



Microsoft

# The Broadband Business Model

## **Building a Broadband Business Model for Residential Access & Services**

October 1998

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### **Abstract**

A comprehensive Broadband Business Model is needed to accelerate deployment of last mile technologies such as Digital Subscriber Loop (xDSL) and Cable modem access for the consumer and small business markets. The model presented in this paper provides an overview to assist Network Operators in transforming their broadband business by reducing backbone costs and increasing revenues through the creation of new services, and sharing revenues from advertising, promotion, tele-marketing and transactions.

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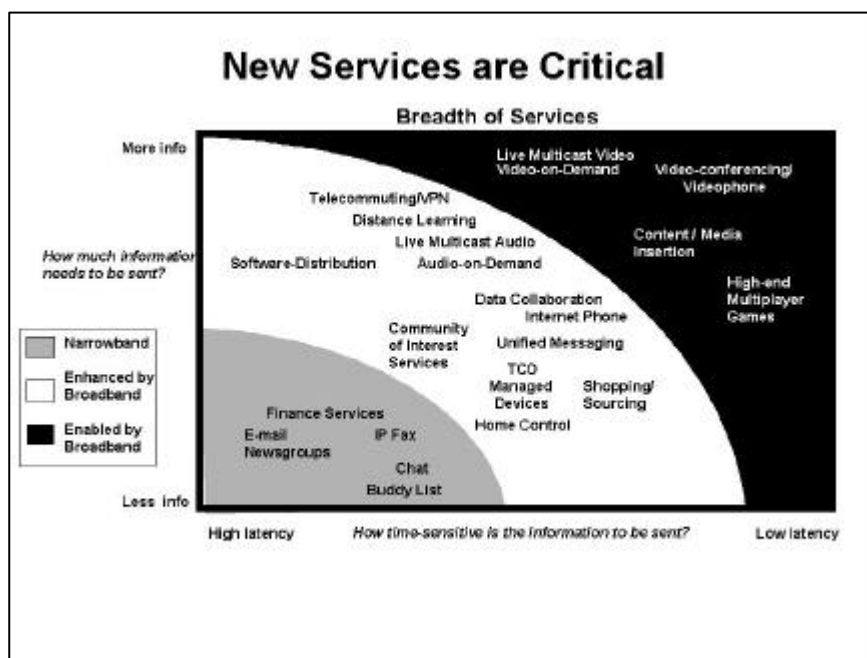


## INTRODUCTION

The next wave of Internet access will be via broadband access technologies such as xDSL and cable modem. In order to make this economically viable for Network Operators to deploy a Broadband Business Model is needed that provides an end-to-end roadmap for revolutionizing the role they play, and the revenues they earn, in providing broadband services for the consumer and small business markets.

Network Operators are ideally positioned for supporting the deployment of broadband technologies that will enable an array of new services. The demand for broadband service is accelerating – driven by needs ranging from the desire for faster Internet connections, to the growth of data transportation, to the need to support video conferencing and the delivery of infotainment and entertainment.

Figure 1 shows the breadth of service opportunities that can be offered by a Network Operator. From narrowband (56Kbps or less) services to services requiring more bandwidth (broadband). These services can be either enhanced by broadband but can work at narrowband speeds to those services that require broadband to function effectively. These are the service opportunities that will be addressed in this paper.



**Figure 0:** Broadband can enhance existing services and enable new service opportunities

A major challenge facing Network Operators is that many of them have been investing in backbone infrastructure, while facing downward pressure on connection prices while ever faster modems have enabled ever more traffic for what are often flat fees. To some, broadband technologies have been an invitation to lose money at a faster speed.

All of this is ready to change. The Broadband Business Model describes a means for the Network Operator to transform their business by reducing backbone costs and significantly increasing revenues through the creation of new services and sharing revenues from advertising, promotion, telemarketing and transactions.

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The Broadband Business Model radically shifts the economics of broadband services in favor of Network Operators. The first enabling step in this shift is the massive deployment of xDSL and cable modem technologies in a manner that significantly reduces the rollout cost to the Network Operator.

This model indicates that Network Operators can provide broadband service at standard Internet connection rates of US\$20 to \$30 dollars per month, and generate revenues from new broadband-enabled services and shared advertising income to subsidize the remaining bandwidth cost.

The Broadband Business Model goes far beyond subsidizing bandwidth deployment. It shows how Network Operators can recast their role from being the low-profit "last mile" of the Internet, to becoming the consumer's "first mile" gateway into a new world of rich services. Broadband services will transform the way in which people communicate, collaborate, conduct business, and enjoy entertainment. The Broadband Business Model provides a guide on how to get there.

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## INCREASING REVENUES AS THE "FIRST-MILE"

Currently, many Network Operators are caught in a financial bind in supporting Internet connections. Revenue opportunities for dial-up narrowband access are limited to flat fees, while consumers use faster modems, support costs increase, and traffic growth demands more bandwidth investment.

With the Internet traffic doubling in size every three and a half months, and Internet advertising revenue doubling every seven months, the infrastructure demands are growing at twice the rate as advertising revenue – nearly all of which stays with the content provider anyway, rather than going to the Network Operator. Market price sensitivity prevents these costs from being passed on to users, with much of the customer base being unwilling to pay the \$50 to \$100 dollars and more per month necessary to render broadband service profitable.

This is the bleak economic picture that exists for the traditional scenario in which the Network Operator simply serves as the "last-mile" link to the consumer.

### Becoming the First-Mile Gateway

The goal is to support Network Operators to move from the last mile access business to providing the first mile services. This creates new revenue, via the provision of new services similar to the call waiting, three-way calling, and voice mail provided to voice telephony customers today, plus new network, multimedia, and other powerful value added services.

Widespread broadband deployment presents Network Operators with the opportunity to radically improve the economics of their Internet business. They can provide network services as an unregulated business, acting as an Internet service provider (ISP) and offering other value-added services.

Some of these new services will generate significant income from new forms of targeted advertising and personalized telemarketing.

Wide scale deployment of broadband will fuel demand for value-added services such as:

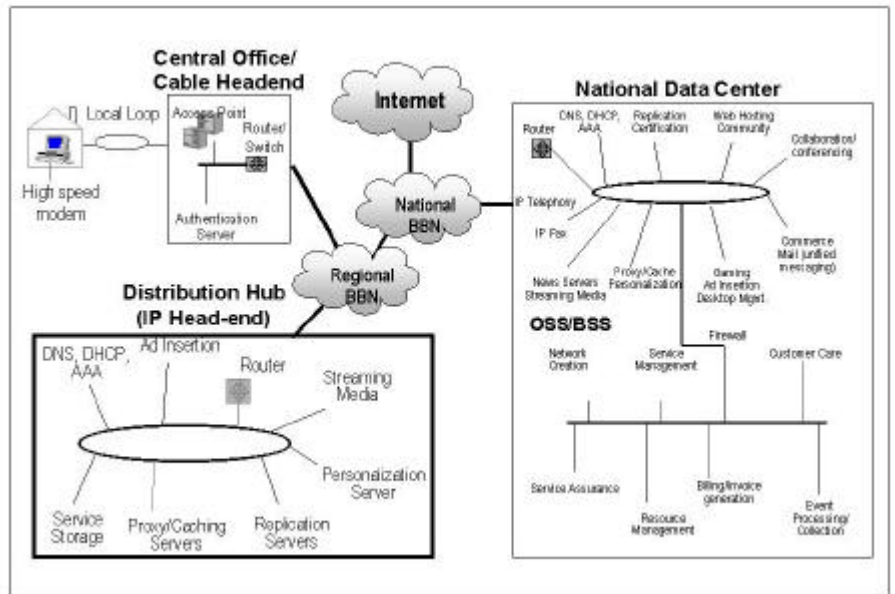
- Enhanced telephony
- Virtual Private Network (VPN) telecommuting
- Internet and intranet services
- Business services
- Electronic commerce
- Education and distance learning
- Home data services

As broadband access becomes universal in homes, Internet-based video-on-demand and other bandwidth-dependent forms of infotainment and entertainment will soar, and video mail could supplant e-mail in personal messaging.

### IP Headend

In order to deliver these services in a manner that maximizes profit potential there is a need to move these services closer to the edge of the network and near the distribution network or local loop. Thereby reducing the dependency and costs associated with high-speed backbone networks. Distribution Hub such as an IP

headend fits this need. It is essentially a distributed data center with the capability of supporting local ad-insertion revenue opportunities, proxy caching, streaming media, personalization and other enhanced IP services that will help drive incremental revenue. Microsoft along with industry support is working to make this capability a reality. Figure 2 provides a glimpse into reference architecture for the IP



**Figure 2:** An IP Headend is required to deliver First Mile services.

Headend.

### New Sources of Revenue

The more universal the deployment of broadband, the greater will be the revenue generating opportunities for Network Operators, which is why the Broadband Business Model calls for subsidizing consumer bandwidth through creating new services and advertising revenues opportunities.

#### Advertising Revenue

A parallel can be drawn between conventional Network Operator participation with the Internet and newspaper publishing. For comparison purposes in the consumer market, a local newspaper charges about US\$12 per month for home delivery, pays about US\$3 per paper per month to the paper boy, and earns about US\$70 per month in advertising revenues per subscriber. No longer should Internet access be the revenue ceiling for Network Operators. The newspaper industry clearly view subscriptions as the revenue floor with the majority of revenue derived from advertising.

In today's business model for the Web, consumers pay about US\$20 per month for Internet access, but the Network Operator often plays more the role of the delivery agent or paperboy, receiving perhaps US\$3 per month per user. And the Network Operator typically has no share in advertising revenue.

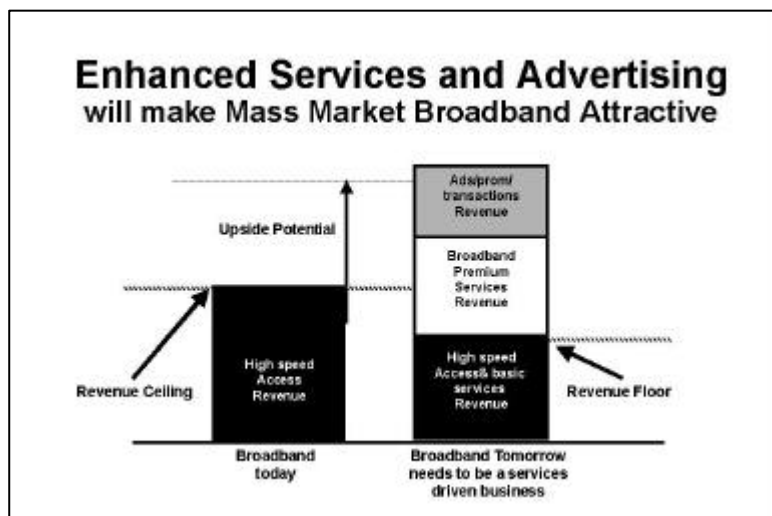
Widespread broadband deployment will enable new forms of content that carry

new opportunities for advertising and marketing revenues. For example, broadband access will allow video delivery for information or entertainment, in which a portion of the screen is reserved for advertisement. In much the same way that television carries a mixture of national and local advertisements. Local ad insertion technology is already available for streaming media services. Network Operators can use this capability to reserve time slots for selling the ads that frame video delivery.

Measured advertising, such as classified ads, in the United States total approximately \$100 billion dollars annually, with another \$130 billion being spent on promotion and \$200 billion on telemarketing. Estimates indicate that approximately 6% of advertising will be done on the web, and adding promotion and telemarketing brings total annual revenues to \$25 billion.

The Web is useful for promotion because advertising can be targeted, rather than being sent at random. Network Operators are ideally suited for centrally storing personal customer information including occupations, demographics, location, and other factors. \$200 billion is spent every year on telemarketing in the U.S, which is often not targeted properly.

The coming years should see revenues from advertising, promotion and transactional activities increase to US\$30-40 per-month per-user, with the Network Operator receiving 20% or US\$6 to \$8 of this for providing delivery. Figure 3 shows how access revenues can be the revenue floor and not the revenue ceiling, which is where most of the market is today.



**Figure 3:** Broadband access can be subsidized by supplementing advertising, promotional and transactional revenues with additional revenues from premium services

#### Multimedia Communication Revenue

Technologies like Universal xDSL (also known as G.lite) is a great transport technology for augmentation of data services with multimedia communication services. This will substitute for perhaps 20% of today's voice service, providing Network Operators with perhaps US\$10 per user per month. There will be immediate demand for video, audio and data communication in the business sector

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for real-time conferencing, marketing presentations, and distance learning. Multimedia communication revenue will grow as computer makers make low-cost cameras a standard component, and broadband in the homes will make video-mail as popular as e-mail is today.

#### System Management Revenue

Network Operators can also participate with the Microsoft Zero Administration Windows® program in which operating system and application updates would be delivered to users over the Web. The consumer might pay US\$7 per month for this, with the participating Network Operator retaining perhaps 40% of this or \$3 per-user per-month.

#### Using Revenue to Accelerate Broadband Deployment

The three basic revenue sources noted above cover half the US\$40 per-month cost of deploying broadband access. The other half is covered by the US\$20 access fee users are already accustomed to paying for basic Internet connection.

<b>Advertising Revenue</b>	\$7 per month
<b>Multimedia Communication Revenue</b>	\$10 per month
<b>System Management Revenue</b>	\$3 per month
<b>Consumer Access Revenue</b>	\$30 per month

With broadband access (256Kbps minimum) offered to consumers at US\$30 per month the market in the U.S. alone should grow to 40 million homes in the next 5 years, representing a US\$20 billion consumer market.

The following sections outline the services and technologies that are being delivered by Microsoft and 3<sup>rd</sup> parties that will help enable and drive this market forward.

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## BENEFITING FROM TECHNOLOGICAL ADVANTAGES

Traditional public network systems were based on circuit switched and proprietary mainframe technologies. Operational support systems, customer service networks, and the like were implemented specifically for these systems. Network Operators are now converting from being dependent on mainframe software to being, Internet standards based, client server object oriented full service operational systems. New network multimedia features allow data including video and audio enabled applications. The unification of voice telephony, video entertainment, and computer data, will create tremendous revenue opportunities. The following is a summary of the key innovations and technologies that are making this a reality.

### New Compression Technologies

New compression standards such as MPEG4 and H.324 make the PC the next major standards based service platform.

Newer compression technologies than MPEG2 can create full motion quarter-screen video at 256Kbps-512Kbps wholly in software. This can easily expand to a full screen for TV Web-viewing, and such services can be delivered efficiently over the Internet or corporate intranets.

Also, partial screen video leaves the rest of the screen available for advertising and similar materials to provide additional revenues. Using a small fraction of the huge bandwidth needed for MPEG2 video, enables a completely different and more profitable business model for the Web. The software to support all these capabilities already exists in current releases of Windows NT Internet Information Server®.

Ever increasing scalability will let Windows NT-based servers fill the most demanding carrier-class needs at a fraction of the cost of UNIX platforms.

### Providing Quality Streaming

Full motion quarter screen 256Kbps video, plus advertising, and high-speed content retrieval, can be performed with the 0.5 to 1.0Mbps service planned by the DSL consortium. Higher quality for advertising and transactions justifies greater revenues, but only up to the point where costs rise faster than value, as occurred with Interactive TV. Using 256Kbps streaming media, instead of 3Mbps, and leaving 75% of the screen available for advertising and the like, rather than having two minutes of commercials every 10 minutes, as with TV, can make the Web profitable at low cost.

Quarter screen streaming media at 256Kbps full motion video enables high-value and personalized programming such as expatriate television, breaking business news, keynote conference speeches, analyst morning calls, mutual fund daily updates, and other services, for which \$20 per month can be charged for several years. Quarter screen full motion is also the quality level at which subscription business models become viable, including sports, night clubs, bookshop readings, distance learning, and other services, and leaves large portions of very valuable screen real estate for advertising, promotion, and transactions.

Unlike MPEG2 entertainment quality video, these lower data rates require no additional cost for the modems in user PC clients. In addition, the head end DSLAM equipment used to send data can share up to eight subscribers on a single existing robust, inexpensive digital signal processor (DSP) chip. Later technology will allow

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DSLAM densities of up to 200 lines per shelf by 2000, underwriting per line capital costs of under \$200, or about \$5 per month depreciation over three years. \$5 per month DSL equipment costs can help make consumer services profitable if backbone costs can be greatly reduced, and advertising revenue is included.

### Camera Prices Dropping

Prices of user hardware are dropping rapidly, with PC cameras now priced at under \$150, and over 6 million shipped by the end of 1997. Cameras will soon be integrated into every PC for less than \$25, and external adapters will let any Handycam or VCR be used to capture high quality video. Simple editors will allow anyone to create video mail, with viewers being sent in the same envelope, so no special software is needed. These services will require no hardware upgrades, freeing dollars in labor and lost time.

### Reducing Backbone Costs

Intelligent network functionality, such as caching and multicasting, will allow broadband services to be provided without a tremendous increase in backbone costs, which is vital to increase the profitability of Network Operator services.

#### Intelligent Caching

Caching greatly reduces backbone traffic. This is important because the backbone represents 40% to 50% of present costs for Web service even with average access rates being below 30 Kbps.

Caching simply stores popular material locally for repeated use by others. Storing popular content on a caching server in the POP or central office serving a given user population keeps data from having to repeatedly transfer across the backbone. The first access of a given piece of data from a remote site causes it to transparently transfer to a local POP server, making the second access entirely local, both improving service quality and lowering delivery costs. If desired, only frequently accessed data may be cached, economizing on storage while still eliminating most backbone traffic.

A tremendous benefit occurs with intelligent caching, as 80% of advertising revenues will be associated with 50% of the most watched content, which can be locally stored, vastly reducing bandwidth use.

#### Multicasting

Multicasting allows unlimited users to view a single datastream, providing a great benefit over traditional Web transmission in which a duplicate datastream is sent for each viewer. Without multicast ability, a live video session might be now be limited to only about 2,000 users, even with a 45 megabits per second feed to 28.8 kbps user modems. With Web radio only about 4,000-8000 simultaneous customers can be serviced, even on a large site with millions of users. Multicast will serve any number of users, with only one copy of data on the backbone.

Multicast will also allow true "channel programming" with live 'casts and feeds of content not available on cable or satellite such as localized news feeds, or receipt of content at work where a TV is inappropriate. The technology for subscribing to, joining and leaving multicasts already exists in Windows NT.

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## WORK FROM HOME, SOHO AND SMALL BUSINESS BROADBAND OPPORTUNITIES

Home based workers will benefit from economical high bandwidth service, providing a natural migration path from the business market to home users, of which there will be an estimated 15 million in the year 2000, and 40 million by 2002.

With 15 million professionals using xDSL or cable modem to work at home perhaps 10 hours per week, there would be an \$80 per-month market including corporate network access, for a total of \$15 billion per year. This initial revenue can create the momentum and experience to make DSL a consumer platform as the year 2000 approaches.

### Content Presentation Services

Just as today newspapers use multiple new sources like Bloomberg, Reuters and Associated Press, Network Operators can act like a video provider which consolidates various pieces of video content and makes them available to a user on their PC.

### Small Business Services

Microsoft Small Business Server provides printing, file systems and indexing and retrieval, in addition to hosting applications, electronic commerce. Several independent software vendors are providing PBX and a single mailbox for e-mail, news, fax, and voice that works with this solution. All of this data can be received on the client's desktop, or over the phone system, as desired.

### Enhanced IP Telephony Services

Many IP-based enhanced telephony services like prepaid calling cards, international callback services, internet call centers and others will be enabled by the powerful Microsoft Windows NT platform.

IP Voice allows economical packet based switching, rather than costly circuit switching. It also enables data conferencing, and includes support for standards like T.120, which allows users to chat either in pairs or larger groups.

IP fax is a store and forward application that operate over the Internet, and so need not use the normal voice network.

### Zero Administration Services

Network Operators, as earlier noted, can derive revenue by participating in Microsoft's plan to convert the several thousand dollar annual administration cost of Microsoft Windows and Microsoft Office into carrier class Zero Administration Windows® services for both business and consumers. Another compelling opportunity is to provide "Virtual back office" services, such as software distribution and upgrades.

These distribution channels will provide Web sites where software can be purchased, rather than at retail outlets or by mail order. Users can even subscribe to a channel devoted to software distribution and upgrades, which provides an opportunity for entrepreneurs to install and monitor the content used, with the Network Operator collecting a monthly fee.

This same service can be used to obtain new drivers or other upgrades as necessary. Personnel can perform upgrades, and provide other managed services such as data backup, virus cleaning and other valuable services. Thinking of

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computers as a service rather than a product will not only earn new revenue to providers, it will lower the total cost of ownership to users.

#### Remote Management Services

Network Operators can provide customer self-activation and provisioning, by providing access to billing, customer service, and settlement services. They can also provide web enabled call forwarding and rejection, call restrictions, locking, and others. These can be accessed by users without having to contact a service provider, which is easier for customers, by saving them time and telephone calls. A future service, called win tone, will be analogous to a dial tone. They can also use Microsoft software to become a virtual information technology department for small businesses.

Rather than just hosting Web servers for corporations, in the future Network Operators can host and manage database servers, messaging servers, and others for the small business customers.

#### Distance Learning

Another vast market is real-time and on-demand delivery of remote training and distance learning programs. Businesses can save on travel costs by using distance learning to update sales and field personnel, instead of flying people into a central training center.

#### Video Desktop Publishing

Network Operators can profit from providing video desktop publishing services for video mail and distance selling. This eventually leads to the creation of a video communication infrastructure, which will allow them to charge \$20 per month to millions of subscribers. Video-mail may replace the ubiquitous e-mail of today's Internet as the preferred mode for most communication, being both quicker and more informative. Managing video-mail services is a natural extension to voice-mail services, and then one small step to hosting other video services for both business and consumers.

#### Providing Authentication

DSL modems may include smartcard readers to enable robust authentication services to be provided by Network Operators, perhaps by providing an empty multifunction smart card with the DSL activation fee. Charges can be levied to service providers for services such as storing access codes, token cash, royalty services, and home banking. Such cards can store images of normal credit cards, bringing electronic commerce about much faster than expected, and in a manner which is a natural extension for Network Operators already familiar with credit card transactions.

Retailers are introducing signature capture pads to reduce credit card charge backs, and this customers familiarity will allow them to be used at homes and offices to enable secure Web transactions. These pads may be used in conjunction with card readers, to let customers use signatures to acknowledge transactions such as opening brokerage accounts, borrowing, leasing, and the like. This will also save the 1% surcharge applied by the credit card industry to direct mail transactions without signatures, including Web transactions which use certificates.

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## POWERFUL NEW CONSUMER SERVICES

Consumer service profitability can also be raised, as noted earlier, through revenues from advertising, promotion, telemarketing. This allows deployment of services that have zero or low cost to consumers, just as today many on-line services, like web guides, community guides, and yellow pages, are being provided profitably.

Network Operators can provide aggregated content presentation services in which they bundle content with access, much as European telephone companies provide subscription services like mailings, personal web page hosting.

### Localized Consumer Advertising

Just as the cable TV, broadcast television or radio industries provide time slots in which localized advertising can be added to the data sent by the global content provider, a portion of a Web page can be used to display content, with the remainder available for locally inserted advertising, telemarketing, and promotion. Per user costs are greatly lowered, as the backbone need transfer far less data. Dividing Web pages into three or more portions, with global data remaining unchanged, as with a TV signal, lets advertisers rent screen space, which can be personalized to target certain types of users. Local insertion of personalized local advertising, promotion and telemarketing. lowers costs because the backbone does not repeatedly transfer animations, videos, and other high bandwidth data.

Only global content, such as a concert, for example, will be multicast, with all user advertising being localized to the target area, allowing each city to advertise just their own upcoming concerts.

#### Targeting Viewers

Personalization can also be related to the global content being viewed. For example, while a NFL football game is being displayed in one frame via multicast, a shoe vendor can insert national advertising for a new brand in a second frame. A third frame might display a promotion being offered by a local shoe store, perhaps offering the first 100 viewers who click on an icon 10% off on those shoes. A transaction window would allow the shoes to be purchased using the customer credit card.

The integration of these functions allows content, advertising, promotion, and transactions to be connected. During a transaction a user who enters their credit card number might see an advertisement for a new car. All of this could stall the game if desired, which would be spooled back at the POP, in a manner similar to a virtual VCR with interactivity. This would allow information on demand, even if part of the game is no longer live.

#### User Profile Personalization

The unique connection to each user's home or office allows data to be totally personalized, based on user profiles obtained by a Network Operator or other trusted party. This is a highly effective way to do advertising or telemarketing, because profiles might include data about the interests of each user, the number of computers they own, approximate family income, and the like. This data will only need to be entered once, rather than repeatedly on every Web site, as at present. Personalized data like this offers higher value, and therefore greater profit, to them.

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#### Community of Interest Network Services

Service providers can offer community of interest hooks, to let users join groups related to their special interests, like chess, gardening, business, child care, and others, as well as standard Internet access.

#### Consumer Communication Services

Unified messaging is the integration of e-mail, fax, paging, and voice mail into one service. In addition, enhanced consumer IP telephony services enable lower cost domestic and international long distance calls. Video communications, which are treated like voice mail, but which offer far richer data comprise a vast future opportunity in the consumer market, by allowing travel videos, for example, to be sent to relatives. Consumers will also use video conferencing when it becomes available.

#### On-line Education

As with distance learning in the corporate environment, on-line education is another powerful opportunity. Several universities are beginning to work with ISP's to provide home-based video and audio learning. High-speed connections to the residential marketplace will provide even richer services and greater innovation in education.

#### On-line Shopping and Banking

On-line banking features can allow fully automate transactions, while providing two-way video access to a bank agent if necessary. Similarly, a user can select a product while shopping on-line, and an agent can appear to describe the benefits of the product, as a secure electronic commerce mechanism is enabled for that transaction. Sites can offer audio, music, and video, as well as software download features, reducing the need for CD-ROM-based software distribution.

#### Entertainment on Demand

Media streaming will enable audio and video on demand, unlike existing cable video services, which are limited to scheduled programming. This will let viewers watch the news, or television programs, at their own leisure. This service can be integrated with localized advertising, and promotions personalized to that user, along with multicast audio and video. Host services can also be provided for a data broadcasting bank with video programmed for users, who employ an electronic program guide to make selections. This turns a conventional PC into a "Broadcast PC".

In addition to conventional Internet access through a television, data can also be broadcast which corresponds with particular programming. As selections are made in an electronic program guide, highlights can be shown of a particular show, which would combine data with analog video. DSL functionality can also be provided with a television platform, to enable much higher speed Internet TV functionality, including features such as an answering machine service in which viewers watching television can either interrupt a program to take a call or let it go to a server. An Internet TV video mail and conferencing service, much like that used in corporate settings, can also be created.

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## SUMMARY

A well designed Broadband Business Model gives Network Operators an end-to-end roadmap for revolutionizing the role they play, and the revenues they earn, in providing broadband services to the consumer and small business markets.

There is no question that “Always On” broadband technologies will enable an array of new services. The demand for broadband service is accelerating – driven by needs ranging from the desire for faster Internet connections, to the growth of data transportation, to the need to support video conferencing and the delivery of entertainment.

The model is especially effective because it provides significant new revenue sources for Network Operators. They can provide network services as an unregulated business, acting as an ISP and offering other value-added services, while creating new revenue streams from advertising, video communication, and “Zero Administration Windows®” system management.

Consumer service profitability can be enhanced through revenues from advertising, promotion, telemarketing, and system administration.

On the hardware side, Network Operators benefit from the emerging standards such as G.lite (splitterless ADSL) and DOCIS (cable modem). Computer makers will include ADSL modems on motherboards that can be activated through a software “wizard” program, meaning Network Operators will be able to activate service from the Central Office without rolling trucks, laying wire, installing network interface cards, or configuring systems.

All of this means that public Network Operators are ideally positioned for supporting the deployment of broadband and in an extraordinary position to benefit from the world of new services that this broadband deployment will bring. Broadband communication will transform the way in which people communicate, conduct business, and enjoy entertainment. The Broadband Business Model shows how they can recast their role from being the low-profit “last mile” of the Internet, to becoming the consumer’s “first mile” gateway into this new world of rich services.

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INFORMATION

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