Multichannel Delivery on a Web Site

A Web site must allow customers to conduct business over that site. For many types of transactions, documents are the result of the interaction, be they a summary of the transaction or documents that support the transaction. This is the case when an individual wants to sign-up with a bank online. The traditional method was for the bank to send a sign-up kit to the potential customer. By enabling multichannel **delivery** and digital signatures, the sign-up transaction can be completed online. Customers can choose to receive the required disclosure documents online or in hard copy form mailed to an address they specify.

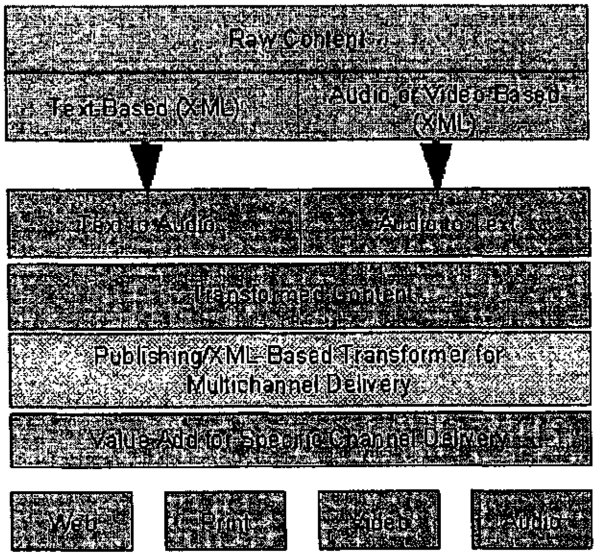
Developing an architecture that will enable seamless multichannel **delivery** takes concerted planning and a commitment from management, as this effort will require changing a lot of behavior. While it will take some time to deliver to multiple channels, enterprises should focus on being capable of delivering to at least two channels. For those who use paper as a **delivery** medium for statements and bills, the focus should be on enabling those documents to be viewed electronically by customer service representatives and the actual customers. By YE04, 40 percent of corporate **content** will support **delivery** over at least three different channels instead of the single or dual channels used in 2001 (0.7 probability).

A **content** publishing architecture (see Figure 1) is a high-level view of how to leverage **content** from one channel to another. Within the context of this architecture, some degree of **content** customization will still be required. Implicit in this is the incorporation of lots of metadata into the raw **content**.

Enterprises should develop a comprehensive approach to **content delivery** as part of an overall **content** management framework. Much of the work involved with this will be to understand the origins and the process owners of the **content**. Leveraging a **content delivery** architecture can help minimize **content** redundancy and make the transformation and **delivery** of the **content** as automated as possible.

Figure 1

Content Publishing Applications Architecture



Source: Gartner Research

Bottom Line: The era of single-channel **content delivery** is over. In moving toward multichannel **delivery**, a **content** strategist can help make sense out of what can be a complex and cumbersome migration. Enterprises that leverage the power of multichannel **content delivery** will gain a competitive advantage over those that do not.

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services will trail DSL access revenue. Cable modem access pricing is and will continue to be discounted to improve market penetration in the highly price-sensitive and increasingly competitive consumer market segment. Cable modem's revenue and profit will increasingly come from overlaying value-added services and applications (for example, voice, multimedia/video). DSL access revenue, on the other hand, is primarily generated from the less price-sensitive telecommuter (generally subsidized), SOHO and high-end consumer segments. The current DSL price structure appears to more closely reflect the real cost of service, but going forward, average price points will continue to increase (as price-per-Kbps drops) because of increasing delivered DSL bandwidth and bandwidth demand to support bandwidth-hogging applications.

Table 1

North American Residential High-Speed Access Subscriber Forecast, in Thousands

[return to List of Tables]

Service Category	1999	2000	2001	2002	2003	2004	1999-2004 CAGR (%)
ISDN-BRI	824.4	1,030.5	1,239.6	1,369.3	1,442.5	1,445.3	11.88
DSL	531.2	1,729.0	3,488.2	6,172.3	8,809.9	11,454.2	84.82
Wireline Cable Modem	1,861.0	4,334.1	7,193.3	10,459.8	13,308.9	15,738.5	53.27
Fixed Wireless Cable-MMDS	30.8	164.0	447.0	843.0	1,294.9	1,715.6	123.45
Satellite (Two-Way)	10.0	75.5	552.5	1,182.5	1,690.0	2,472.0	201.03
Total	**3,257.4**	**7,333.1**	**12,920.5**	**20,026.8**	**26,546.2**	**32,825.6**	**58.73**

Source: Gartner Dataquest (June 2000)

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Table 2

United States Residential High-Speed Access Subscriber Forecast, in Thousands

[return to List of Tables]

Service Category	1999	2000	2001	2002	2003	2004	1999-2004 CAGR (%)
ISDN-BRI	800.8	1,001.0	1,201.2	1,321.3	1,387.4	1,387.4	11.6
DSL	439.5	1,491.7	3,009.4	5,324.9	7,523.1	9,814.2	86.1
Wireline Cable Modem	1,373.5	3,355.8	5,872.7	8,809.0	11,451.8	13,742.1	58.5
Fixed Wireless Cable-MMDS	28.8	144.0	390.0	735.0	1,141.9	1,535.6	121.5
Satellite (Two-Way)	10.0	75.0	550.0	1,175.0	1,675.0	2,442.0	200.3
Total	**2,652.6**	**6,067.5**	**11,023.3**	**17,365.3**	**23,179.2**	**28,921.3**	**61.3**

Source Gartner Dataquest (June 2000)

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Research Studies

III.Population Characteristics

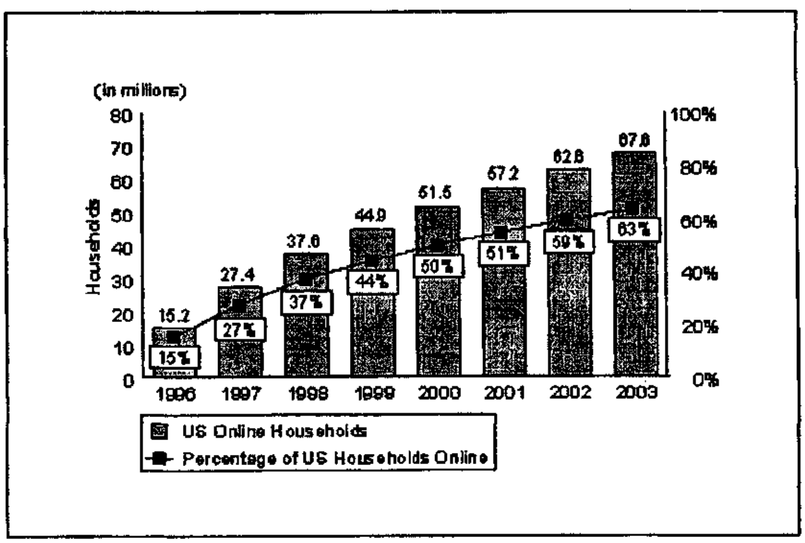
Given the clear differences in attitudes and expectations among different segments of the online population, it is important to understand the size of these segments. How large is the online population? What is its composition in terms of age, gender, income, and geography? How will these distributions change over time? The answers to these questions provide a sense of what segments should be targeted now and how strategies must adapt in the future.

Total Online Population

Two-thirds of Households Will Be Online by 2003

At the end of 1998, 37.6 million households—or 37 percent of total US households—were online. Jupiter estimates that the online household population will expand to 67.6 million households—or 63 percent of total households—by 2003. This represents a compound annual growth rate of 12 percent. With an expected doubling of population size and correspondent penetration of a clear majority of American households, the Internet will establish itself as a mass-market medium by 2003. Online penetration in 2003 will rival that of cable TV, providing a massive customer base for advertising, content, and commerce ventures.

Figure III.1: U.S. Online Households, 1996-2003



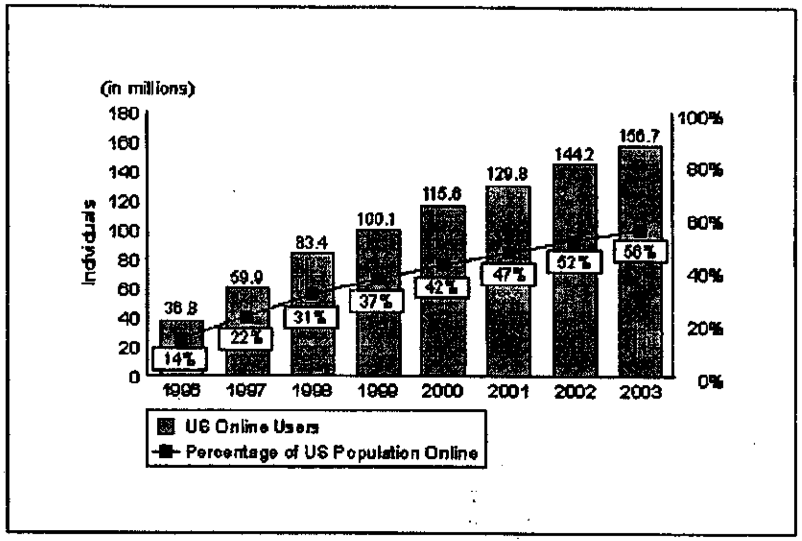
SOURCE: JUPITER ANALYSIS

(PUB. 7/99)

One-half of US Population Will Be Online by 2003

Given incremental users outside the household (e.g., workplace users, youth at school) and the increase of additional users within the household, it is worthwhile to also examine growth in individual users. Jupiter expects the number of online individuals to reach 157 million by 2003, up from 83.4 million users in 1998—a compound annual growth rate of 13 percent. Online penetration of US individuals will grow from 31 percent in 1998 to 56 percent by the end of 2003.

Figure III.2: US Individuals Online, 1996-2003



SOURCE: JUPITER ANALYSIS

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Consumer Broadband Satellite Services

A Global Analysis of Key Players and Market Opportunities

October 2001

NORTHERN SKY RESEARCH

Northern Sky Research is an international market research and consulting firm specializing in broadband technology and Internet applications. Northern Sky Research primary areas of expertise include satellite technology, cable and wireless networks, and content/new media markets.

Our services and clients cover the entire globe. With extensive expertise in all geographic regions and a number of broadband sectors, Northern Sky Research is a leading provider of in-depth market insight and analyses. Our analyses allow our clients to stay a step ahead of the competition and plan for future opportunities in all markets.

With expertise across a number of sectors, Northern Sky Research has quickly gained a reputation as a premier market research and consulting firm. In fact the company is often quoted as an expert in many leading publications such as The Wall Street Journal, New York Times, Washington Post, Business Week, Time Magazine and Forbes.

Northern Sky Research clients include both startups and leaders in the various broadband industries. Current clients include equipment vendors, service providers, network operators, systems integrators, financial institutions, intergovernmental organizations, trade associations and technology providers.

Northern Sky Research's first report of 2001, *Broadband Satellite Markets: A Comprehensive Analysis of Trends and Opportunities*, analyzes the market for broadband satellite services across the globe. The report was published in July 2001.

REPORT DETAILS

Consumer satellite access has remained a central focus for satellite players over the last five years. As broadband Internet demand grows exponentially, satellites are seen as a way to bypass inadequate terrestrial infrastructure and offer service to unserved users. However, technology and cost limitations have forced many satellite companies to scale back aspirations and delay service. Based on these trends, the question arises: Can satellites adequately fulfill the long-term requirements of the consumer access market?

This new report from Northern Sky Research provides a complete analysis of the global consumer broadband satellite market, including potential consumer demand and vendor supply over the next 5 years. The report profiles key service providers and equipment manufacturers, as well as future services expected for deployment over the next twenty-four months.

Based on a conservative and thorough forecast methodology, there appears to be a significant market opportunity for satellite players in the consumer arena, especially across North America, Europe and Asia. If they live up to their advertised potential, Ka-band systems threaten to upset the status quo with existing consumer Ku-band systems and have the potential to compete with terrestrial alternatives on both a performance and cost basis.

Primary Elements of the Report Include:

- Regional and Global Forecasts for Consumer Broadband Satellite Access Services
- Review of Trends, Opportunities and Market Potential for Equipment Vendors
- Review of Existing and Future Consumer Service Providers
- Trends in Market and Technology Development, Including the Impact of Ka-band
- Discussion and Assessment of Competing Broadband Access Technologies
- Profiles of Over 30+ Companies in the Satellite Services and Equipment Markets

Who Would Benefit From this Report:

- Satellite Operators
- Satellite Service Providers
- Network Service Providers and Carriers
- Equipment Manufacturers and Integrators
- Financial Institutions and Potential Investors
- Satellite Manufacturers
- Satellite System Software Developers
- Content Delivery Networks (CDNs)
- Terrestrial-Based ISPs
- Launch Service Providers
- Consumer/Entertainment Content Providers

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BROADBAND SATELLITE MARKETS

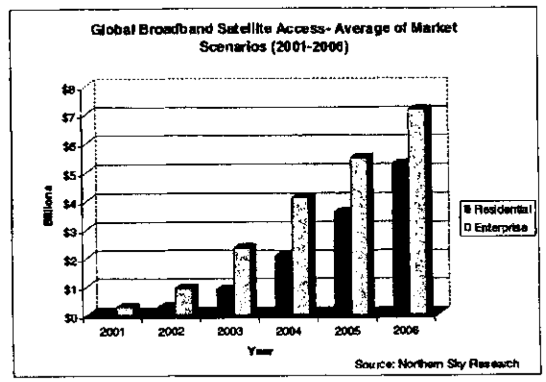
A Comprehensive Analysis of Trends and Opportunities

400 pages - June 2001 - 241 Exhibits

This new report from Northern Sky Research analyzes the market for broadband satellite services across the globe. The report provides a comprehensive analysis of the broadband satellite market, where both new and established satellite companies are now positioned for growth. A thorough review of viable applications and prospective market opportunities is provided to show that satellites do have a role to play in the broadband sector. Trend analysis and competitive profiles will also assist satellite players to assess their positioning in the emerging broadband satellite market.

Despite the rapid buildout of terrestrial access technologies, there appears to be a significant market opportunity for satellite players in a few key segments. A vast majority of the Internet population will remain unserved by broadband access for years to come. In addition, increasingly complex Internet content is creating massive gridlock that terrestrial networks have been unable to adequately remedy. Both broadband access and multicast services appear to still hold great promise for satellite companies, especially as the Internet becomes a truly global network.

As new satellite capacity is launched and demand inevitably increases for Internet services, satellite players stand to benefit from a multi-billion market in the next 5-10 years. Both service providers and equipment/ technology vendors should see sizable market opportunities across the globe.



Primary elements of the report include:

- Regional and Global Forecasts for Broadband Satellite Access and Multicast and Content Distribution Services
- Review of Trends, Opportunities and Market Potential for Equipment Vendors
- Bandwidth Demand for Broadband Satellite Services
- Trends in Market and Technology Development
- Review of Viable Satellite Multicast and Content Distribution Services
- Extensive Profiles of Companies in the Satellite Service/Operator and Equipment Markets- Interviews Held with Over 150 Companies.

Profiles Include:

Air TV Ltd	EMS Technologies Inc	InfoLibria	NDS	StarBand
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Aloha Networks	Europe*Star	Intelsat	New Skies Satellites	Tachyon
AlphaStar/SkyCrossing	Eutelsat	International Datacasting Corp	Norsat International Inc	Telesat Canada
American Multiplexer Corporation	GE Americom	IP Planet	OrbLynx	Tenzing Communications
AsiaSat/SpeedCast	Gilat Satellite Networks	IPricot	PanAmSat	Terayon
Boeing	Gilat/Spacenet	Irdeto Access	Radyne ComStream	Thomcast
British Telecom Broadcast Services	Global Convergence Technology	KenCast	Raytheon	Verestar
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Northern Sky Research clients include both startups and leaders in the various broadband industries. Current clients include equipment vendors, service providers, network operators, systems integrators, financial institutions, intergovernmental organizations, trade associations and technology providers.

About the Author:

Christopher Baugh, Founder & Principal Analyst

Prior to forming Northern Sky Research in 2000, Mr. Baugh served as Senior Analyst for Pioneer Consulting and authored *Satellite Mediacasting: A New Model for the Internet* and *Next Generation Broadband Satellite Networks.*

Prior to Pioneer, Mr. Baugh was an International Trade Specialist and Economist for the U.S. Department of Commerce in Washington, DC. Mr. Baugh holds a Bachelor's Degree from Westminster College and a Master's Degree in International Economics from The George Washington University.

Mr. Baugh is also a monthly columnist for *Satellite Broadband* Magazine.

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Jupiter Media Metrix

Attracting Consumers to Broadband Services in the Absence of Killer Applications

Lead Analyst:
Zia Daniell Wigder
Contributing Analysts:
Dylan Brooks, Joe Laszlo

Concept Report
August 24, 2001

SBC plans to offer enhanced broadband services to all DSL subscribers on SBC's network in certain areas, even if those subscribers use third-party ISPs. This battle for control over broadband services signals a shift in focus from access to applications.

Key Questions

- How are relationships between ISPs and broadband service providers (BSPs) evolving?
- Have any value-added features emerged with unique broadband appeal?
- What broadband applications are attracting a large share of the broadband audience?

Key Finding

Although several applications have a significant number of broadband users, applications that are uniquely popular among the broadband community remain elusive. ISPs should consider bundling security features early on. Security is currently the one application with a large user base that skews toward the broadband demographic.

Better to Cultivate Consumers than to Alienate Them

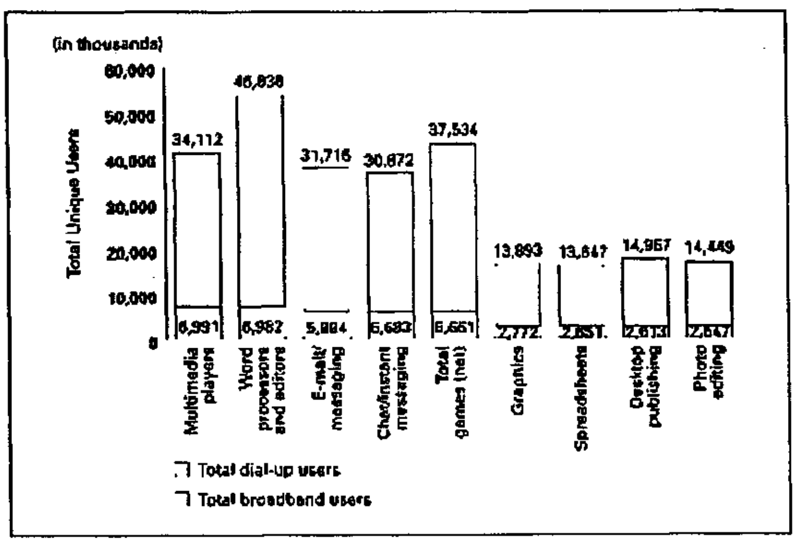
SBC's recent move, while affecting only a minority of subscribers on SBC's network (over 90 percent already subscribe to SBC's ISP services), is a likely harbinger of events to come. Jupiter has long recommended that BSPs, whether cable modem or DSL providers, leverage their infrastructure to enable the distribution of broadband applications. However, customer ownership is likely to become an increasingly contentious issue between ISPs and BSPs—ISPs depending on BSPs for their broadband infrastructure. Rather than attempting to circumvent ISPs and sell directly to end users, Jupiter advocates working with ISP partners to co-market services that take advantage of the infrastructure of BSPs. By cultivating these relationships, BSPs ensure a strengthened marketing channel for their services and simultaneously help deflect regulatory scrutiny of their practices.

For Applications, Popular with Broadband Equals Popular with Dial-up

Identifying applications to peddle to broadband users will prove to be as challenging as structuring relationships to distribute these applications. Most applications that appeal to the broadband audience also remain popular among narrowband users. (See Figure 1.) Despite the high absolute numbers of broadband users, however, none of these applications attracted especially high percentages of broadband users. Even bandwidth-intensive applications, such as multimedia players and graphics, registered only slightly higher-than-average percentages of broadband users: Both had broadband user penetrations of 17 percent as compared with approximately 13 percent for software applications overall—broadband users currently make up approximately 12 percent of online individuals. Streaming media players are not likely to skew toward broadband because such players are currently used for audio more than for video, and player makers target the widest possible audience. The dominance of dial-up makes it difficult for applications providers to tailor their offerings to appeal to broadband users. However, for some applications, usage intensity differences offset dial-up dominance. For example, dial-up users made use of applications in the e-mail and messaging category for an average of 27 minutes per usage day, whereas broadband users did so for an average of 33 minutes per usage day. Other applications categories with strong average usage disparities included chat and instant messaging (dial-up, 18 minutes per usage day; broadband, 47 minutes per usage day) and total games, net (dial-up, 46 minutes per usage day; broadband, 63 minutes per usage day).

Figure 1: Number of Users in Applications Categories with Highest Levels of Broadband Use

Dial-up Dominates Even the Most Popular Applications



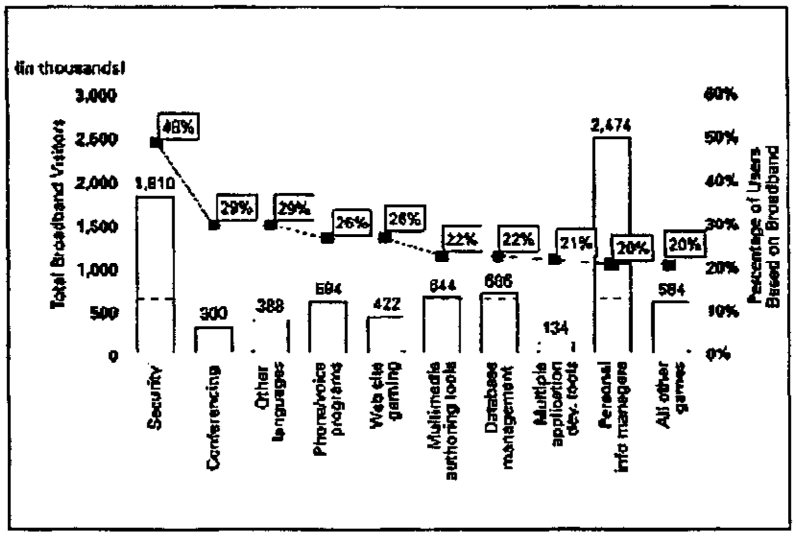
Note: Chart excludes nearly ubiquitous applications such as operating systems, browsers, and certain utilities such as file management.
Source: Jupiter Media Metrix Hardscan/Soft Usage Report (Vol. 1, 2001)

Security Unique in Its Widespread Broadband Appeal

Although most of the broadband audience still gravitates toward the same applications as its narrowband counterparts do, a few classes of applications have proven to be particularly attractive to the high-speed community. (See Figure 2.) Security applications (e.g., antivirus and firewall software) prove to be the runaway broadband winners: Approximately 48 percent of those using security applications were on a high-speed connection. Security applications also ranked high in terms of sheer number of broadband consumers, with an estimated 1.8 million unique high-speed users. Other applications such as conferencing and non-C programming languages registered broadband user bases of approximately 30 percent; voice services and online gaming garnered broadband user bases of approximately 26 percent apiece. However, all of these applications attracted far smaller numbers of total high-speed users than security did. BSPs or ISPs that have not already added a security feature should consider offering one as part of their service packages. Some security offerings may be purely software-based, but Jupiter expects increasing efforts to bundle firewall functionality into a residential gateway for home networking. This could be disadvantageous: Most value-added applications are purely software-based or server-side, and it costs more to inventory, distribute, and support hardware-based applications. However, given the broadband appeal of security, ISPs may come to view such hardware-based adjuncts as key value-added up-sells.

Figure 2: Application Categories with Highest Percentage of Users with Broadband

Applications with High Percentages of Broadband Users Vary Greatly



Note: This figure highlights only those applications with more than 100,000 unique monthly users.
Source: Jupiter Media Metrix Hardscan/Soft Usage Report (Vol. 1, 2001)

Temper Expectations for Revenue from Enhanced Services

BSPs and ISPs should gear up to roll out enhanced services, but both parties should temper their expectations for the additional revenue that they can derive from these services. Broadband subscriber valuations have historically surpassed those of dial-up subscribers based on the additional services that companies were expected to pump to these subscribers over broadband pipes. However, few services have emerged to date that are prime contenders to attract the mass market to paid subscriptions. Streaming video, even provided free of charge, has not proven to be the killer app that everyone anticipated; nor has video-on-demand emerged as a viable technology in any test markets to date. Streaming audio may become a hit with the broadband mainstream, but it is hampered by the slow progress toward secure standards and recording industry support. As mentioned previously, security remains a promising option, but others such as voice services and gaming hold more narrow appeal. For the next two years to three years, BSPs will find themselves largely relying on access as the key revenue stream, with few dollars coming in per subscriber for the enhanced applications that the market has eagerly anticipated.

Jupiter Media Metrix, an analyst research and measurement company, analyzes changes caused by the Internet and new technologies and how these changes directly impact business performance, management, and strategy. The Company delivers innovative analysis, measurement, and advice to provide businesses with unmatched global resources for understanding and profiting from the Internet. Jupiter Media Metrix brings together world-class products and services, including Jupiter Research, Media Metrix, and AdRelevance. The Company is headquartered in New York City and operates worldwide, across the Americas, Asia Pacific, Europe (as Jupiter MMXI), and the Middle East. For more information on the comprehensive roster of services, visit www.jmm.com.

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Jupiter Media Metrix

Sharpening the Edge
Improving Performance Beyond the Server

Lead Analyst:
Peter Christy
Contributing Analysts:
Ari Mayerfield, Cormac Foster, David Schatsky

Concept Report
August 21, 2001

Performance that meets users' expectations is critical. As the dream of ubiquitous broadband in the near term continues to fade, more effort must be placed on last-mile optimization, and dial-up access must remain the focus for most sites.

Key Questions
What are the appropriate tools for optimizing content to enable faster last-mile delivery?
How can new content-acceleration hardware and services help Web ventures speed delivery?

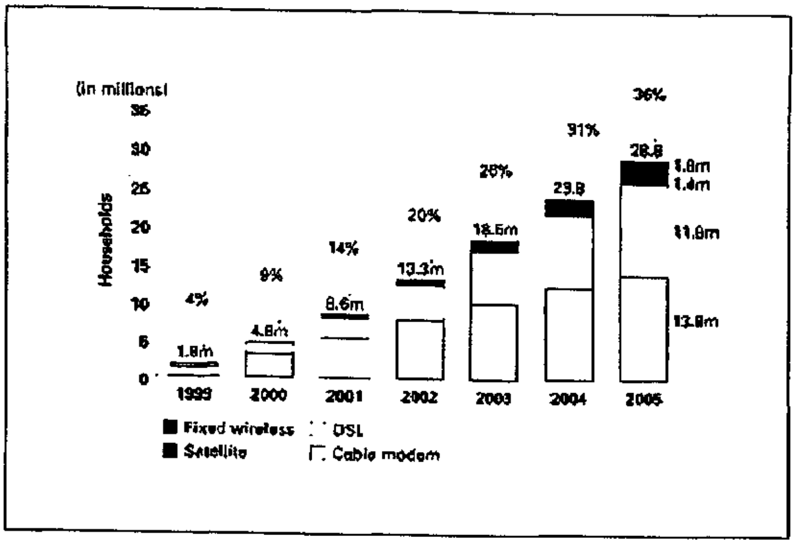
Key Finding
While dial-up connections continue to dominate, there are many viable solutions that can vastly improve user experience on a given site. Optimizing last-mile delivery is a low cost, high-return investment that should be a primary focus of site developers.

Reduce Download Size for Time, Cost Savings

A recent Jupiter Consumer Survey revealed that faster-loading pages are the single most compelling improvement Web sites can provide; however, broadband penetration in US households will reach just 36 percent in 2005, according to Jupiter forecasts. Content distribution networks (CDNs) such as Akamai have reduced download times by bringing data closer to the user, but reducing the amount of data being transferred remains the fundamental way to speed downloads, whether a CDN is used or not. Efforts to do so can also provide some return on investment (ROI), because reducing the amount of content passing to users should reduce bandwidth costs as well as decreasing download times and improving customer satisfaction.

Figure 1: Broadband Penetration in the US, 1999-2003

Web Ventures Must Consider Dial-Up a Priority for the Immediate Future



Source: Jupiter Internet Access Model, 7/00 (US only)
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Optimize Legacy Code

Web sites and user platforms are constantly evolving, and many Web pages show evidence of a tumultuous past. Legacy compatibility issues have cluttered pages with substantial amounts of needless code. Many Web pages contain version checks for user platforms that are now irrelevant. For instance, checks for version three of Internet Explorer and Netscape Navigator to determine support for cascading style sheets (CSS) are now almost completely outmoded. Modern versions of Navigator and Internet Explorer both support this feature, and usage of older browsers is almost nonexistent. In many cases, multiple, whole browser-specific pages were embedded within a single document, more than doubling its size. Web ventures should also remove unnecessary comments, white space, and nested tables, all of which can contribute significantly to download sizes and, in the case of nested tables, rendering times. Removing legacy logic can also make code far easier for developers to understand.

Review Image Policy, Provide Multiple Resolutions

Image data creates a significant strain on data transport; it is often the single largest contributor to overall page size. Many Web ventures store all images at a fairly high resolution, leaving low-bandwidth users to suffer with slow downloads or turn off images altogether. Web ventures should review their image policies to determine if the aesthetic tradeoffs of lower-resolution images might be worth the trouble on their slowest-loading pages. Additionally, if the resources are available, Web ventures should offer multiple resolutions when appropriate. On a dynamically generated site, where sites can base image selection on a user cookie, creating a bandwidth-selection option for users is relatively easy, and requires fairly little work beyond creation of the images themselves. This option can also serve users with limited screen size or color resolution, such as laptop users.

Caching Server Optimization: Reverse Proxy Servers

For larger Web sites, dynamic content servers are also powerful tools for reducing load times. Much in the way traditional proxy servers cache pages users request and serve them directly to others on the network, reverse proxy caches act as distributed Web servers, intercepting requests for content and freeing the origin server of the burden of serving them. These systems can be purpose-engineered by using cost-optimized microprocessors and real-time operating systems that are considerably more cost effective than performing the same functions through the origin server. Reverse proxy systems that provide caching of dynamic content are available from vendors such as FineGround Systems and Bang Networks (a dynamic content acceleration service). A FineGround Reverse Proxy Server (RPS) will fetch content from the origin server, convert it to dynamic HTML, and transmit the page to the browser as compressed dynamic HTML. When a request from the browser is made to refresh a page, the FineGround server determines what content has changed and sends only the modified content, in compressed form.

Bang Networks achieves the same bandwidth savings in a different manner: A Java applet opens a connection between a user's browser and the nearest server on the Bang network, which maintains a list of all browsers currently viewing Bang-accelerated content; when the content changes, the browser updates the applet, which, in turn, updates the browser screen. These systems offer a favorable ROI because of the significant decrease in bandwidth these applications require. Use of these technologies also permits the dynamism of the content to be increased, opening new applications opportunities. These servers also leave the existing content creation and publishing process intact. For larger organizations with rich content-delivery requirements, dynamic serving solutions such as RPS will provide more efficient last-mile content delivery.

Wild Card: Additional Line Optimization

Modern browsers accept compressed content as a standard feature. Modern modems provide on-the-fly compression, but better compression can be achieved by compressing larger chunks of data. Often, HTML is verbose and structured for readability by a human programmer at a cost of considerable size. Compression can reduce the size of such content, often by a factor of six or more. Similarly, script content can be compressed. An intelligent content accelerator can identify the specifics of a connected browser (e.g., IE or Netscape) and preprocess a script to eliminate unnecessary comments and code (e.g., forgoing conditional Netscape code when the browser is IE), then compress it for transmission. Additional speed optimizations are possible in terms of maintaining persistent connections to the browser while minimizing the impact of these connections on servers. Finally, when secure sockets layer (SSL) processing is added, additional optimization is possible since content is no longer encrypted and available to the optimizer. Packateer, Redline Networks, and NetScaler all sell reverse-proxy servers that provide one or more of these optimizations.

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