistants and mobile phones. Networking those devices to each other, to PCs and to the Internet allows content to be moved easily between them, thus creating a fundamental change in the way content is accessed. Eventually, the home is likely to have a single platform – a media server or home gateway server – that will aggregate content delivered over broadband Internet connections or via other distribution mechanisms and that will distribute it to various access devices.

Personalised Consumption – Instead of content that gets pushed to consumers at a time selected by the content provider, it will be pulled from the network by consumers for use at a time of their choosing. The on-demand availability and growing choice of content will lead to personalised consumption, replacing the older model of an aggregated audience that watches at the same time. The relationship of content providers to consumers will change from the one-to-many broadcast model to the one-to-one personalised model, enabling consumers to immediately satisfy their content requirements and enabling advertisers to tailor their material to the individual consumer.

Broadband Adoption: Patterns and Implications

Europe is currently in the midst of transitioning from the narrowband Internet to the broadband Internet. The speed with which this transition occurs depends on a number of factors, including:

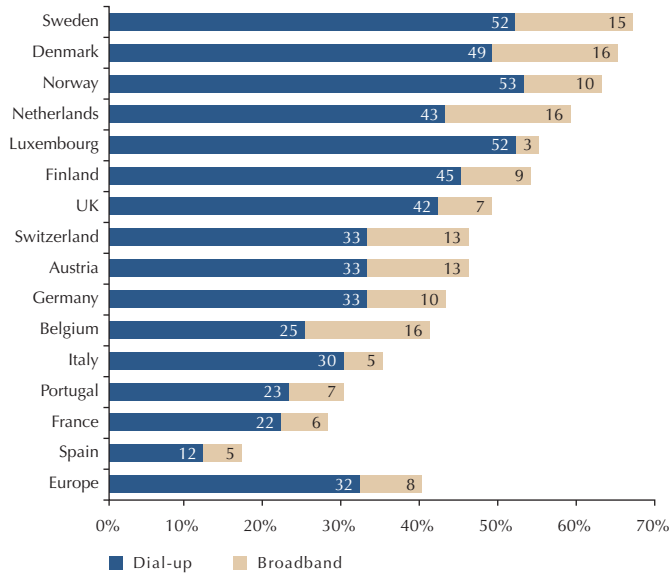
- **Availability** – The availability of broadband service reflects both the state of the telephone and cable network plant in a given geographic area and the network operators' decisions about investments to upgrade that plant.
- **Pricing** – Consumers have shown themselves to be very price sensitive relative to adopting broadband, so pricing will have a significant impact on adoption rates. The pricing strategies pursued by the network operators will depend partly on the degree of competition in specific geographic markets.
- **Quality content** – The availability of compelling and differentiated broadband-only content and applications will affect consumer adoption of the technology.
- **Value** – Consumers must perceive value in upgrading to broadband (for current dial-up Internet users) or in connecting to the Internet for the first time.
- **Elimination of barriers** – Other barriers to consumer adoption must be eliminated – for example, by making it easier to set up a home network and to configure a broadband connection.
- **Culture** – A homogeneous language and culture. An educated, technology savvy population (particularly youth culture). High population density with mature Telco infrastructure. Strong government support. Competitive ADSL / Cable business climate.

Adoption Rates

Residential broadband adoption in Europe has been slower than in other nations. However, significant growth is expected over the next four years: more than 45 million Europeans are forecast to have broadband Internet access by 2007 – many more than the 13 million broadband connections (8% of all households) at the end of 2002. Approximately 71% of all broadband connections, in 2002 were DSL and 26% were broadband cable. DSL technology will maintain its leading position (exhibit 6). In contrast with other technology markets, broadband grew more strongly than expected last year in Europe, with 92% more households connected at year-end 2002 than at the end of 2001. Price cuts will keep powering European broadband adoption in 2003 at a 53% growth rate, according to Forrester Research Inc.

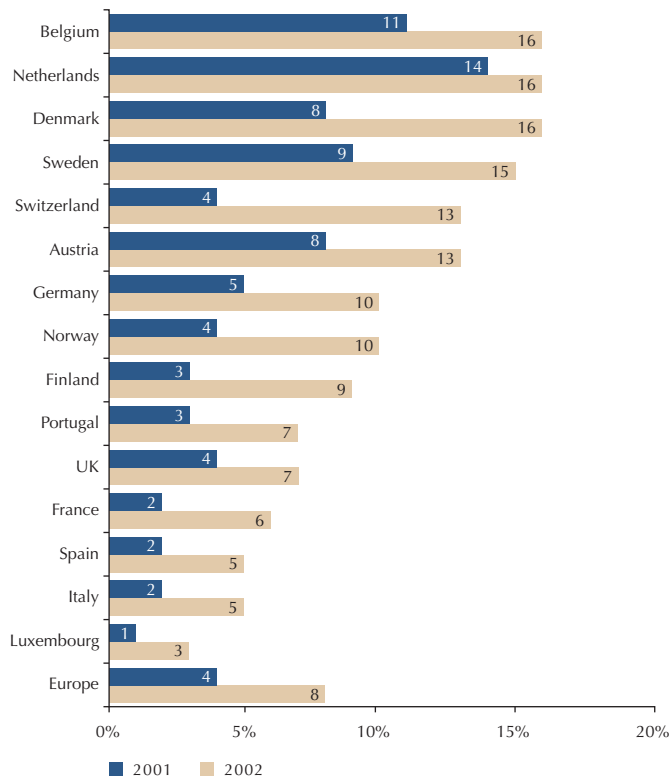
Exhibit 5. Comparison of broadband penetration

Figure 1: European Household Internet Penetration
By Access Technology, 2002



Source: Forrester Research, Inc.

Figure 2: Broadband penetration by household,
2001 and 2002



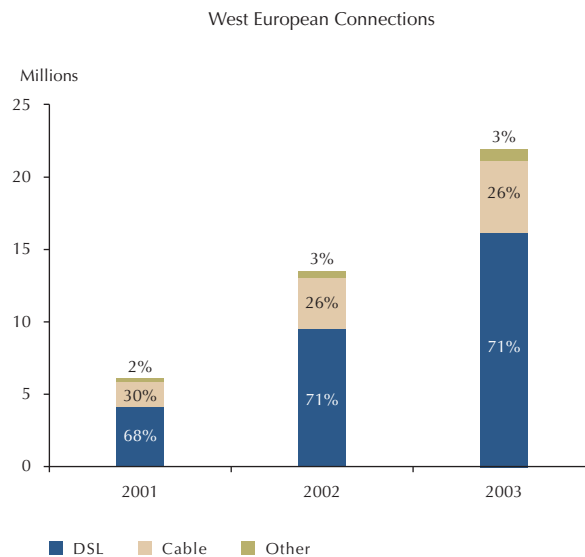
Source: Forrester Research, Inc.

In reaching 8% penetration, European broadband adoption has completed the early-adopter stage and is likely to reach the threshold of mass-market adoption in 2004. Network operators are introducing increased configuration choices – including tiered pricing based on connection speed and bundled services that combine broadband Internet access with telephone service – that segment the market and enable them to achieve greater penetration. Network operators are also increasing their mass-market appeal by integrating value-added services such as parental controls and firewall, antivirus and antispam capabilities into their broadband Internet access products. (See sidebar The Network Operator Perspective.)

The primary motivation for broadband sign-up has been the convenience of faster downloads and always-on connectivity for accessing Web content and applications. Although surveys have shown that both broadband and dial-up customers perform similar activities – the leading applications are e-mail, search, shopping and instant messaging [Yankee Group, 2003] – their Internet usage patterns reveal some important differences.

Broadband Internet consumers spend 50% more time and 64% more money shopping online than dial-up consumers do [Arbitron/Edison Media Research, 2003]. Broadband consumers are four times as likely as dial-up consumers to download videos, are three times as likely to download music or watch streaming video, and are more than twice as likely to listen to streaming audio [IDC, 2003].

Exhibit 6. Comparison of broadband access technologies



"AS CONSUMERS TAX THEIR BROADBAND CONNECTION WITH ADDITIONAL CONTENT AND APPLICATIONS, THEY WILL REQUIRE MORE PERFORMANCE AND MORE BANDWIDTH. THERE WILL BE AN EVOLUTION TO HIGHER TIERS OF SERVICE. APPLICATIONS TODAY AND APPLICATIONS IN FIVE YEARS ARE GOING TO BE VERY DIFFERENT."

Source: Marilyn O'Connell, Verizon Communications

The Network Operator Perspective

The broadband Internet provides network operators – incumbent and competitive local exchange carriers and cable multiple system operators – with a tremendous opportunity to increase the revenue from their existing networks and to create new service offerings. Thirty percent of European households will subscribe to residential broadband service by 2008, and broadband access revenues will reach €21.7 billion that year, up from €3.3 billion this year [IDC, 2003].

New subscribers will come from increasingly price-sensitive market segments. Rather than lowering prices for very high-speed services to €20 per month, as network operators have done in Japan and South Korea, European network operators may prefer establishing multiple tiers of service, with the lowest-priced tier aimed at new customers. Offering a €20 per month, entry-level broadband service that is only several times faster than a dial-up connection has been successful in increasing broadband adoption in the United Kingdom.

New subscribers will also be less familiar with the intricacies of computer networks than early adopters have been, so making Internet connections easy to install and use will be crucial in marketing to this population. Ease of use will become even more important during the next few years as a wider range of consumer electronics devices get connected to home networks and the Internet.

As telephone carriers and cable operators compete for the same broadband subscribers, they face downward pressure on prices. These wireline network operators also confront competition from a widening range of wireless technologies, including improved versions of 802.11 wireless local area networks. Internet access will eventually become a low-margin commodity service.

In response, network operators will need to develop augmented services that can command premium prices – much as they've implemented enhanced calling features in voice telephony. These premium services might comprise directory services, including the ones used in peer-to-peer applications such as online chat; dynamic provisioning, which allows subscribers to temporarily increase their connection speeds during periods of heavy network use; or support for applications that are complex to implement, such as multipoint videoconferences. Network operators also have the opportunity to provide services for content providers, such as Web site hosting, billing, content caching and guaranteed quality of service.

Network operators will need to invest in infrastructure that allows them to provide network connections with symmetric bandwidth. Most of today's residential broadband connections are asymmetric, which is efficient when the primary application for broadband is the downloading of content. However, some of the most important applications will involve two-way interaction between individuals and groups, and those applications need symmetric bandwidth.

Recommendations

In this section, we recommend actions for content providers and network operators as they prepare for the growth in residential broadband Internet access.

Recommendations for Content Owners

The content industry has not reaped many benefits from the initial phase of consumer Internet use. Increased broadband adoption offers content owners a second chance, but the industry must take specific actions both to benefit from the opportunities provided by the broadband Internet and to counter the threats it poses. We recommend that content owners take the following steps.

Take advantage of video as a content type. The ability to transmit high-quality video is the key differentiator between broadband Internet access and dial-up access. Content providers must respond by developing innovative content and applications that use video to enhance the value of content properties and generate incremental revenue. Short-term opportunities include selling supplemental video content that currently is available only on DVDs and adding video messaging to current interactive Web sites. Deutsche Telekom for example offers its broadband T-Online customers video-on-demand and TV programme services through their cable and telephone networks.

Take advantage of the interactivity provided by the broadband Internet. Content owners have been accustomed to distributing their content via channels such as broadcast and cable television that offer limited or no interactivity. As more content gets distributed over the Internet, content providers must respond by adding interactivity to their existing content and by developing new types of content and new applications that benefit from that interactivity. This area offers a broad range of opportunities, including interactive Web sites that supplement movies and television programming and possibly even allow fans to get involved during content creation.

Take advantage of non-content uses of the broadband Internet. A good deal of broadband Internet usage will involve activities other than experiencing professionally produced content. Among the most important of those activities will be the various forms of real-time and asynchronous communications between individuals and groups. Content owners must develop innovative and effective strategies that will allow them to benefit from these activities. Specific opportunities are likely to include the sponsoring of interactive online communities, encouragement of the development of communities that increase consumers' loyalty to particular content properties, and the licensing of content for use in interpersonal and group communications.

Convince Internet users to pay for content. A number of approaches can be pursued to convince Internet users to pay for content. By decreasing the supply of free content, media companies force Internet users to pay or do without. They can also begin by charging for new content that is not currently available online and expanding the range of paid content over time. Content aggregators such as Yahoo! are charging for premium content – including video-enhanced news, entertainment and specialised information such as investment research – and consumer willingness to pay signals a shift in consumers' expectations about paying for content.

"WE ARE LOOKING TO ENHANCE THE BUNDLE BY PUSHING TO THE NEXT LEVEL, CONVERGING MULTIPLE PLATFORMS, TO OFFER MORE INNOVATIVE SERVICES THAT ARE UNIFIED ACROSS PLATFORMS, SUCH AS CALLER-ID TO THE TV, VIDEO ON PC AND E-MAIL TO THE TV."

*Source: Dallas Clement,
Cox Communications*

Design content for multiple platforms. As entertainment content gets accessed via a wider variety of platforms, content providers face the challenge of adapting their material for devices that have different screen sizes and resolution, input mechanisms, and programmability. Designing easily adaptable content will be crucial.

Deliver content in the right packages. Content owners are unlikely to generate significant revenue from selling movies or television programming over the Internet within the next few years. But the initial success of Apple's iTunes indicates that even recorded music, which has been subject to the most unauthorised distribution, can be sold if the right content packaging and pricing structure get adopted. However, consumers will expect the flexibility to experience the content on the device and at the time of their choosing.

Enhance partnerships with content aggregators. Content providers need to explore innovative partnership arrangements with content aggregators such as AOL, MSN, RealNetworks, T-Online and Yahoo! Consumers are more likely to pay for content if aggregators can offer attractive bundles of content at favourable prices. Content providers will benefit from access to the large numbers of users that already look to these aggregators for information and entertainment content.

Explore partnerships with network operators. In the short term, content providers and network operators can benefit from joint marketing efforts, such as the partnership that combines Yahoo!'s content with the U.S. carrier SBC's DSL service. In the longer term, content providers may need to explore revenue-sharing arrangements with network operators for the latter to be willing to invest the considerable capital required to upgrade their infrastructures and make broadband available to more subscribers and at higher speeds. Broadband Internet access charges alone may not generate enough revenue from these investments to make them attractive to the network operators, especially as the broadband connectivity market becomes more competitive. Because content owners stand to benefit from the wider availability of broadband access, they should consider finding ways for content revenue to help finance the network build out.

Improve the user experience. Content providers, network operators, software providers and device manufacturers have a shared interest in making the broadband consumer experience a favourable one. Content owners must ensure that these other vendors make broadband connections easy to install and configure and that they provide easily integrated devices and software. Content owners must work with other vendors to develop content, software and access devices that provide the right mix of features from the Internet and from traditional content distribution channels. All of these companies need to work hard at taking risk away from the consumer by developing standards that guarantee interoperability among products from different vendors and by resolving consumer concerns about security.

Invest in traditional content or risk cannibalisation. The very lack of homogeneity in networks and brand may provide European content providers leverage in the short term. But without economies of scale it is difficult to see major growth through broadband in the long term.

Invest in the growth areas of non-traditional content (gaming, videoconferencing, technology etc.) because it is growing faster than traditional content.

Recommendations for Network Operators

The increased number of residential broadband Internet subscribers creates new opportunities for network operators. Network operators can benefit from those opportunities by taking the following steps.

Offer multiple tiers of service. As residential broadband enters the mass-market adoption phase, new subscribers will come from increasingly price-sensitive segments of the market. Network operators should offer multiple tiers of service, including entry-level pricing as low as €30 per month aimed at new customers. Network operators also should provide attractive upgrade paths as new subscribers learn the value of broadband and become willing to pay more for a faster connection.

Adapt service offerings to meet the needs of mass-market adoption. As residential broadband enters the mass-market phase, network operators need to make Internet connections and home networks easier to install and configure. Network operators also need to be more aggressive in providing services that protect subscribers' computers from attacks through the Internet and that allow parents to prevent their children from accessing inappropriate content.

Invest in infrastructure. Network operators should prepare for the growth in broadband subscribers and faster connection speeds by investing in their network infrastructure. Network operators also should expect to see increasing demand for symmetric rather than asymmetric connections and should begin investing in the infrastructure that will enable them to satisfy that demand.

Provide billing services for content. Network operators should extend their existing billing relationships with subscribers by creating services that enable subscribers to access pay-per-use content and have the charges added to their monthly Internet access bill.

Create new services. Network operators should develop new services that will command premium prices to offset falling prices for basic access. Opportunities include directory services, dynamic provisioning of connections, and support for hard-to-implement applications such as multipoint videoconferences.

Partner with content providers. In the short term, content providers and network operators can benefit from joint marketing efforts, such as the one entered into by Yahoo! and SBC. In the longer term, network operators may need to explore revenue-sharing arrangements with content providers. These arrangements could help justify the considerable investment required to upgrade network operators' infrastructures and make broadband available to increasing numbers of subscribers, with symmetric connections and at higher speeds.

"IN JAPAN, WHERE MORE THAN 27% OF HOUSEHOLDS HAVE BROADBAND INTERNET ACCESS, 70% OF BROADBAND CONSUMERS INDICATED AN INCREASE IN INTERNET USAGE TIME, 27% INDICATED REDUCTION IN SLEEPING TIME, AND 21% INDICATED REDUCTION IN TV VIEWING TIME."

Source: Nomura Research Institute, 2002, quoted in International Telecommunications Union, *Promoting Broadband: The Case of Japan*

Recommendations for Telecom Suppliers

Plan for the first wave of adoption. The major impact of broadband over the next three years will not be in traditional content but the addition of video to existing applications – including conferencing, messaging and gaming – and the development of new applications that enable user- and community- provided video content.

Ascertain the economic implications of broadband when discussing the regulatory framework with the government.

Follow emerging standards that will probably be set by American companies. Monitor and embrace competing technology e.g. Personal Video Recorder (PVR), WLAN and Wi-Fi. Try to leverage European strengths in mobile business.

Closing Remarks

The main motivation for consumers to use a broadband Internet connection is the convenience of accessing Web content via a high-speed, always-on connection – not the ability to access movies or broadcast television.

During the next few years, revenues from content distribution via broadband Internet will be modest and will be limited to video-based premium content that augments or repackages existing media assets. The major impact of broadband in this time frame will be the addition of video to existing applications – including conferencing, messaging and gaming – and the development of new applications that rely on user- and community-provided video content.

Over the longer term, there is a significant revenue opportunity from content and applications that leverage broadband's unique characteristics – specifically, the greater interactivity made possible by high speed and low latency. Such content and applications are yet to be developed. Content providers need to invest in reconceptualising the design of their content in order to take advantage of this improved interactivity and in testing these new concepts with audiences – and they need to start now.

