The Developing Enterprise Edge

Streaming Media and CDNs in the Enterprise

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Signature
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About The HTRC Group, LLC
The High-Tech Resource Consulting Group focuses on CDNs, streaming media, advanced IP services and service provider networking, providing consulting, custom market research, and market research studies to service providers and product manufacturers.

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The 2001 Streaming Media and CDNs in the Enterprise Study

The use of streaming media and content delivery networks in the enterprise is rapidly becoming a strategic advantage for organizations of all sizes. During an economic downturn, the most successful technology solutions are those that reduce costs while increasing performance. Enterprise streaming media and content delivery solutions are positioned to have this positive effect on the bottom line. The growth of streaming in the enterprise is gaining significant momentum from 2001 to 2002.

The HTRC Group's 2001 Streaming Media and CDNs in the Enterprise Study examines emerging products and services that utilize streaming media as well as content delivery technology. Enterprise streaming is the use of streaming media within the organization's network, i.e., the Intranet and/or the Extranet. Enterprise content delivery network (CDN) technology is a solution that enables content to be intelligently delivered through an overlay network of CDN devices, such as caches, located strategically close to end users. Organizations can reduce bandwidth demand that streaming media can place on local area networks (LANs) and wide area networks (WANs) with the use of enterprise CDNs (eCDNs).

Using critical supply- and demand-side information, this study also examines the market opportunity for providers of streaming media and content delivery products and services.

The 2001 Streaming Media and CDNs in the Enterprise Study was conducted to gather critical market information for enterprise streaming media and CDN product and service plans. This study examines the details of the enterprise streaming media and CDN product and service opportunities for service providers and product manufacturers.

The 2001 Streaming Media and CDNs in the Enterprise Study provides an in-depth analysis of critical market information gathered including:

- 4 Worldwide Forecasts:
  Enterprise streaming services forecast
  Enterprise streaming products forecast
  Enterprise CDN (eCDN) products forecast
  eCDN services forecast

ENTERPRISE STREAMING

- Plans for enterprise streaming media products and services
- The growth of streaming traffic in enterprise networks
- Streaming hosting strategies

- Current and future plans for outsourcing streaming media, including content production, streaming network design, network build-out and operation, digital rights management, and storage services
- Current and future plans for Quality of Service (QoS) technologies, including MPLS, DiffServ, ATM, RSVP, and IPv6
- Preferred provider types for enterprise streaming media services
- Streaming media technology plans
- Business and technical enterprise streaming challenges
- Barriers to enterprise streaming implementation
- Current and future streaming media content creation plans
- The effects of streaming media on storage infrastructure, including storage technologies, capacity requirements, and storage architectures
- Enterprise network performance technologies
- Enterprise network bottlenecks
- Desired streaming statistics, including concurrent users, bit rates, most frequently accessed content, buffer time, round trip time (RTT), and number of buffers required
- Current and future plans for streaming servers and software
- Network capacity planning
- Desired service level agreements for streaming media
- Expenditures for streaming products and services
- Final decision maker titles
- Desired service provider features for streaming media
- Desired streaming product manufacturer features
- Streaming use in the Extranet
- Sources for learning about new products and services
- The publications considered most influential by IT decision makers

ENTERPRISE CDNS

- eCDNs , including network build-out and operation, CDN network design, managed CDN services, digital rights management, consulting, and professional services

- Current and future plans for CDN products and services in the enterprise
- Enterprise benefits for CDN products and services
- Current and future eCDN content types, including static content, dynamic content, video-on-demand, file distribution, and live streaming

How to Use This Study

The HTRC Group embarked on the 2001 Streaming Media and CDNs in the Enterprise Study after preliminary research with our Rapid Business Intelligence Research Service uncovered enterprise plans for implementing streaming solutions. This study was designed to read like a research study and used as a reference. We recommend that readers that want to look up specific information look at the table of contents, table of figures, and index. Alternatively, each section is designed to cover a specific topic about enterprise streaming or CDNs.

This study is directed at any company addressing the enterprise streaming and/or eCDN markets. Those companies will gain a detailed understanding of products and services for enterprise streaming and CDN usage. Readers most likely to benefit include senior level management, product managers, marketing managers, technology developers, and product developers.

The *Executive Summary* section (also available as an Adobe PDF document on the CD-ROM) contains analyses of multiple areas in this study. This section was designed to give the reader an overview of the market research findings.

The *Key Findings* section contains a summary of the key findings from this study. This section includes findings listed in bulleted form.

The *Forecasts* section looks at the opportunities for product manufacturers and service providers in the areas of hardware and software products for enterprise streaming, enterprise streaming services, hardware and software products for enterprise CDN, and enterprise CDN services.

The *Demand-Side Research* portion of this study is derived from the data we collected from 232 respondent interviews. The detailed data, charts, analyses, and trend discussions are based on these in-depth interviews.

The *Supply-Side Research* portion of this study contains descriptions of market players in the enterprise streaming and eCDN markets. Interviews were conducted with market players for their insights on the market in general, which helped us shape our analyses and forecasts on the enterprise streaming and eCDN markets. The information presented about market players is based on from public information sources such as Web sites and company literature. The list of market players may not be all-inclusive.

The *Questionnaire* section, located in the appendix, includes a list of questions respondents were asked. Topics include streaming equipment, streaming services, streaming technology use, streaming media creation, Extranet streaming use, storage, eCDNs, bandwidth and performance, capacity planning, SLAs, revenue and expenditures, market messaging, and challenges.

The *Data Summary* section, located in the appendix, contains the results of interviews with 232 respondents. The details of the numerical analysis including means, medians, modes, standard deviations, and quartile analysis can be found in this section.

The *Verbatim Responses* section, located in the appendix, contains the open-ended responses from study participants.

Executive Summary

The use of streaming media and content delivery networks in the enterprise has become a strategic advantage to organizations of all sizes. During economic downturns, the most successful technology solutions are those that reduce costs while increasing performance. Enterprise streaming media and content delivery solutions can have this positive effect on the bottom line.

The growth of streaming in the enterprise will gain significant momentum from 2001 to 2002. In our efforts to better understand the market for enterprise streaming products and services, we asked 232 U.S. based respondents (with 500 or more employees) if they use or plan to use streaming media technology in their networks now, and in 2002.

The use of streaming media in the enterprise will increase from 35% in 2001 to 42% in 2002. The enterprise streaming has begun - however, not without barriers, including network capacity and saturation. Content delivery network (CDN) solutions are a critical market enabler. We discovered a significant correlation between those implementing streaming in the enterprise and those implementing enterprise CDNs (eCDNs). eCDNs solve some of the network problems enterprise streaming media can create, such as network capacity problems, wide area network (WAN) congestion, network saturation, and decreased performance for critical enterprise applications.

The question that is most frequently asked of HTRC about the enterprise streaming market is “What do enterprises plan to use streaming for?” We asked respondents to identify, from a list of applications of streaming media, what they use now, and what they plan to use in 2002. “Training for employees,” which increases from 57% in 2001 to 80% in 2002, and “Increasing internal communications,” which increases from 55% in 2001 to 75% in 2002, are the category leaders. “Intra-company meetings and collaboration” (corporate communications) which increases from 52% (2001) to 71% (2002), indicates that streaming is a critical business communications application

The use of “Increasing communications with external organizations” (external communications), which increases from 43% in 2001 to 58% in 2002, was expected. We believe enterprises are beginning to grasp the potential that streaming holds for both internal and external business communications. The use of streaming with external organizations creates additional demand for high performance streaming services. Along with external communications, training for customers and suppliers falls within that scope, which increases from 41% this year to 56% next year.

The Shift to the Enterprise

Providers of CDN services and the product manufacturers that cater to them have shifted their market focus to include enterprise networks. The streaming and CDN markets have come together to provide improved performance for delivery of Internet content. With the recent economic downturn, product manufacturers and service providers are looking to the enterprise market opportunity. In 2001, the CDN market continues to heat up with new products and services targeting enterprise networks.

Most computers sold today are built with multimedia capabilities and include audio and video systems that facilitate the viewing of streaming media. Unlike the desktop videoconferencing market where penetration has been historically low, the streaming enabled desktop is not a barrier in this market.

Microsoft's strategy of including Microsoft Media Server in Windows 2000 Server will likely pay off in the long term in the enterprise streaming market, as they currently dominate the enterprise server operating systems market. While on top in 2001, Windows NT actually decreases from 53% in 2001 to 50% in 2002. This decrease is dwarfed by the giant increase in Windows 2000 - from 32% in 2001 to 61% in 2002. The next closest server operating system for streaming servers is Unix, which increases slightly from 25% in 2001 to 28% in 2002. All other operating systems for streaming servers, including Solaris, Linux, and Mac OS, show marginal growth.

The majority of our respondents (59%) plan to host their streaming media technology in their own networks. We believe this strategy falls in line with plans to build out a network of streaming servers within the enterprise network. A distant second strategy, with 22% of respondents, is Hybrid Colocation. Hybrid Colocation is a distant second strategy with 22% of respondents.

Hosting enterprise streaming servers in both the enterprise network and a service providers network enables enterprises to deliver streaming content to Extranet partners including customers, suppliers and business partners. We found that 39% of our respondents use or plan to use streaming media with Extranet partners, and 60% plan to do so next year.

Most respondents plan to use a centralized approach for storing and serving streaming media content. This trend leads us to believe that centralized enterprise deployments of streaming media will need an enterprise CDN solution in order to enhance streaming performance and reduce streaming traffic on WAN links.

By far, the majority of respondents plan to use a centralized approach in storing and serving streaming media content. This trend leads us to believe that centralized enterprise deployments of streaming media will need an

eCDN solution in order to facilitate streaming performance delivery and reduce streaming traffic on WAN links.

Quartile analysis of the number of streaming servers indicates that the top 25% of respondents are planning large enterprise streaming rollouts. Responses from the previous question regarding simultaneous streams support this notion. The remaining 75% of respondents are likely implementing workgroup or experimental implementations of enterprise streaming solutions.

Services

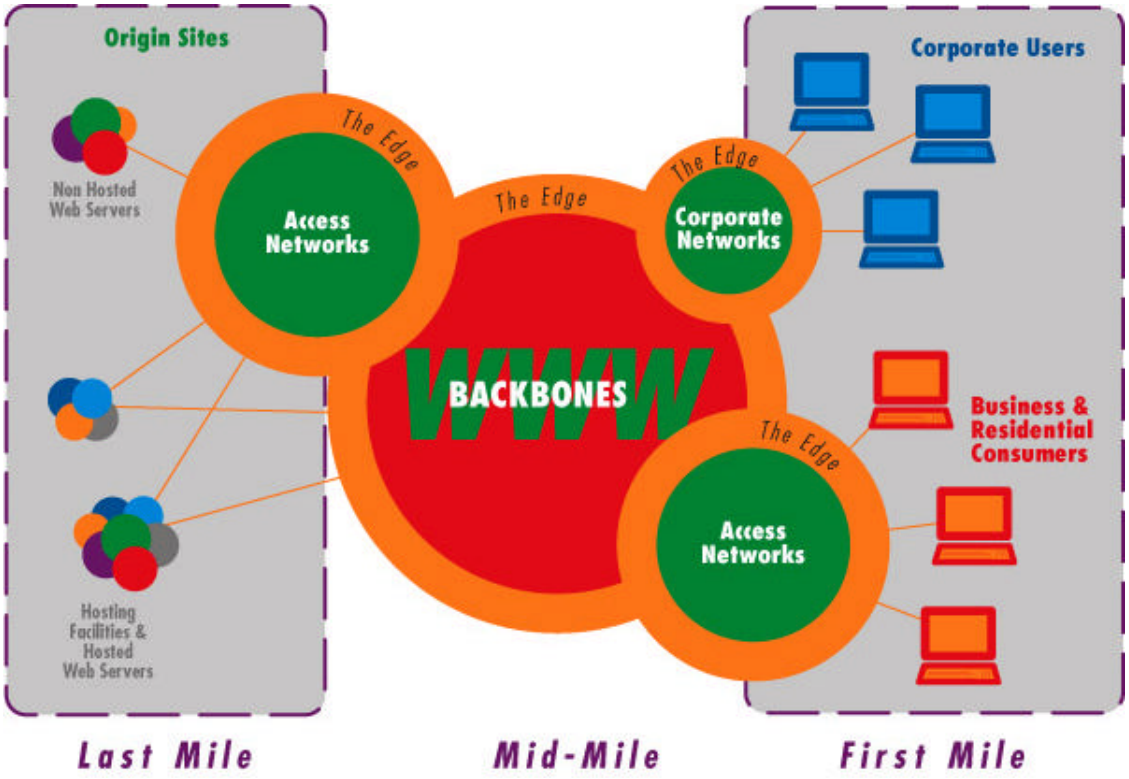
Service providers are accustomed to building networks and delivering streaming services. The Internet is made up of thousands of haphazardly interconnected networks; conversely, enterprise networks are controlled, deterministic, and can be viewed under one management platform. However, streaming media files are large compared to static Intranet site graphics and will pressure network capacity. Popular streaming content may stress the capacity of an organization's network, choking existing application performance.

Service providers have a wealth of expertise with IP streaming networks, and can apply it to the enterprise networks. This is a big market opportunity for service providers. Those equipped to deliver enterprise streaming are positioned well to deliver managed services and Extranet streaming services.

Service providers and enterprises are building out a new multi-function edge, but how the edge is defined will vary, depending on who you are talking to. We see the Internet as developing multiple edges.

Internet CDNs deliver content from the edge of the Internet, while eCDNs deliver content from the enterprise edge. Figure E-1 shows the three basic Internet edges, depending on perspective. First, large backbone carriers, such as AT&T and UUNet, have an edge: the edge of their network interfaces with access network and corporate networks. Access networks have an edge that interfaces with backbone carriers and corporate networks. Corporate networks, in turn, have an edge that can interface with access networks or backbone carriers.

Figure A-1: The Developing Edge



The deployment of streaming applications in the enterprise makes eCDNs a compelling solution for performance and cost savings. These services complement CDN services, as they provide performance enhancements by delivering the streamed media from the edge, closer to end users. In this early market, 64% of respondents have no plans to outsource with only 8% not sure of plans. Of our total respondents, 28% are outsourcing some streaming media function in 2001, increasing to 39% in 2002. We believe the degree to which streaming media is implemented within an organization will significantly influence which streaming media functions are outsourced.

Enterprise Streaming

The enterprise network is not inherently disadvantaged by the openness of the public infrastructure. Enterprise based streaming has available bandwidth and fewer restrictions due to the closed network, and enterprises have control over the performance and quality of service on their networks. Streaming media was primarily, by definition, developed for the Internet and IP networks. When compared to the Internet, which is mostly narrowband access, enterprise networks have considerable bandwidth to the desktop. Streaming media is expected to thrive in this ideal environment.

New types of content are continually being developed to increase the effectiveness of enterprise communication. Streaming content technologies increase performance and efficiency which enhances applications such as e-learning and corporate communications. Streaming media is growing in popularity as a means for conveying information to end users.

Although relatively new, streaming media technology continues to develop and incorporating new features and functionality for enterprise networks. We asked respondents to name the type of streaming media their company uses this year and next year. In 2001, responses for video (72%) and audio (71%) are within one percent point. Respondents expressed that video increases to 97% in 2002, while audio increases to 88%.

Live and on-demand streaming media have very different product and network requirements. Live streaming requires creating, producing, encoding, and delivery during a live event. A live enterprise streaming event might be a company-wide CEO broadcast to all employees. Live streaming events can be recorded and archived for future on-demand use. On-demand is the most popular streaming type for respondents, increasing from 59% (2001) to 81% (2002). Live enterprise streaming increases from 44% in 2001 to 59% in 2002.

Security is an increasing requirement for organizations of all types. Secure streaming will increase from 37% (2001) to 56% (2002). Few products for secure streaming are on the market today. Based on our findings, service providers' and product manufacturers' streaming solutions should include security, including DRM and encryption, as standard features in products and services.

Streaming media technology can be delivered in a number of ways including File Transfer Protocol (FTP), streamed from an enterprise streaming server, and streamed from an external service provider. The two most popular streaming delivery mechanisms are streaming media servers and FTP. The use of a streaming media server increases from 46% in 2001 to 65% in 2002, a significant increase of 19%, while the use of FTP to deliver streaming files increases from 40% in 2001 to 46% in 2002. The use of an external provider for enterprise streaming services increases from 16% in 2001 to 21% in 2002.

The storage requirements for enterprise data including streaming content are increasing at 63% as employees access growing amounts of streaming content. The mode (most frequent response) for enterprise storage capacity growth increases 20 times from 100 GB (2001) to 2,000 GB (2002). From 2001 to 2002, the median (the midpoint value of ranked values with half below and half above) doubles from 1,000 GB to 2,000 GB. According to respondents, storage requirements increase 7,910 GB from this year to next (12,487 GB in 2001; 20,397 GB in 2002), a gain of 63%.

Respondents for this study represent large companies with numerous site locations–a diverse environment for storage. Respondent deployment of storage resources indicates a significant percent (38%) distributed throughout organizations. The percentages for centralized vs. distributed storage show little change from 2001 to 2002. Based on responses, the organizations we interviewed may be under the impression that streaming media will not impact current storage architectures. Enterprises interested in streaming solutions should be educated on the impact streaming will have on their existing infrastructure.

Enterprise CDNs

Early in this study, we found that 100 of the 232 respondents were doing streaming in the enterprise either this year or next year. Of those 232 respondents, 35% were doing streaming in 2001 and 42% were planning to implement streaming in 2002. Those 100 study respondents that were doing streaming were also employing the use of content delivery technology in their network, 30% for this year rising to 54% next year. This confirms that the use of streaming media technology is directly related to the use of content delivery technology in the enterprise network.

Of the original 232, 132 respondents said they did not use or plan to use streaming media technology in the network. We took that group of respondents through an exit questionnaire and, only 7% indicated they used content delivery technology in their network this year. This is additional confirmation that streaming media technology usage is related to content delivery technology usage in the enterprise network.

The top reason for using CDN technology, as noted by 46% of respondents, was “Better Performance.” This category included responses such as minimizing latency in distributing information, reducing server load, gaining efficiency, and increasing frequency of updates. Performance is important to most organizations because waiting for files and/or data to be delivered has associated costs. For example, if a streaming file takes a considerable amount of time to download/buffer, employees waste time waiting for the streaming media to start. An employee cannot leave and come back later because the stream could start at any moment. Whether live or on-demand, poor performance results in Lost Productivity. The longer an employee waits for streaming content, the more that productivity decreases. Better performance saves costs for the Intranet and for streaming media.

ROI/Reduce Costs was cited by 31% of study respondents as the next highest reason for CDN technology use. Responses included in this category are increasing collaboration with partners/groups, optimizing cost savings, and reducing bandwidth use. Ease of Operations was described by 13% of respondents, followed by Training (9%) and Remain Competitive (4%).

Forty-eight percent of study respondents distribute dynamic content over their Intranet in 2001, and 78% plan to distribute in 2002. Dynamic content creates new requirements for eCDN solutions, such as assembling personalized content at the enterprise edge.

Respondents noted that the next most frequent way of using CDN products or services was to distribute static HTTP content over the Intranet. Usage will grow from 46% (2001) to 80% (2002), for a net increase of 34%.

File distribution points to a need for larger storage capacity in both servers and on desktops. File distribution use increases from 43% in 2001 to 72% in 2002. Video streaming, the next most frequently used in the enterprise, increases from 41% this year to 70% next year. Video is a bandwidth and storage intensive application and will likely increase requirements for both network build-out and storage. Following video streaming is audio streaming, which grows from 33% (2001) to 63% (2002).

Of the respondents (65% for 2001, 27% for 2002) that previously indicated they do not use CDN technology in their networks, we asked in an open-ended question the reasons for not using CDN technology. We categorized the verbatim responses as follows: “No Need,” “Network Sufficient,” “Not Evaluated Yet,” and “Budget.” The “Not Evaluated Yet” category, representing 34% of study respondents that do not use CDN technology, included a range of reasons such as “currently investigating,” “uses are not specific enough to plan for,” and “haven’t gotten around to it.” The next reason also described by 34% of respondents was “No Need.” Responses in this category included “doesn’t fit applications,” “no need to replicate the information,” and “no critical need.”

Strategies

Product manufacturers and service providers have similar strategies to address enterprise prospects. Most do not have a complete end-to-end solution of products and/or services to offer, and while there are many definitions of what a complete solution entails, we believe the complete solution must include everything from content creation to content delivery. Only a few vendors are strategically partnering to include all the components in an end-to-end streaming solution. The basic categories include Content Creation, Infrastructure, Management, and Delivery Services. Clearly, partnerships will play a key role in successfully addressing the needs of potential customers. We strongly recommend that product manufacturers partner with other manufacturers and service providers to fill portions of their end-to-end solution.

According to interviews with vendors (product manufactures and service providers), enterprises will likely offer trial implementations of streaming this year and launch full streaming services by next year. This expectation is

somewhat consistent with our findings. The quartile analysis of streaming servers, number of simultaneous streams, and expected streaming capacity indicated an early adopter market. Most respondents that are implementing streaming are doing so in a conservative manner.

The top two applications that vendors expect customers to implement for streaming in the enterprise are e-learning and live executive broadcasts. These expectations are in alignment with our research findings. Streaming will be driven by specific business applications such as e-learning and corporate communications (live company address or quarterly results). The ROI for streaming will be an easy concept readily accepted once applications are rolled out widely in the enterprise.

Streaming is no longer solely for entertainment uses. Streaming has found its calling as a business application tool. There are definite business applications that vendors anticipate will offer high growth. Enterprises that have a widely distributed workforce are the earliest adopters due to the returns of streaming solutions versus conventional communication methods and travel requirements. Streaming is ideal for the broadcast communications requirements needed by enterprises today, without the extravagant cost of the traditional broadcasting medium.

Few providers are offering true eCDN services.

Based on our supply-side surveys and interviews with vendors, the number one application that drives the adoption of CDN usage, and the most frequently discussed use of CDNs, is streaming media. The two specific applications of streaming media, as mentioned by enterprise streaming vendors, are e-learning and corporate communications. Both enterprise streaming and CDN vendors' observations are justified in our research.

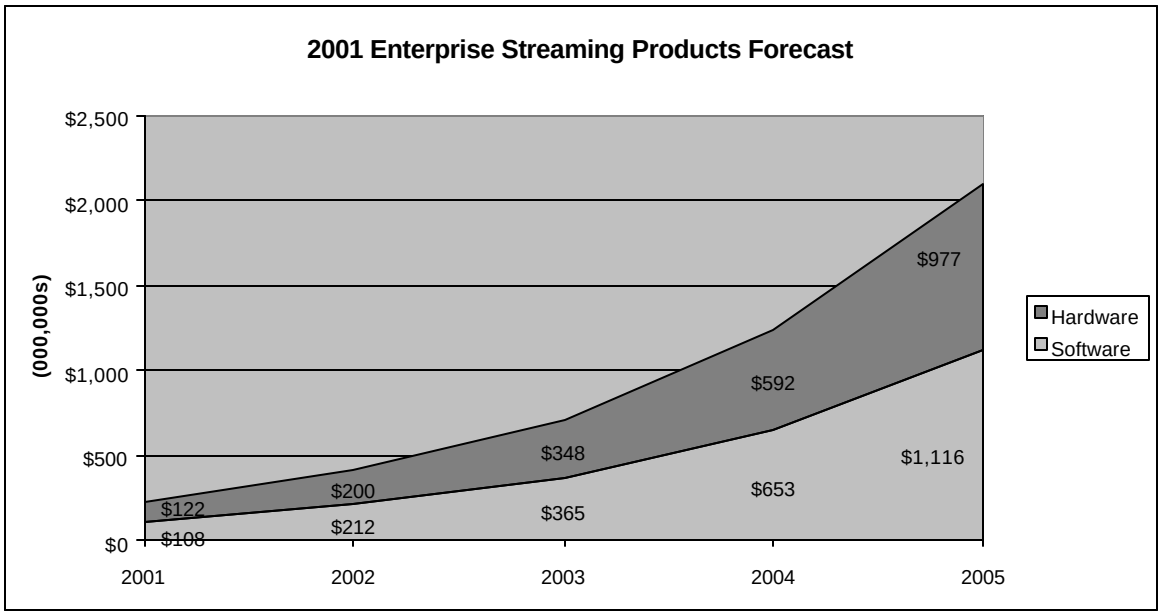
The future direction for eCDN infrastructure includes added functionality, such as translation technology. This technology would enable the network to recognize a source media file and convert the media on the fly to the required format of the recipient streaming server, device, or desktop. This would eliminate the need to encode for several media formats and several bit rates.

Enterprise Streaming Products Forecast

Enterprise Streaming Products

Enterprise streaming products include streaming server software, client streaming software, streaming management systems, eCDN devices that include streaming capabilities, and streaming hardware. We asked respondents about their current and future procurement plans for streaming hardware and software in order to gain a better understanding of demand and growth.

Chart A-1: 2001-2005 Enterprise Streaming Product Forecast

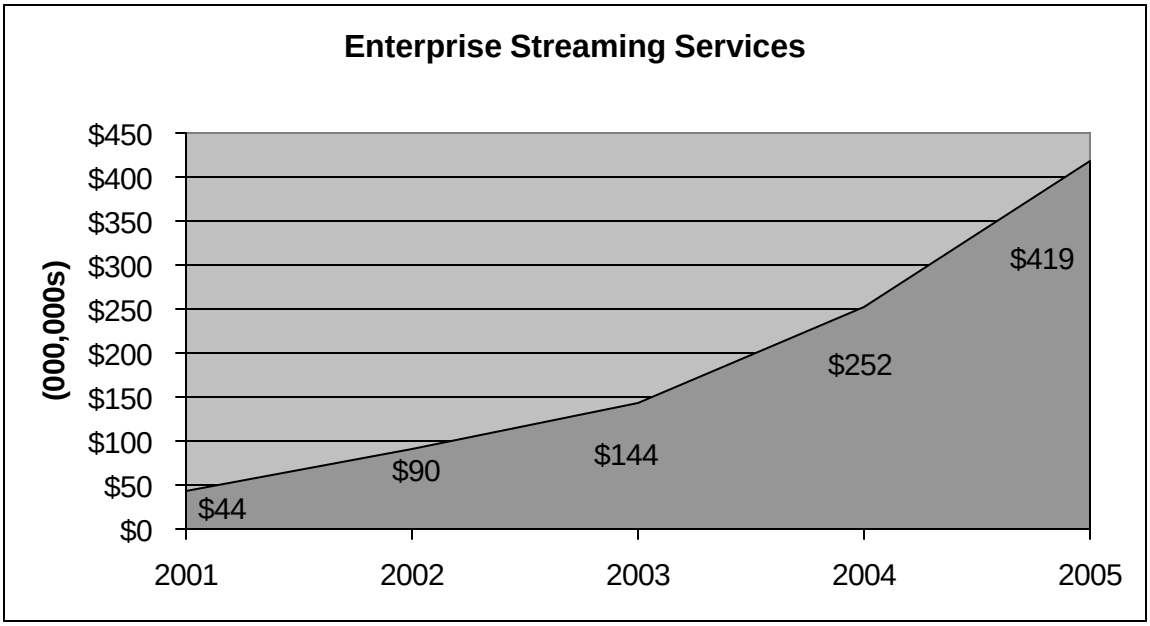


Enterprise Streaming Services Forecast

Enterprise Streaming Services

Many organizations plan to outsource streaming services, especially for Extranet partners that reside off the enterprise network. Since enterprise organizations have no control over the quality of streaming traffic once it leaves their network, performance streaming services for Extranet partners are best served from a provider of enterprise streaming services. These services include managed services, outsourcing, Extranet streaming services, and streaming in the enterprise.

Chart A-2: 2001-2005 Enterprise Streaming Forecast

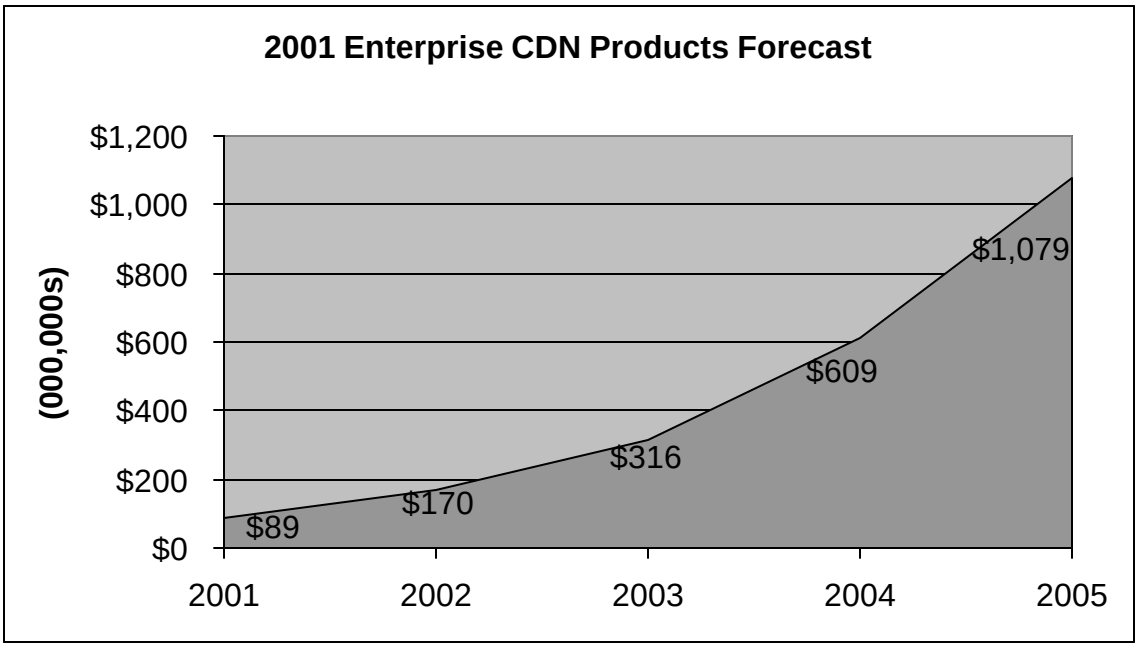


Enterprise Content Delivery Products Forecast

Enterprise CDN Products

This study shows evidence of the adoption of eCDN technology by enterprise organizations. eCDN products are being deployed to increase Intranet and network performance as well as to reduce costs. We have found a significant correlation between those enterprises deploying streaming, and those deploying eCDN solutions, indicating that. eCDN solutions are an enabling element for streaming in the enterprise. eCDN solutions can increase network performance for streaming applications while deferring costly network capacity build-outs. The technology is new and expertise is scarce; product manufacturers will have to fill the expertise gap with professional and network services.

Chart A-3: 2001-2005 Enterprise CDN Product Forecast

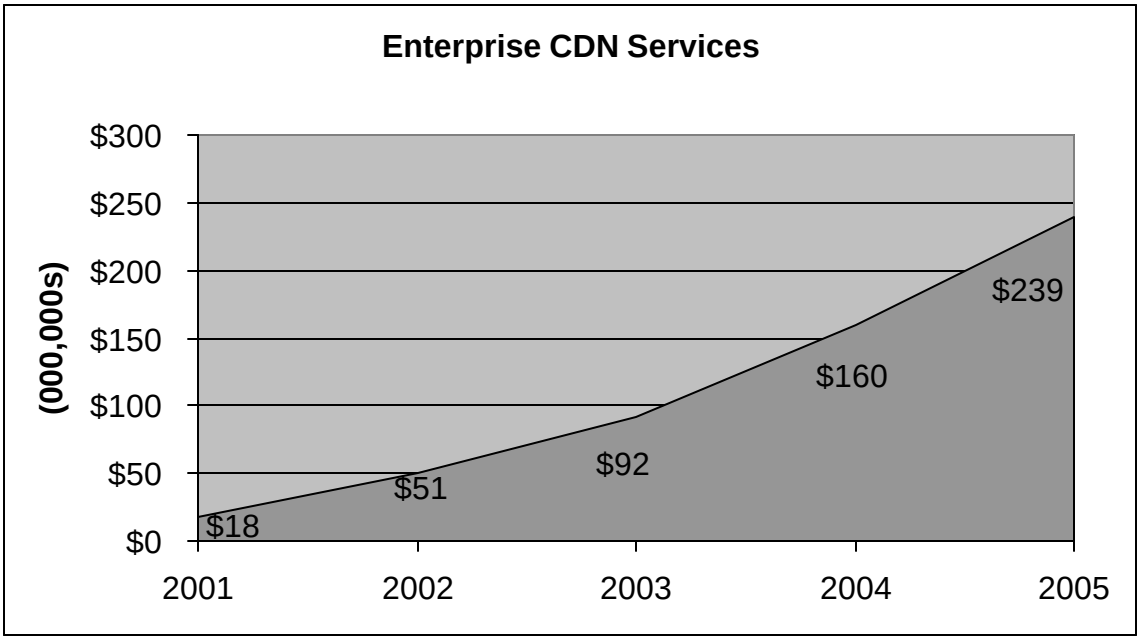


Enterprise Content Delivery Services Forecast

Enterprise CDN Services

Enterprises with frequent Intranet use will benefit from eCDN through increased productivity, as well as applications such as e-learning. Based on our demand-side research, 7% of respondents plan to use eCDN managed services, doubling to 15% next year. Outsourced eCDN network operations increases from 9% in 2001 to 13% in 2002. While the market for eCDN services is small, we expect the market to gain momentum over time. Large organizations with distributed networks stand to gain the most benefit from subscribing to eCDN services.

Chart A-4: 2001-2005 Enterprise Streaming Server Forecast



Conclusions

As with all new technology markets, the lack of market education remains the key barrier to adoption. Throughout the demand-side part of this study, we found responses to questions that lead us to the conclusion that most respondents do not have a firm grasp of streaming media and CDN technologies.

Historically, the most successful new technology markets have progressed with market education, proven to be a successful strategy in other markets. Simply put, prospects will not purchase unless they understand the solution. We believe education is essential to the growth of both the enterprise streaming and eCDN markets. We suggest that vendors (product manufacturers and service providers) take a close look at the Market Messaging section, which includes the sources respondents turn to for information about new streaming and eCDN solutions.

Of the top sources for information, Vendor Web sites, useful and important sources for customers, were listed by 75% of study respondents. If your Web site does not offer product or service educational material or the specific information he/she is looking for, that customer will likely not consider your organization in their product or service evaluation.

The next most useful source is independent white papers, as expressed by 74% of respondents. Independent white papers are crucial in helping

customers understand the technology of the product or service in general and the problem it addresses in the industry.

Web based seminars were described by 70% of respondents as another useful source. Efforts should be made to allow customers the ability to view seminars and presentations from their geographic location. Not all customers have the time to attend in person, and expenses for travel and lodging are becoming increasingly cost-prohibitive. Even Trade Shows are decreasing in importance, as only 61% of respondents rated them very useful.

Sixty-nine percent of respondents rated Trade Magazines as an additional useful source. Manufacturers and providers should strive to be included in columns and articles of significant trade publications, and to maintain good relationships with industry writers who cover products, services and new technology.

Respondents indicated the top business challenge was determining the return on investment for streaming deployments. Most vendors (product manufacturers and service providers) agree that the ROI analysis is playing a more significant role than in the past. Prospects need the tools and assistance to help figure out their personalized ROIs. Although ROI analysis for streaming and eCDNs may lengthen the sales cycle, vendors may gain advantage by providing assistance. To do so, vendors will need to train their sales people to use ROI tools and to assist in the process.

Market education is the biggest challenge for the enterprise streaming and eCDN markets. The research in this study details these viable markets and presents a significant opportunity for product manufacturers and service providers.

Key Findings

The market for enterprise streaming and CDN products and services has just begun. The market for enterprise streaming products and services is real, and based on our research, eCDN solutions are a key ingredient that will propel the streaming market forward. Streaming is a key driver for eCDN products and services. We have gathered an immense amount of data in our endeavor to understand the demand-side of the enterprise streaming and CDN markets. The following are noteworthy key findings:

- There is a significant correlation between companies implementing streaming media and eCDN solutions.
- The use of streaming media in the enterprise increases from 35% in 2001 to 42% in 2002.
- The majority of our respondents (59%) plan to host their streaming media technology in their own network.
- The research shows that 48% of respondents use or plan to use streaming media with Extranet partners, and next year 61% of respondents plan to do so.
- The most popular use of Extranet streaming is with customers, and increases from 48% in 2001 to 73% in 2002, a significant gain of 25%.
- The mean streaming traffic as a percentage of total network capacity grows from 12% in 2001 to 19% in 2002.
- Cost is the biggest concern to 55% of respondents. Thirty-one percent of respondents said that Staffing Resources was the next biggest concern and Bandwidth was third as noted by 29% of respondents
- Most respondents plan to use a centralized approach for storing and serving streaming media content.
- Streaming enabled desktops are not a barrier in this market, the mean percentage of streaming enabled computers grows from 62% in 2001 to 71% in 2002. By 2002, half of our respondents will have over 90% of desktops streaming enabled.
- The mean number of simultaneous streams increases significantly from 156 in 2001 to 643 in 2002. Quartile analysis of the required number of simultaneous streams indicates that the top 25% of respondents are planning large enterprise streaming rollouts.
- Microsoft is leading the enterprise server software market with 56% of respondents this year, increasing to 61% next year. Real

Networks video server software increases from 48% in 2001 to 52% in 2002.

- Cisco Systems has a strong presence in the enterprise. Cisco's IPTV solution, an MPEG-1 solution, shows the only significant growth overall. Cisco IPTV increases from 13% (2001) to 24% (2002).
- Of our total respondents, 28% are outsourcing some streaming media function in 2001, increasing to 39% in 2002.
- Respondents rated "IT overloaded with other tasks" (70%) highest on the list of reasons for outsourcing enterprise streaming services.
- In 2001, the use of video (72%) and audio (71%) streaming is a close one percent difference. Respondents expressed that video increases to 97% in 2002, while audio increases to 88%.
- The two most popular streaming delivery mechanisms for respondents are streaming media servers and FTP. The use of streaming media servers increases from 46% in 2001 to 65% in 2002, a significant increase of 19%, while the use of FTP increases from 40% in 2001 to 46% in 2002.
- On-demand is the most popular streaming type for respondents, increasing from 59% (2001) to 81% (2002). Live enterprise streaming increases from 44% in 2001 to 59% in 2002.
- Security is an increasing requirement for organizations, and secure streaming increases from 37% in 2001 to 56% in 2002.
- "Training for employees," which increases from 57% in 2001 to 80% in 2002, and "Increasing internal communications," which increases from 55% in 2001 to 75% in 2002, are the leading uses of streaming media.
- A surprising number of our respondents currently create streaming media content, 75% are doing so today and increases to 84% in 2002.
- Roughly a third (33%) outsource streaming media creation functions this year, with little difference indicated for next year (35%).
- Respondents' mean storage capacity needs for 2001 are 12,487 GB, which increases to 20,397 GB in 2002.
- Respondent deployment of storage resources shows that a significant percent (38%) that is distributed throughout organizations. The percentages for centralized vs. distributed storage show little change from 2001 to 2002.
- RAID is a leading storage technology among 78% of study respondents. It remains unchanged for 2001 and 2002.

- Thirty percent of respondents, whose organization uses streaming media, said their organization uses CDN technology in their network this year, rising to 54% percent in 2002. This is a significant increase of 24% in content delivery technology usage.
- The top reason for using CDN technology, described by 46% of respondents, was Better Performance. ROI/Reduce Costs was cited by 31% of study respondents as the next reason for CDN technology use.
- Forty-eight percent of study respondents distribute dynamic content over their Intranet in 2001, and 78% plan to distribute in 2002, an increase of 30%.
- Respondents expressed that the next most frequent use CDN products or services was to distribute static HTTP content over the Intranet. This usage shows a significant gain of 34%, which increases from 46% (2001) to 80% (2002).
- "Performance to end users" is a fundamental differentiation in choosing content delivery network products for the enterprise and was rated critical by 92% of the study respondents. Eighty-nine percent of study respondents rated "Security features" as a critical feature of an eCDN product. The next two critical features, as stated by 73% of respondents, are "offers on-demand streaming features" and "offers live streaming features."
- Local Load Balancing products are the most frequently used performance technology, as noted by 66% of the respondents in 2000 and increasing to 76% in 2001. The next frequently used technology is Bandwidth Optimization/Traffic Shaping products.
- ATM is the most frequently used QoS technology as described by 45% of our study respondents this year, increasing to 48% next year. IPv6 is the next frequently used technology.
- Fifty-three percent of the respondents attributed their top enterprise network bottleneck to Insufficient Bandwidth.
- Topping the list of desired streaming statistics was identifying the Number of Concurrent Users, described by 59% of study respondents. Users Geographic Location was expressed by 46% of respondents.
- Respondents rated Availability (90%) and Time to Repair (85%) as critical SLAs.
- Rated the most critical service provider feature for streaming services by 88% of respondents is Service and Support. The next

critical feature, as rated by 81% of study respondents, is Service Provider Reputation.

- Rated the most critical product manufacturer feature for streaming hardware and software by 97% of respondents is Service and Support. The next two critical features are Performance (96%) and Manageability (92%).
- The significant publications with which streaming product manufacturers and service providers should maintain close relationships include Network World (15%), Network Computing (13%), eWeek (7%), Network Magazine (7%), Information Week (6%), and Computer World (6%).
- The top business challenge, described by 26% of the study respondents, is ROI. Cost, a factor in determining Return, was reported as a challenge by 21% of respondents. Understanding Technology (15%) is mentioned as the next business challenge.
- To 49%, nearly half of the study respondents find Network Capacity to be the largest technical challenge. Technology is expressed as a technical challenge by 28% of the respondents.

Market Background

New types of content are continually being developed to increase the effectiveness of communication in the enterprise, as well as online. Streaming content technologies increase performance and efficiency in order to enhance applications such as e-learning and corporate communications. As an avenue to convey information to end users, streaming media grows in popularity.

The enterprise network is not inherently disadvantaged by the openness of the public infrastructure. Enterprise based streaming has available bandwidth and fewer restrictions due to the closed network, and enterprises have control over the performance and quality of service on their networks. Streaming media was primarily, by definition, developed for the Internet and IP networks. When compared to the Internet, which is mostly narrowband access, enterprise networks have considerable bandwidth to the desktop. Streaming media is expected to thrive in this ideal environment.

Streaming media is defined as either live or on-demand audio or video that does not have to be downloaded before playback. When streaming media is live, it is captured at the source and transmitted to an audience with a minimal level of delay. (Acceptable delay, however, is a gray zone and is best defined by the end user.) Streaming content that has been produced and is available for streaming when requested is considered to be on-demand. Streaming media includes popular formats such as RealVideo/Audio, QuickTime, and Microsoft Media Technology.

Enterprise streaming is the use of streaming media within the organization's network, i.e., the Intranet and/or the Extranet.

While streaming technology has existed for some time, CDN technology is relatively new. The CDN market emerged in 1999 with the announcement of Akamai Technologies and Sandpiper Networks, both offering new technology and services that dramatically increased Web site performance. CDN servers are typically deployed at ISP points of presence (POPs), in Internet collocation facilities, or at other traffic aggregation points. CDNs store and deliver content objects to users from nearby locations, via servers that operate as proxies for origin Web sites. Most CDN providers have begun offering on-demand streaming services. Streaming over the Internet provides a challenging environment where performance enhancement services significantly increase the end user's experience.

eCDN technology is a content delivery network solution that enables content to be intelligently delivered through an overlay network of CDN devices, such as caches, located strategically close to end users within the organization's network.

Providers of CDN services, and the product manufacturers that cater to them, have shifted their attention to include enterprise networks. The streaming and CDN markets have collided to form a synergistic offering for Intranet content delivery. With the recent economic downturn, product manufacturers and service providers are examining to the enterprise market opportunity. In 2001, the CDN market continues to heat up with new products and services targeting enterprise networks.

The Developing Edge

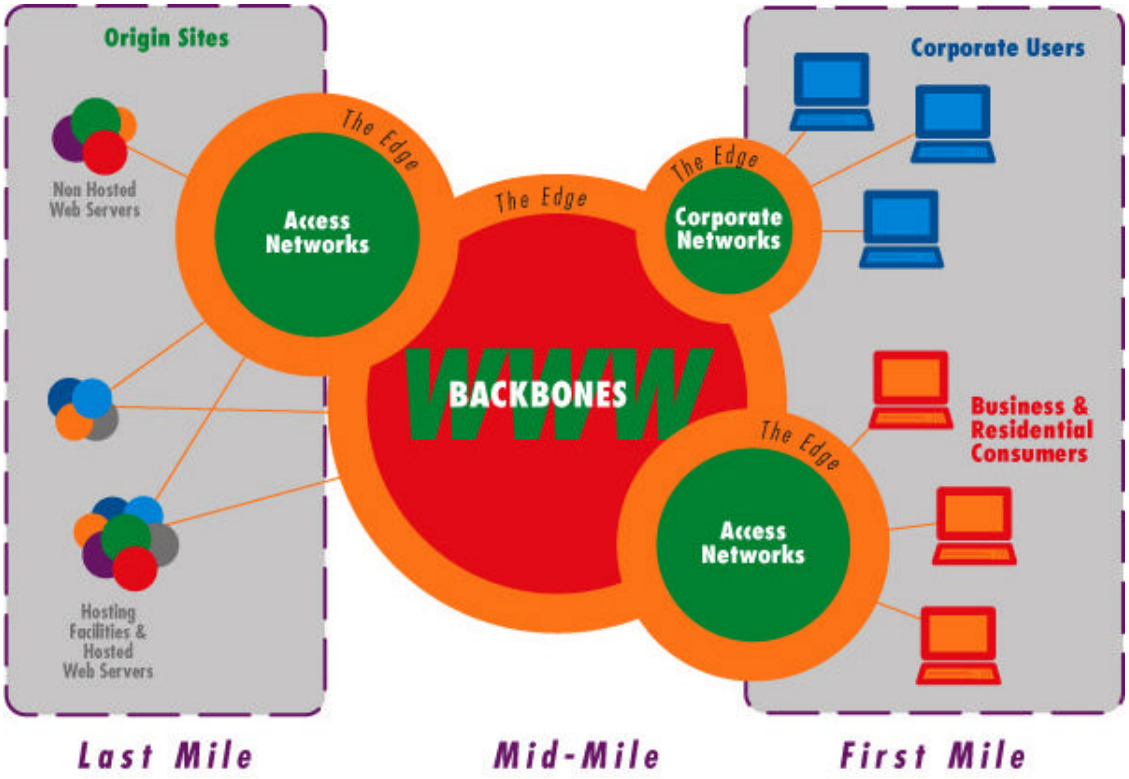
Service providers and enterprises are building out a new multi-function edge, but how the edge is defined will vary, depending on who you are talking to. We see the Internet as developing multiple edges.

Internet CDNs deliver content from the edge of the Internet, while eCDNs deliver content from the enterprise edge. Figure B-1 shows the three basic Internet edges, depending on perspective. First, large backbone carriers, such as AT&T and UUNet, have an edge: the edge of their network interfaces with access network and corporate networks. Access networks have an edge that interfaces with backbone carriers and corporate networks. Corporate networks, in turn, have an edge that can interfaces with corporate users as well as access networks or backbone carriers.

The deployment of streaming applications in the enterprise makes eCDNs a compelling solution for realizing performance and cost savings. These edge services are complementary to CDN services, as they provide performance enhancements by delivering the streamed media from the edge, closer to end users.

Figure B-1 below shows an illustration of the developing edge with last mile, mid-mile, and first mile references.

Figure B-1: The Developing Edge



Streaming Media and CDNs in the Enterprise Study Forecasts

The 2001 Streaming Media and CDNs in the Enterprise Study forecasts cover products and services targeting streaming media in enterprise networks. We use the term enterprise loosely to include business, government, and educational private networks. The number of streaming enabled desktops in the enterprise market is staggering; most respondents have over 90% streaming enabled by 2002. Streaming enabled desktops are not a barrier in the enterprise streaming market.

The term streaming has been widely used to describe the technology for delivering audio and video over the Internet; consequently the focus of streaming products may differ among vendors. Streaming media solutions created for the Internet may not be easily adaptable to enterprise network environments. As with most popular emerging markets, terms used by vendors to describe their product solution are at times misrepresented. Enterprise networks are closed and controlled, desktop connectivity consists of switched 10/100 Mbps Ethernet, with enterprise backbone speeds ranging from 100Mbps to 1,000Mbps. The forecasts were based on demand-side interviews and supply-side research.

Currently, the economy is in a downturn, which is impacting capital expenditures. Streaming in the enterprise holds the promise of saving significant amounts of money with applications such as e-learning.

Following are significant market factors influencing our forecasts:

Market Factors

- Cost is the largest barrier to the immediate adoption of enterprise streaming media
- The price of enterprise streaming products and services will decrease over time, driving adoption rates up
- Streaming use increases from 35% to 42% from 2001 to 2002
- Streaming media creation, production, and encoding expertise does not scale with demand; enterprises will outsource more IT functions
- New applications for streaming in the enterprise will drive network upgrades and QoS technology implementations
- Respondents network capacity grows from 510Mbps in 2001 to 831Mbps in 2002
- Streaming as a percent of total enterprise traffic grows from 12% in 2002 to 18% in 2002

- Quartile analysis for number of simultaneous streams revealed large implementations of streaming in the enterprise suggesting some strong growth
- Quartile analysis for number of simultaneous streams revealed 3/4 of respondents testing or experimenting with streaming
- Quartile analysis for number of streaming servers revealed large implementations of streaming in the enterprise
- Quartile analysis for number of streaming servers revealed 3/4 of respondents testing or experimenting with streaming
- Streaming enabled desktops are not a barrier for rolling out streaming media in the enterprise
- The growth of streaming media in the enterprise over the next 12 to 18 months will be influenced by the health of regional economies
- PC shipments are slowing in the US and Latin America
- PC shipments are not slowing in Europe and Asia Pacific
- The growth of e-learning is driving the adoption of streaming solutions and eCDNs
- Universities and other educational facilities are implementing streaming
- The increased use of online education through the Internet and Intranet sources will familiarize enterprise employees with streaming
- Asia Pacific and Europe will outsource more services with increased IT spending on unfamiliar technologies like streaming
- Security is a critical part of streaming in the enterprise, which may lengthen sales cycles
- The increased use of streaming on the Internet will set expectations for enterprise streaming
- Some enterprise streaming content may be subsidized with advertisements, lowering costs and increase usage
- Expertise will be a significant barrier for IT shops implementing enterprise streaming solutions
- IT spending is not increasing worldwide, IT shops will invest more in solutions that reduce costs with clear benefits
- IT shops will implement enterprise CDNs to reduce the impact of streaming on existing network, to defer network capacity build-out

plans and to reduce the cost of delivering training and other information to the field.

Methodology

The 2001 Streaming Media and CDNs in the Enterprise Study Forecasts examine the opportunity for providers of eCDN services as well as manufacturers of streaming hardware and software products. This forecast is based on primary and secondary information sources. To understand the total population of enterprises, we considered public information gathered on the total number of businesses by size. For this we used statistics gathered in 1998 and aggregated by the Office of Advocacy of the US Small Business Administration.

For our forecast, we used extrapolation techniques and market factors to estimate the market and growth for enterprise streaming media products. Using demand-side information gathered in this study, as well as supply-side sources, we projected the opportunity for enterprise streaming media products and services, as well as eCDN products and services.

Enterprise Streaming Products Forecast

Enterprise Streaming Products

Enterprise streaming products include streaming server software, client streaming software, streaming management systems, eCDN devices that include streaming capabilities, and streaming hardware. We asked respondents about their current and future plans for streaming hardware and software in order to gain a better understanding of demand and growth.

What's Included

Included in this forecast are products that enterprise organizations use and plan to use in the delivery of streaming media spanning Intranets and Extranets. For this forecast, we include eCDN hardware and software that deliver streaming media. Some eCDN products with streaming functionality in enterprise streaming forecast will overlap in the eCDN products forecast.

Products counted for this report include the following:

- Streaming products used for enterprise streaming
- Enterprise streaming products used to deliver content to Extranet partners: customers, partners, and suppliers
- Streaming server software
- Client streaming software

- Streaming management systems
- Streaming hardware and appliances

What's Not Included

This forecast does not include the following revenue sources for the streaming products:

- General purpose operating systems
- General purpose operating system servers
- Streaming products used only for the Internet Web site

Some numbers in the forecasts may not add up due to rounding.

Chart C-1: 2001-2005 Enterprise Streaming Product Forecast

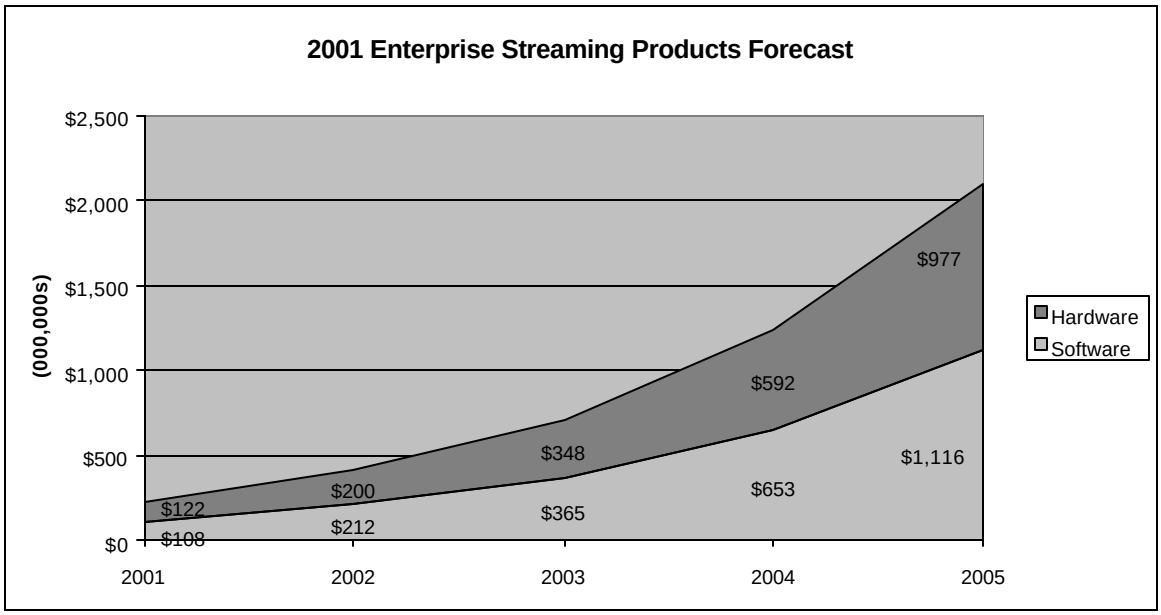


Table C-1: 2001 Enterprise Streaming Software Forecast Details

	2001	2002	2003	2004	2005	CAGR
North America	$85.1	$157.5	$230.8	$370.8	$598.3	62.8%
Europe	$11.9	$27.6	$68.7	$150.1	$266.8	117.7%
Asia Pacific	$10.8	$25.4	$62.0	$124.0	$234.4	115.9%
Latin America	$0.1	$1.1	$2.2	$5.9	$12.3	226.6%
AF/ME	$0.1	$0.4	$0.9	$2.0	$4.5	153.6%
Total	$108	$212	$365	$653	$1,116	79.3%

Table C-2: 2001 Enterprise Streaming Hardware Forecast Details

	2000	2001	2002	2003	2004	CAGR
North America	$81.6	$127.4	$212.9	$342.9	$525.8	59.3%
Europe	$22.0	$38.0	$69.7	$136.2	$234.6	80.7%
Asia Pacific	$18.3	$34.0	$62.7	$106.6	$205.2	83.0%
Latin America	$0.1	$0.4	$2.1	$4.1	$7.8	182.9%
AF/ME	$0.1	$0.4	$1.0	$2.4	$3.9	137.9%
Total	$122	$200	$348	$592	$977	68.2%

Enterprise Streaming Services Forecast

Enterprise Streaming Services

Many organizations plan to outsource streaming services, especially for Extranet partners that reside off the enterprise network. Enterprise organizations have no control over the quality of streaming traffic once it leaves their network, so performance streaming services for Extranet partners will be best served from a provider of enterprise streaming services. Enterprise streaming services include managed services, outsourcing, Extranet streaming services, and streaming in the enterprise.

What's Included

Products counted for this report include the following:

- Streaming services within enterprise networks, Intranet streaming
- Extranet streaming services that may deliver to customers, partners, and suppliers
- Managed Services
- Streaming for enterprise functions such as e-learning, CEO addresses, corporate communications, and product launches with Extranet partners
- eCDN services that include streaming

What's Not Included

For this forecast, we do not include the following revenue sources for the streaming services:

- Streaming services for the Internet
- All Intranet content except streaming media

Some numbers in the forecasts may not add up due to rounding.

Chart C-2: 2001-2005 Enterprise Streaming Forecast

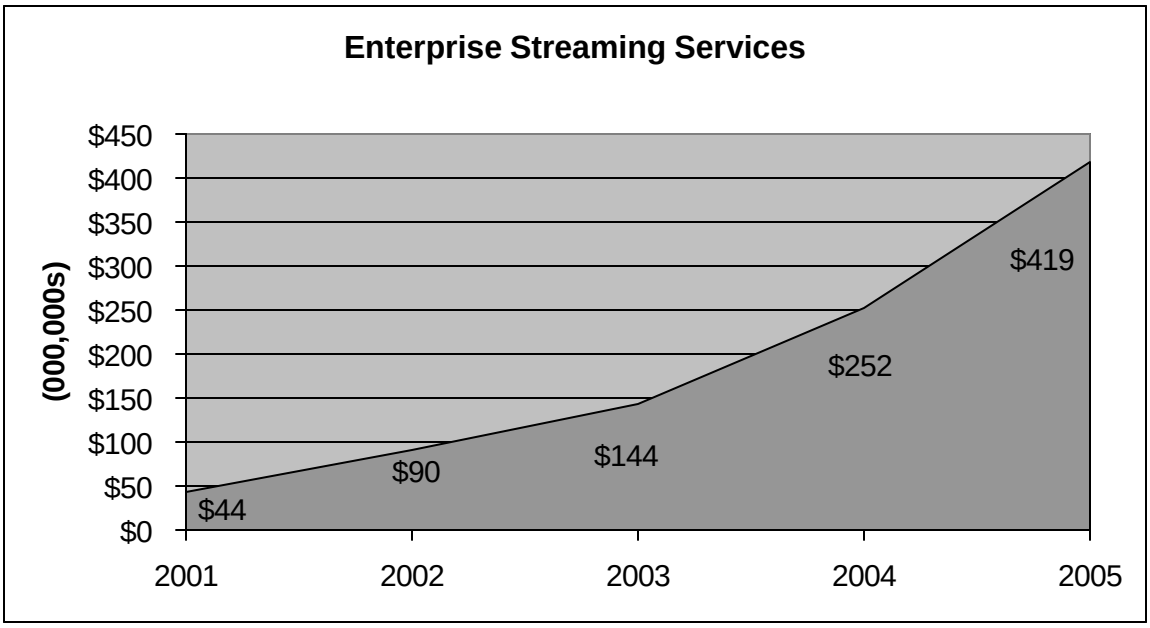


Table C-3: 2001 Enterprise Streaming Service Forecast Details

	2000	2001	2002	2003	2004	CAGR
North America	$34.5	$66.2	$93.7	$146.3	$230.4	60.7%
Europe	$5.3	$12.6	$27.5	$55.5	$100.1	108.5%
Asia Pacific	$4.2	$10.8	$21.6	$47.9	$83.8	110.8%
Latin America	$0.1	$0.5	$1.3	$2.5	$4.6	168.7%
AF/ME	$0.0	$0.0	$0.0	$0.1	$0.2	148.2%
Total	$44	$90	$144	$252	$419	75.5%

Enterprise Content Delivery Products Forecast

Enterprise CDN Products

Research in this study documents the adoption of eCDN technology by enterprise organizations. eCDN products are being deployed to increase Intranet and network performance as well as to reduce costs. We have found a significant correlation between those enterprises deploying streaming, and those deploying eCDN solutions. eCDN solutions are an enabling element because they can increase network performance for streaming applications while deferring costly network capacity build-outs. eCDN solutions can increase network performance for streaming applications while deferring costly network capacity build-outs. The technology is new and expertise is scarce; , product manufacturers will have to fill the expertise gap with professional and network services.

Enterprise CDN solutions are an enabling element because they can increase network performance for streaming applications while deferring costly network capacity build-outs.

What's Included

Products counted for this report include the following:

- CDN products used within the enterprise
- eCDN products that may deliver content to Extranet partners: customers, partners, and suppliers
- eCDN hardware and software
- eCDN management systems
- eCDN solutions that deliver Intranet content
- eCDN products that deliver streaming media

What's Not Included

For this study, we do not include the following revenue sources for the streaming products:

- CDN products used to deliver Internet content
- Caches used for Internet performance

Chart C-3: 2001-2005 Enterprise CDN Product Forecast

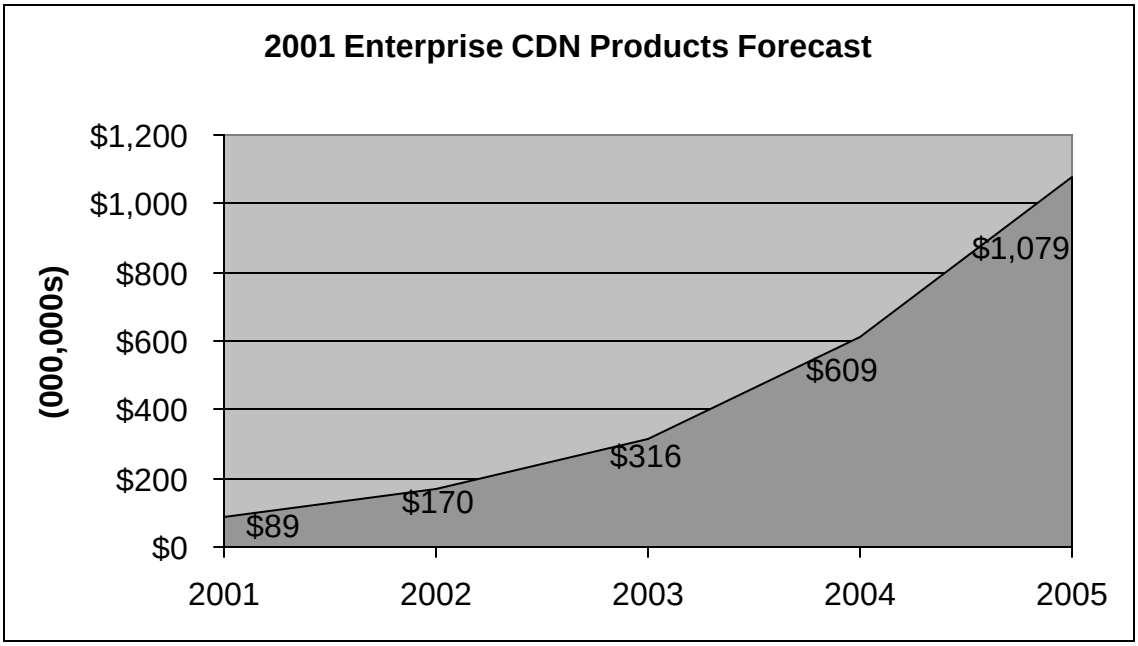


Table C-4: 2001 Enterprise CDN Product Forecast Details

	2000	2001	2002	2003	2004	CAGR
North America	$70.4	$125.5	$205.1	$353.3	$625.6	72.6%
Europe	$9.8	$22.1	$60.3	$145.6	$257.8	126.4%
Asia Pacific	$8.9	$20.4	$47.3	$103.5	$183.4	113.0%
Latin America	$0.1	$1.7	$2.5	$6.1	$10.8	231.7%
AF/ME	$0.1	$0.2	$0.3	$0.6	$1.1	86.5%
Total	$89	$170	$316	$609	$1,079	86.4%

Enterprise Content Delivery Services Forecast

Enterprise CDN Services

Enterprises with frequent Intranet use will benefit from eCDN services through increased productivity and applications such as e-learning. Based on our demand-side research, 7% of respondents plan to use eCDN managed services, doubling to 15% next year. Outsourced eCDN network operations increases from 9% in 2001 to 13% in 2002. While the market for eCDN services is small, we expect the market to gain momentum over time. Large organizations with distributed networks stand to gain the most by subscribing to eCDN services.

What's Included

Products counted for this report include the following:

- eCDN services within the enterprise network
- eCDN services that may deliver streaming media to Extranet partners: customers, partners, and suppliers
- eCDN services may include enterprise streaming media that is distributed through an eCDN service

What's Not Included

For this study, we do not include the following revenue sources for the streaming products:

- Does not include Internet CDN services
- Does not include Internet Streaming services

Chart C-4: 2001-2005 Enterprise Streaming Server Forecast

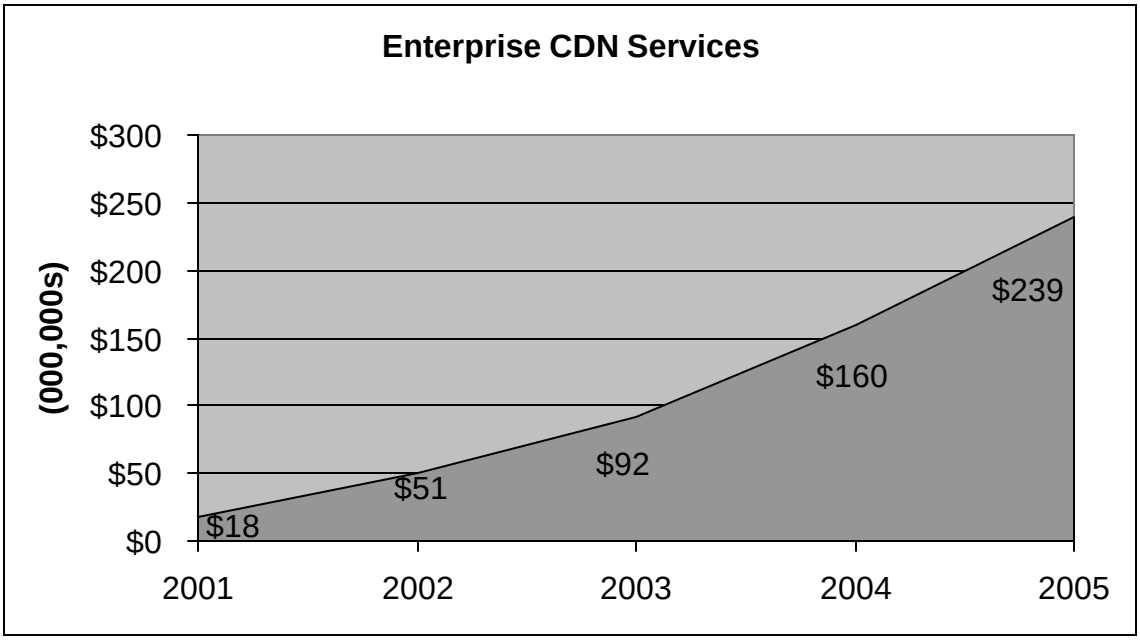


Table C-5: 2001 Enterprise CDN Services Forecast Details

	2000	2001	2002	2003	2004	CAGR
North America	$14.0	$37.7	$59.5	$93.0	$138.5	77.5%
Europe	$1.9	$6.6	$17.5	$38.3	$57.1	132.8%
Asia Pacific	$1.8	$6.1	$13.7	$27.2	$40.6	118.9%
Latin America	$0.0	$0.5	$0.7	$1.6	$2.4	241.0%
AF/ME	$0.0	$0.1	$0.1	$0.2	$0.2	91.7%
Total	$18	$51	$92	$160	$239	91.6%

Study Methodology

To gain a thorough understanding of the opportunity for enterprise streaming and content delivery products and services, we interviewed 232 technical decision makers, selected at random from IT (Information Technology) professionals who subscribe to one or more of 20 professional IT-oriented publications. All respondents are from organizations that have 500 or more employees; interviews were terminated with individuals at organizations with less than 500 employees. All respondents were decision makers for purchasing products and services. Interviews were terminated with individuals with no decision making influence. Determination of a respondent's knowledge of plans for enterprise streaming and content delivery (including network plans, streaming media technology plans, storage, bandwidth, management, performance, and challenges) was based on the first interview question. Selection was further refined by actual contact; interviews were terminated with prospects that did not have detailed knowledge of their enterprise network including streaming and content delivery plans as indicated by their inability to answer the majority of the interview questions. Not all survey participants answered all questions, the "n" is indicated on each chart.

As mentioned above, we interviewed 232 technical decision makers, selected at random from IT professionals who subscribe to one or more of 20 professional IT-oriented publications. The population of 232 IT professionals in our sample represent the population of 21,000 organizations with 500 or more employees in the U.S. The sample (232) has a 6% confidence interval at the 95% confidence level. The formula below was used to determine the confidence interval.

$$1.96\left(\sqrt{\frac{.25}{232}}\right) = .064$$

Interviewers, trained by the HTRC Group, conducted 25-minute telephone interviews using The 2001 Streaming Media and CDNs in the Enterprise Study questionnaire located in the appendix. Interviewers used computer-aided telephone interviewing (CATI) in order to increase the accuracy of data collection. CATI software increases efficiency and effectiveness of the interview, automatically controlling the flow of the interview, and reduces errors associated with manual data entry. We have found that conducting technical interviews requires the capacity to clarify questions in real-time in order to obtain the most accurate responses possible.

In Table D-1 covers the data generated from telephone interviews. Interviewers completed an average of 0.20 interviews per hour. Interviews were terminated (54) with prospects with no purchasing influence, less than 500 employees, or terminated the interview midway. There were 282 prospects with a busy phone or had calls blocked. There were 773 prospects who were out of business or had disconnected phones. There were 3,279 prospects that did not answer or had an answering machine. Prospects that did not have any knowledge or refused to participate numbered 1,850. Four hundred eighty-seven prospects said it was against company policy to participate. Prospects who were unavailable or could not offer a replacement were 1,086.

Table D-1: Interview Call Statistics

Interview Call Statistics	Number of Calls
Blocked Call	194
Company Policy	487
Disconnected Phone	767
Initial Refusal	1,070
Mid-Interview Terminate	24
No Answer/Answering Machine	3,279
No Replacement	266
Out of Business	6
Phone Busy	88
Respondents Not Available	820
Q1 No Knowledge of Network/No Referral	701
Q1 Don't Know/No Referral	47
Q2a Less Than 500 Employees	27
Q2a Don't Know/Refused Number of Employees	6
Q3 Don't Know/Refused and No Referral Name	18
Q4 No Purchasing Influence	3
QE1 Don't Know/Refused	8
Completes Per Hour	**0.20**

Greg Howard, Principal Analyst of the HTRC Group, LLC, developed the study questionnaire based on market trends, hot issues, and feedback from product manufacturers and service providers.

Respondents were offered a copy of the summary results of this study as an incentive to participate in the interview.

Recommendations for service providers and product manufacturers pertinent to the information obtained on each question are made throughout the study.

Quick Take

- Number of respondents: 232 (100 streaming, 132 not streaming)
- 6% confidence interval at the 95% confidence level
- Respondent organizations had 500 or more employees
- All respondents were decision makers
- All respondents had detailed knowledge of their network, including performance, applications and streaming
- Twenty-five minute interviews
- Respondents received summary of survey results

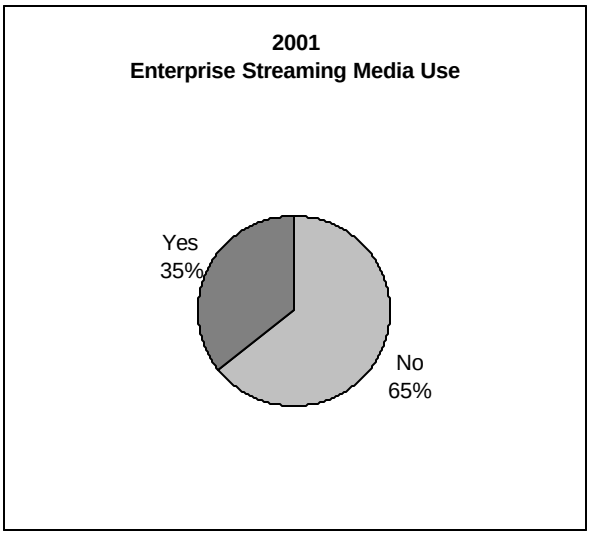
Enterprise Streaming

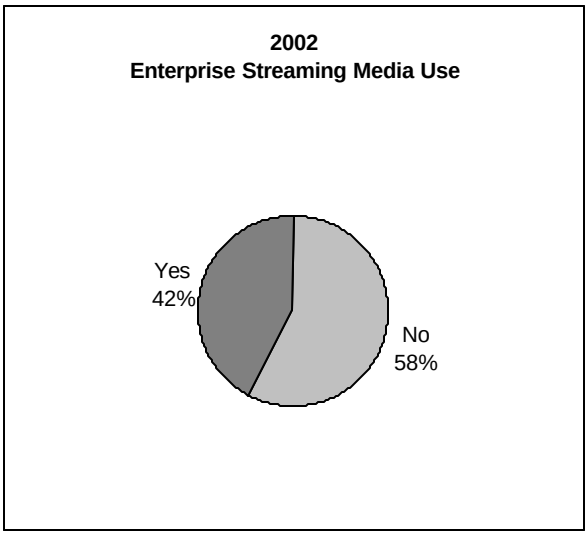
Streaming Media Technology Use

To better understand the market for enterprise streaming products and services, we asked 232 U.S. based respondents if they used or planned to use streaming media technology in their networks now, and in 2002. The use of streaming media in the enterprise increases from 35% in 2001 to 42% in 2002.

We estimate the total number of organizations with 500 or more employees in the US to be 21,000. The number of organizations with 500 or more employees will fluctuate over time. Given our sample, the number of organizations with streaming media technology in their networks will increase from 7,350 (21,000 x .35) to 8,820 (21,000 x .42). Chart 1-1 below compares those who do streaming and those who do not, for 2001 and 2002.

Chart 1-1: The Use of Streaming Media Technology (n=232) Q3





Enterprise Streaming Media Hosting Strategies

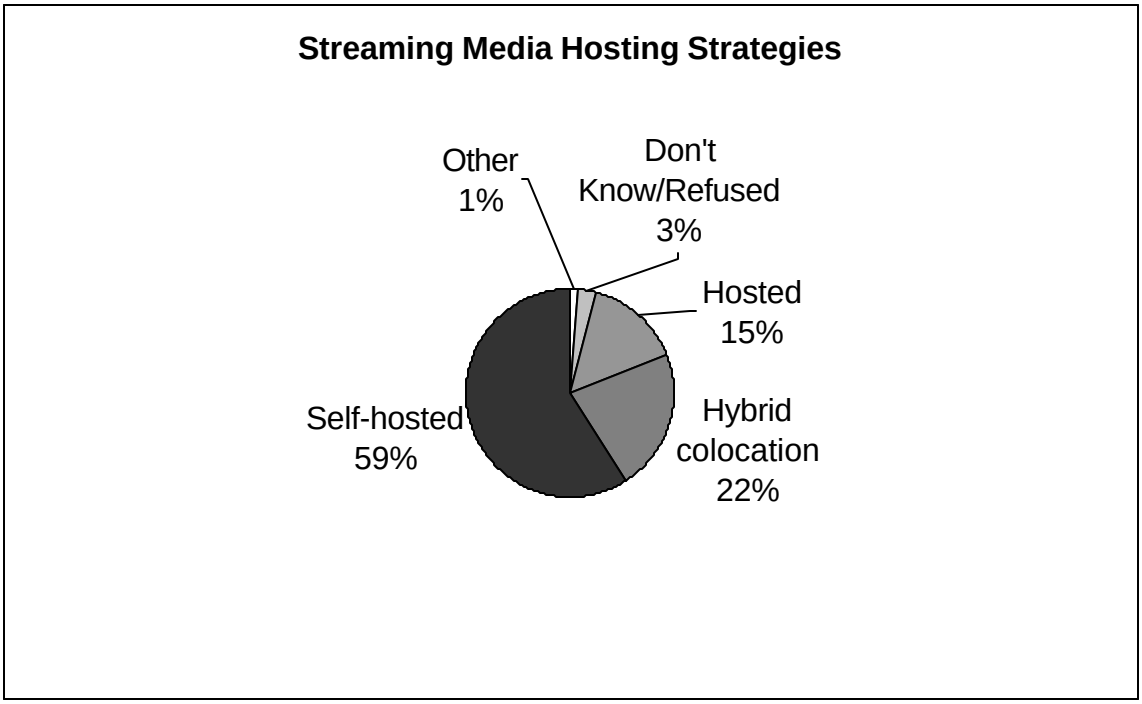
Early adopters of streaming media technology are faced with difficult decisions, the first of which is determining the streaming architecture for optimal delivery. We asked respondents to select what best describes their streaming media hosting strategy for their networks from a list of options including: Self-Hosted in the enterprise network, Hosted with a service provider, Hybrid Colocation (hosted both in the enterprise network and a service providers network), and Don't Know.

The majority of our respondents (59%) plan to host their streaming media technology in their own network. We believe this popular enterprise streaming hosting strategy falls in line with plans to build out a network of streaming servers within the enterprise network. A distant second strategy, with 22% of respondents, is Hybrid Colocation.

Hosting enterprise streaming servers both in the enterprise network and a service providers network provides greater flexibility to deliver streaming content to Extranet partners including customers, suppliers and business partners. In our research for this study, we found that 39% of our respondents use or plan to use streaming media with Extranet partners, while next year 60% of respondents plan to do so. The growth of enterprise streaming media content off of the enterprise network will likely drive the need for enterprise Extranet partner streaming services. We believe most enterprises will not find it economical to build out an infrastructure on the Internet in order to facilitate performance streaming for Extranet partners.

Providers targeting enterprises with enterprise streaming hosting and outsourced services should be cognizant of hosting strategies. Those enterprises planning to host their own streaming servers may have issues with control—presenting additional barriers for sales. Chart 1-2 below shows the breakdown of streaming media hosting strategies.

Chart 1-2: Enterprise Streaming Hosting Strategies (n=100) Q8

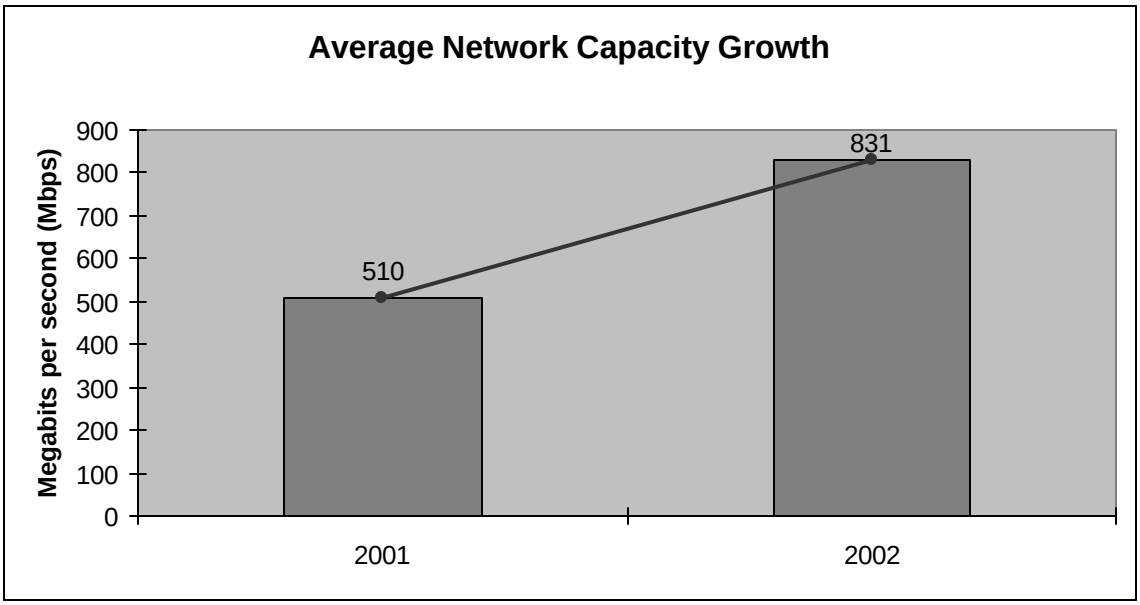


Enterprise Network Capacity and Streaming Traffic

Network Capacity Growth

We asked respondents to identify the total capacity of their network in Megabits per second (Mbps) in March of 2001 and by March of 2002. Of the 100 respondents interviewed, 60 gave responses for 2001, and 52 gave responses for 2002. Chart 1-3 below shows the mean network capacity growing from 509.52 Mbps in 2001 to 830.81 Mbps in 2002. While this appears to be significant growth in enterprise network capacity, the mode (most frequent response) and median (the midpoint value of ranked values with half below and half above) both remain 100. See chart 1-3 for a representation of the average network capacity growth from 2001 to 2002.

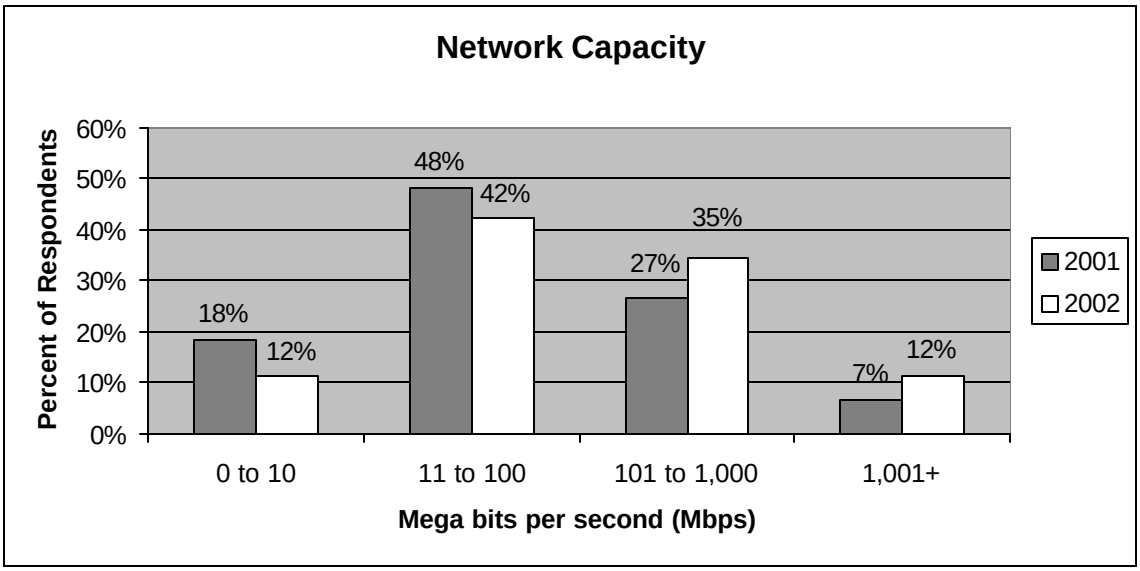
Chart 1-3: Average Network Capacity Growth (n=60,52) Q9



The jump in capacity in Mbps from this year to next may indicate a number of respondents plan to adopt Gigabit Ethernet. The strong network capacity growth points to a strong and healthy market for network product manufacturers. Streaming media is a significant driver of network upgrade plans. Among the other factors driving network growth are bandwidth, number of employees, number of sites, and number of applications.

Respondents who use 0 to 10 Mbps decrease 6% (from 18% to 12%) from this year to the next. Eleven to 100 Mbps users decrease from 48% (2001) to 42% (2002), a decrease of 6%. The significant gain of 8% is from study respondents that use 101 to 1,000 Mbps from 2001 (27%) to 2002 (35%). Those respondents who use more than 1,001 Mbps show growth of 5% from 7% in 2001 to 12% in 2002. The chart 1-4 shows enterprise network capacity by the above-mentioned intervals of Mbps. Figures in the chart may or may not add up due to rounding.

Chart 1-4: Enterprise Network Capacity (n=60,n=52) Q9

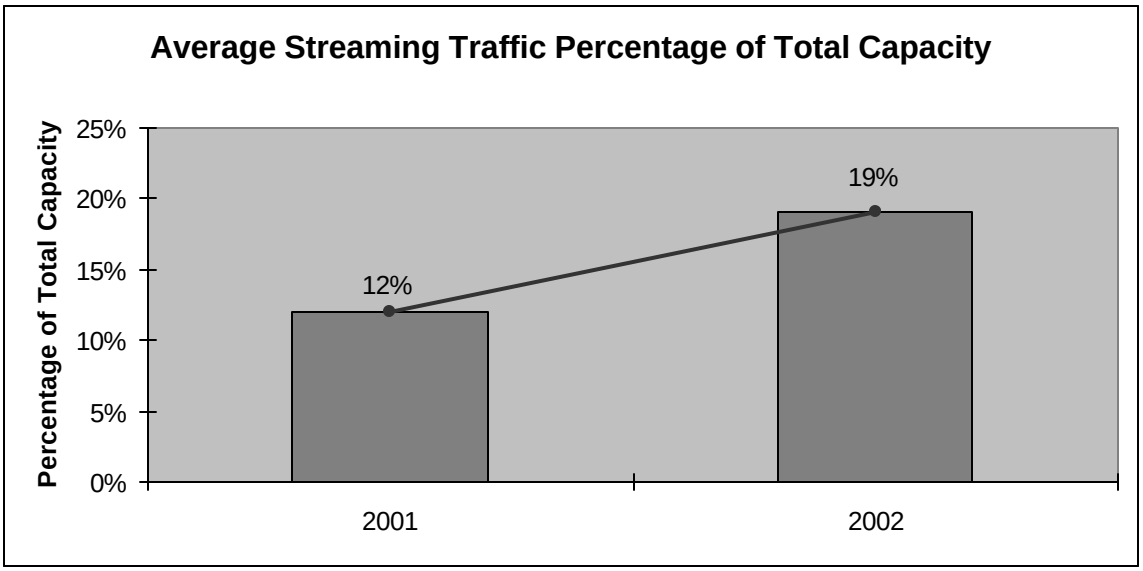


Enterprise Streaming Network Capacity Growth

In order to understand the impact of enterprise streaming on the network, we asked respondents to name the current and future streaming traffic percent of the total network capacity. Of the 100 respondents interviewed, 74 gave responses for 2001, and 79 gave responses for 2002.

Chart 1-5 below shows the mean streaming traffic as a percent of total network capacity growing from 12% in 2001 to 19% in 2002. Examining the mode (most frequent response) and median (the midpoint value of ranked values with half below and half above), both double from 5% this year to 10% in 2002. This jump in streaming traffic from this year to next year represents significant growth for the use of streaming in the enterprise and indicates strong adoption of enterprise streaming. Streaming media will drive network upgrades.

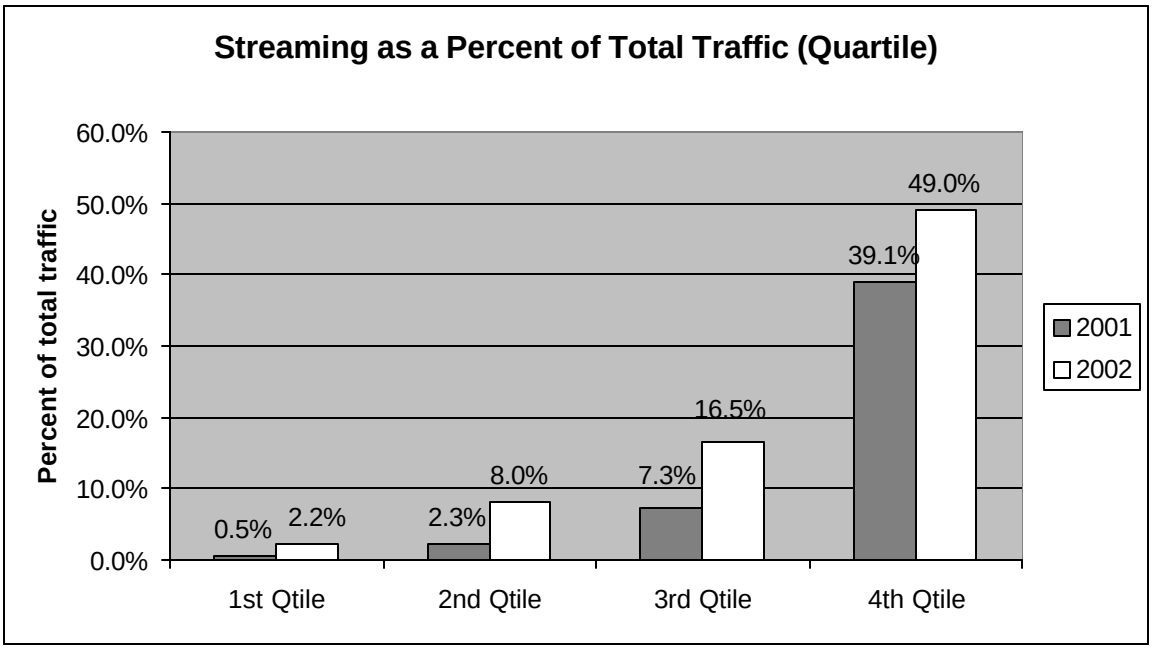
Chart 1-5: Average Streaming Traffic Percentage of Total Capacity (n=74,n=79) Q10



The chart 1-6 shows the quartile breakdown of responses for 2001 and 2002. Quartile responses represent the amount of streaming traffic as a percentage of the total amount of enterprise traffic. The strongest growth occurs in the third and fourth quartiles. The fourth quartile, or the top 25% of the responses, indicates respondents have significant plans for streaming traffic on enterprise networks. The fourth quartile increases from 39.1% in 2001 to 49% in 2002. The third quartile increases from 7.3% to 16.5% in 2002.

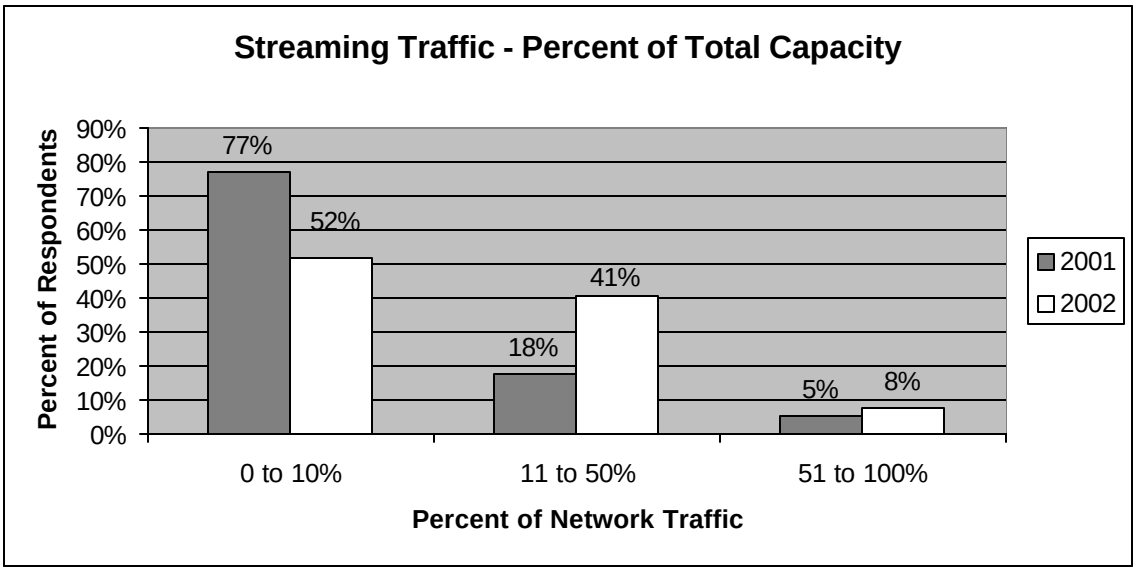
The first and second quartiles showed marginal growth. Respondents averaged .5% in 2001 growing to 2.2% in 2002 in the first quartile. Growth in the second quartile increases from 2.3% in 2001 to 8% in 2002. The fourth quartile shows a strong early adopter market. The first and second quartile respondents are either in the experimenting or in the trial implementation phase. The third quartile is in the phase where respondents are beginning to adopt the technology. Respondents will likely advance from their respective quartiles to the next quartile over time. We expect the first and second quartiles will look like the third and fourth quartiles a year from now. Fourth quartile respondents are an excellent target for eCDN products and services. eCDNs can reduce the amount of streaming traffic, dramatically improving network performance and capacity.

Chart 1-6: Streaming Traffic on Enterprise Networks (Quartile) (n=74,n=79) Q10



The chart 1-7 shows the streaming traffic increases on enterprise networks. This chart is not a true quartile chart. The categories were arbitrarily designated as “0 to 10%”, “11 to 50%,” and “51 to 100%” of total traffic. As indicated by the doubling of the median and mode, the largest increase is in the 11 to 50% category. This category increases from 18% to 41% from this year to next, a gain of 23%. Streaming traffic is 50% or less of the total network capacity as expressed by 95% of respondents for 2001. This drops to 93% for 2002. Only a small percentage of respondents use more than 50% of the network capacity on streaming traffic. Figures in the chart may or may not add up due to rounding.

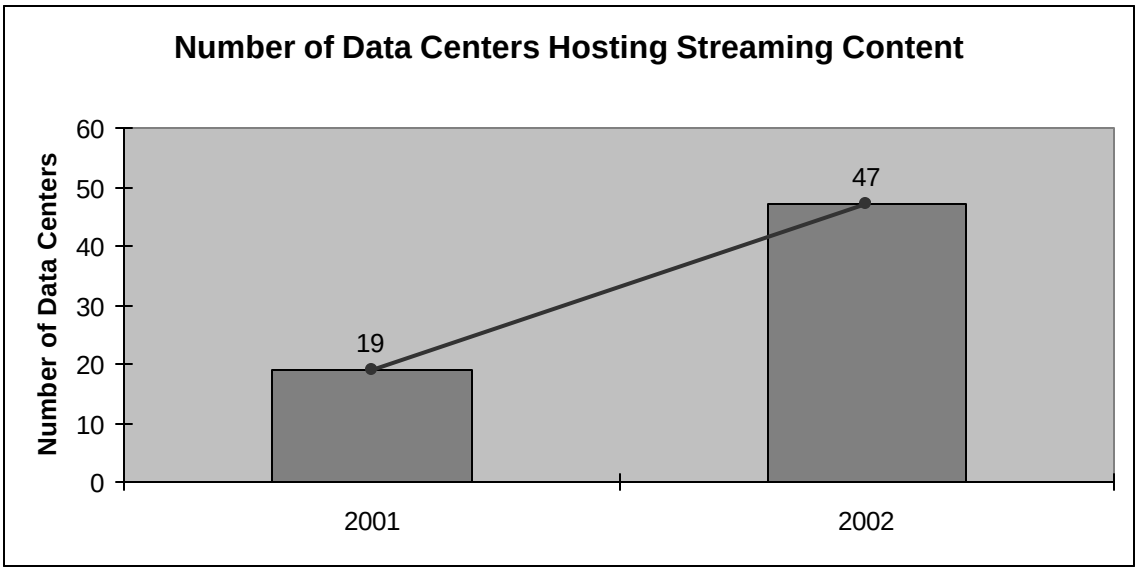
Chart 1-7: Enterprise Network Streaming Capacity (n=74,n=79) Q10



Enterprise Streaming Data Centers

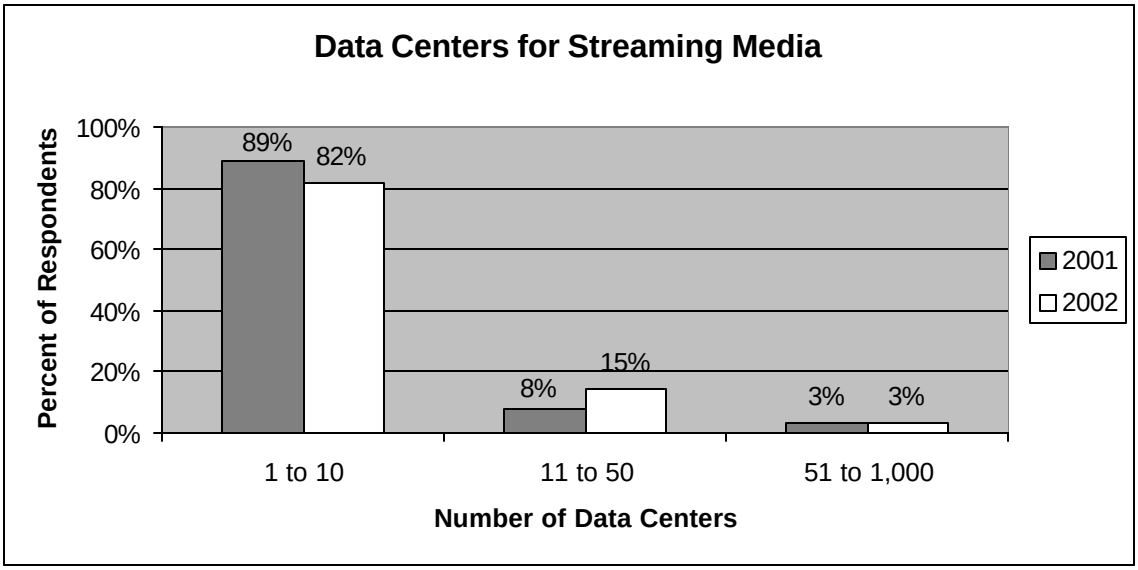
Respondents were asked to name the number of data centers they use this year and plan to use in 2002. Of the 100 respondents interviewed, 88 gave responses for 2001, and 89 gave responses for 2002. Chart 1-8 below shows the mean number of data centers respondents use, growing from 19 in 2001 to 47 in 2002. The mode (most frequent response) remains at 1 for both 2001 and 2002. The median (the midpoint value of ranked values with half below and half above) increases from 1 (2001) to 3 (2002). These figures represent significant growth for the total number of data centers respondents use now and plan to use to deliver streaming media in the enterprise. The large jump in the mean in 2001 to 2002 is due to respondents planning to deliver streaming media from a large number of sites.

Chart 1-8: Number of Data Centers Hosting Streaming Content (n=88,n=89) Q11



Most respondents plan to use a centralized approach in storing and serving streaming media content. This leads us to believe that centralized enterprise deployments of streaming media will need an eCDN solution in order to facilitate streaming performance delivery and reduce streaming traffic on WAN links. Respondents were asked how many data centers their organizations have to host their streaming media content for this year and next. Eighty-nine percent have between 1 to 10 data centers hosting streaming media content. This drops to 82% in 2002. Respondents (8%) have 11 to 50 data centers for hosting this year and increases to 15% by 2002. Overall, only a small percentage of respondents plan to use more than 10 data centers from which to store and deliver streaming media content. The chart 1-9 below shows the clustering of data centers used to host streaming media.

Chart 1-9: Enterprise Streaming Data Centers (n=88,n=89) Q11



Streaming Enabled Desktops

In order to gain a better understanding of the total number of streaming enabled desktops, respondents were asked to approximate the percent of employees that have streaming enabled computers for 2001 and 2002. Streaming enabled desktops are networked computers with a multipurpose operating system, such as Windows 2000, that includes codec functions and can receive and play audio and video streaming media.

Of the 100 respondents interviewed, 80 gave responses for 2001, and 96 gave responses for 2002. The chart below shows the mean percent of streaming enabled computers growing from 62% in 2001 to 71% in 2002. The mode (most frequent response) remains at 100 for both 2001 and 2002, indicating a large population of enterprise users with streaming enabled desktops. Most computers sold today have built-in multimedia capabilities and audio and video hardware. Microsoft desktop operating systems include software that facilitates the viewing of streaming media. The median (the midpoint value of ranked values with half below and half above) increases from 73% in 2001 to 88% in 2002, representing strong growth for the total number of streaming enabled computers. The jump in the mean from 2001 to 2002 represents a large and growing population of enterprise employees with streaming capabilities. Unlike the desktop videoconferencing market where penetration has been historically low, the streaming enabled desktop is not a barrier in this market.

Chart 1-10: Average Percentage of Employees with Streaming Enabled Desktops (n=80,n=96) Q12

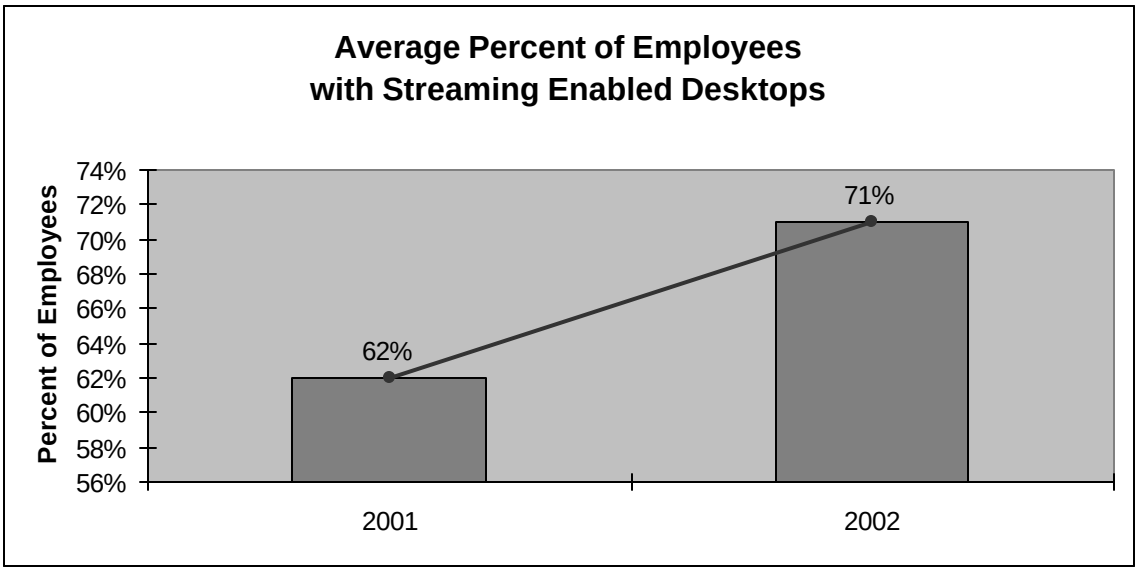
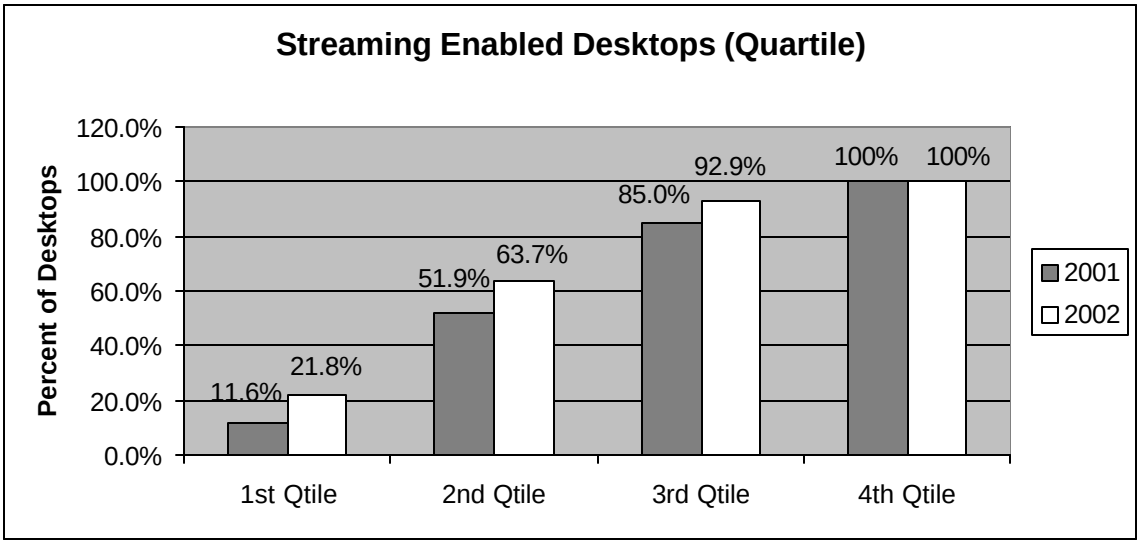


Chart 1-11 shows the growth of streaming enabled desktops at respondent organizations by quartile. By 2002, half of our respondents will have over 90% of the desktops streaming enabled. In the fourth quartile, all desktops (100%) are streaming enabled. This quartile represents the early adopter segment, one that has been through the testing and implementation and is currently in the enterprise rollout phase.

Chart 1-11: Streaming Enabled Computers (Quartile) (n=80,n=96) Q12



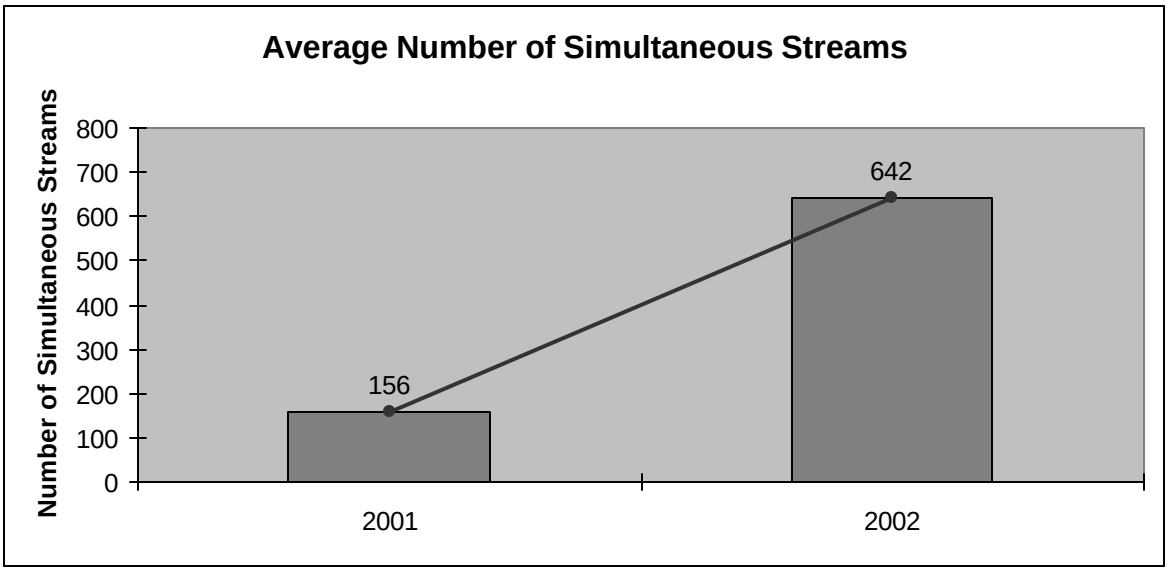
Streaming Equipment

To better understand the requirements for streaming media products, we asked respondents about their streaming requirements and demands, including: simultaneous streams, number of streaming servers, enterprise streaming server software, and streaming server operating systems. Most respondents plan to build out and host their own streaming equipment. This is a large opportunity for product manufacturers.

Simultaneous Streams

Earlier in our study we found that 35% of our respondents have implemented or plan to implement streaming in 2001, increasing to 42% in 2002. While the number of organizations implementing streaming is a good indication of total growth in the enterprise streaming market, we must also look at the degree to which respondents are implementing enterprise streaming. Therefore, we asked respondents how many simultaneous streams they use in 2001 and in 2002. In chart 2-1, the mean number of simultaneous streams increases significantly from 156 in 2001 to 643 in 2002. The median (the midpoint value of ranked values with half below and half above) and mode (most frequent response), while low, both increase significantly from 2001 to 2002. The median increases from 1 (2001) to 10 (2001) and the mode increases from 4.5 (2001) to 10 (2002). While this gives us an indication of strong growth from year to year, an examination of the quartile breakdown provides greater detail as to the degree of enterprise streaming rollouts.

Chart 2-1: Average Number of Simultaneous Streams (n=48,n=67) Q13



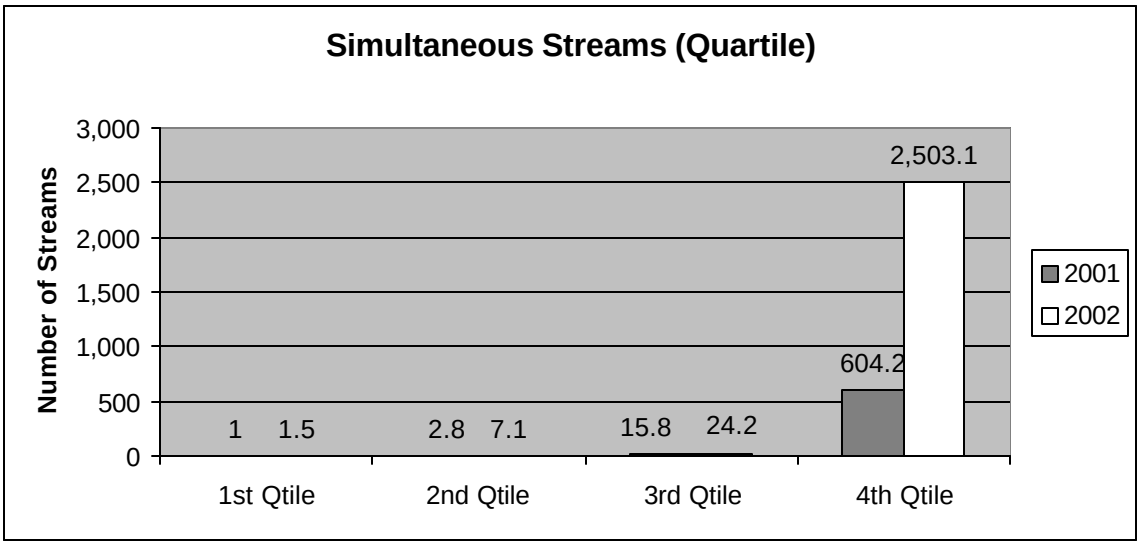
The chart 2-2 shows the quartile breakdown of responses for simultaneous streams in 2001 and 2002. For quartile responses, the data was broken into four groups, each with a separate mean, median, and mode for the amount of simultaneous streams. The chart includes the means for each of the quartiles for 2001 and 2002.

The strongest growth occurs in the third and fourth quartiles. The fourth quartile, or the top 25% of the responses, have simultaneous streaming requirements that are an order of magnitude higher for enterprise networks than the first three quartiles. The fourth quartile increases from 604 in 2001 to 2,503 in 2002. This is indicative of the early adopter segment.

The first, second, and third quartiles are vastly different; the majority of respondents are likely applying workgroup or experimental implementations of enterprise streaming solutions. The upside is that many organizations are rolling out streaming. The downside is that if simultaneous streaming requirements do not change, this will be a small market. However, training, which was cited by 70% of respondents in 2001 and 82% in 2002, indicates strong growth for large organizations. The first and second quartile requirements will increase significantly as they shift to match the requirements of the third and fourth quartile by next year.

Quartile analysis of the required number of simultaneous streams indicates that the top 25% of respondents are planning large enterprise streaming rollouts. The remaining 75% of respondents are likely implementing workgroup or small experimental implementations of enterprise streaming solutions.

Chart 2-2: Simultaneous Streams (Quartile) (n=48,n=67) Q13



Streaming Servers

While the number of simultaneous streams gives us a good indication of growth in the enterprise streaming market, we also looked at plans for streaming servers to better understand the degree to which our respondents are implementing enterprise streaming. We asked respondents how many total streaming servers they currently have, and how many they plan to have in 2002. In chart 2-3, the mean number of streaming servers increases from 31 in 2001 to 43 in 2002. The median (the midpoint value of ranked values with half below and half above) and mode (most frequent response), while low, more than double from 2001 to 2002. The median more than doubles from 2 streaming servers this year to 5 in 2002.

The mean number of streaming servers indicates marginal growth from year to year. However, an examination of the quartile breakdown provides more detail as to the degree of enterprise streaming rollouts.

Chart 2-3: Number of Streaming Servers (n=70) Q14

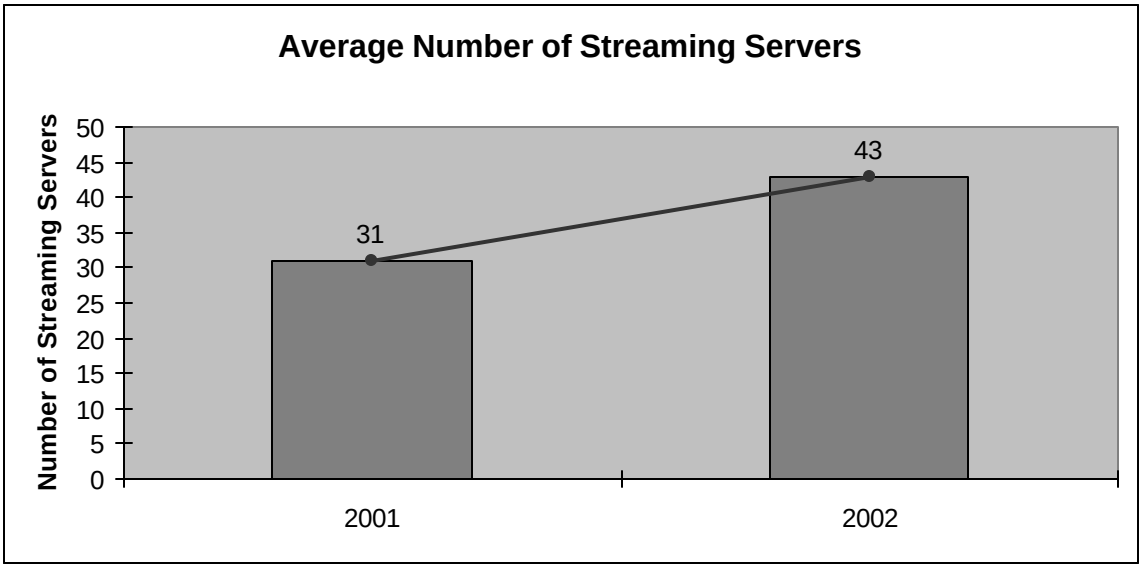
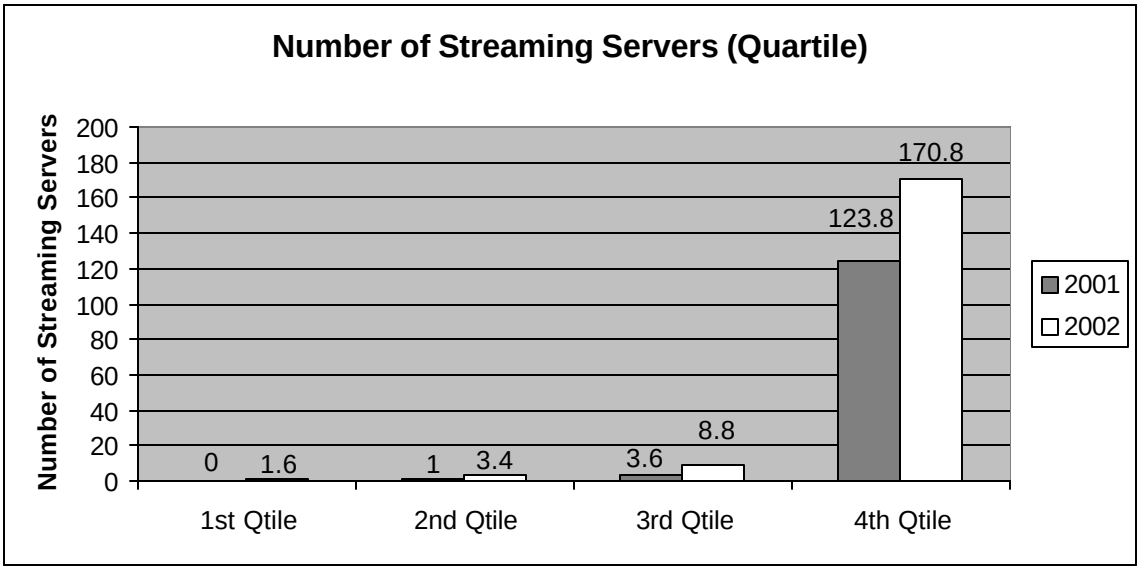


Chart 2-4 shows the quartile breakdown of responses for streaming servers in 2001 and 2002. For quartile responses, the data was broken into four groups, each with a separate mean, media, and mode for the amount of streaming servers. The chart includes the means for each of the quartiles for 2001 and 2002.

The strongest growth occurs in the fourth quartile. The fourth quartile, or the top 25% of the responses, indicates respondents have significant requirements, an order of magnitude higher for the number of streaming servers than the first three quartiles. The fourth quartile increases from 124 in 2001 to 171 in 2002. There is a huge difference between the means of the fourth quartile, the early adopter segment, and the first, second, and third quartiles. The requirements for the first, second, and third quartiles will have to significantly change to match the fourth quartile by next year.

Quartile analysis of the number of streaming servers indicates that the top 25% of respondents are planning large enterprise streaming rollouts. Responses from the previous question regarding simultaneous streams support this notion. The remaining 75% of respondents are likely implementing workgroup or experimental implementations of enterprise streaming solutions.

Chart 2-4: Streaming Servers (Quartile) (n=70) Q14



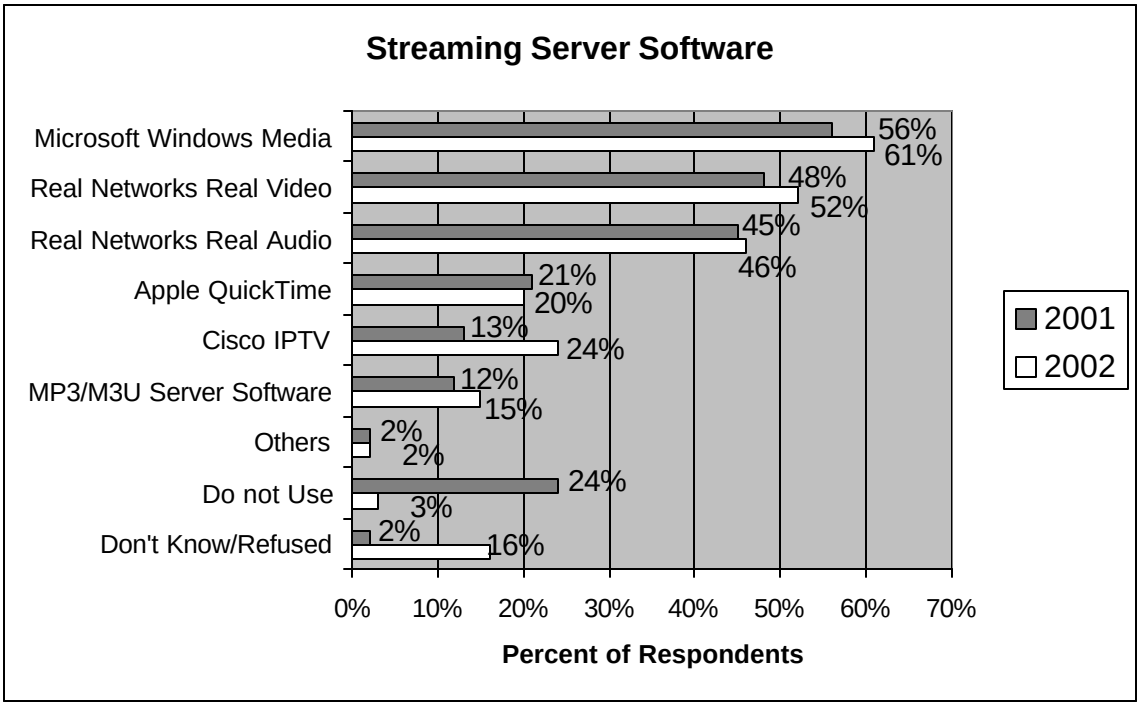
Enterprise Streaming Server Software

Microsoft and Real Networks dominate the streaming server software market, each with its respective audio and video streaming products. A battle has long raged between Microsoft and Real networks in the streaming market for players and server software. In order to gain a better understanding of this tug of war, we asked respondents what streaming server software they currently use, and plan to use in 2002. Chart 2-5 shows the growth of streaming server software at respondent organizations. For this question, multiple responses were allowed.

Microsoft is leading the enterprise server software market with 56% of respondents this year, increasing to 61% next year. Real Networks video server software increases from 48% in 2001 to 52% in 2002, while their audio server software marginally increases from 45% in 2001 to 46% in 2002.

Cisco Systems has a strong presence in the enterprise. Cisco's IPTV solution, an MPEG-1 solution, shows the only significant growth overall. Cisco IPTV increases from 13% (2001) to 24% (2002). Cisco's presence along with Cisco-powered networks in a noteworthy amount of organizations has created strong brand loyalty, which may provide them with an advantage in the enterprise streaming market. Streaming performance is based on network performance. Though Cisco is not known for streaming, Cisco is known for its network performance and can easily develop a reputation for streaming performance.

Chart 2-5: Enterprise Streaming Server Software (n=100) Q15



Enterprise Streaming Server Operating Systems

We asked respondents what operating system they currently use for streaming servers in 2001 and 2002. Respondents were read a list of server operating systems ranging from Windows 2000 to Linux. For this question, multiple responses were allowed.

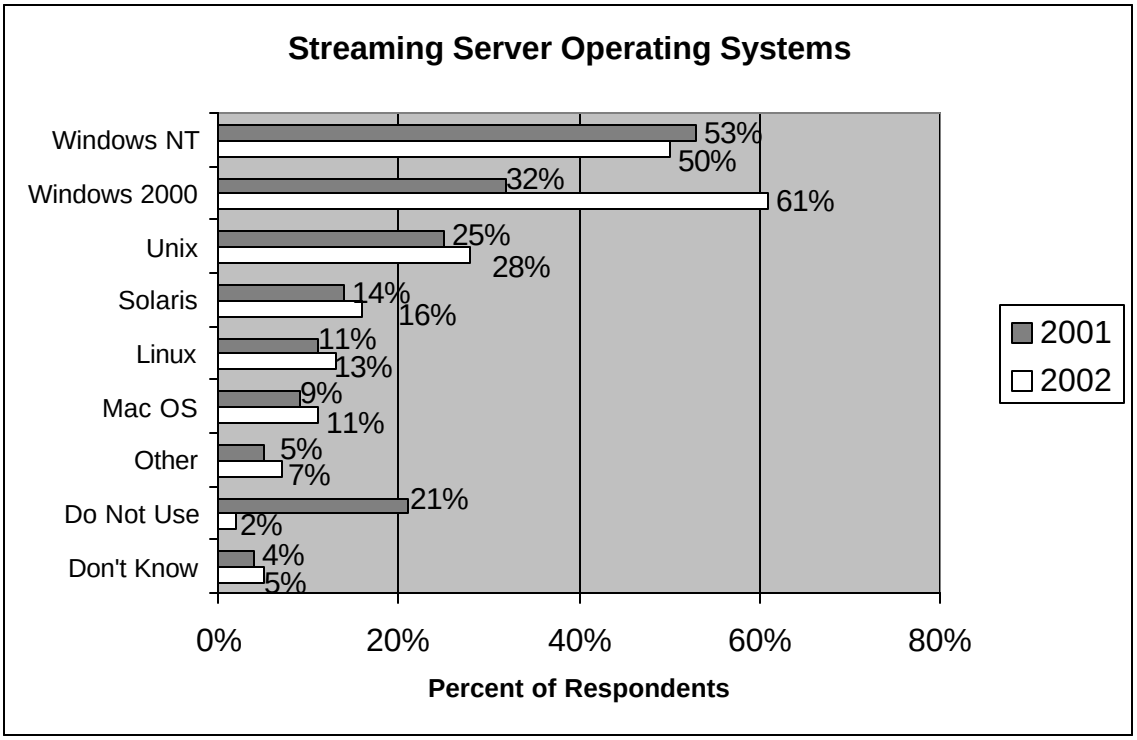
Microsoft's strategy of including Microsoft Media Server in Windows 2000 Server will likely pay off in the long term in the enterprise streaming market, as they currently dominate the enterprise server operating systems market. While on top in 2001, Windows NT actually decreases from 53% in 2001 to 50% in 2002. This decrease is dwarfed by the huge increase in Windows 2000 systems, which increases from 32% in 2001 to 61% in 2002. The next closest server operating system for streaming servers is Unix, which increases marginally from 25% in 2001 to 28% in 2002. All other operating systems for streaming servers, including Solaris, Linux, and Mac OS, show marginal growth.

Those using Windows NT and Windows 2000 will likely use Windows Media Technology, since Windows Media is included with Microsoft's streaming server software. Microsoft Producer, a new digital media presentation creator for Windows 2000 and Office XP, offers the capability of creating streaming

presentations. Our research shows that 74% of respondents create (2001) and 84% plan to create (2002) their own streaming content. Microsoft has received backlash recently over its announcement that they would be moving from a software licensing agreement to an annual subscription service with their upcoming software products. Microsoft's competitors will likely position and create market messaging to attract disgruntled Microsoft customers.

Finally, Linux and Mac OS streaming server software have an unexpected presence in the enterprise. They are growing marginally from this year to next. Apple Computer is offering an open source version of its Apple Quicktime Streaming Server software called the Darwin Streaming Server. This new free offering may influence the adoption rate of the Mac OS as a streaming server operating system. Along with running on the Mac OS, FreeBSD, Red Hat Linux, and Solaris, Darwin Streaming Server is also available for the Windows NT and Windows 2000 platforms. Chart 2-6 lists the enterprise streaming server operating systems expressed by study respondents.

Chart 2-6: Enterprise Streaming Server OS (n=100) Q16



Enterprise Streaming Services

The use of streaming is becoming more popular in the enterprise. Unlike the Internet, enterprise networks are controlled, deterministic, and can be viewed under one management platform. Enterprise networks are built out to serve individual company requirements. Even so, streaming content may stress the capacity of an organization's network, choking existing application performance.

The Internet is made up of thousands of haphazardly interconnected networks. Streaming media is a latency sensitive application, which significantly degrades with Internet congestion and the number of router hops. Service providers have learned to mitigate the deficiencies by deploying a variety of products to provide the best performance at reasonable cost.

As a result, service providers are accustomed to delivering streaming services and they are familiar with enterprise. Their expertise with IP streaming networks opens up a major market opportunity for service providers. Streaming service providers are well equipped to deliver managed services and Extranet streaming services and provide expert deployment advice. The following sections discuss the enterprise streaming service opportunity.

Enterprise Streaming Service Providers

The Service Provider Market

Network service providers (NSPs) operate in an increasingly competitive landscape where new revenue generating services, aside from straight access, have become critical for survival. Competitive pressures and technological advances have long since eliminated high margins on Internet access.

Despite the variety of services and applications that can be delivered across IP networks, most NSPs still focus on data transport to generate revenues.

The survival of service providers hinges upon their ability to continually attract new customers, while retaining existing profitable customers.

Historically, NSPs have been evaluated on the sheer number of their customers. However, recent market conditions and the trend to profitability are forcing NSPs to be evaluated on the quality and profitability of customers. This trend has sparked many NSPs to re-evaluate the need for value added services–those layered on top of existing IP service connections.

Service providers will quickly lose market share to faster, nimbler providers who capitalize on implementing new services, including enterprise streaming services. Flexibility in enterprise streaming revenue models is critical to moving forward, as NSPs position themselves to take advantage of the growing opportunity in enterprise streaming services.

Timeliness remains an essential factor, and the NSPs who decrease the time it takes to develop, deploy, and deliver new streaming services will have an important competitive advantage.

In the overall service provider market, NSPs have built remarkable networks and now have an opportunity to generate new revenues through enterprise streaming and eCDN services. Although broadband services promise to boost revenues and reduce churn, few NSPs have announced plans to offer enterprise streaming and eCDN services.

Enterprise Streaming Service Requirements

NSPs need a new generation of streaming platforms to serve the enterprise streaming market. New investments in streaming technology should meet the basic criteria for enterprise streaming outlined below. The requirements for service providers include performance/reliability, scalability, fault tolerance, manageability, security (Digital Rights Management or DRM and secure streaming), and professional services (integration and design, Extranet streaming services, managed services).

Performance/Reliability

Expectations of reliability online continue to increase. Popular mega sites, such as Yahoo!, are changing users' expectations of online media by providing a consistent and reliable experience. Because data networking is a magnet for Murphy's Law, NSPs must have solid disaster recovery systems for enterprise streaming content. To counter the inevitable connectivity problems, streaming service solutions must be resilient and reliable so they able to deliver performance streaming media to intended users.

Performance is the largest factor differentiating streaming services today, and it is also the hardest to accomplish. Performance can be defined in many different ways; for enterprise streaming services, performance is defined by reliable delivery of the highest quality video.

Scalability

There are two dimensions of scalability that streaming services should offer: the "quality" of the viewing and the total number of simultaneous users. Streaming requirements, particularly for live video streaming events such as quarterly results, are very difficult to predict, and impose difficult design decisions for online organizations. An enterprise streaming solution must scale with a large number of users.

An effective streaming architecture must include an extensible framework that supports the integration of current and future streaming features, products, and services. The development of standardized "interface-compatible" components enables quick integration of future features, as well as product and service compatibility.

Fault Tolerance

Performance streaming solutions must be based on fault tolerant networks, which include reliable network management systems that identify problems before they occur. A well-constructed solution will include a fault tolerant architecture, which reliably delivers performance streaming services.

Manageability

In order to maintain streaming performance, the management solutions must have the capacity to monitor the health of the network between streaming servers and the end users. Management tools should include the capacity to offer and measure a range of streaming service level agreements (SLAs). The streaming platform should be able to set up flexible SLAs based on changing market demands.

Streaming content creators need to understand their audiences. Management tools should, therefore, include the capacity to gather a wide range of information about streaming media audiences.

Security

Security has become a major issue, especially with ongoing, high profile denial of service (DoS) attacks against major Web sites. Streaming solutions must include mechanisms to defend against DoS attacks by methods such as monitoring idle connections and monitoring suspicious activity (e.g., unauthorized access attempts). With security issues on the rise, respondents have stated the need for increased usage of DRM and secure streaming.

Professional Services

Product manufacturers and service providers are beginning to realize the importance of a professional services group in their overall success. These services, in the form of the design and integration streaming networks, Extranet streaming services, and managed services can be of great value to customers. Most of all, the professional services group assists customers with the evaluation and planning of their enterprise CDN solutions and the integration of services for enterprise partners. We strongly suggest that these services should not be free but value-added services that are bundled with the sale and service on streaming services.

Enterprise Streaming Functions Outsourced

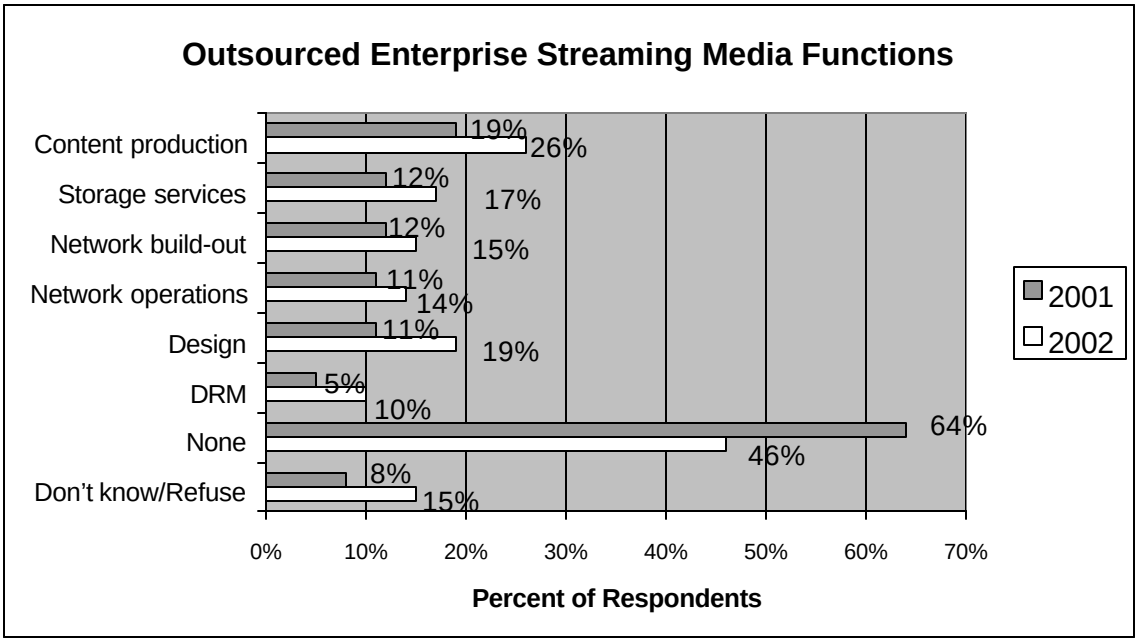
Streaming media technology is new to the enterprise market and, like all new technologies, organizations must build, rent, or buy expertise in order to utilize this new technology. Respondents were asked, from a list, which functions they outsource now, and which they plan to outsource in 2002. We used the word "outsource" in our question as it best describes the procuring of services from outside sources for functions listed in our question. The use of the term "outsource" may have influenced some respondents as it is sometimes viewed negatively. "Outsourcing" may literally mean outsourcing one or more aspect of the respondent's job functions. The chart 3-1 below shows the functions of streaming media that respondents plan to outsource. For this question, multiple responses were allowed.

In this early market, 64% of respondents have no plans to outsource with only 8% not sure of plans. Of our total respondents, 28% are outsourcing some streaming media function in 2001, increasing to 39% in 2002. We believe the degree to which streaming media is implemented within an organization will significantly influence which streaming media functions are outsourced.

The largest current and planned function to be outsourced for streaming media is content production. Content production is the capture, development, and encoding of streaming content. The responsibility of production generally falls on an organization's Audio/Video (AV) group; however, not all organizations have such groups. Although AV groups traditionally deal with analog video and production solutions, the growing popularity of enterprise streaming technology is prompting AV groups to learn more about digital video and streaming media technology. Of our respondents, 19% are outsourcing content production in 2001, increasing to 26% in 2002. Digital content production is not yet mainstream for most AV professionals, but we see this trend changing in the near future. Digital content production offers significant cost savings in terms of equipment and functionality. New developments in digital video creation software are simplifying production and enabling non-technical people to capture and produce digital video content.

The growth rates for outsourcing storage services, network build-out, network operations, and network design all show similar growth rates. Those respondents outsourcing streaming network design, build-out, and operations will likely use a single source.

Chart 3-1: Outsourced Enterprise Streaming Functions (n=100) Q17



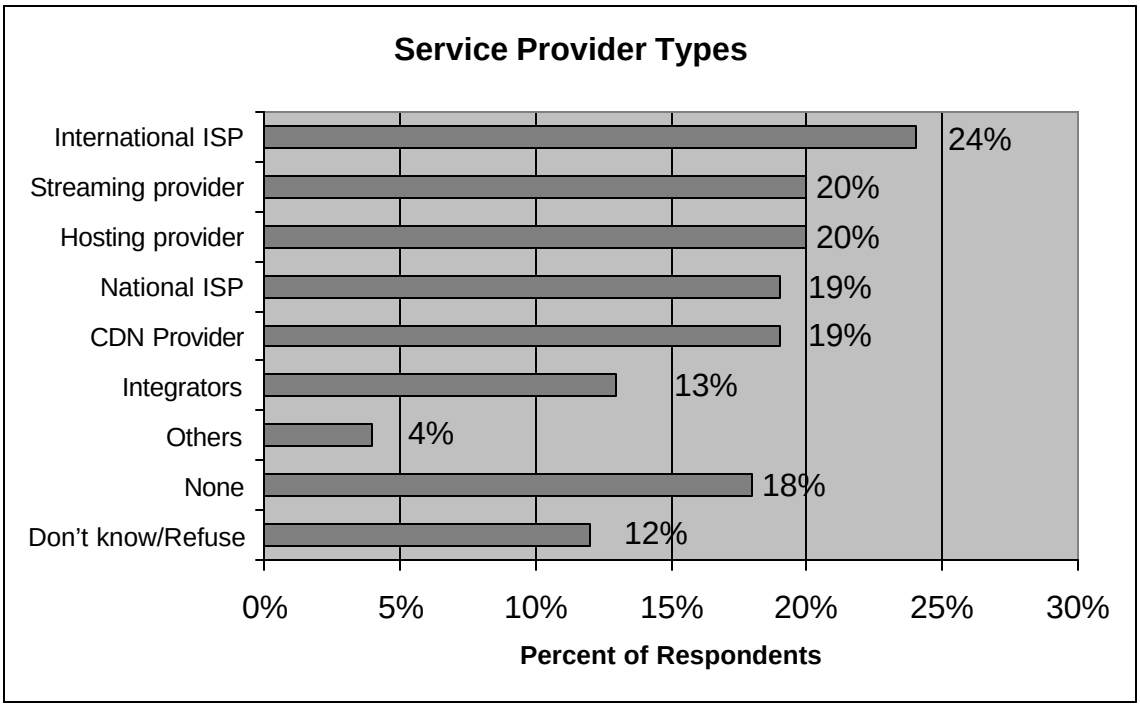
Preferred Providers for Streaming Services

In order to understand the types of service providers that enterprises might look for, we asked respondents to choose from a list of service provider types that they prefer to use. For this question, multiple responses were allowed.

The chart 3-2 below shows the types of service providers that respondents plan to use for enterprise streaming services. There are no major differences between service provider types. The most desired service provider type was an International ISP as expressed by 24% of study respondents. Streaming provider (20%) and hosting provider (20%) types are the next desirable service provider types.

At this stage, none of the service provider types has a distinct advantage in the market. Enterprises will likely look to existing service providers for enterprise streaming services. A significant opportunity exists for service providers who develops offer equipment resale, network design, network build out, managed services, and professional services.

Chart 3-2: Desired Service Provider Types (n=100) Q18



Reasons for Outsourcing Streaming Services

In the past, most IT departments viewed outsource services as a threat, However, we believe that IT Professionals are becoming neutral to outsourcing, largely due to the expertise gap in the market. Selective outsourcing is on the rise, and is becoming a necessity for IT departments. To determine the reasons IT managers outsource streaming services, we constructed a ratings question where we asked respondents to rate the reasons for outsourcing. On a scale of 1 to 7, the ratings were categorized where 1 is "do not agree" and 7 rates as "strongly agree." For our analysis, ratings of 5, 6, or 7 were grouped together and represent the primary reasons for outsourcing.

Respondents rated "IT overloaded with other tasks" (76%) highest on the list of reasons for outsourcing enterprise streaming services. Fifty-five percent of respondents rated "Do not have in-house expertise," while 54% rated "New applications difficult to keep up with" as the reason for outsourcing enterprise streaming services. Only 44% of respondents rated "It costs less to outsource rather than buy streaming applications" as a primary reason.

Product manufacturers and service providers who target the enterprise, should ensure their marketing material describe the benefits of outsourcing

by positioning the benefits of easing the overload faced by IT professionals. Chart 3-3 shows respondents' reasons for outsourcing enterprise streaming services.

Chart 3-3: Enterprise Streaming Outsourcing (n=99) Q19

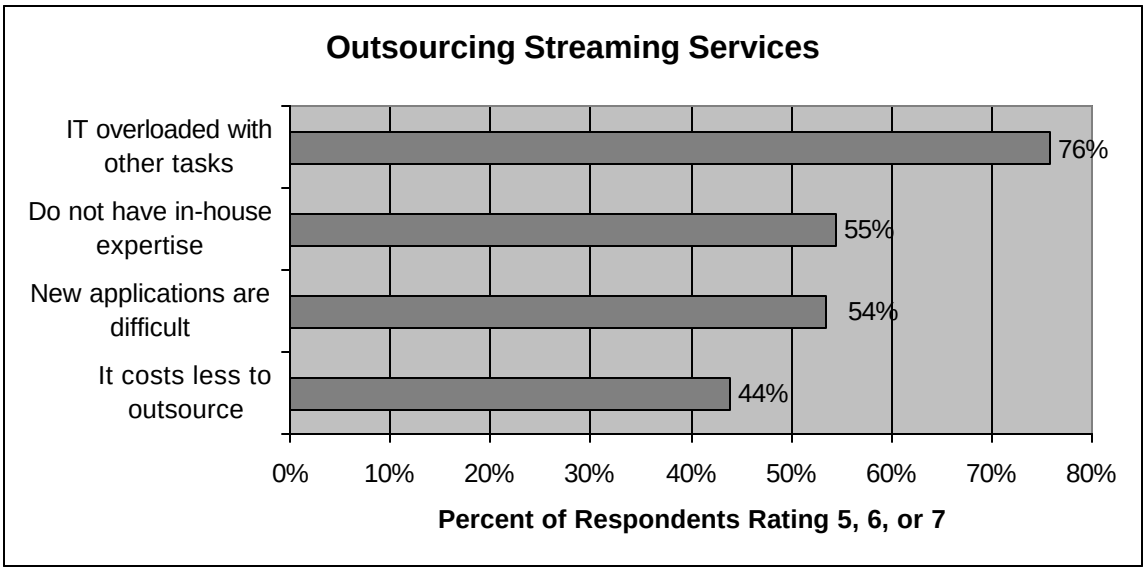


Table 3-1 below shows other primary reasons for outsourcing enterprise streaming services.

Table 3-1: Other Responses for Primary Reasons to Outsource Q19

Additional Responses:
BUSINESS CLIMATE
EASIER FOR EXTERNAL PURPOSES
FOLLOWING GENERAL TREND
MANAGERIAL
SMALL BUSINESS INCENTIVES

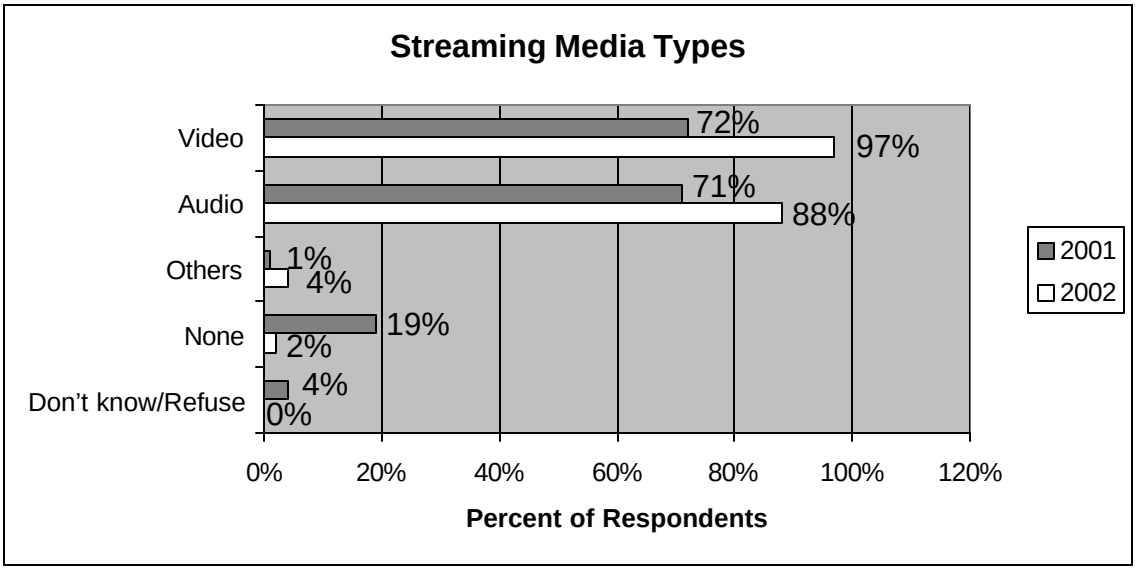
Streaming Technology Uses

The Streaming Media Use

We asked respondents to name the type of streaming media their company uses this year and next year. For this question, multiple responses were allowed. In 2001, responses for video (72%) and audio (71%) are a close one percent difference. Respondents expressed that video increases to 97% in 2002, while audio increases to 88%.

Although audio represents a large portion of streaming solutions, it is not an influential driver of network build-out–the files are smaller and have a relatively small impact on enterprise networks. With this in mind, it is interesting that responses suggest video will be more popular than audio in 2002. Chart 4-1 shows the current and future use of video and audio streaming media.

Chart 4-1: Enterprise Streaming Types (n=100) Q20



Enterprise Streaming Delivery Mechanisms

Streaming media can be delivered in a number of ways including File Transfer Protocol (FTP), streamed from an enterprise streaming server, and streamed from an external service provider. In this section, we asked study respondents in what ways they deliver streaming media this year and next. For this question, multiple responses were allowed.

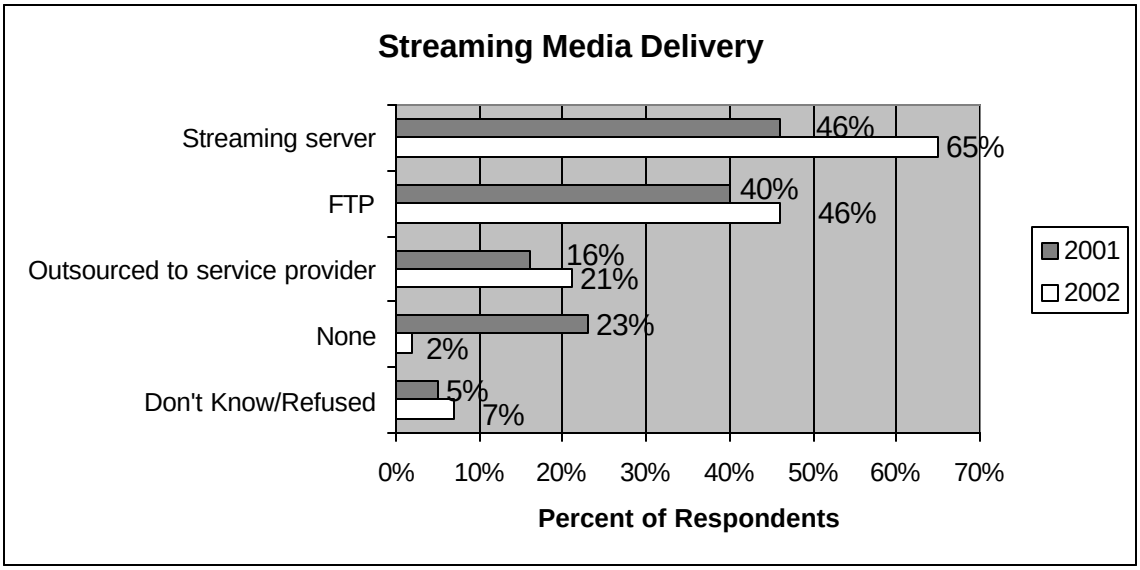
The two most popular streaming delivery mechanisms for respondents are the use of a streaming media server and FTP. The use of a streaming media server increases from 46% in 2001 to 65% in 2002, a significant increase of 19%, while the use of FTP to deliver streaming files increases from 40% in 2001 to 46% in 2002. The use of an external provider for enterprise streaming services increases from 16% in 2001 to 21% in 2002.

A surprising number of respondents plan to use FTP as a delivery mechanism. This means that users download the file to their computer before they view the audio or video streaming content. The use of FTP will likely cause some additional IT headaches, including:

- Large files cluttering end users' hard disks
- Very large streaming video files being sent across the enterprise network
- LANs and WANs will suffer from unpredictable network congestion

Enterprises may not be aware of these drawbacks, and will likely implement manageable streaming solutions. In addition to those hindrances, FTP is difficult to regulate. Fortunately CDNs can work effectively with streaming and large files and are a way to alleviate potential problems. Chart 4-2 below shows current and future plans for enterprise streaming delivery mechanisms.

Chart 4-2: Enterprise Streaming Delivery Mechanisms (n=100) Q22



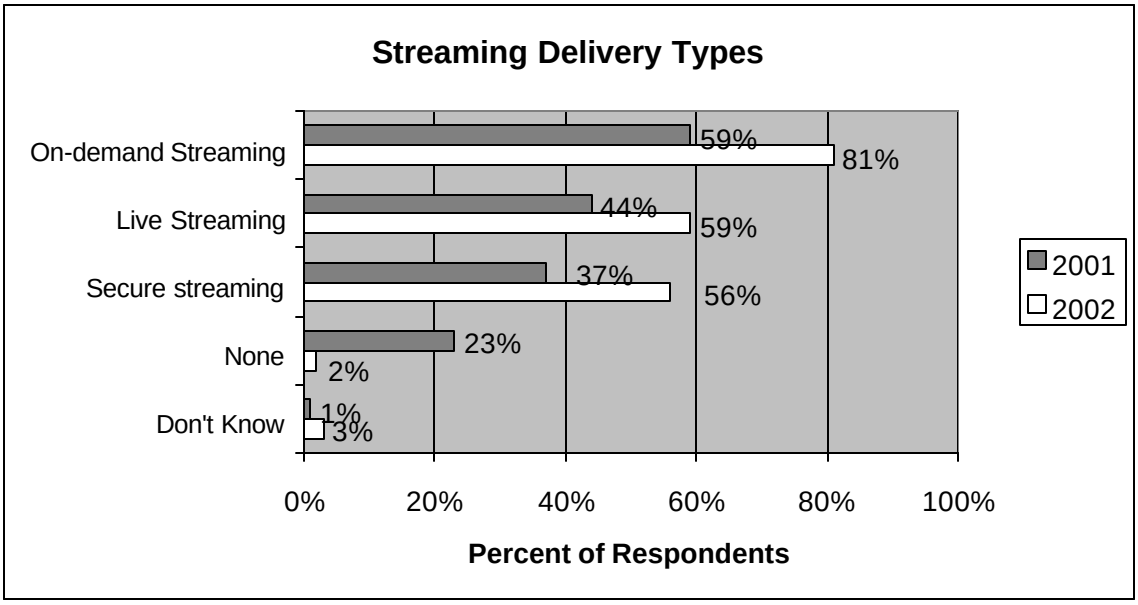
Live, On-demand, and Secure Streaming

Live and on-demand streaming media have very different product and network requirements. Live streaming requires creating, producing, encoding, and delivery during a live event. An example of a live enterprise streaming event is a company-wide CEO broadcast to employees. On-demand streaming files are stored for future access. Live streaming events are recorded and archived for future on-demand use. To gauge the streaming requirements, we asked respondents to list the kinds of streaming audio and video they use now and plan to use. For this question, multiple responses were allowed.

On-demand is the most popular streaming type for respondents, increasing from 59% (2001) to 81% (2002). Live streaming increases from 44% in 2001 to 59% in 2002. Security is a growing requirement for all organizations. We were surprised by the increase of secure streaming by respondents, 37% (2001) moving to 56% (2002). Few products for secure streaming are available today. Based on our findings, service providers' and product manufacturers' streaming solutions should include security, including DRM and encryption as standard features in products and services.

Nevertheless, product manufacturers and service providers have to support all streaming delivery requirements. The requirements will differ among organizations. Extranet partners will access the same or similar content, therefore driving the need for enterprise streaming services. Chart 4-3 shows the use of streaming content types by respondents.

Chart 4-3: Live, On-demand, and Secure Streaming (n=100) Q24



Enterprise Streaming Formats

On-Demand Enterprise Streaming Formats

In order to gain a better understanding of on-demand streaming formats, we asked respondents about the formats they use and plan to use. Respondents were read a list of streaming formats. For this question, multiple responses were allowed.

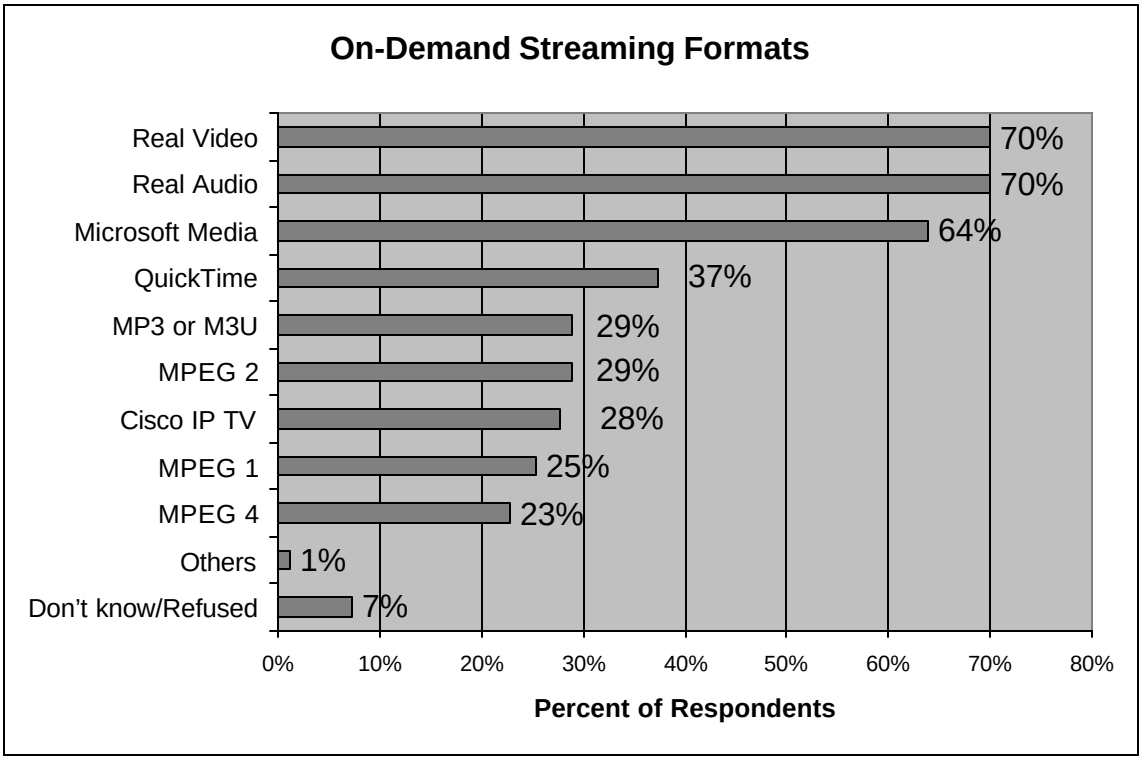
For on-demand streaming content, 70% of respondents identified Real Networks as the leader in the category for both on-demand video and audio. Microsoft Media closely followed with 64% of respondents.

All other on-demand streaming formats are significantly lower than Real and Microsoft. Apple QuickTime (37%), MP3 (29%), MPEG 2 (29%), Cisco IP TV (28%), MPEG 1 (25%), and MPEG 4 (23%). QuickTime, Real, and Window formats are based on proprietary codecs, while MPEG 1, 2, and 4 formats are standards based.

Cisco Systems has a strong enterprise presence and this may account for the high usage of IP TV. Cisco's IP TV solution is in actuality an MPEG-1 solution. Cisco benefits from strong brand loyalty from its customer base, its reputation in the telecommunications and networking industries, and its rapport with channel partners, resellers, and integrators.

It is likely that Microsoft will continue to see strong gains due to its bundling of its Media Technology with its server software. Chart 4-4 below shows streaming formats for on-demand enterprise streaming media.

Chart 4-4: On-Demand Streaming Formats (n=83) Q25



Live Enterprise Streaming Formats

As we mentioned earlier, live streaming includes creating, producing, encoding, and delivery during a live event. The responses for live streaming paint a different picture for the future of streaming format types. For this question, multiple responses were allowed.

For live streaming content, 73% of respondents identified Microsoft as the category leader, closely followed by Real Networks with 68% for video and 66% for audio. You will notice a flip in category leaders for on-demand vs. live streaming. The differences between Real Networks and Microsoft are marginal, and may indicate enterprises are beginning to use Microsoft Media more than Real Networks. Live streaming represents the most recent streaming content, and will likely be re-purposed for future on-demand use. Real Networks' position ahead of Microsoft for on-demand enterprise streaming may indicate existing streaming formats for existing content.

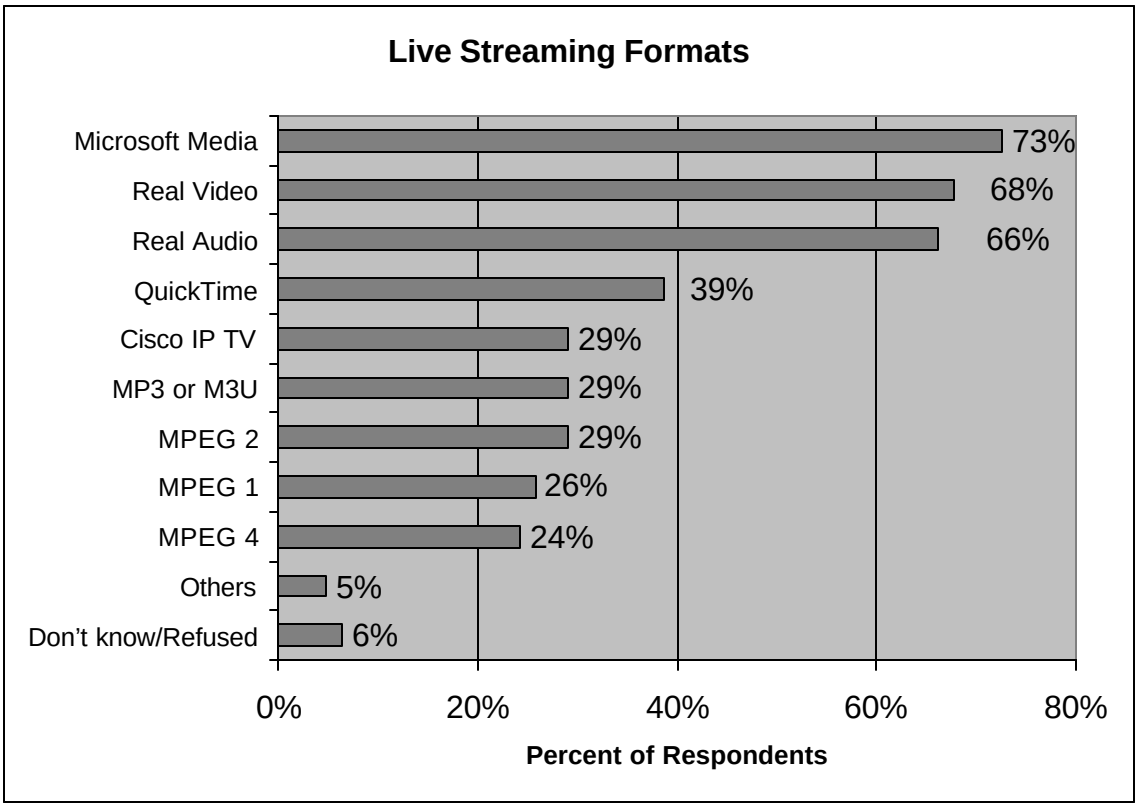
All other streaming format types for on-demand are significantly lower than Real Networks and Microsoft. Apple QuickTime (39%), Cisco IP TV (29%), MP3 (29%), MPEG 2 (29%), MPEG 1 (26%), and MPEG 4 (24%). QuickTime,

Real, and Window formats are based on proprietary codecs, while MPEG 1, 2, and 4 formats are standards based.

Once again, Cisco's IP TV solution, an MPEG-1 solution, is a player in this category, with 29% of respondents. Cisco Systems has a formidable enterprise presence and it may account for the high usage of IP TV. As mentioned previously, Cisco benefits from strong brand loyalty, its industry reputation, and its rapport with channel members.

In on-demand as well as live streaming formats, Microsoft will continue to see strong gains due to its bundling of its Media Technology with its server software. Chart 4-5 shows streaming formats for live enterprise streaming media.

Chart 4-5: Live Streaming Formats (n=62) Q26



Applications for Enterprise Streaming

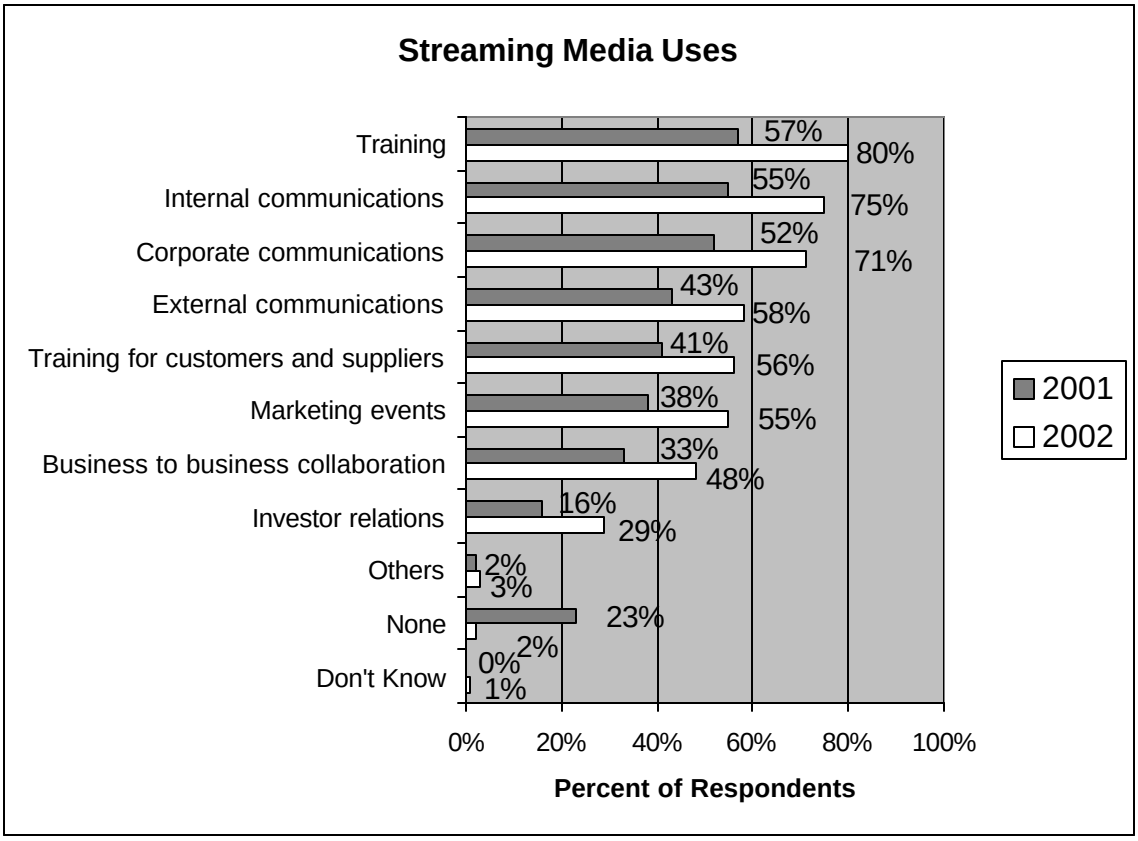
The question that is most frequently asked of our analyst regarding the enterprise streaming market is "What do enterprises plan to use streaming for?" We asked respondents to identify, from a list of applications of streaming media, what they use now, and what they plan to use in 2002. For this question, multiple responses were allowed.

"Training for employees," (Training) which increases from 57% in 2001 to 80% in 2002, and "Increasing internal communications," (Internal communications) which increases from 55% in 2001 to 75% in 2002, are the category leaders. "Intra-company meetings and collaboration" (corporate communications) which increases from 52% (2001) to 71% (2002), further supports the use of streaming as a critical business communications application.

The use of "Increasing communications with external organizations" (external communications), which increases from 43% in 2001 to 58% in 2002, was expected. We believe enterprises are beginning to grasp the potential that streaming holds for business communications both internally and externally. The use of streaming with external organizations creates additional demand for performance streaming services. Along with external communications, training for customers and suppliers falls within that scope, which increases from 41% this year to 56% next year.

Enterprises deploying streaming media with external organizations have very little control over the quality of streaming media when it leaves the enterprise network. Chart 4-6 below shows enterprises current and future uses of streaming media.

Chart 4-6: Enterprise Uses of Streaming (n=100) Q23



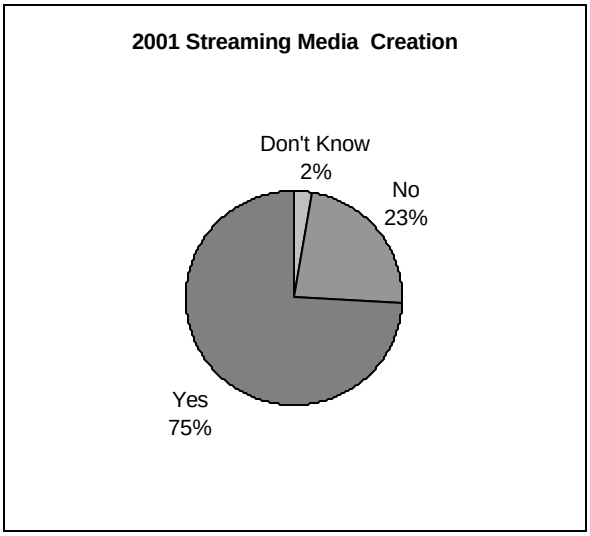
Streaming Media Creation

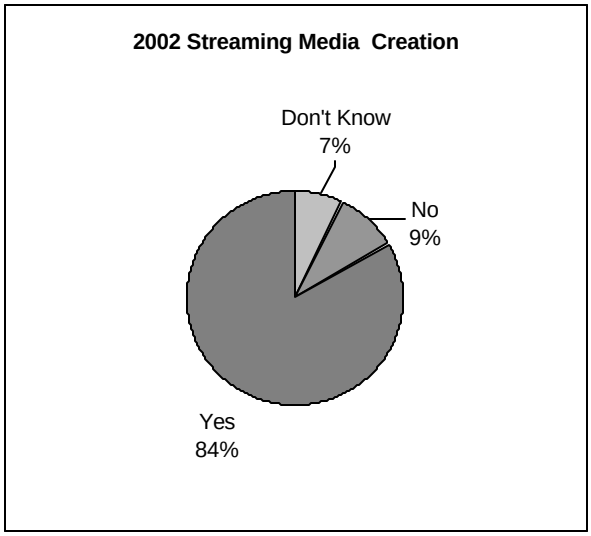
Most large enterprises have AV groups that create audio and video content. In order to gain a better understanding regarding the creation of streaming media content, we asked if respondent organizations created streaming media content in 2001 and 2002. A surprisingly large number of respondents currently create streaming media content, the 75% doing so today increasing to 84% in 2002.

Such a positive response suggests that most large businesses have the capacity to create a large amount of streaming content, further driving the utility of streaming in the enterprise. Content creation capabilities will drive usage for training, corporate communications, and relations with customers, suppliers, and partners.

The chart 5-1 below shows the number of respondents creating streaming media content in 2001 and 2002.

Chart 5-1: Enterprise Streaming Media Creation (n=82,n=98) Q27





In-House Streaming Media Creation Functions

In an effort to gain a more granular understanding of the streaming media creation tasks that respondent organizations perform, respondents were read a list of tasks and then asked to identify the tasks they perform internally. Multiple responses were allowed for this question.

Streaming media production topped the list, and increases from 50% in 2001 to 69% in 2002. Production is the creation of audio and video content.

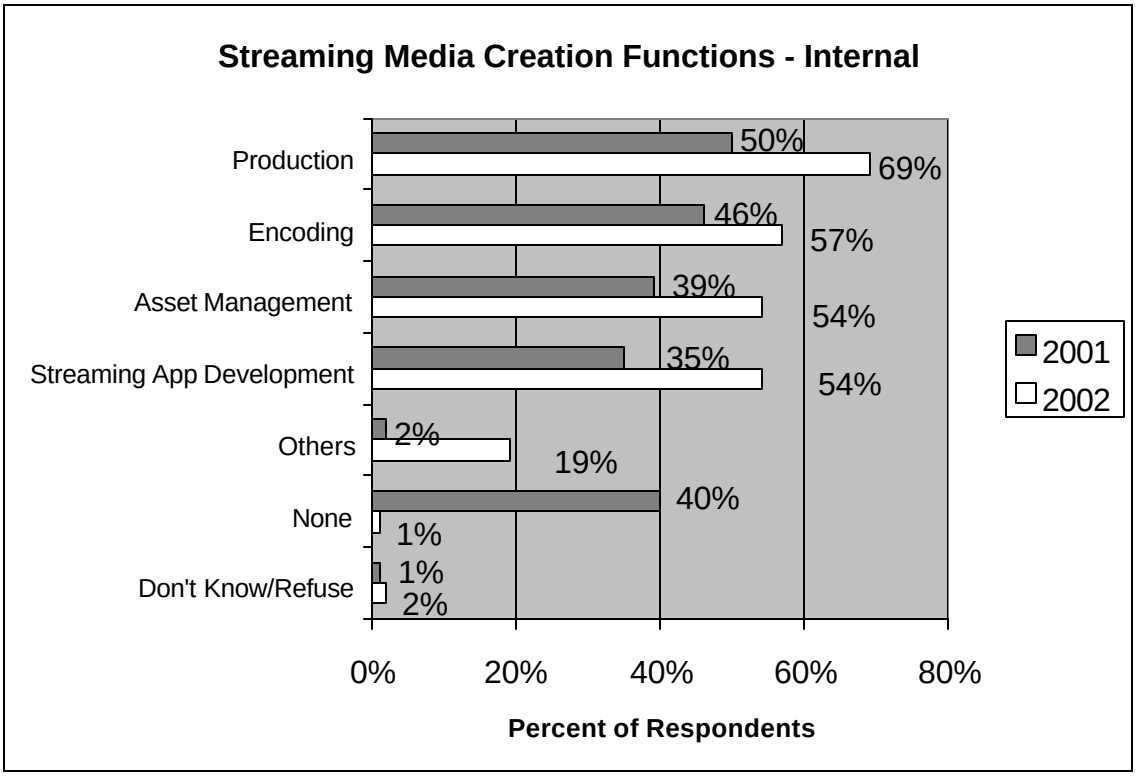
Encoding, which increases from 46% in 2001 to 57% in 2002, is the process of transcoding audio or video content into streaming media formats (e.g. Real Network or Microsoft Media) and bit rates (e.g. 56Kbps, 100Kbps, 300Kbps) for network delivery.

Asset management, which is the management of the intellectual properties and rights of content, is a key part of developing and delivering large amounts of streaming content. Respondents indicated strong growth in asset management, which increases from 39% in 2001, to 54% in 2002.

A surprising number of respondents identified they are developing streaming media applications. Responses indicate strong growth for streaming media applications development, which increases from 35% in 2001, to 54% in 2002. Product manufacturers should develop tools available for enterprises that enable them to develop custom enterprise streaming applications.

Developing applications can be difficult, and also presents an opportunity for professional services aimed at assisting the development of streaming media applications. Although application development can be difficult, it represents an opportunity to provide professional services for assisting customers with the development of streaming media applications. Chart 5-2 shows internal enterprise streaming creation functions.

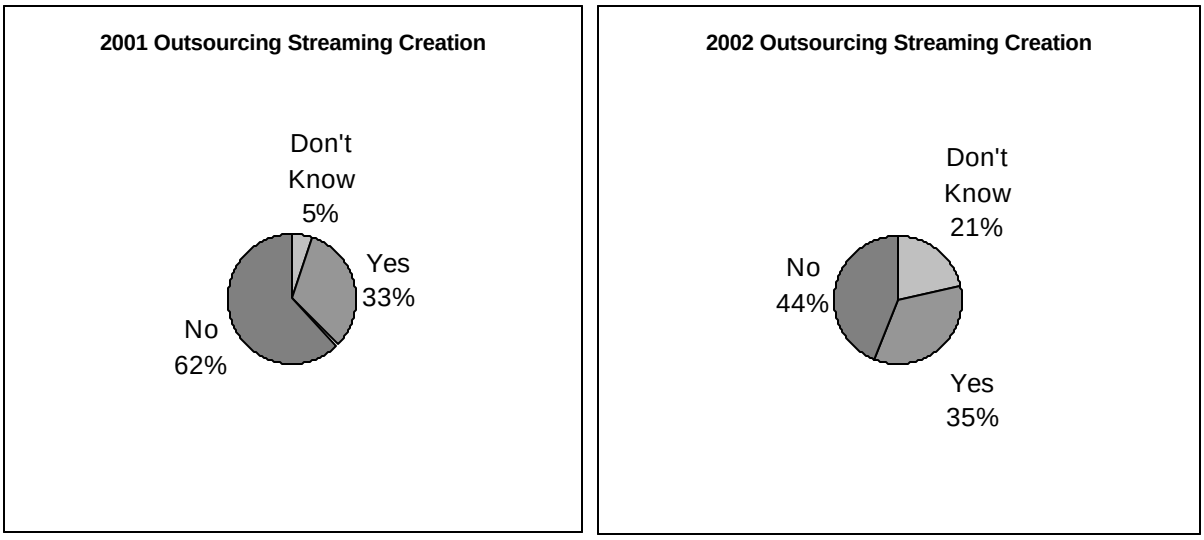
Chart 5-2: Enterprise Streaming Creation Functions (n=100) Q28



Outsourced Streaming Media Creation Functions

Outsourcing, as a trend, varies depending on the task and available in-house expertise. Respondents were asked about their plans to outsource streaming media creation. Roughly a third (33%) outsource streaming media creation function this year, with little difference indicated for next year (35%). As we saw in the last section, most organizations plan to create their own streaming media content. Nonetheless, there is still a healthy market for outsourcing streaming media creation. Chart 5-3 shows if streaming creation functions are outsourced for 2001 and 2002.

Chart 5-3: Streaming Creation Outsourced (n=82,n=98) Q29

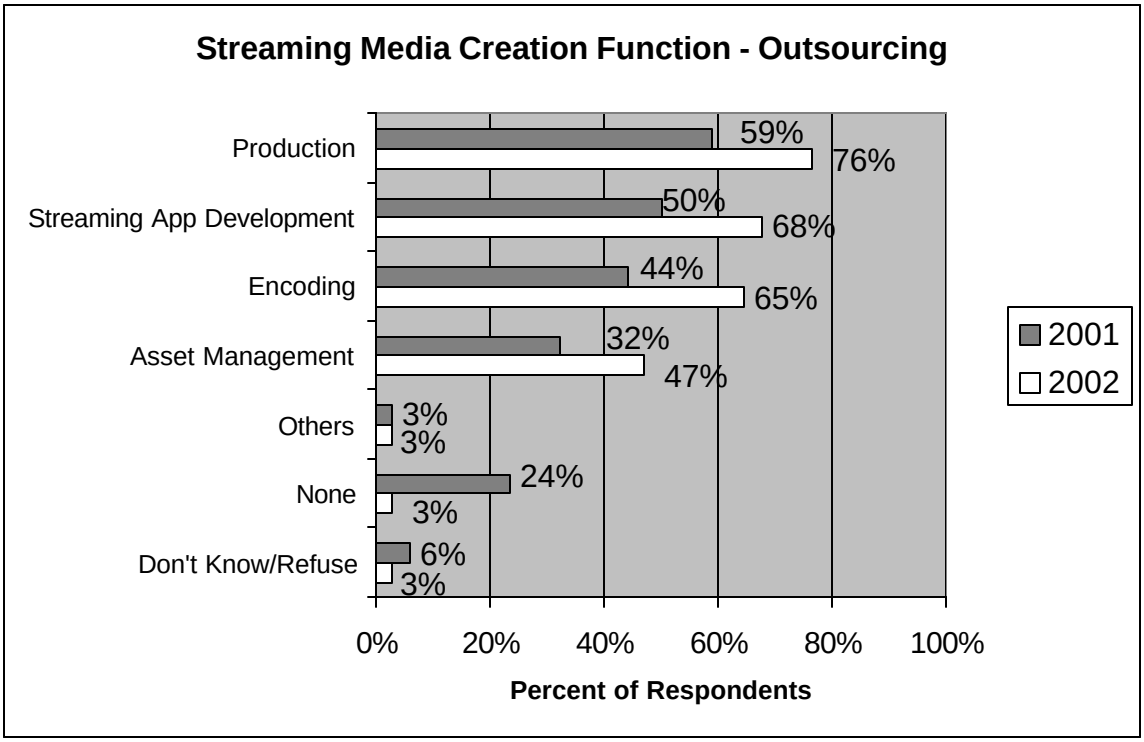


In an effort to gain a better understanding of the types of streaming media creation tasks that respondents plan to outsource, respondents were read a list of tasks and then asked to identify the tasks they currently and plan to outsource. Multiple responses were allowed for this question.

Of those that are outsourcing streaming creation functions, streaming media production is the function most outsourced and increases from 59% in 2001 to 76% in 2002. Production is the creation of audio and video content. Respondents outsourcing streaming media applications development indicate an increase from 50% this year to 68% next year. Encoding gains 21% as it increases from 44% in 2001 to 65% in 2002. It is the process of transcoding audio or video content into streaming media formats (e.g. Real Network or Microsoft Media) and bit rates (e.g. 56Kbps, 100Kbps, 300Kbps) for network delivery. Asset Management, showed a gain of 15% from this year (32%) to next (47%).

Overall, if product manufacturers and service providers wish to provide a complete solution, it is recommended that they develop relationship/partnership with companies that can provide these functions. Chart 5-4 shows outsourced streaming creation functions.

Chart 5-4: Outsourced Streaming Creation Functions (n=34) Q30



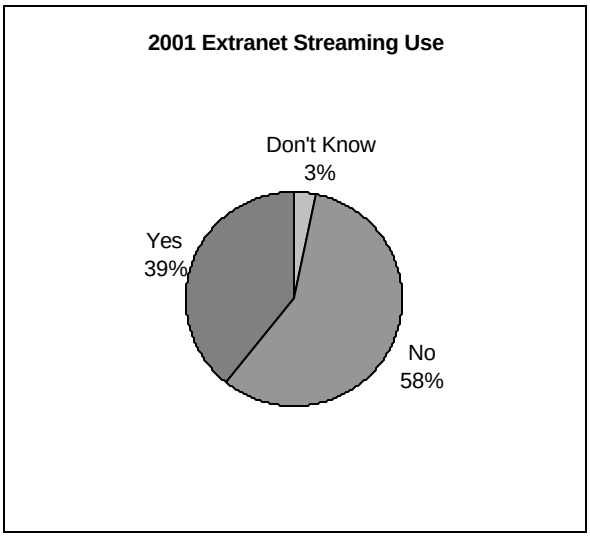
Extranet Streaming

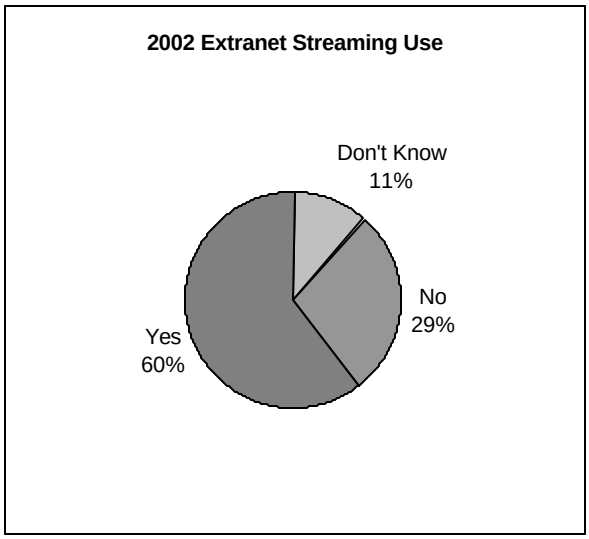
Streaming audio and video content holds value for Extranet partners as well as employees. Extranet partners include customers, suppliers, and business partners. An Extranet is an extension of a company's Intranet via private lines or the public Internet. The use of Extranet streaming for educating channel partners on products and services is a likely example. In this example, channel partners would view product and service training videos over the supplier Extranet.

Extranet Streaming Use

Respondents were asked if they plan to use enterprise streaming media with partners, suppliers, or customers. Extranet streaming media use increases from 39% in 2001 to 60% in 2002. Because customers are the "lifeblood" of any organization, it makes sense that these organizations provide added value by deploying streaming for functions such as sales, marketing, customer service and technical support. Chart 6-1 shows the use of streaming with Extranet partners.

Chart 6-1: Extranet Streaming Use (n=100) Q31, Q31a





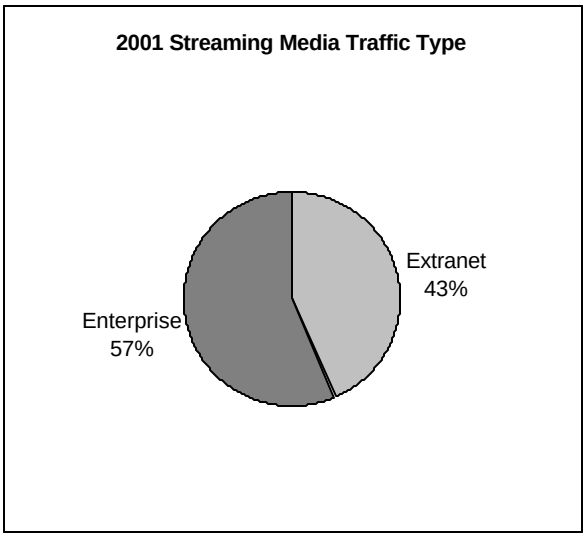
Streaming Traffic, On and Off the Enterprise Network

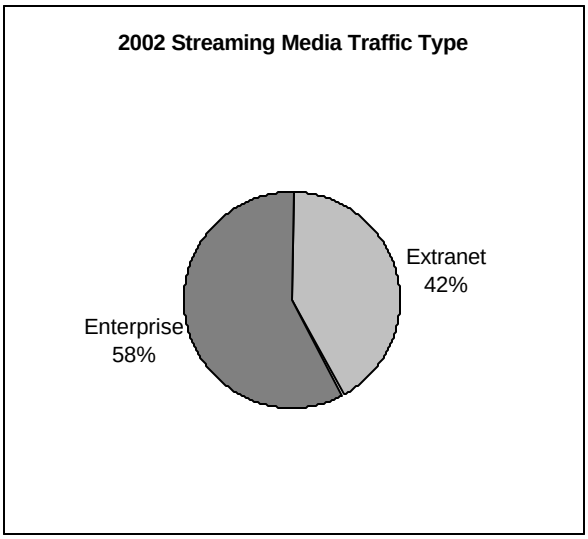
In order to better understand how much streaming respondent organizations plan to use streaming media with Extranet partners, we asked respondents to name the percentages for enterprise streaming traffic and Extranet streaming traffic for this year and next.

Of the 100 respondents interviewed, 68 gave responses for 2001, and 86 gave responses for 2002. In chart 6-2 below, the mean enterprise streaming traffic grows from 57% in 2001 to 58% in 2002, while the mean Extranet streaming traffic decreases from 43% (2001) to 42% (2002). On examination of the mode (most frequent response) for the enterprise and the Extranet, they show no change from year to year. Median (the midpoint value of ranked values with half below and half above) fluctuates slightly for both enterprise and Extranet traffic. Enterprise's median decreases from 70 to 65 from 2001 to 2002. Extranet increases from 30 this year to 35 next year. Responses show no difference between 2001 and 2002.

Respondents do not expect the ratio between enterprise and Extranet traffic to change. This shows that Extranet is a solid requirement in enterprise streaming. Ample opportunity exists for service providers to offer Extranet streaming services. Enterprise streaming media delivery of content via the Extranet will rely on the Internet where performance will be a requirement. Chart 6-2 shows enterprise vs. Extranet streaming traffic types for 2001 and 2002.

Chart 6-2: Enterprise Streaming Traffic (n=68,n=86) Q21





Streaming Use and Extranet Partners

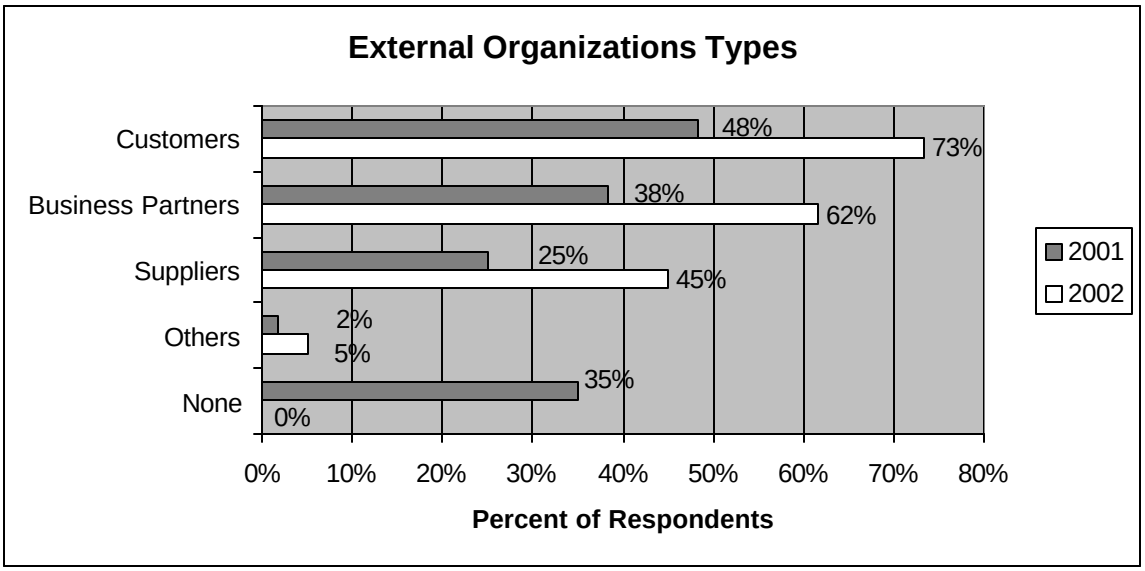
Respondents were asked to name the external organizations for whom they plan to use enterprise streaming media for both 2001 and 2002. Multiple responses were allowed for this question.

The most popular use of Extranet streaming is with customers, and increases from 48% in 2001 to 73% in 2002, a significant gain of 25%. We expected customers to be high in usage with the Extranet and to be cited as the leading group by respondents.

Extranet streaming with business partners increases 24% from 38% in 2001 to 62% in 2002. Streaming with suppliers increases from 25% in 2001 to 45% in 2002, reflecting a 20% rise. There is high usage of business partners and suppliers due to the large number of manufacturers that are implementing streaming in the enterprise.

Chart 6-3 shows the types of external organizations that Extranet streaming will be used for.

Chart 6-3: Extranet Streaming Use by Partner Type (n=60) Q32



Storage

Storage is a critical part of enterprise networks. Enterprise streaming will likely have a dramatic impact on storage capacity requirements in a variety of storage architectures ranging from distributed to centralized.

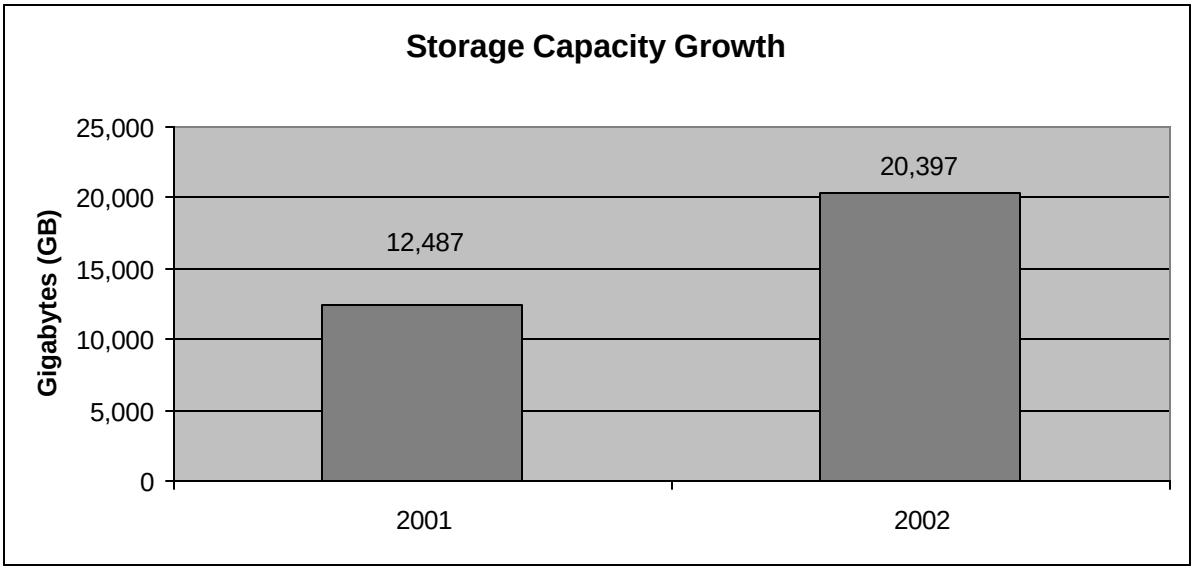
The growth of enterprise networks continues to move forward at a strong rate. Digital information is increasing significantly as organizations convert audio, video, and information to a digital medium that is stored for use. New media developments that facilitate e-learning and company-wide presentations, which enhance audio and visual experience, are continually emerging. Growth is fueled by ceaseless technology innovation that enables the distribution of new and old media.

The storage requirements for enterprise data including streaming content are increasing at 63% (see below) as employees access growing amounts of professional media. Professional media types come in many forms and may include rich media images, video and audio clips, company processes and procedures, and training videos.

Enterprise Storage Capacity Growth

In order to gain a better understanding of enterprise storage growth, we asked respondents what their total storage capacity needs were for 2001 and 2002. The mode (most frequent response) for enterprise storage capacity growth increases 20 times from 100 GB (2001) to 2,000 GB (2002). From 2001 to 2002, the median (the midpoint value of ranked values with half below and half above) doubles from 1,000 GB to 2,000 GB. Respondents average 12,487 GB in 2001, increasing to 20,397 in 2002. According to respondents, storage requirements increase 7,910 GB from this year to next, a gain of 63%. Chart 7-1 below shows the average storage capacity growth from 2001 to 2002.

Chart 7-1: Enterprise Storage Capacity Growth (n=47,n=41) Q33

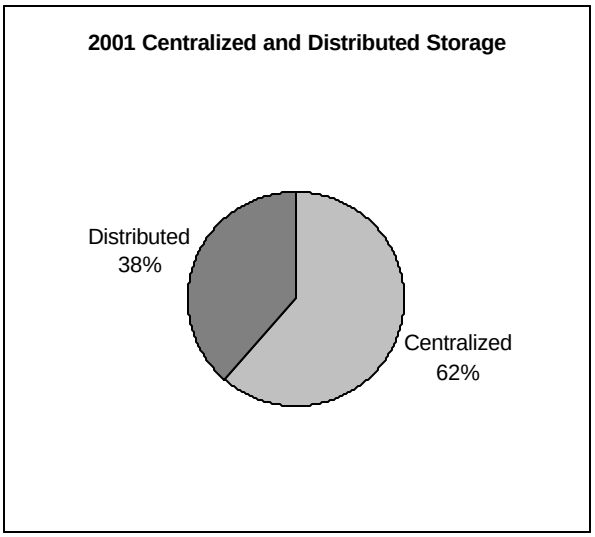


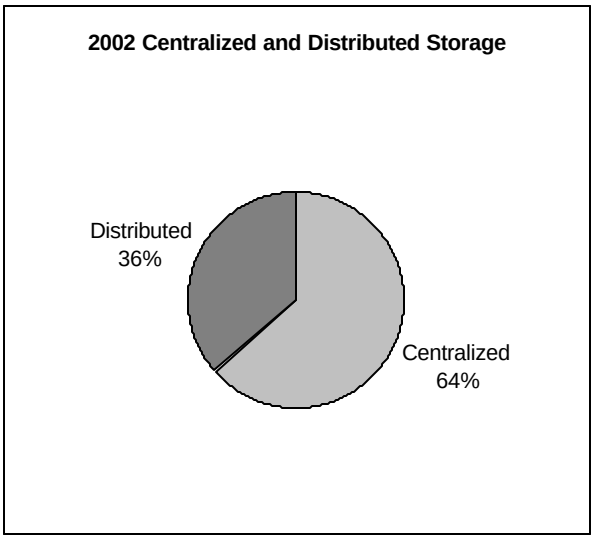
Centralized and Distributed Storage

Respondents for this study represent large companies with numerous sites–a diverse environment for storage. Respondent deployment of storage resources indicates a significant percent (38%) that is distributed throughout organizations. The percentages for centralized vs. distributed storage show little change from 2001 to 2002. Based on responses, the organizations we interviewed may be under the impression that streaming media will not impact current storage architectures. Enterprises interested in streaming solutions should be educated on the impact streaming will have on their existing infrastructure.

There are no plans to change centralized storage for streaming. Respondents may not understand the requirements for streaming video content and what it will do to their infrastructure, both storage and network. eCDN solutions include distributed storage and may account for the distribution of streaming video. Chart 7-2 below shows the distribution of centralized versus distributed storage architectures in the enterprise.

Chart 7-2: Centralized and Distributed Storage (n=92,n=90) Q34





Storage Technologies

Businesses continue to create and use increasing amounts of information. Connecting employees to corporate data enables employees to make faster and better informed decisions, which ultimately can benefits the company. The growing wealth of information is driving the need for better performing storage products with greater capacity. Today, roughly half of the large companies in the U.S. have multiple data centers housing complicated arrays of redundant Web servers, storage systems, and networking hardware. Predicting the future growth needs of an in-house solution can be difficult and largely dependent on budget.

In this section, we asked respondents about the types of storage technologies their organizations use for all data this year and next. Multiple responses were allowed for this section.

RAID

As the Internet grew, so did the requirements for data storage. Web sites soon outgrew their data center environment, requiring better performance and consistent uptime in order to support emerging Internet revenue models. Web servers began using Redundant Array of Inexpensive Disks (RAID), the use of two or more inexpensive hard disks arranged in a grouping in order to increase the reliability and performance for disk storage. RAID is a leading storage technology among 78% of study respondents. It remains unchanged for 2001 and 2002.

Direct Attached Storage (DAS)

DAS devices include all computer storage devices such as hard disks and disk arrays, e.g., RAID, which has a dedicated connection to a server using SCSI, IDE, USB, and others. DAS can also represent standalone servers, e.g., workgroup servers. DAS technology is not considered to be reliable, scalable, or responsive enough for use in a networked environment. Nonetheless, was identified as the leading storage technology by respondents, equal to RAID technology. It decreases slightly from 78% to 75% from 2001 to 2002.

Network Attached Storage (NAS)

NAS devices are dedicated file servers that sit on the enterprise LAN. This provides easy access by both LAN users and application servers. NAS provides an easy way to improve enterprise server performance by offloading file server duties. NAS is easy to implement, but it becomes difficult to manage and scale for significant storage requirements. NAS technology increases slightly from 43% this year to 47% next year.

Storage Area Networks

For larger enterprise organizations, SAN based storage architectures are mandatory for managing large database operations. Furthermore, many Web site environments are adopting SAN solutions in order to keep pace with the growth of Web site content. SAN solutions are high performing centralized storage solutions connected to Web and application servers through a dedicated storage connection. One example is an EMC Symmetrix storage system that connects to servers over a high-speed Fibre channel network. Even though SAN solutions can scale to tens of Terabytes (TB), they represent expensive infrastructure for an enterprise to acquire, install, and manage. SANs make a significant gain of 12% from 2001 (43%) to 2002 (55%) as reported by study respondents.

Storage Service Providers

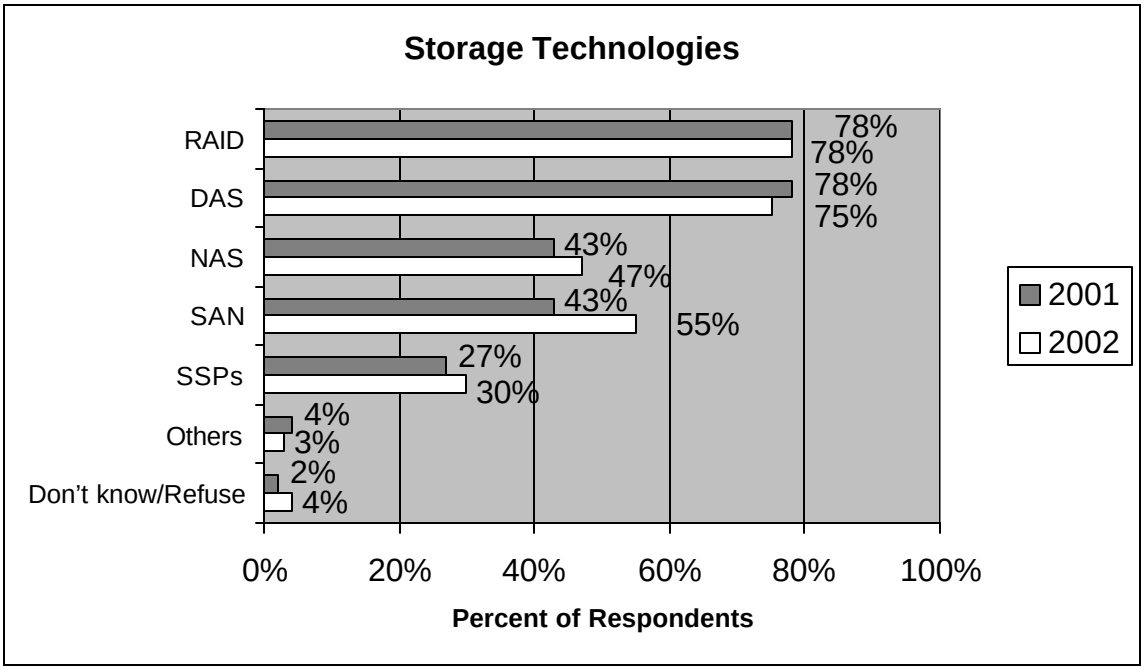
Expertise continues to be scarce in nearly all IT occupations, and the managing and maintaining of in-house SAN and NAS solutions are no exception. Storage Service Providers (SSPs) emerged on the market to provide customers with outsourced storage solutions. SSPs readily adopted familiar SAN and NAS technologies to provide for enterprise streaming.

In an effort to reduce acquisition and administrative costs of large centralized storage systems, some enterprises have turned towards these SSPs. An SSP leverages the transmission properties of fiber optics to provide outsourced SAN services. Normally co-located at service providers such as Exodus, these

vendors offer storage space rental while managing administration themselves. SSPs show strong and consistent usage among respondents. From 2001 to 2002, SSPs increase slightly from 27% to 30%.

Overall, SAN technology shows an increase of 12%, while all other storage technologies show marginal or no changes from 2001 to 2002. Chart 7-3 below shows the types of storage technologies in the enterprise network.

Chart 7-3: Storage Technologies (n=100) Q36



Storage Technology Use for Streaming Media Content

After asking about overall types of storage technology, we also asked respondents about the types of storage technology that they were using for streaming media now and planned for next year. Multiple responses were allowed for this question.

The leading technology for storage of streaming media is an inexpensive technology used widely in the enterprise, RAID. It shows a significant gain of 18% among respondents from 2001 to 2002, increasing from 44% to 62%. Direct attached storage (DAS) is the second leading technology with an increase from 2001 (42%) to 2002 (57%). Also showing a significant gain of 18% is SANs, increasing from 23% (2001) to 41% (2002). NAS increases from 22% to 35% from this year to next.

Caching software and appliances both increase consistently from 2001 to 2002. Caching software increases from 16% to 28% from 2001 to 2002, and

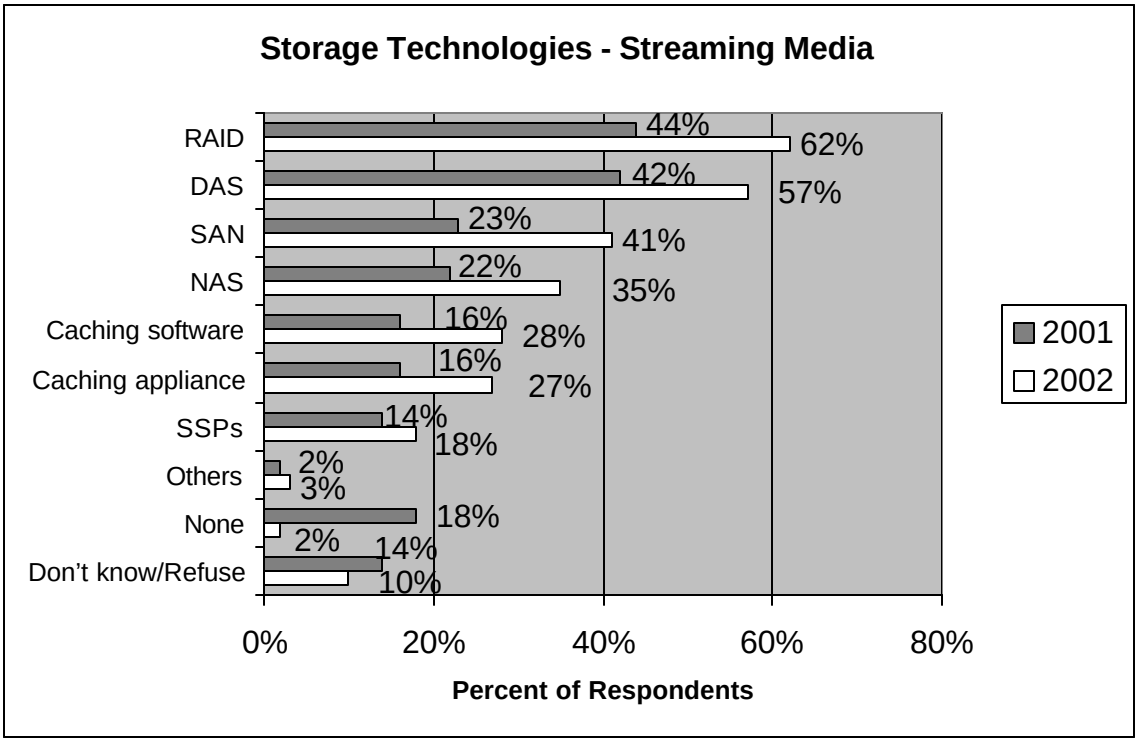
caching appliances increase from 16% to 27% from this year to next. With no difference between one or the other, there is no clear winner between software and appliances. This represents a continuing open market for product manufacturers.

SSP usage and planned usage remain strong and consistent from 2001 to 2002. SSPs increase from 14% to 18% as expressed by our respondents. SSPs may have connections to the Internet, which may offer a degree of performance for Extranet streaming partners.

There is very little change between the type of storage technology used for all data and the type of storage technology used for streaming media. If enterprises are comfortable with one technology, they will likely continue to use that technology for other uses.

Chart 7-4 below shows the types of storage technologies for streaming media in respondent networks.

Chart 7-4: Storage Technologies for Streaming (n=100) Q37



Enterprise Content Delivery Networks

Streaming Media and CDN Usage Correlation

Early in this study, we found that of the 232 respondents, 100 of them were doing streaming in the enterprise either this year or next year. Of those 232 respondents, 35% were doing streaming in 2001 and 42% were planning on doing streaming in 2002. Those 100 study respondents that were doing streaming were also employing the use of content delivery technology in their network, 30% for this year rising to 54% for next year.

Of the original 232, 132 respondents said they did not use or plan to use streaming media technology in their network. We took that group of respondents through an exit questionnaire. Of the 132 respondents, only 7% used content delivery technology in their network this year. This leads us to additional confirmation that streaming media technology usage is related to content delivery technology usage in the enterprise network. Of those that did not use streaming media technology, only 7% used content delivery technology in their enterprise network.

The Correlation

The correlation between streaming in the enterprise and the use of eCDN solutions was measured using the Pearson Correlation within SPSS 10.1. SPSS is the leading statistical analysis application, commonly used for market research statistical analysis. According to SPSS, the Pearson Correlation Coefficient is "A measure of linear association between two variables. Values of the correlation coefficient range from -1 to 1. The sign of the coefficient indicates the direction of the relationship, and its absolute value indicates the strength, with larger absolute values indicating stronger relationships."

The table 8-1 below is a matrix of enterprise streaming use by eCDN use by year. The shaded areas of the table show significant values, and represent the correlation between enterprise streaming and eCDNs in 2002.

Table 8-1: Table of eStreaming vs. eCDN Correlation

		eStreaming in 2001	eStreaming in 2002	eCDNs in 2001	eCDNs in 2002
eStreaming in 2001	Pearson Correlation	1	-.067	.024	.077
	Sig. (1-tailed)	.	.254	.405	.224
	Sum of Squares and Cross-products	14.760	-.360	.500	2.300
	Covariance	.149	-.004	.005	.023
	N	100	100	100	100
eStreaming in 2002	Pearson Correlation	-.067	1	.200*	.247**
	Sig. (1-tailed)	.254	.	.023	.007
	Sum of Squares and Cross-products	-.360	1.960	1.500	2.700
	Covariance	-.004	.020	.015	.027
	N	100	100	100	100
eCDNs in 2001	Pearson Correlation	.024	.200*	1	.532**
	Sig. (1-tailed)	.405	.023	.	.000
	Sum of Squares and Cross-products	.500	1.500	28.750	22.250
	Covariance	.005	.015	.290	.225
	N	100	100	100	100
eCDNs in 2002	Pearson Correlation	.077	.247*	.532**	1
	Sig. (1-tailed)	.224	.007	.000	.
	Sum of Squares and Cross-products	2.300	2.700	22.250	60.750
	Covariance	.023	.027	.225	.614
	N	100	100	100	100

* Correlation is significant at the 0.05 level (1-tailed).
** Correlation is significant at the 0.01 level (1-tailed).

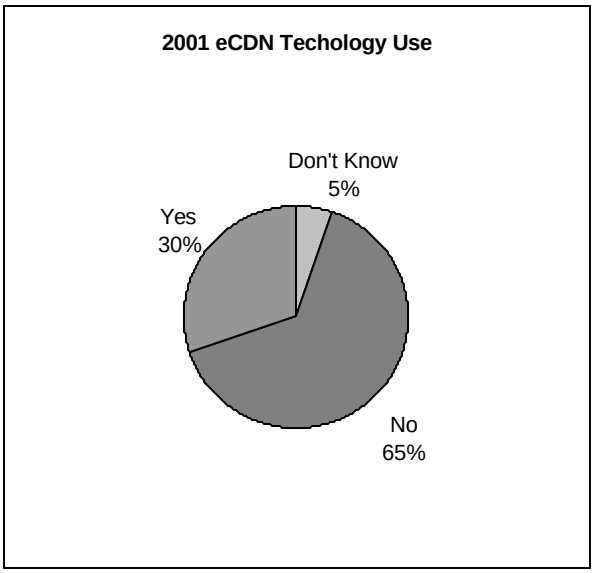
The Use of Content Delivery Technology

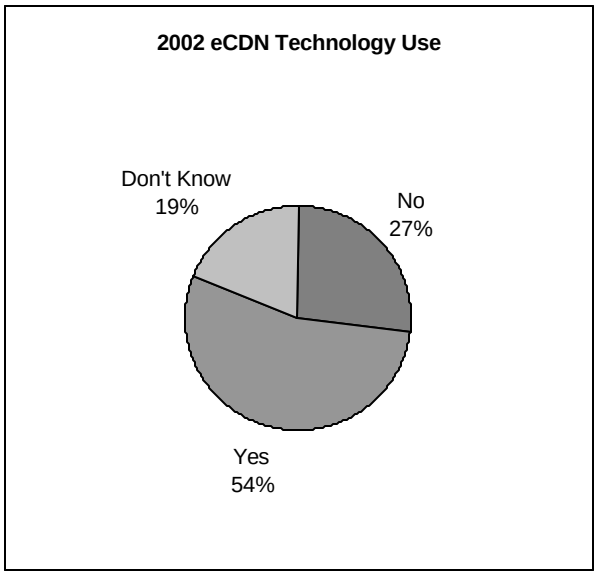
Enterprise content delivery network (CDN) technology is a solution that enables content to be intelligently delivered through an overlay network of CDN devices, such as caches, located strategically close to end users. By delivering frequently accessed content, organizations can reduce bandwidth demand on local area networks (LANs) and wide area networks (WANs).

In order to comprehend the extent of content delivery technology usage in the enterprise, we asked all 232 respondents about their organizations' usage of content delivery technology in their networks for this year and for next year. Of the 100 study respondents who use streaming in their organizations, 30% of the respondents said their organization uses content delivery technology in their network this year, while 65% do not currently use this technology. Fifty-four percent said their organizations plan to use content delivery technology in 2002, while 27% do not. This is a significant increase of 24% in content delivery technology usage in the enterprise network between 2001 and 2002.

As mentioned previously, there is a noteworthy correlation between organizations offering streaming in the enterprise network and those that use content delivery technology. Of those not doing streaming (132 respondents), only 9 respondents were using eCDN services. Those respondents' responses were similar to responses from respondents who were doing streaming and CDN in the enterprise. This correlation shows that organizations offering streaming services will likely look to build their networks with CDN technology. Chart 8-1 below reflects usage of CDN technology in the enterprise for this year and next year.

Chart 8-1: Content Delivery Technology Use (n=100) Q38





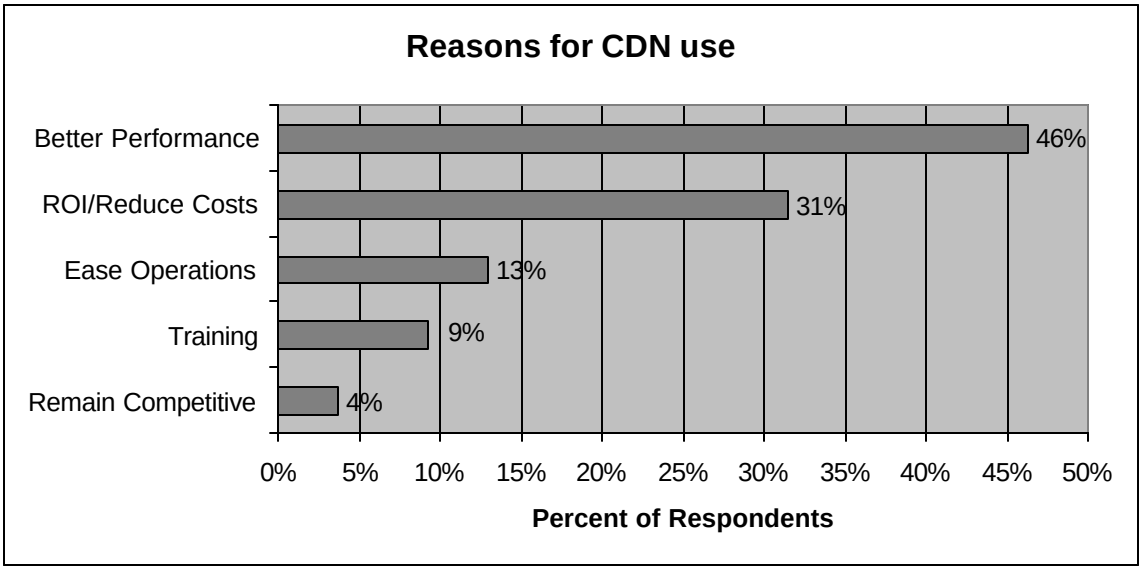
Content Delivery Technology - Reasons for Using

In order to gain a better understanding about CDNs in the enterprise, we asked study respondents in an open-ended question why they use or plan to use content delivery technology. We categorized the verbatim responses as follows: Better Performance, Return on Investment (ROI)/Reduce Costs, Ease Operations, Training, and Remain Competitive. Respondents were allowed to offer multiple responses. Verbatim responses can be found in the appendix in the Verbatim Responses section.

The top reason for using CDN technology, described by 46% of respondents, was Better Performance. This category included responses such as minimizing latency in distributing information, reducing server load, gaining efficiency, and increasing frequency of updates. Performance is important to most organizations because waiting for files and/or data to be delivered has associated costs. For example, if a streaming file takes too long to download/buffer, employees waste productive time waiting for the streaming media to start. An employee cannot leave and come back later because the stream could start at any moment. Whether live or on-demand, the results are the same. This cost is Lost Productivity. The more time an employee waits for streaming content, lost productivity increases. Performance saves costs for the Intranet and for streaming media. The next section examines this performance versus productivity cost discussion.

ROI/Reduce Costs was cited by 31% of study respondents as the next reason for CDN technology use. Responses included in this category are increasing collaboration with partners/groups, optimizing cost savings, and reducing bandwidth use. Ease of Operations was described by 13% of respondents. Training (9%) and Remain Competitive (4%) were the next reasons expressed by respondents. Chart 8-2 below shows the reasons for the usage of content delivery technology.

Chart 8-2: Reasons for Content Delivery Technology (n=54) Q42



Lost Productivity Cost Model

To offer an example of performance affecting productivity, we created a lost productivity cost model below to illustrate. To begin, we have to start with some assumptions. We assume that the average price per employee is $50,000 and the overhead cost per employee ranges from 20-50%. In this example, we use 50%. An employee is not productive while waiting for a streaming file to be downloaded or buffered. The employee usually waits for a streaming file to begin playing and would not leave their workspace, as an employee would if it were a typical file download. Annual cost per Employee including overhead cost equals $75,000.

Without an eCDN solution, we can figure the lost productivity cost to an organization by first calculating the cost per minute. There are fifty-two weeks in a year, 52 weeks times 5 days equal 260 days. Take the 260 days and subtract 10 days for vacation, 7 days for holidays, and 5 days for sick days. The rough number of days an employee works equals 238 days. If there are an average of eight hours in a workday, 238 days times 8 hours a day equals 1,904 hours. This is equal to 1,904 hours or 114,240 minutes.

The employee cost per minute is $75,000 divided by 114,240 minutes, which equals **$0.66/minute or $0.01/second.** Table 8-2 below shows the figures for lost productivity cost model.

Table 8-2: Lost Productivity Cost Model

Lost Productivity Cost Model		
Cost per Employee per second	$	0.01
45 second download/buffer for large streaming media file	$	0.45
Number of Employees		22,000
Number of Files per Year		100
Total Loss of Productivity =	$	990,000

If it takes 45 seconds to download or to buffer a stream, the cost is $0.45 for that employee to wait or for the loss in productivity of that employee. In our study, the average organization has 22,000 employees. Lost productivity would equate to 22,000 employees times $0.45 or $9,900 in lost productivity per employee for the organization.

This calculation, however, was based on one file. If we calculated 50 files per year per employee, the figure would be $495,000 in lost productivity. For 100 files per year, the lost productivity calculated would be $990,000. To help organizations calculate lost productivity, we have included a Performance Cost Model Worksheet on the study's CD-ROM.

Content Delivery Technology - Reasons for Not Using

Of the respondents (65% for 2001, 27% for 2002) that previously indicated they do not use CDN technology in their networks, we asked in an open-ended question to describe the reasons for not using CDN technology. This question allowed for multiple responses from respondents. We categorized the verbatim responses as follows: "No Need," "Network Sufficient," "Not Evaluated Yet," and "Budget." Open-ended responses can be found in the appendix in the Verbatim Responses section.

The "Not Evaluated Yet" category, representing 34% of study respondents that do not use CDN technology, included a range of reasons such as "currently investigating, "uses are not specific enough to plan for," and "haven't gotten around to it." The next reason also described by 34% of respondents was "No Need." Responses in this category included "doesn't fit applications," "no need to replicate the information," and "no critical need."

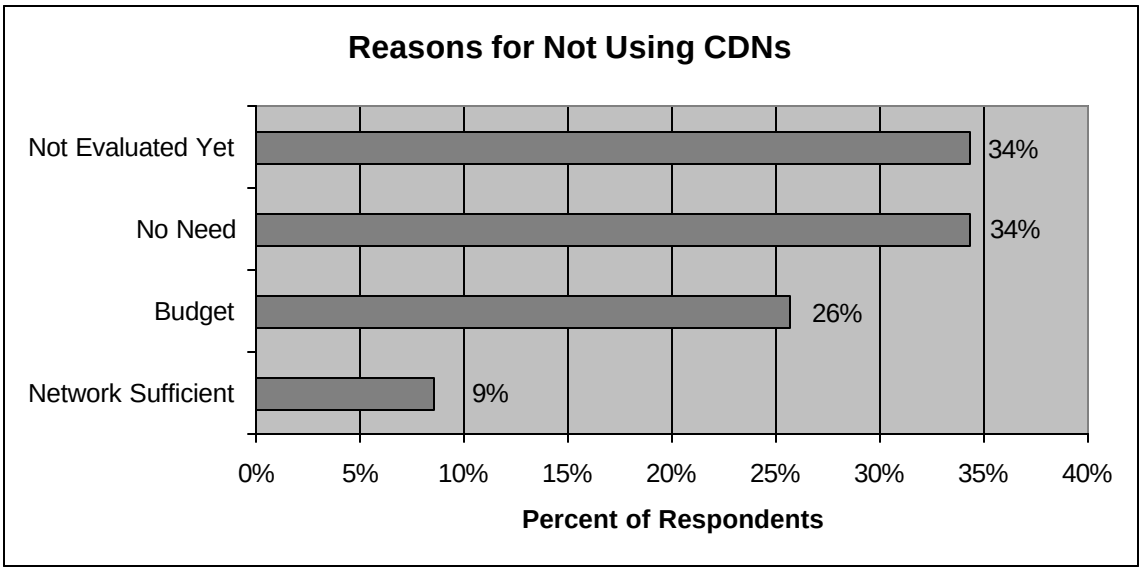
The next significant reason for not using content delivery technology was "Budget," conveyed by 26% of respondents. Responses included "Budget Restraints," "Funding," and "Resources." Through most of last year, new

entrants in the CDN market have not driven the price of CDN products and services down. However, there are emerging entrants that will likely drive the price of CDN services lower. Lower cost services will also drive greater adoption of CDN services, as will the use of CDN optimizing and performance appliances, such as those from CacheFlow.

Content delivery technology is new, and can present a challenge to potential customers. Providers of content delivery products and services should create marketing collateral and host seminars that target customers at different levels of technical expertise. This may include the business-focused buyers, those new to content delivery technology, and technically advanced buyers. The ability of prospects to understand new technology is pivotal to content delivery product manufacturers' and service providers' acquisition of enterprise customers.

Product manufacturers and service providers must do a number of things to attract new customers. Market education is one, as reasons for not using CDN technology are mostly due to a lack of understanding about the technology. Among other things to attract customers, product manufacturers and service providers need to offer more evaluation programs and technical education. If vendors do not offer product or service educational material or the specific information the customer is looking for, the customer will most likely not consider that vendor in its buying decision. Vendors must show clear value propositions and build ROI models relative to the prospect's network. Chart 8-3 below shows the reasons why respondents do not use or plan to use content delivery technology.

Chart 8-3: Reasons for Not Using CDN Technology (n=35) Q44



Outsourcing of Enterprise CDN Functions

To get an understanding of which eCDN functions organizations outsource now or plan to outsource, we provided study respondents a list of CDN functions from which to select those they outsource. While we also probed for any other functions, we allowed for multiple responses in this question. Respondents are from large companies, those with 500 or more employees, and their organizations offer streaming media on their networks.

An enterprise can outsource their network CDN functions in many ways such as:

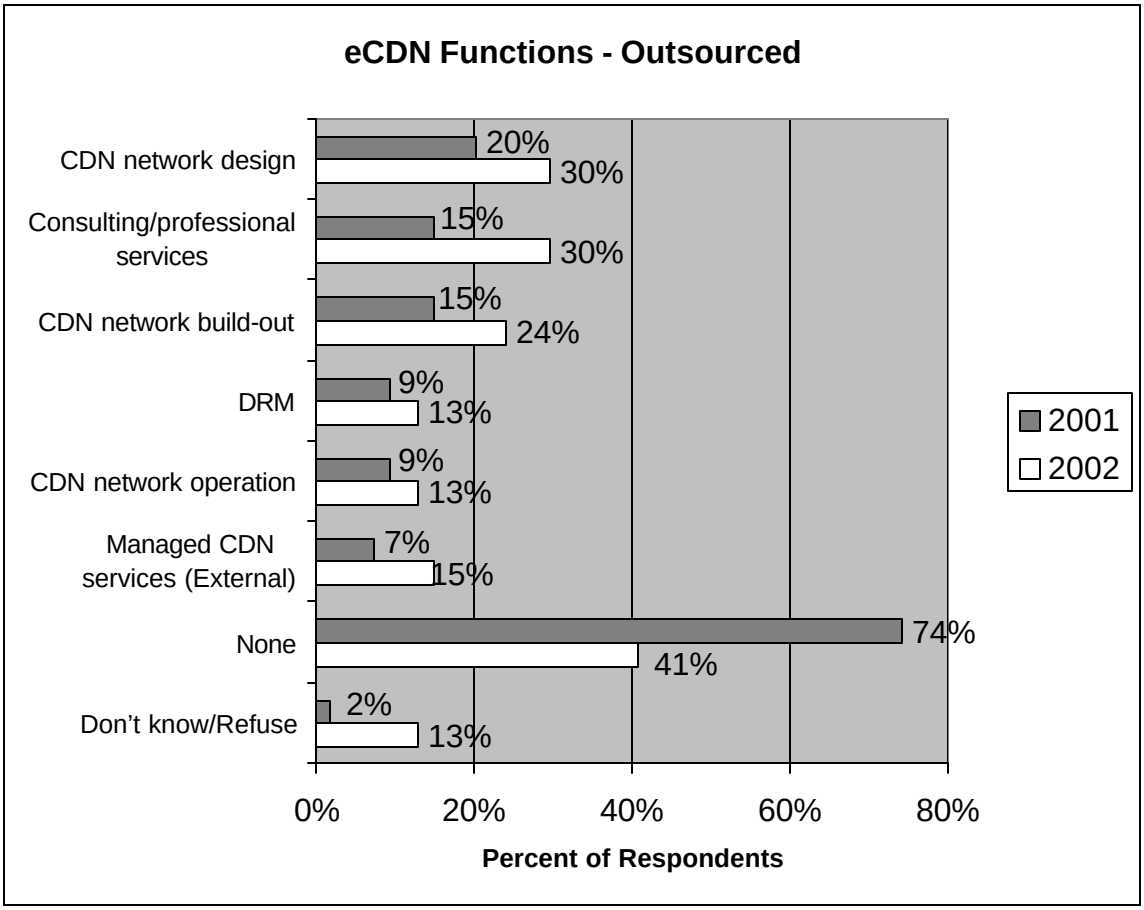
- The build-out functions of their CDN network
- The design functions of their CDN network
- The operation functions of their CDN network
- The management functions of CDN services for their External network
- The digital rights management functions for the enterprise
- Consulting and Professional services functions

Twenty percent of study respondents expressed that "CDN network design" was the function that they outsource most frequently this year. This outsourced function grows to 30% next year, a gain of 10%.

The next frequent function outsourced is "consulting/professional services," which grows from 15% in 2001 to 30% in 2002. This is a significant growth of 15% and supports an earlier recommendation about market requirements, for product manufacturers and service providers to offer professional services to customers. These services are needed to help customers evaluate and plan their eCDN solutions, for offering additional network services such as streaming and e-learning. We strongly suggest these services to be a value-added service bundled with the sale and not a free service. It is also important to develop partnerships with integrators.

The next most frequent function outsourced is "CDN network build-out," which grows from 15% (2001) to 24% (2002). "DRM" Digital rights management, which increases from 9% to 13% from this year to next, is a tough function to manage within the enterprise. Since staffing and IT expertise are scarce and managing digital rights is a complicated security solution to implement and maintain, it is suggested that this function should be outsourced. Also showing growth from 2001 (9%) to 2000 (13%) is the "CDN network operation" function. Finally, we see a significant increase of 8% in "Managed CDN services (external)" from 7% (2001) to 15% (2002). Chart 8-4 below shows respondent's outsourced eCDN functions.

Chart 8-4: Outsourced eCDN Functions (n=54) Q38c



Enterprise Content Delivery Products/Services

Enterprise Usage of CDN Technology

After asking respondents about their use of CDN technology in their enterprise, we proceeded into an organization's use of CDN products and services. A list of CDN usage in the enterprise was read and the respondents were given the opportunity to offer multiple answers to this question.

Forty-eight percent of study respondents distribute dynamic content over their Intranet in 2001, and 78% plan to distribute in 2002, an increase of 30%. Dynamic content creates specific requirements for eCDN solutions. Product manufacturers need a way to deliver dynamic content in the enterprise. Most will likely follow Akamai's technology lead, the use of XML in the delivery of dynamic content.

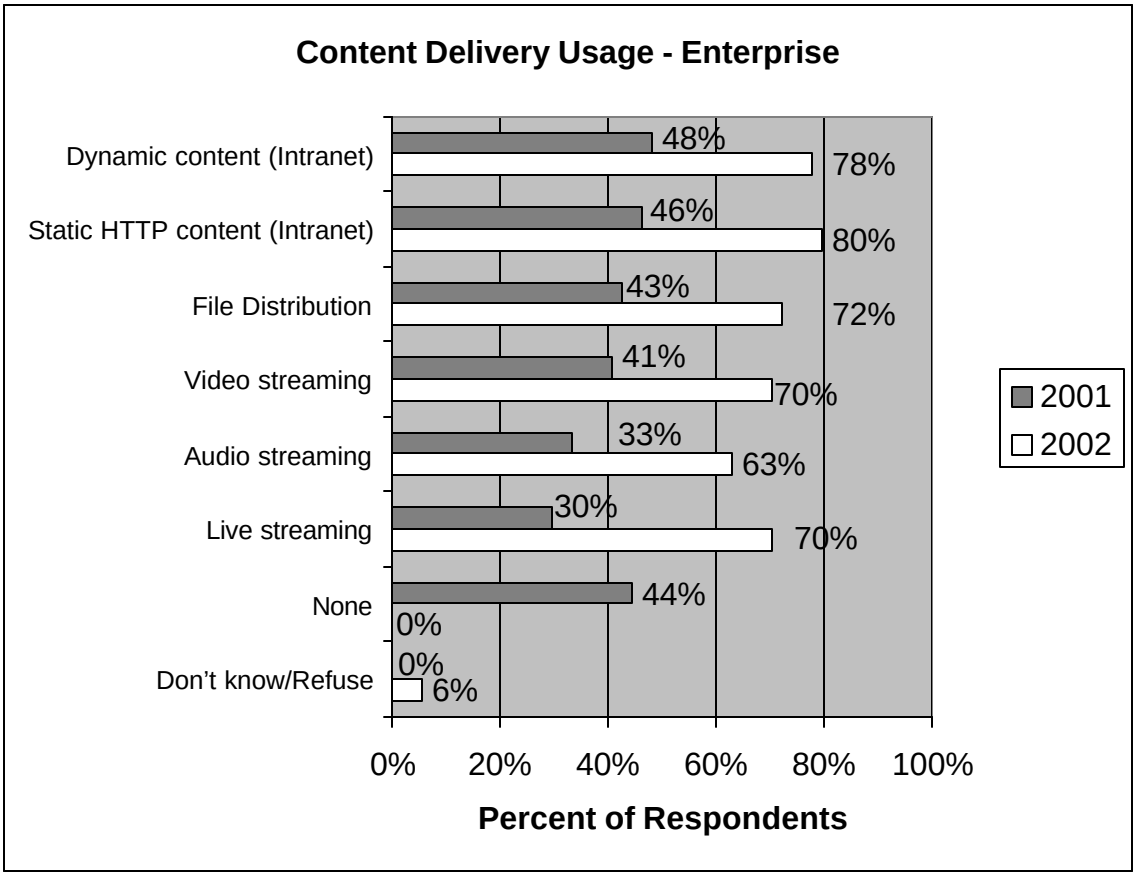
Respondents expressed that the next frequent way of using CDN products or services was to distribute static HTTP content over the Intranet. This usage shows a significant gain of 34%, which increases from 46% (2001) to 80% (2002). Static HTTP content for the Intranet can be delivered from caches offered today.

File distribution points to larger storage requirements both in servers and on desktops. File distribution use increases from 43% in 2001 to 72% in 2002. Video streaming is the next frequent use in the enterprise. Video increases from 41% this year to 70% next year as described by respondents. Video is a bandwidth and storage intensive application and will likely increase requirements for both network build-out and storage. The next highest use following video streaming is audio streaming, which grows from 33% (2001) to 63% (2002).

The largest increase in enterprise use of CDN products and services is seen in Live Streaming Events, increasing from 30% this year to 70% next year, a gain of 40%. Live streaming events encompass efforts to improve corporate communications, to offer distance learning, and to improve Intra-company meetings and collaboration efforts. Support for streaming both live and on-demand is a part of market requirements for eCDN products. We believe it is a good idea to include multicast support for streaming audio and video along with live events.

These frequent uses show that enterprise organizations are embracing CDN products and services to better serve content to employees. This favorable reception is also shown in the dramatic increase in overall uses from 2001 to 2002. Chart 9-1 below shows the usage of content delivery in the enterprise.

Chart 9-1: Content Delivery Usage in the Enterprise (n=54) Q39



Enterprise CDN Product Features

Differentiating CDN products for enterprise networks is difficult in an emerging market. CDN product manufacturers have started to offer products specifically for the enterprise market–an ideal market because of the short buying cycles involved and the reliance on a closed infrastructure. On a scale of 1 to 7, where 1 is "not important" and 7 is "important," we asked respondents to rate the features in choosing content delivery network products for eCDNs. Responses that rated features as 5, 6, or 7 by respondents were classified as "critical."

"Performance to end users" is a fundamental differentiation and was rated critical by 92% of the study respondents. As discussed earlier, performance is important to most organizations because waiting for files and/or data to be delivered has associated costs, such as lost productivity. Performance saves costs for the Intranet and for streaming media. Product manufacturers should offer the ability of performance metric reporting to users. Marketing material should explain in detail how performance is increased through design and technology education.

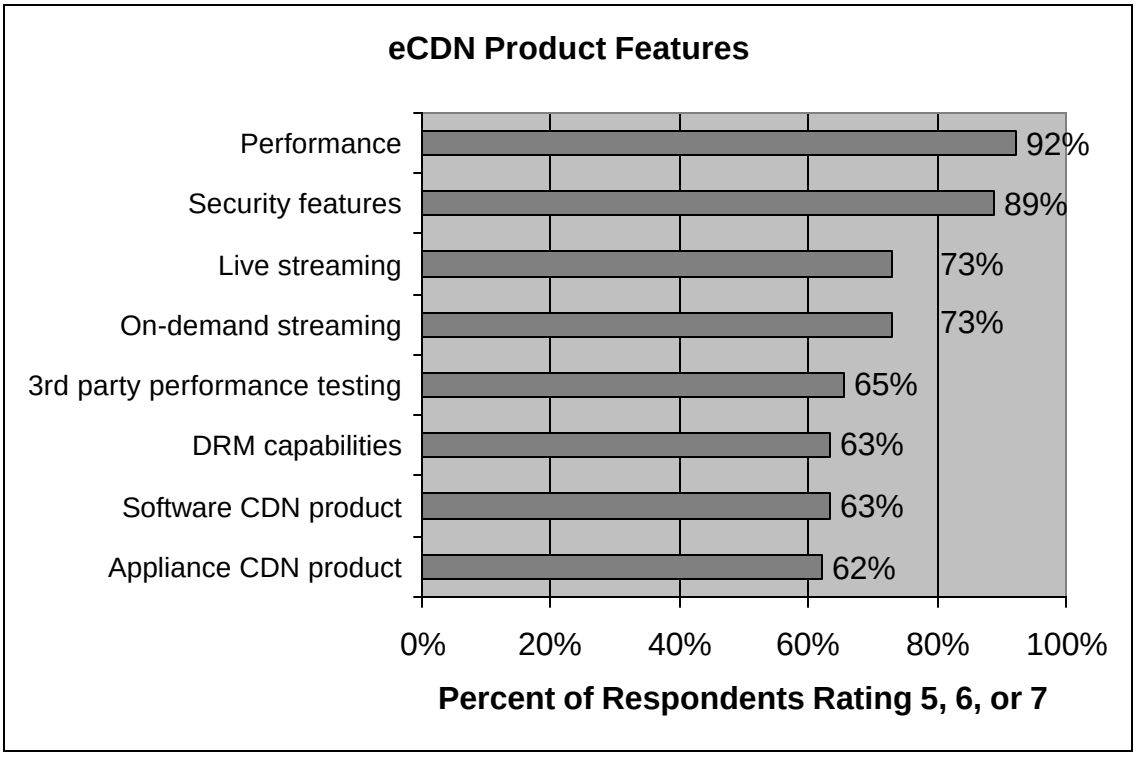
Security features have been and will likely continue to be one of the fundamental criteria for judging a product for use in a network especially the enterprise. Eighty-nine percent of study respondents rated "security features" as a critical feature of an eCDN product. Security is important due to the ongoing security issues that are at the forefront of the media. Network intrusions and hacking along with other security issues warrant attention.

The next two critical features, as expressed by 73% of respondents for each, are "offers on-demand streaming features" and "offers live streaming features." This further substantiates the correlation between the desire of organizations to offer streaming services and the desire to create a CDN within their enterprise. To support streaming as a delivery format, enterprises need to consider media formats, storage implications, and the support for live and on-demand streaming. Product manufacturers should design eCDN products to offer streaming services.

"Third party performance testing" is the next feature as cited by 65% of respondents. "Digital Rights Management (DRM) capabilities" follow that with 63% of study respondents. Finally, the jury is still out on software versus appliance CDN products. Both are viable in the marketplace and the main points between one or the other are security breaches, performance, and reliability. It is still up to the market to decide.

Chart 9-2 below shows the most desired eCDN product features, those rated 5, 6, or 7 by respondents.

Chart 9-2: Desired Features for Enterprise CDN Products (n=53) Q43



Content Delivery Products

To get a better look at the kinds of content delivery products organizations were using in their enterprises, we asked respondents in an open-ended question to name the products they currently use and plan to use in their networks this year and next year. Responses indicate a wide range of products, which blur the functionality or definition of eCDNs. Respondents appear to not understand eCDN products and this is a sign of early market confusion. Cisco, overall, is positioned very well in addressing the CDN market. Table 9-1 below shows responses for content delivery products used in the enterprise network for 2001.

Table 9-1: 2001/2002 CDN Products (n=24, n=36) Q40, Q41

2001 CDN Products	*2002 CDN Products*
CISCO (3)	CISCO (9)
REAL NETWORKS (3)	MICROSOFT (6)
AKAMAI	REAL NETWORKS (6)
ALTEON	AKAMAI
APACHE SERVERS	APACHE SERVERS
CACHE SERVER	CACHE SERVER
COMPUTERLAND	CURRICULUM
CURRICULUM	DELL
DELL	DOCUMENTUM
DOCUMENTUM	HP
HP	IBM
IBM	IE 5
IE 5	LIVE ONLINE INSTEAD OF TAPED VIDEO
MS STREAMING	NETWORK APPLIANCE
ONLINE COURSES	QUICKTIME
PCZONE	STREAMING VIDEO
PI (MFG DATA)	TIVOLI
TIVOLI MGMT SOFTWARE	WEBSONS
WEBSONS	
WINDOWS MEDIA PLAYER	

Content Delivery Technology - Reasons for Using

Of the 132 respondents that previously reported they do not use streaming media technology, only 7% use content delivery technology in their network. Their responses were very similar to those who use streaming media and content delivery technologies. It was not necessary to further discuss those responses because they were not statistically different enough to be noteworthy.

Content Delivery Technology - Reasons for Not Using

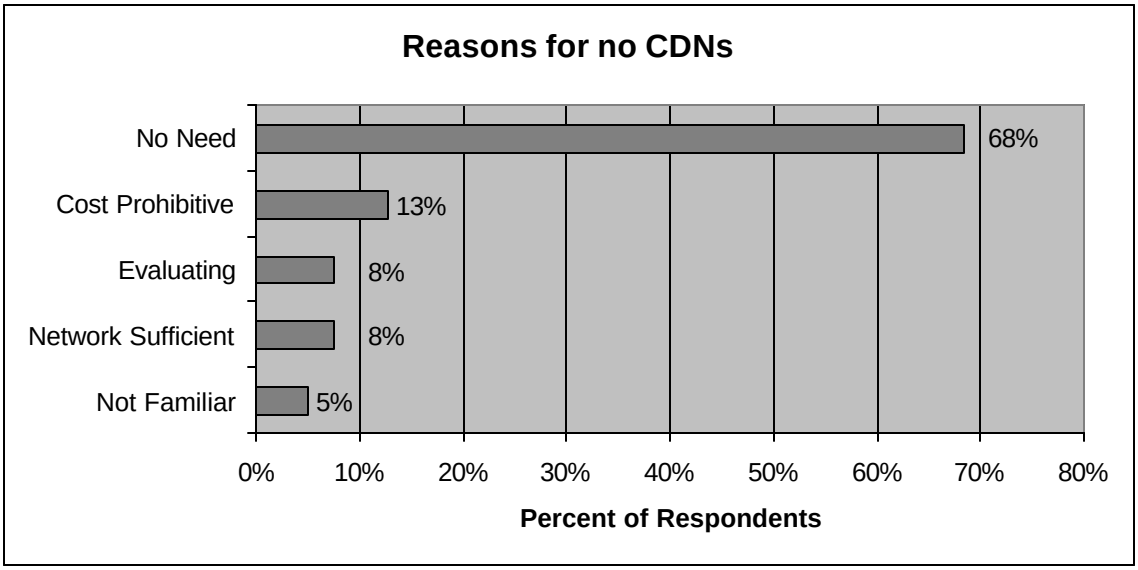
We asked the same 132 respondents who do not use streaming media and CDN technologies in their network to tell us why they did not use content delivery technology. Seventy-nine respondents provided us with their reasons. This question allowed for multiple answers from respondents.

Eight-two percent of respondents offered “No Need” as the reason for not using the technology. “Cost Prohibitive”, reported by 13% of the respondents, was the next most prevalent reason. Eight percent of respondents said that

both “Evaluating” and “Network Sufficient” were reasons for not using content delivery technology in their network.

Product manufacturers and service providers must show strong value propositions for the use of CDNs. Streaming is just one application driving eCDN adoption. Others include Intranet content and Web based applications. A performance and productivity model is a business benefit and should target business decision makers as well as technical decision makers. Chart 9-3 below shows the categorized reasons for not using CDN technology in the enterprise.

Chart 9-3: Reasons for Not Using CDN Technology (n=79), EQ8



Performance and QoS Technologies

Network Performance Technologies

Organizations use a variety of technologies to increase network performance. We asked respondents to indicate which technologies, read from a rotated list, they use to increase network performance. This question was designed to get a grasp of the proliferation of network performance technology usage in today's organizations. Respondents were given the opportunity to offer multiple answers to this question.

Local Load Balancing products are the most frequently used technology, used by 66% of the respondents in 2000 and increasing to 76% in 2001. The next frequently used technology is Bandwidth Optimization/Traffic Shaping products. Forty-nine percent of respondents are using this technology this year and it increases to 58% for next year. Multicast products are the next frequent technology in use, increasing from 45% (2000) to 48% (2001). Multicast support is a requirement for enterprise streaming and eCDN products.

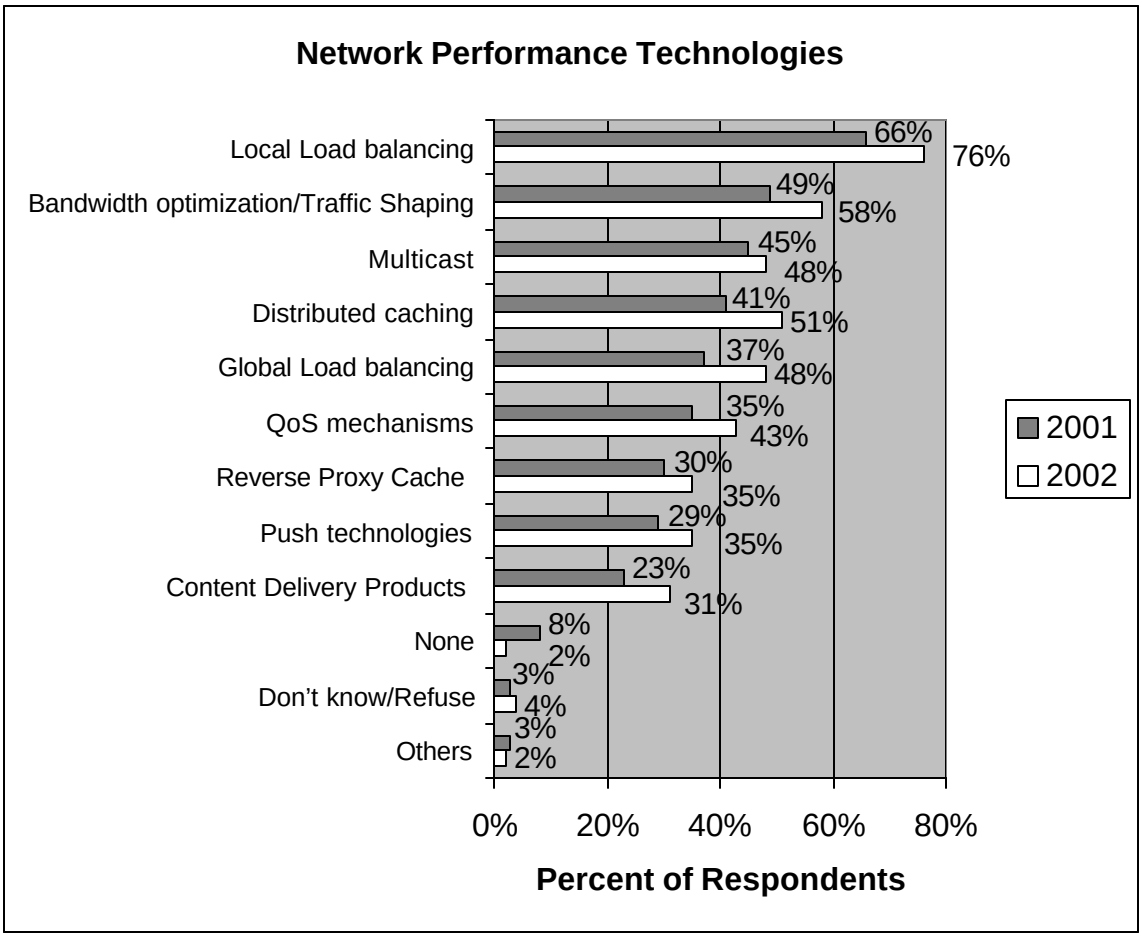
Distributed Caching products were used currently by 41% of the study respondents, increasing to 51% by next year. Caching continues to be a strategic technology used to increase network performance. In fact, caching was the leading technology identified by respondents in The HTRC Group's 2000 Content Delivery Service Study as well as the previous year's study.

Reverse Proxy Caching is mildly increasing in popularity from 30% in 2000 to 35% in 2001. Reverse Proxy Caching is also known as a server accelerator. If content is stored in the cache, network traffic can be reduced because the content is retrieved locally from the cache and not the server.

Global Load Balancing products reflect the greatest increase of use by our respondents. It grows from 37% in 2000 to 48% in 2001, a gain of 11%. Respondents with more than one data center will likely use global load balancing products. Respondents that do not use global load balancing products and had more than one data center may use data centers for different data types and may thus not need global load balancing. The next significant increases occur with Distributed Caching and Local Load Balancing products, each of which shows an increase of 10%. As mentioned above, Bandwidth Optimization/Traffic Shaping products increase 9% in respondent usage from this year to next year.

These types of technology continue to expand into the enterprise market with market education and awareness. Chart 10-1 below depicts respondents' use of technologies that increase network performance.

Chart 10-1: Performance Technology Usage (n=100) Q45



Quality of Service Technologies

In this question, we asked respondents to indicate which Quality of Service (QoS) technologies, read from a rotated list, they use to increase network performance. We offer this question to get an understanding of the types of QoS technology in use in today's organizations. Respondents were given the opportunity to offer multiple answers to this question.

ATM, short for Asynchronous Transfer Mode, is the most frequently used QoS technology as described by 45% of our study respondents this year, increasing to 48% next year. ATM can be difficult to prioritize specific applications such as streaming, and guarantee performance. This is due to the inherent complexities of the technology in prioritizing specific types of applications. ATM is primarily used on the backbone network and not the desktop. LAN emulation equipment will be required to facilitate streaming on ATM.

Internet Protocol Version 6 (IPv6) is the next frequently used technology. Twenty percent of respondents are using the technology in 2001 and usage increases to 35% in 2002, a significant gain of 15%. The industry hopes that there will be continued adoption of IPv6. IPv6 offers data security and an increased maximum number of IP addresses that IPv4 could not offer. IPv6 is surprisingly high, and products and services should support an IPv6 migration path.

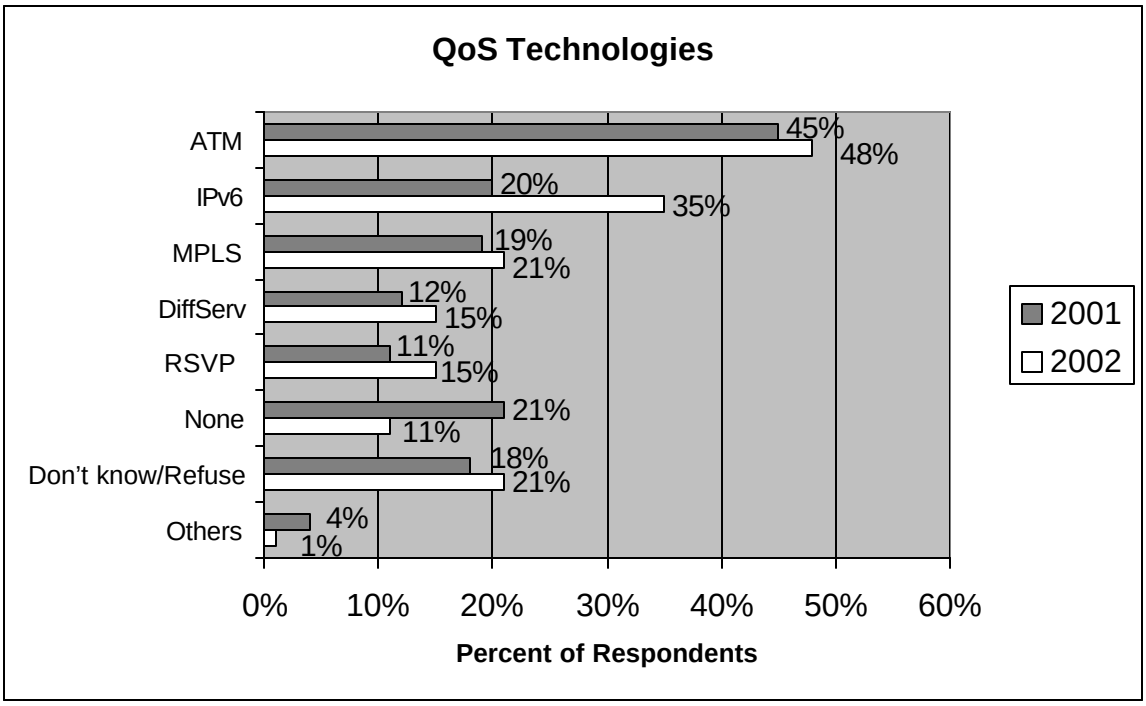
Many market players are also hoping for the increased adoption of Multiprotocol Label Switching (MPLS). MPLS adds labels/tags to data packets that allows routers to distribute the packets faster because it reads the labels/tags rather than looking up the destination address in a routing table. MPLS usage by respondents increases from 19% (2001) to 21% (2002). Diffserv is short for Differentiated Services and it adds QoS to IP networks. Diffserv increases from 12% in 2001 to 15% in 2002. RSVP, or Reservation Protocol, signals the network to reserve bandwidth for a transmission especially for audio and video streaming. Eleven percent of study respondents cited RSVP as the next QoS technology they will use to increase network performance this year. It grows to 15% for 2002.

There are QoS implications for service providers. Extranet streaming traffic may support specific SLAs tied to QoS mechanisms. Service providers must have equipment on the edge to support QoS. This implies that service providers will benefit by rolling out an edge services platform, which will deliver streaming from the enterprise network to the Extranet and its partners.

The "none" responses reduce from 21% to 11%; this indicates that many respondents will be implementing some QoS technology in their networks. In 2001, 61% of respondents will be offering QoS technology and this increases

to 68% by 2002. Chart 10-2 below shows the different types of QoS technologies used for increasing network performance.

Chart 10-2: Quality of Service Technology Types (n=100) Q46



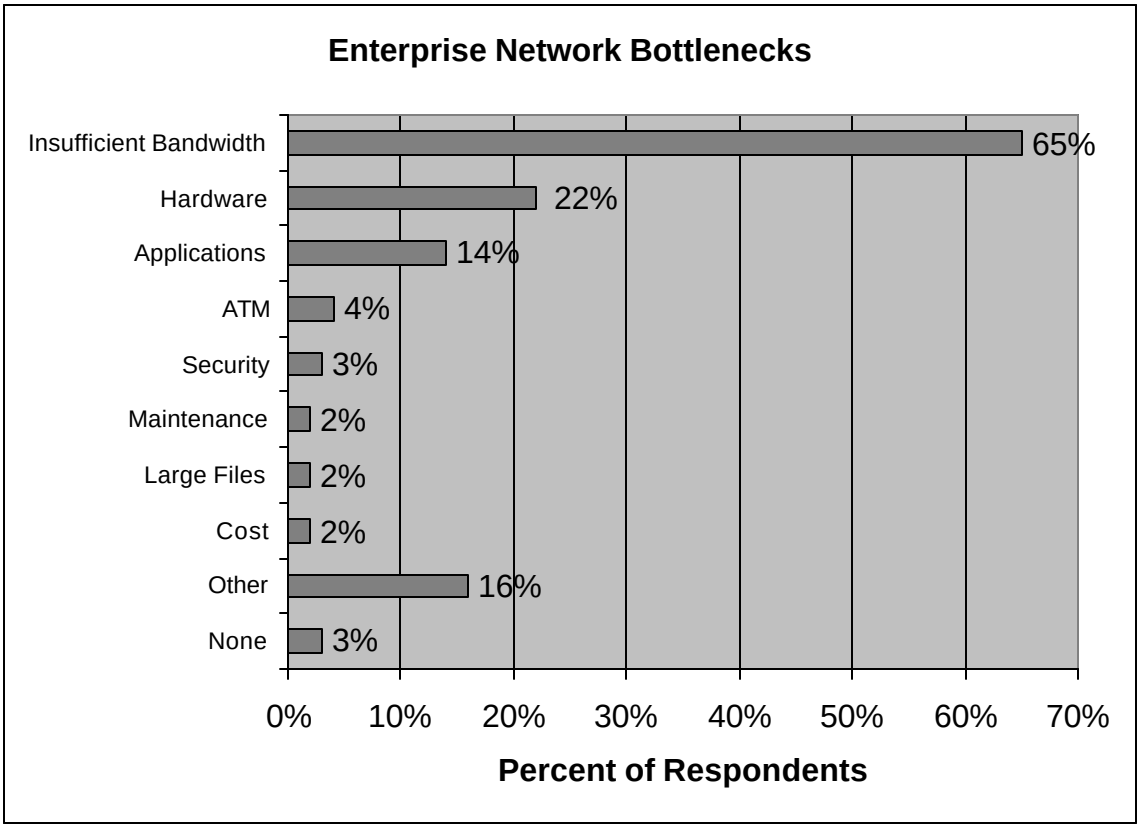
Network Bottlenecks

In an open-ended question, respondents were asked to identify the top three network bottlenecks within their enterprise networks. Responses included management, fragmented storage, IP switching, old network topologies, WAN connections, and firewalls. We categorized these responses into several categories: Insufficient Bandwidth, Hardware, ATM, Maintenance, Applications, Security, Large Files, and Cost.

Sixty-five percent of the respondents attributed their top enterprise network bottleneck to Insufficient Bandwidth. Responses included bandwidth bottlenecks such as outdated network devices, Internet connection, WAN congestion, and Extranet connection. Bandwidth will likely be an issue for streaming. Streaming solutions must be able to regulate streaming traffic.

Hardware (22%) is the next frequent bottleneck for network performance. Responses for Hardware include servers, database servers, local LAN hubs/backbone, and IP switching. The bottleneck category following hardware is Applications as expressed by 14% of respondents. Application bottlenecks included client server applications, e-mail, fragmented storage, graphical applications, and on-demand services. The chart 10-3 below shows respondent's network bottlenecks.

Chart 10-3: Enterprise Network Bottlenecks (n=100) Q47



Management and Capacity Planning

Streaming Statistics

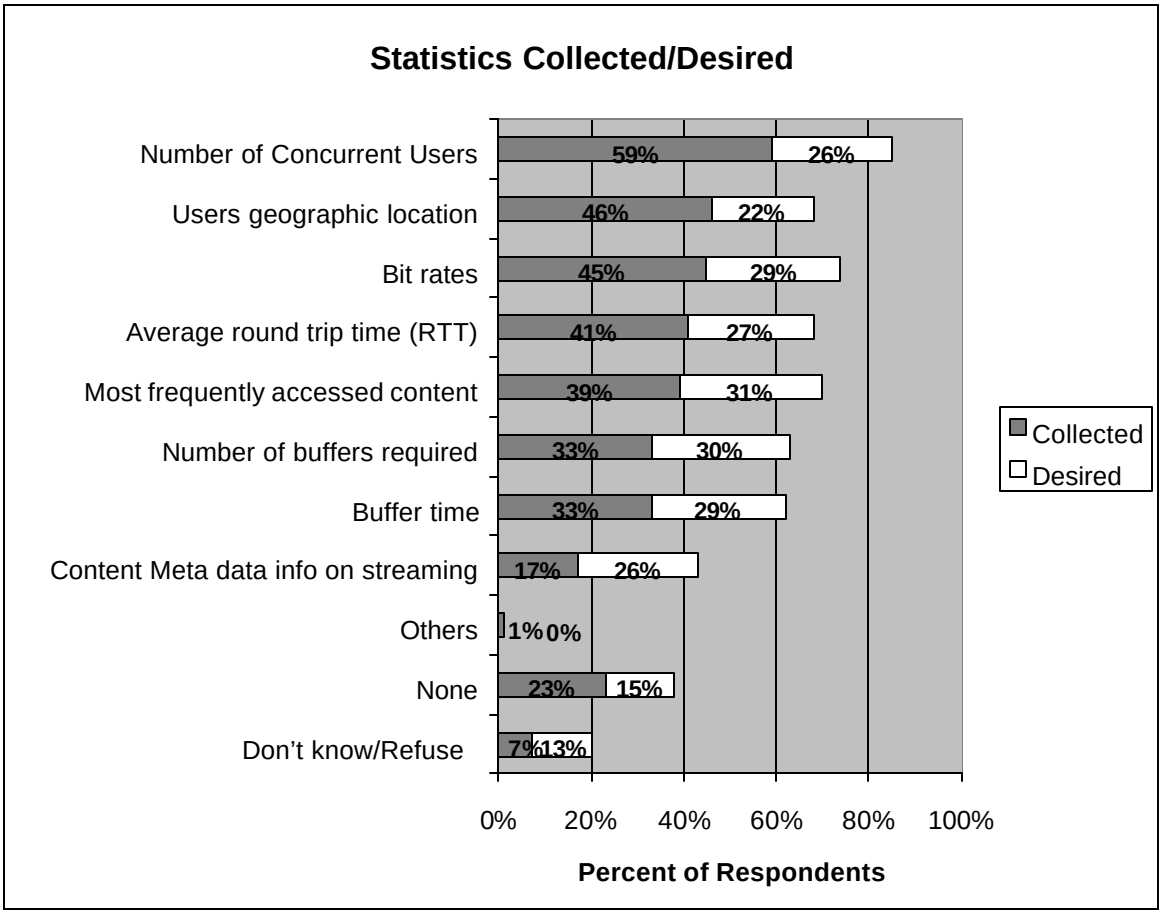
Gathering streaming usage information provides vital data for streaming and network performance analysis. Information collected from server logs provides insight into the performance characteristics of streaming. In order to gain a better understanding of the types of statistics, we asked respondents to name the statistics they currently gather and use for streaming media content. Respondents were given the opportunity to offer multiple answers to this question.

Topping the list of statistics was identifying the Number of Concurrent Users, described by 59% of study respondents. Concurrent user number helps IT managers determine if streaming services is serving up to the desired number of users, along with how many users can be supported before performance degrades. Users Geographic Location was expressed by 46% of respondents. This statistic can help clarify proposed network build-out or repair plans for a particular area. Bit Rates (45%) and Average Round Trip Time (RTT) to users (41%) follow these top statistics. RTT is the time it takes a stream to travel from the server to the user and a request for the next packet from the user to the server. Product manufacturers and service providers of streaming solutions should include as many types of streaming statistics as possible. Our research does not single out any one specific statistic worthy of special product or service development. We strongly suggest including all of the statistics listed in the chart below, and prioritize product and service development based on customer requests.

We asked respondents in this section to name the statistics they currently desire to gather and use for streaming media content. Thirty-one percent of our study respondents indicated that they would like to gather and use information on the Most Frequently Accessed Content. Topping the list of statistics are Number of Buffers Required (30%), Buffer Time (29%), and Bit Rates (29%). This list of desired statistics helps prioritize product development. The unfortunate downside is that most and nearly all of these statistics will be requirements.

As we discussed earlier, service providers and product manufacturers should work closely with customers, as well as prospective customers, in order to set development priorities. Chart 11-1 below combines the streaming statistics that respondents collect and what they would like to collect.

Chart 11-1: Statistics Collected/Desired (n=100) Q48a, Q48b



Planning Challenges

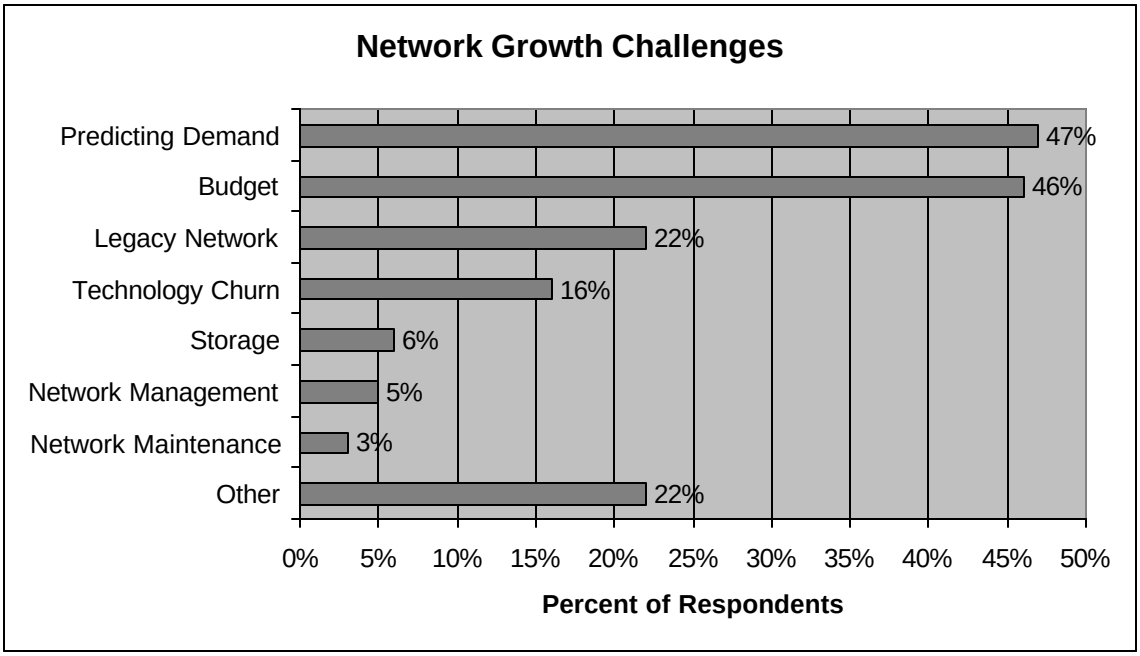
The enterprise creates a difficult environment in which to predict demand. Companies offering streaming on their network could easily create network saturation, which chokes performance. Network saturation could be in the form of bandwidth reduction or server/application performance degradation. In order to gain a better understanding of the challenges facing enterprises, we asked respondents in an open-ended question to name the top three challenges when planning for network growth. The responses were categorized into several main challenges: Budget, Predicting Demand, Legacy Network, Technology Churn, Storage, Network Management, Network Maintenance, and Other.

The top two challenges were Predicting Demand (47%) and Budget (46%). Concerns over Predicting Demand indicate a need to understand bandwidth allocation, management, and requirements. There is also interest in the

demand for content and in user growth. Service providers and product manufacturers of enterprise solutions should include tools to assist customers with determining the growth of their network. Responses concerning Budget indicate a lack of resources for acquiring new technology and equipment, along with the high cost of labor. Budget is usually cited as a challenge although capital expenditures are lower than they have been in the past. This is a further indication that product manufacturers and service providers must show solid value propositions.

Legacy Network (22%) is a challenge concerning the obsolescence and/or technical specification of network infrastructure components. Devices residing on the network could be outdated or inherited. Network growth plans have to consider how to replace or keep legacy equipment in the network and devise a workaround. Chart 11-2 below shows the top network growth challenges categorized.

Chart 11-2: Network Growth Challenges (n=100) Q49

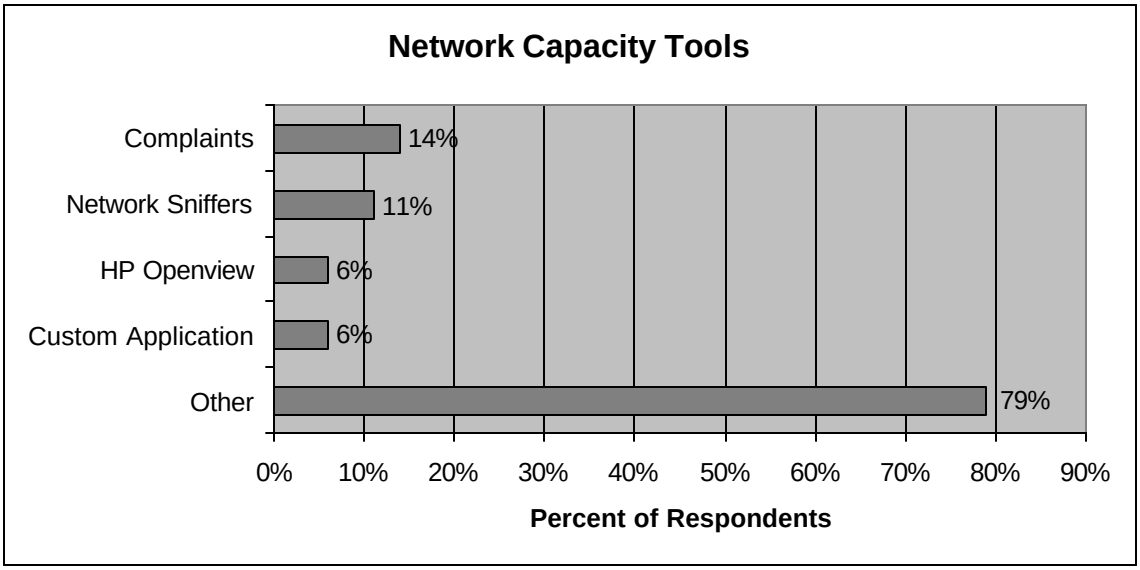


Network Capacity Planning Tools

In addition to asking about network growth challenges, we asked respondents to indicate what tools they use to determine network capacity needs. The responses were categorized into several capacity planning tool groups such as Complaints, Network Sniffers, HP Openview, Custom Application, and Other. Complaints (14%) are the most frequent tool network planners used to plan additional network capacity. The next frequent tool is Network Sniffers (11%). A sniffer is traffic analysis software or hardware that detects congestion and network problems.

We were unable to categorize the remaining "other" responses (77%) into distinct groups. The responses were too diverse to categorize for additional analysis. This is an indication that there are no clear tools or mechanisms for determining network capacity increases. Chart 11-3 below shows the categories of tools used to determine if additional network capacity is needed.

Chart 11-3: Capacity Planning Tools (n=100) Q50



Service Level Agreements

SLAs for Enterprise Streaming

Service level agreements are a way for service providers to differentiate the quality of service for enterprise customers. A list of SLAs in random order was presented to study respondents to rate the agreements when choosing a service provider for streaming services. Respondents were asked to provide a rating on a scale of 1 to 7, where 1 is "not important" and 7 is "very important" on SLAs, such as availability, time to repair, latency, and end user experience. Responses that rated SLAs as 5, 6, or 7 by respondents were classified as "critical."

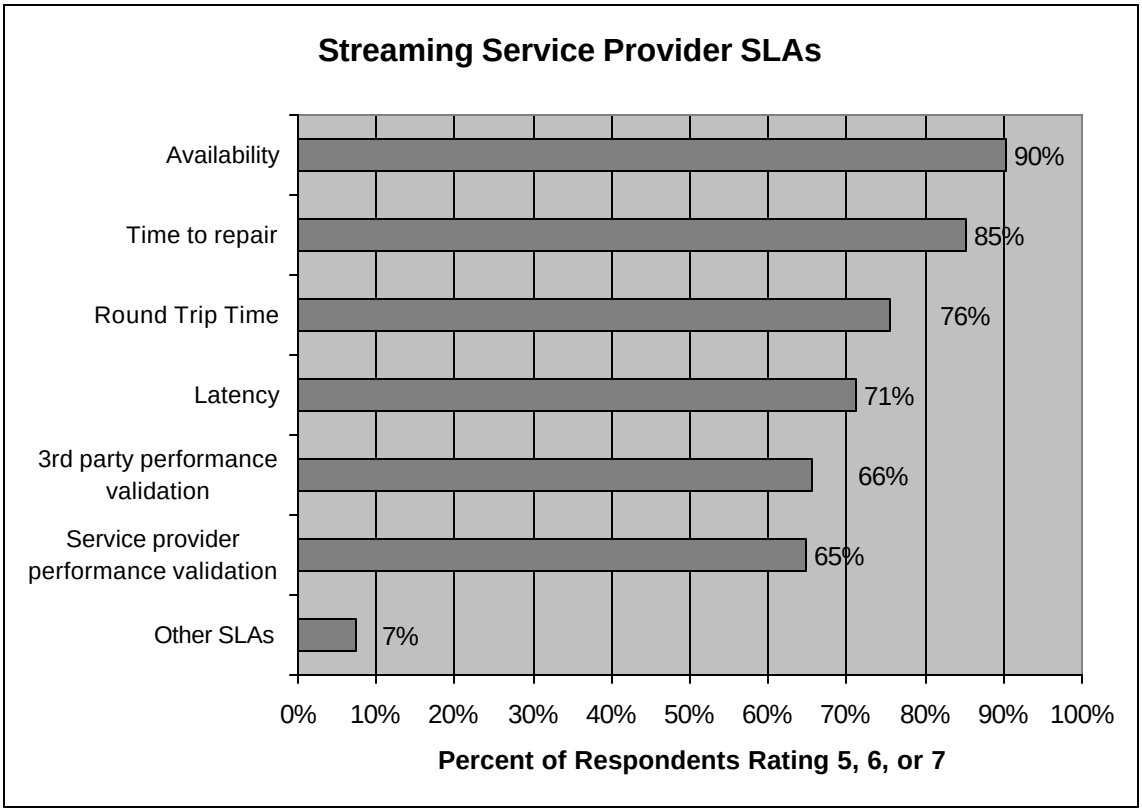
Availability (90%) and Time to Repair (85%) were rated critical by respondents. Respondents are very concerned with streaming availability and the uptime and downtime associated with time to repair since these frequently affect a service provider's online reputation.

Seventy-six percent of study respondents rated Average Round Trip Time to User as critical. Average Round Trip Time is the time it takes for the packet to be sent and received at the destination, and the time it takes for a returning confirmation that the packet has been received. Simply this could be said to be the measure of network delay.

Latency, measured from the streaming server to the end user, was rated critical by 71% of respondents. The time, or lag as it is commonly referred to, required for content to be delivered from the server to the requester greatly affects user experience. The more time it takes, the greater the likelihood that the user will be subjected to an undesirable streaming experience. Video and/or audio jitters, synchronization problems, and video still frames are common experiences reported by users when latency increases. Most users will terminate the stream if they encounter these circumstances.

Since enterprises have varied performance requirements for streaming, service level agreements should be negotiable and, fundamentally, guarantee faster, more reliable services and address availability and time to repair factors. Chart 12-1 below shows the most desired SLAs, rated 5, 6, or 7 by respondents.

Chart 12-1: Streaming SLAs (n=96) Q51



Expenditures

Expenditure Plans

In two open-ended questions, we asked respondents to approximate their expenditures in several areas for 2001 and 2002. Those expenditure areas include streaming management products, enterprise streaming services, streaming media content creation, outsourcing streaming media services, streaming server software, caching, streaming hardware (not servers), and multi-purpose operating system servers.

The largest increase in expenditures from 2001 to 2002 were in the areas of multi-purpose operating system servers, caching, and streaming server software. The largest increase in average expenditures from 2001 to 2002 is in multi-purpose operating system servers spending. Expenditures rise from $1,406,130 in 2001 to $2,499,130 in 2002, an increase of 77%. The next largest increase, at 58%, is streaming server software spending from $244,200 (2001) to $386,500 (2002). With an increase of 57%, caching expenditure increases from $396,352 to $620,294.

The areas of expenditures that show the largest decreases from 2001 to 2002 are enterprise streaming services and streaming hardware (not including servers). Streaming hardware spending decreases from $950,791 (2001) to $610,318 (2002), a decrease of 36%. Streaming hardware is equipment used for streaming that does not include servers, but would include items such as appliances and splitters. From 2001 to 2002, enterprise streaming services spending decreases by 31%, from $929,565 to $644,250.

Study results indicate that fewer people are doing streaming in 2001 than plan to do so in 2002. Unfortunately, the number of respondents for each question skews the expenditures. Of the 100 respondents who do streaming, only a selected group of respondents offered expenditure figures for each expense category. In addition, the “other” expenditure category is considerably high in total in 2001 due to respondents possibly including their network and network upgrade expenditures in that figure.

Table 13-1 below shows the areas of expenditures in which each organization spent or plans to spend for 2001, and Table 13-2 below shows the areas of expenditures in which each organization plans to spend for 2002.

Table 13-1: Expenditure Plans for 2001, Q52 and 52b

Expenditures for 2001			
Number	***Mean***	***Std Dev***	***Expense***
25	$1,611,800	3,492,183	Streaming management products
23	$929,565	2,199,014	Enterprise streaming services
26	$944,884	2,362,407	Streaming media content creation
16	$978,125	1,756,190	Outsourcing streaming media services
25	$244,200	617,742	Streaming server software
17	$396,352	962,518	Caching
24	$950,791	2,223,801	Streaming hardware, not including servers
23	$1,406,130	2,754,705	Multipurpose operating system servers
18	$26,862,222	59,307,212	Others

Table 13-2: Expenditure Plans for 2002, Q53 and Q52b

Expenditures for 2002			
Number	***Mean***	***Std Dev***	***Expense***
20	$1,539,250	4,648,496	Streaming management products
20	$644,250	1,578,360	Enterprise streaming services
23	$851,523	2,268,452	Streaming media content creation
15	$857,333	2,559,913	Outsourcing streaming media services
20	$386,500	1,107,067	Streaming server software
17	$620,294	1,288,547	Caching
22	$610,318	1,147,051	Streaming hardware, not including servers
23	$2,499,130	6,627,514	Multipurpose operating system servers

Market Messaging

Positioning

Streaming Service Provider Features

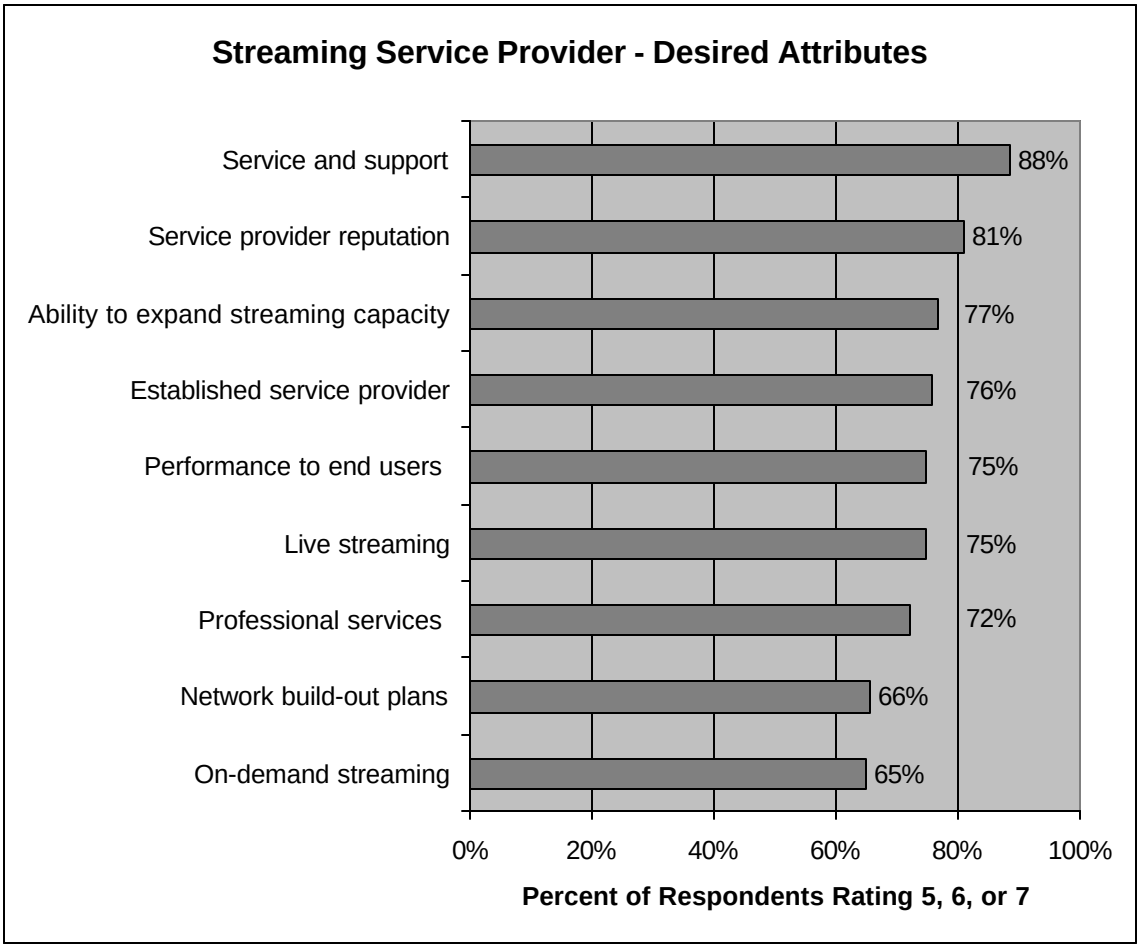
Differentiating streaming services is difficult in a competitive market. Service providers have started to offer streaming services in a variety of flavors based on levels of performance, service level agreements and service provider features. On a scale of 1 to 7, where 1 is "not important" and 7 is "very important," we asked respondents to rate the features in choosing a service provider for streaming services. Responses that rated SLAs as 5, 6, or 7 by respondents were classified as "critical." Desired service provider attributes include features such as service and support, end user performance, and on-demand streaming services offering.

Rated the most critical service provider feature for streaming services by 88% of respondents is Service and Support. Service and Support should be the foundation of any service provider's service differentiation, and will continue to be one of the most fundamental criteria for judging a service provider. The end user experience will make or break any service, especially those that include new technology. With Service and Support rated the most critical by study respondents, service providers should make significant efforts to develop an excellent reputation for service and support as early as possible.

The next critical feature, as rated by 81% of study respondents, is Service Provider Reputation. Technology professionals like to openly discuss the latest and greatest products, services, and technologies in any venue or situation. If your reputation were bad, the word of mouth discussion would be worse. Service providers should partner with an organization or develop a good public relations group to maintain good press and analyst relations. In addition, service providers should include high profile programs promoting constant customer interaction to maintain customer relationships.

A critical feature in choosing a service provider is the ability of the service provider to expand streaming bandwidth capacity immediately at the customer's request. Seventy-seven percent of study respondents feel this is an important attribute for a service provider to offer. Customers want to reduce the possibility that flash crowds or unusual high demand would affect their streaming. Chart 14-1 below show responses that rated 5, 6, or 7 by respondents for desired streaming service provider features.

Chart 14-1: Critical Streaming Provider Features (n=100) Q54



Product Manufacturer Features

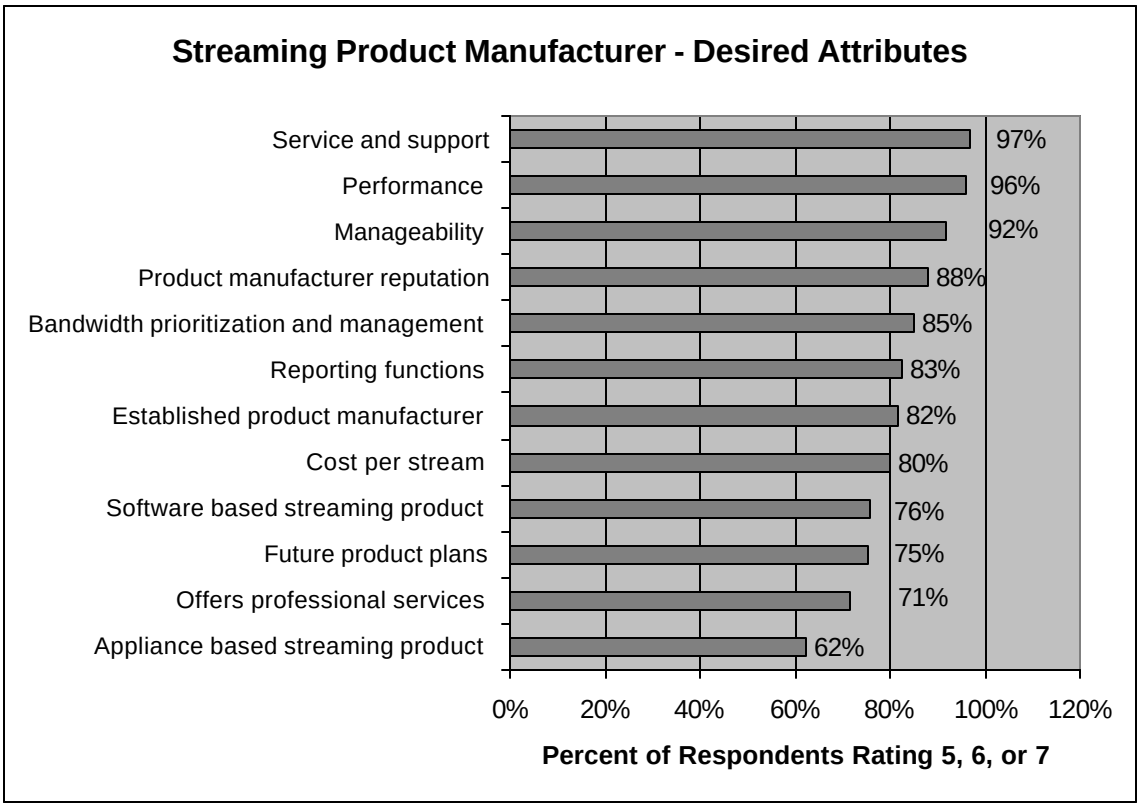
Differentiating product manufacturer features is difficult in a competitive market. On a scale of 1 to 7, where 1 is "not important" and 7 is "most important," we asked respondents to rate the features in choosing a product manufacturer for streaming hardware and software. Responses that rated SLAs as 5, 6, or 7 by respondents were classified as "critical." Desired product manufacturer attributes included features such as service and support, bandwidth prioritization and management, and appliance based streaming products.

Rated the most critical product manufacturer feature for streaming hardware and software by 97% of respondents is Service and Support. Service and Support should be the first feature of any product manufacturer's product differentiation. It will likely continue to be one of the most fundamental criteria for judging a product manufacturer. With Service and Support rated

the most critical by study respondents, product manufacturers should make significant efforts to develop a formidable reputation for service and support as early as possible.

The next two highly rated critical features are Performance (96%) and Manageability (92%). Users complain often about products that are hard to configure and hard to manage. Technical decision makers do not want products that are difficult to configure or manage because it drains scarce resources. Chart 14-2 below shows the other desired features for product manufacturer of streaming hardware and software, responses that rated 5, 6, or 7 by respondents.

Chart 14-2: Critical Product Manufacturer Features (n=100) Q55



Sources for Learning

In order to gain a better understanding of the best sources technical decision makers use for learning about new products and services, respondents were asked to rate the sources of learning on a scale of 1 to 7. One is "not useful" and 7 is "very useful"; responses with a 5, 6, or 7 should be considered as being "most useful."

Of the top sources for information, Vendor Web sites were listed by 75% of study respondents. A Vendor's Web site is a useful and important source of information for customers. Customers visit your Web site to gather and research information about your products and services. It is the first impression the customer experiences of your business even before it interacts with a live person from your organization. Customers are drawn to your Web site by your marketing efforts. If your Web site does not offer product or service educational material or the specific information he/she is looking for, that customer will likely not consider your organization in its buying decision.

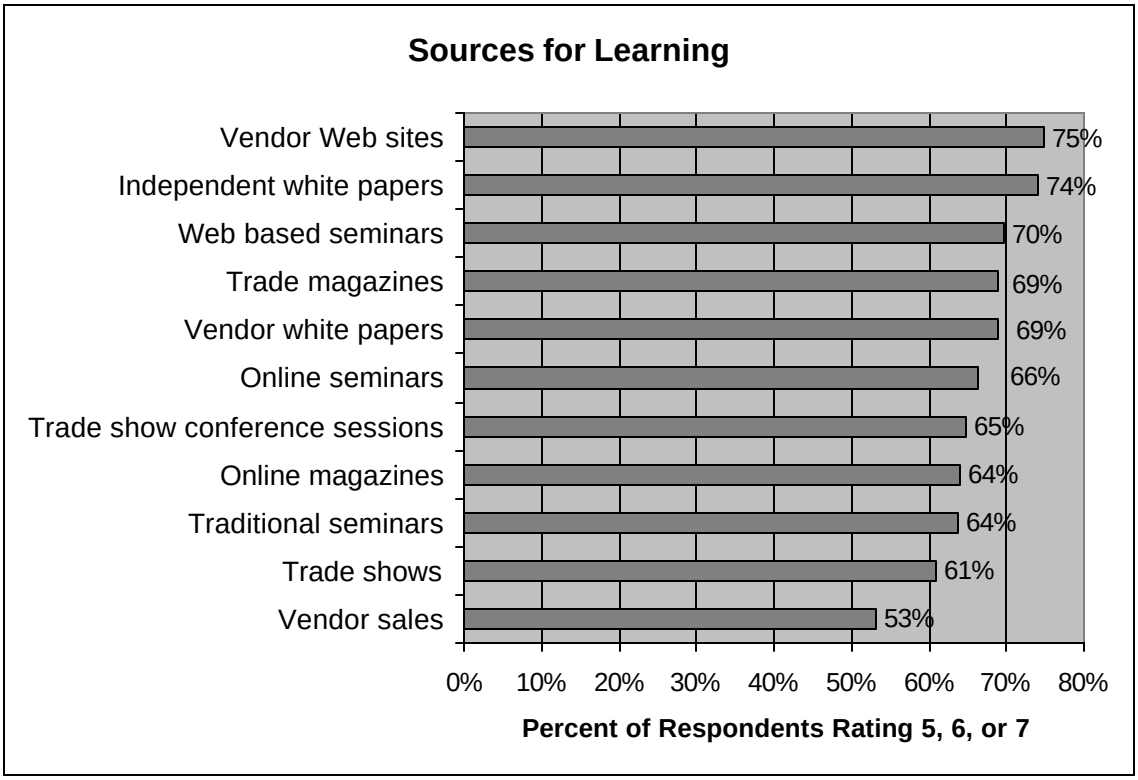
The next most useful source is independent white papers as expressed by 74% of respondents. Independent white papers are essential for helping customers understand the technology of the product or service in general and the problem it addresses in the industry. In The HTRC Group's ongoing research, results have consistently shown that customers lack the educational material needed to diligently evaluate product and service offerings. Marketing confusion sets in when customers can recall the vendor's name but not what their product or service is used for.

Web based seminars were described by 70% of respondents as another useful source. Efforts should be made to allow customers the ability to view seminars and presentations from their geographic location. Not all customers have the time to attend in person, and expenses for travel and lodging are becoming increasingly cost-prohibitive. Even Trade Shows are decreasing in importance as only 61% of respondents rated them very useful. There are too many unfocused trade shows to send IT professionals. The benefit of attending a trade show to gather information is diminishing because most of the beneficial information customers seek is collected on the vendor's Web site.

Sixty-nine percent of respondents rated Trade Magazines as an additional useful source. Manufacturers and providers should strive to be included in columns and articles of significant trade publications, and to maintain good relationships with industry writers who cover products, services and new technology. Sixty-nine percent of respondents also rated Vendor White Papers as a useful source. A Vendor White Paper helps customers understand your organization's technology and its solutions.

Chart 14-3 below shows the different sources for learning and how they rated among the 100 respondents.

Chart 14-3: Sources For Learning (n=100) Q56



Top Publications

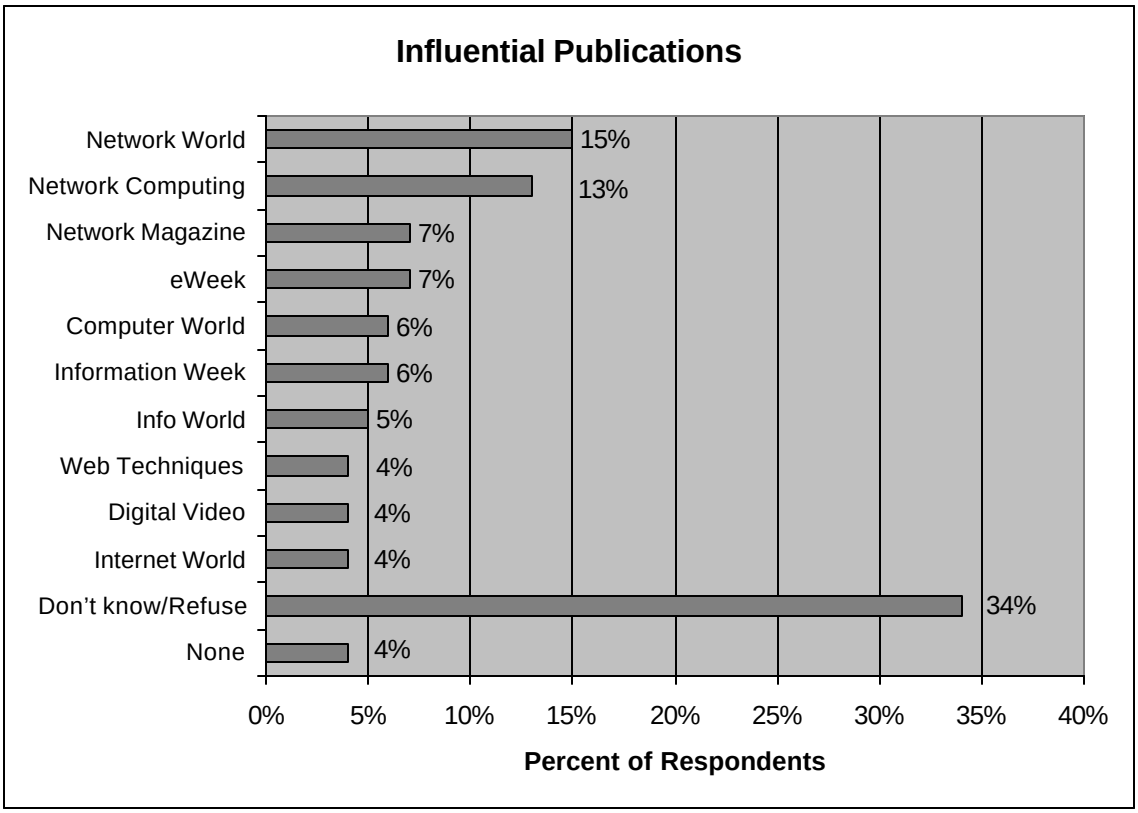
Technical decision makers read many publications; this creates a challenge when determining which publications are most influential when considering advertising expenditures. In an open-ended question, we asked respondents for the top three publications most influential in their purchase of streaming products and services. The list of publications varied widely.

Of the 100 respondents, fifteen percent listed Network World as the most influential publication. The significant publications with which streaming product manufacturers and service providers should maintain close relationships also include Network Computing (13%), eWeek (7%), Network Magazine (7%), Information Week (6%), and Computer World (6%). Thirty-four percent of study respondents could not recall which publications were influential in their research of products and services. This indicates that

product manufacturers and service providers need to reach prospects through additional means.

Chart 14-4 below shows the most influential publications. Appendix C shows additional responses for influential publications.

Chart 14-4: Influential Publications (n=100) Q57



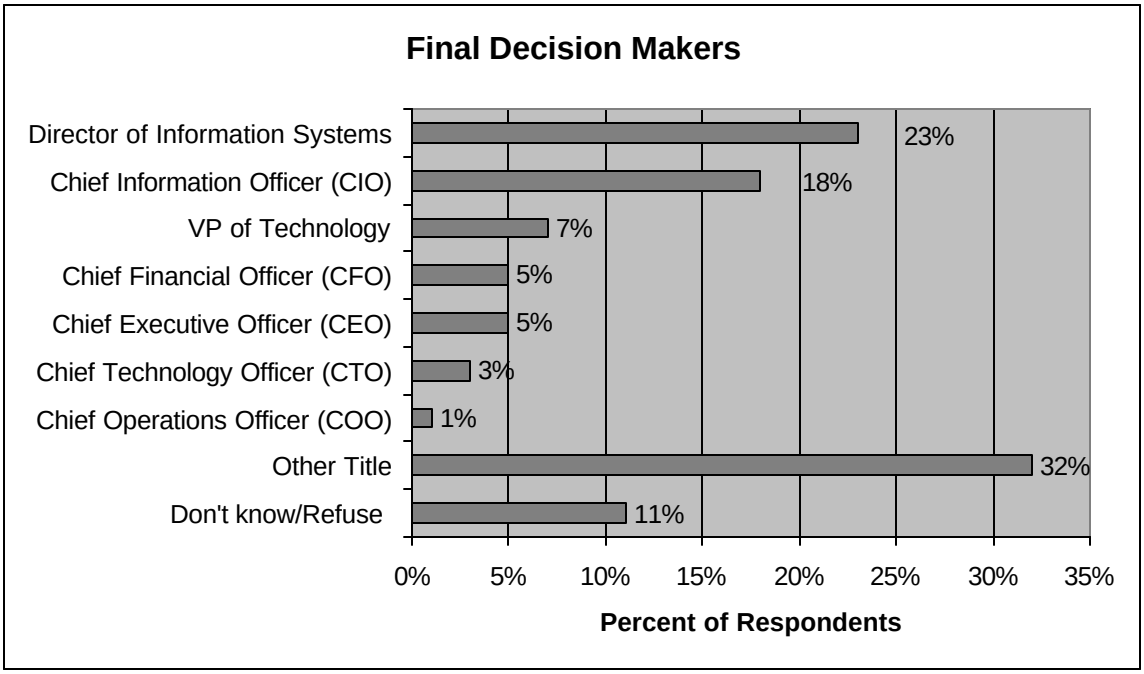
Organization Decision Maker

To better understand who the final decision makers are, we asked respondents, in an open-ended question, to identify the individual(s), by title, in their organizations who makes the final decision to choose streaming products or services.

Product manufacturers and service providers must sell to both technical buyers and business buyers. Sales attempts and marketing material targeting specific buyers should include detailed technology information positioning the resiliency and redundancy of products and services.

Thirty-two percent of study respondents had such varying responses when asked to identify the person(s) responsible for making the final decision on streaming products or services that it was difficult to classify them into definitive categories. The majority of the respondents (23%) identify the Director of Information Systems as the final decision maker responsible for the streaming purchase decisions. The Chief Information Officer (CIO) (18%) was listed as the next decision maker in the organization, followed by the VP of Technology at 7%. Chart 14-5 below shows the breakdown of the categorized responses for final decision makers. An additional table of responses of final decision maker is listed in the appendix under Verbatim Responses.

Chart 14-5: Final Decision Makers (n=100) Q59



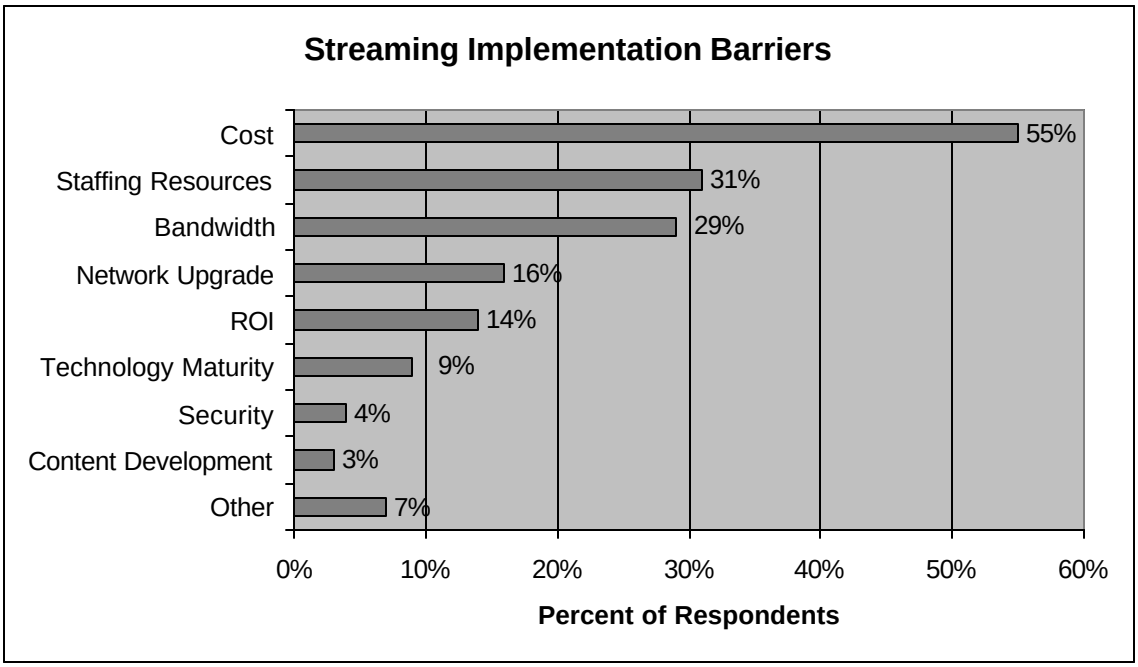
Challenges

Barriers to Streaming

In order to gain a better understanding of the barriers to implementing streaming in the enterprise, we asked respondents in an open-ended question about their top three streaming implementation barriers. We categorized the verbatim responses as follows: cost, staffing resources, bandwidth, network upgrade, ROI, technology maturity, security, content development, and other. *Technology Maturity* is a barrier because technology has not matured to a level for enterprise use. *Content Development* is a barrier over concerns about what content should be produced and how it is to be done.

Of the top three barriers to streaming, Cost is of the most concern to 55% of respondents. Cost is of concern to decision makers because technology implementation costs have historically been high and ongoing. Thirty-one percent of respondents list Staffing Resources as a barrier. Most organizations struggle with cost and staffing resources when considering the addition of new technology. Forecasts for staffing should include concerns for build-out, operations, management, and maintenance, along with IT expertise. The third barrier, described by 29% of respondents, is Bandwidth. IT decision makers are concerned that streaming applications running on the enterprise network will deplete too much network bandwidth.

Chart 15-1: Streaming Implementation Barriers (n=88) Q58

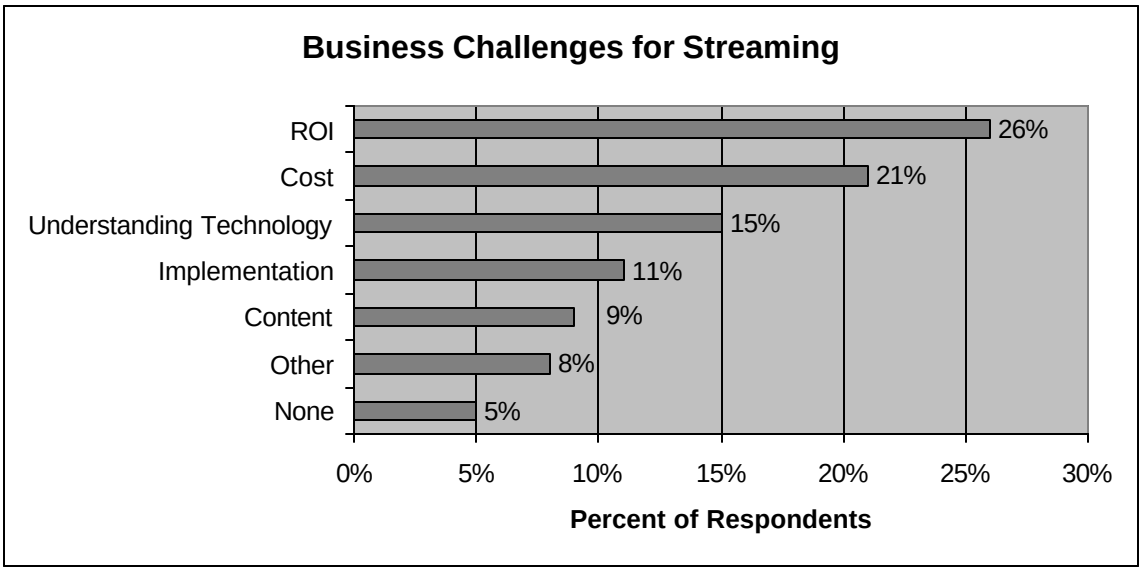


Business Challenges

In order to gain a better understanding of the business challenges streaming professionals currently face, we asked study respondents in an open-ended question about their largest business challenges associated with streaming. We categorized the verbatim responses as follows: Return on Investment (ROI), Cost, Understanding Technology, Implementation, Content, and Other.

The top business challenge, described by 26% of the study respondents, is Return on Investment. ROI is the definitive measurement for most organizations considering implementation of new technology or launching a new product or service. If there is no return, there is no need to consider the technology or offering. Cost, a factor in determining Return, was reported as a challenge by 21% of respondents. Understanding Technology (15%) is expressed as the next business challenge for respondents. Business and technical decision makers that are unable to understand the streaming technology underlying the product or service will not find much use for it in their enterprise. Chart 15-2 below shows a breakdown by category of streaming business challenges.

Chart 15-2: Business Challenges (n=76) Q61

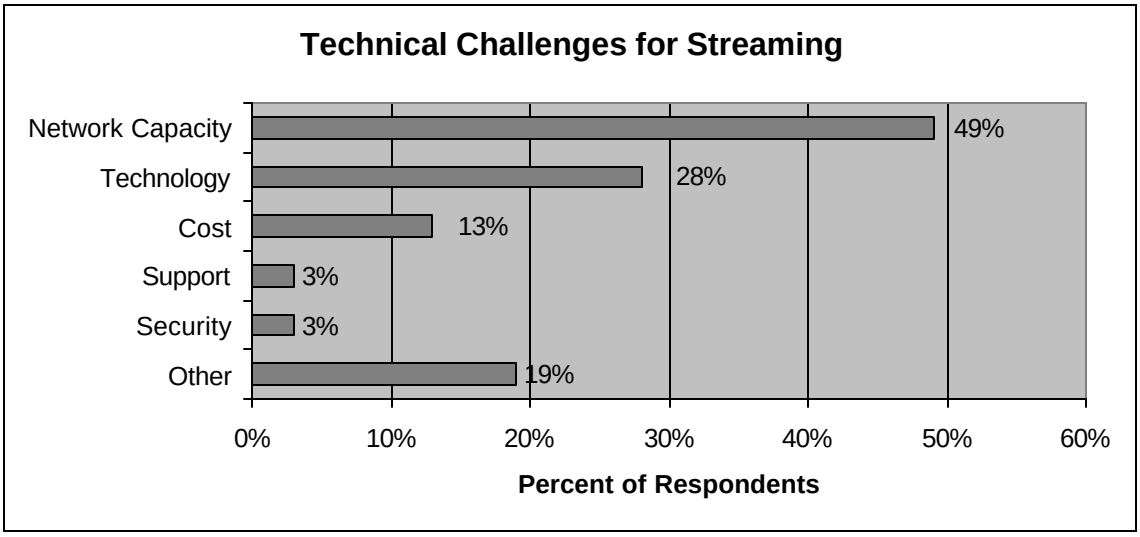


Technical Challenges

To gain a better understanding of the technical challenges for streaming, we asked streaming professionals, in an open-ended question, for their largest streaming technical challenges. We categorized the verbatim responses as follows: network capacity, technology, cost, support, security and other.

To 49%, nearly half of the study respondents find Network Capacity to be the largest technical challenge. Streaming professionals are concerned over how much capacity their network will need to offer streaming and still support other services. Technology is expressed as a technical challenge by 28% of the respondents. The complexity of technology is challenging to most professionals. The amount of time, labor, and resources needed to configure and to manage technology seems to increase with the increase in technology complexity. Cost challenges are described by 13% of the respondents. Chart 15-3 below shows a breakdown by category of streaming technical challenges. The appendix shows other responses for this question in the Verbatim Responses section.

Chart 15-3: Technical Challenges (n=87) Q60

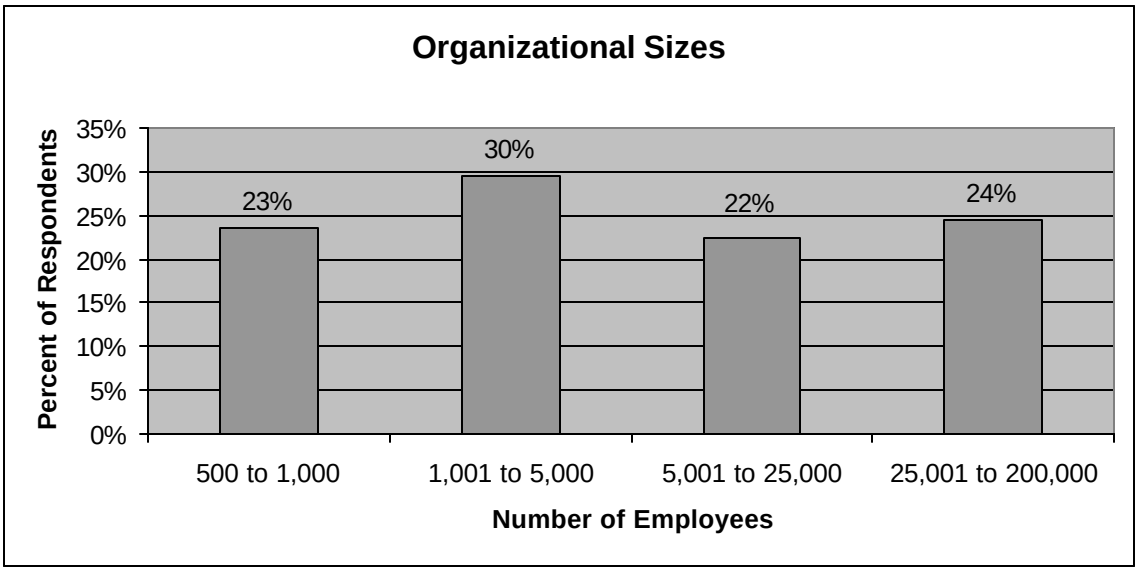


Demographics

Organization Sizes

In this question, we asked respondents to approximate the number of employees in their entire organization. Interviews were terminated with respondents of organizations with less than 500 employees. With a mean of 22,206, survey responses reveal a wide variety of organization sizes ranging from 500 to 200,000 employees. With this wide range, the mode is 5,000 and standard deviation is 37,370. The largest number of respondents (30%) are with organizations of 1,001 to 5,000 employees. This is followed by 24% of the respondents at organizations with 25,001 to 200,000 employees. In addition, two respondents replied that they have more than 500 employees, but no specific number of employees was given. Chart 16-1 below shows organization sizes by percentage of respondents.

Chart 16-1: Organizational Sizes (n=98) Q2, Q2a



Annual Organization Revenue

We asked respondents to approximate the annual revenue of their organization. Of the fifty-seven respondents, the mean annual revenue is $1,661,136,842. The median is listed as 500,000,000 with a standard deviation of 2,542,096,567.

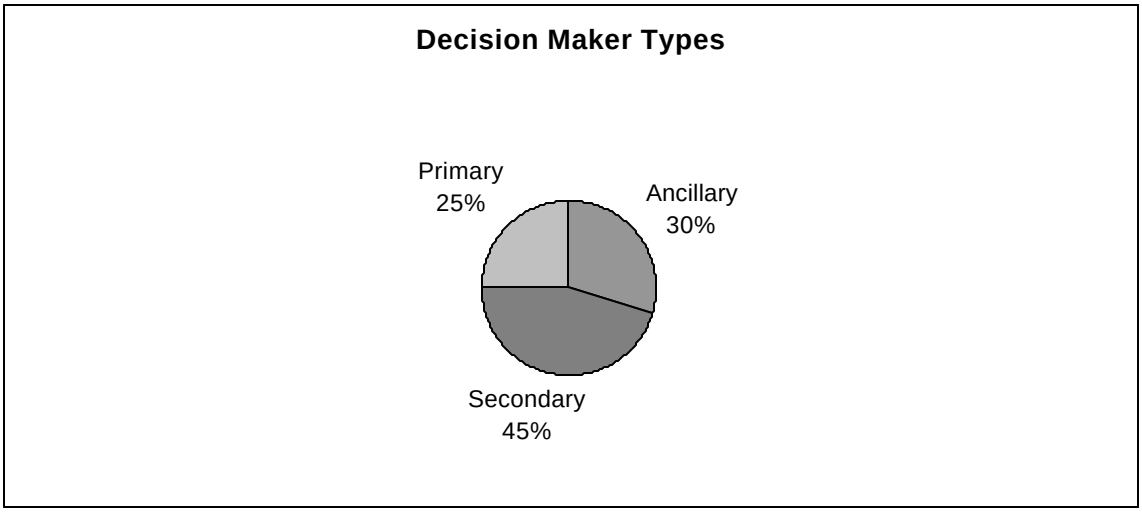
Table 16-1: Annual Organization Revenue (n=57) Q62

Annual Organization Revenue	
Number	57
Mean	$1,661,136,842

Decision Maker Types

Targeting the right decision makers to interview in organizations can be difficult, but necessary in order to obtain dependable data that reflects current buyer thinking. Respondents must have influence on product and service purchase decisions. In this question, we asked respondents what type of decision maker they were, including primary decision maker, secondary decision maker, and ancillary decision maker, when purchasing products or services. Primary decision makers are those responsible for making the *final* decision on products and services. Secondary decision makers were defined as those having *significant* influence on product or service procurement, and ancillary decision makers as those having *some* influence on product or service procurement. Interviews were terminated with respondents that had no influence on the purchase decision. Of the three decision maker types, responses are as follows: primary decision makers are 25% of respondents, secondary are 45% of respondents, and ancillary decision makers are 30%. Chart 16-2 below shows the breakdown of respondent decision maker types.

Chart 16-2: Decision Maker Types (n=100) Q4



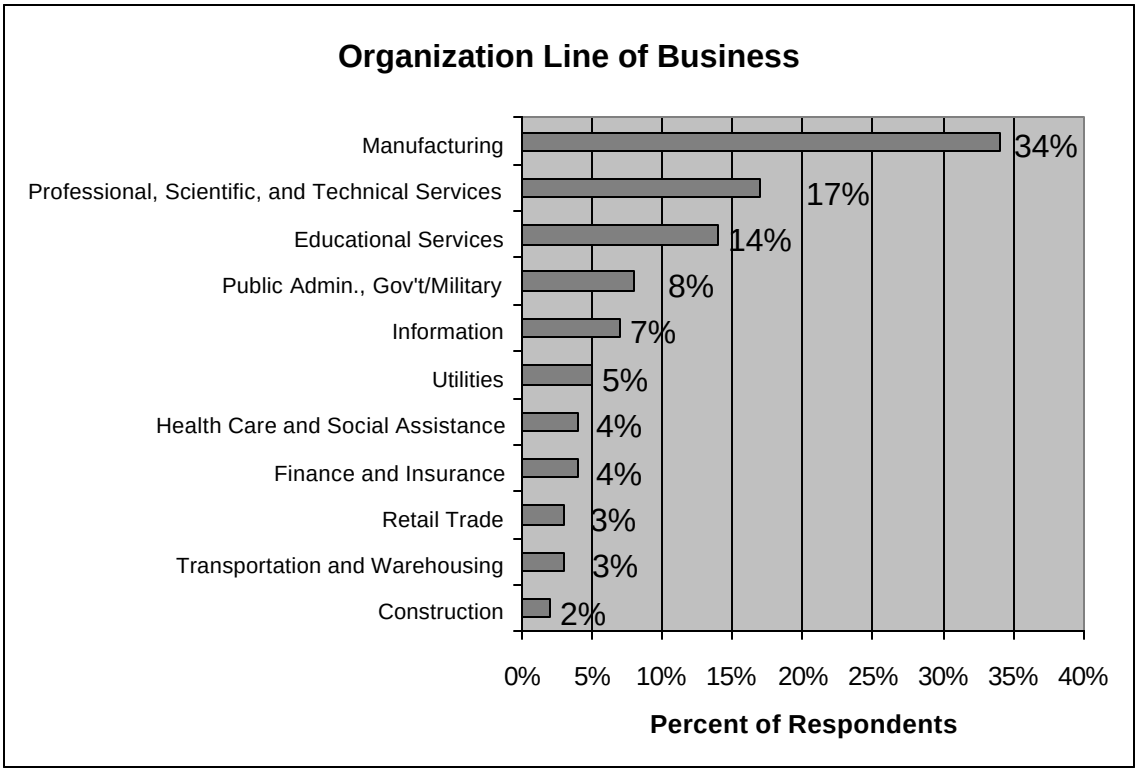
Organization Line of Business

As an open-ended question and allowing for multiple responses, respondents were asked to identify what type of business their organizations were in. Responses to this question ranged from manufacturing to utilities to construction, and were organized into the categories below. We interviewed a total of 232 respondents in this study. The chart below only includes those 100 respondents that are doing enterprise streaming.

Thirty-four percent of respondents list Manufacturing as the most frequent organization line of business type in the sample. Manufacturing lines of business may be a natural target for product manufacturers and service providers. Professional, Scientific, and Technical Services follow as the next line of business type, reported by 17% of respondents. The Educational Services business type closely follows as expressed by 14% of respondents.

Other lines of business types are listed in the chart. Please note that this question allows for multiple responses. At least one respondent's organization operates in two lines of business. Chart 16-3 below shows breakdown of responses by organization line of business type.

Chart 16-3: Organization Line of Business (n=100) Q7

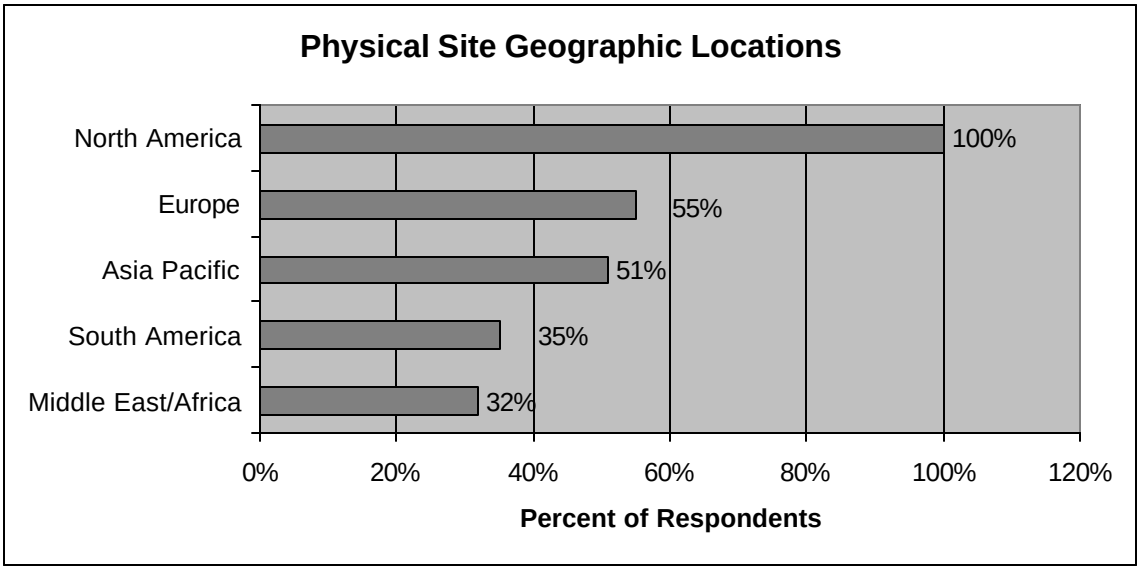


Business Geography

In this question, respondents were asked to identify the geographic regions of the world in which their organizations have physical site locations. Respondents were allowed to offer multiple responses.

Of the 100 respondents who answered this question, 100% indicated that their organizations have physical site locations in North America. Fifty-five percent of respondents have locations in Europe and 51% in Asia Pacific. South America and Middle East/Africa results also have a presence in the chart below. This question also allowed for multiple answers since organizations can have more than one physical site in more than one region. Chart 16-4 below shows the number of physical site locations by region.

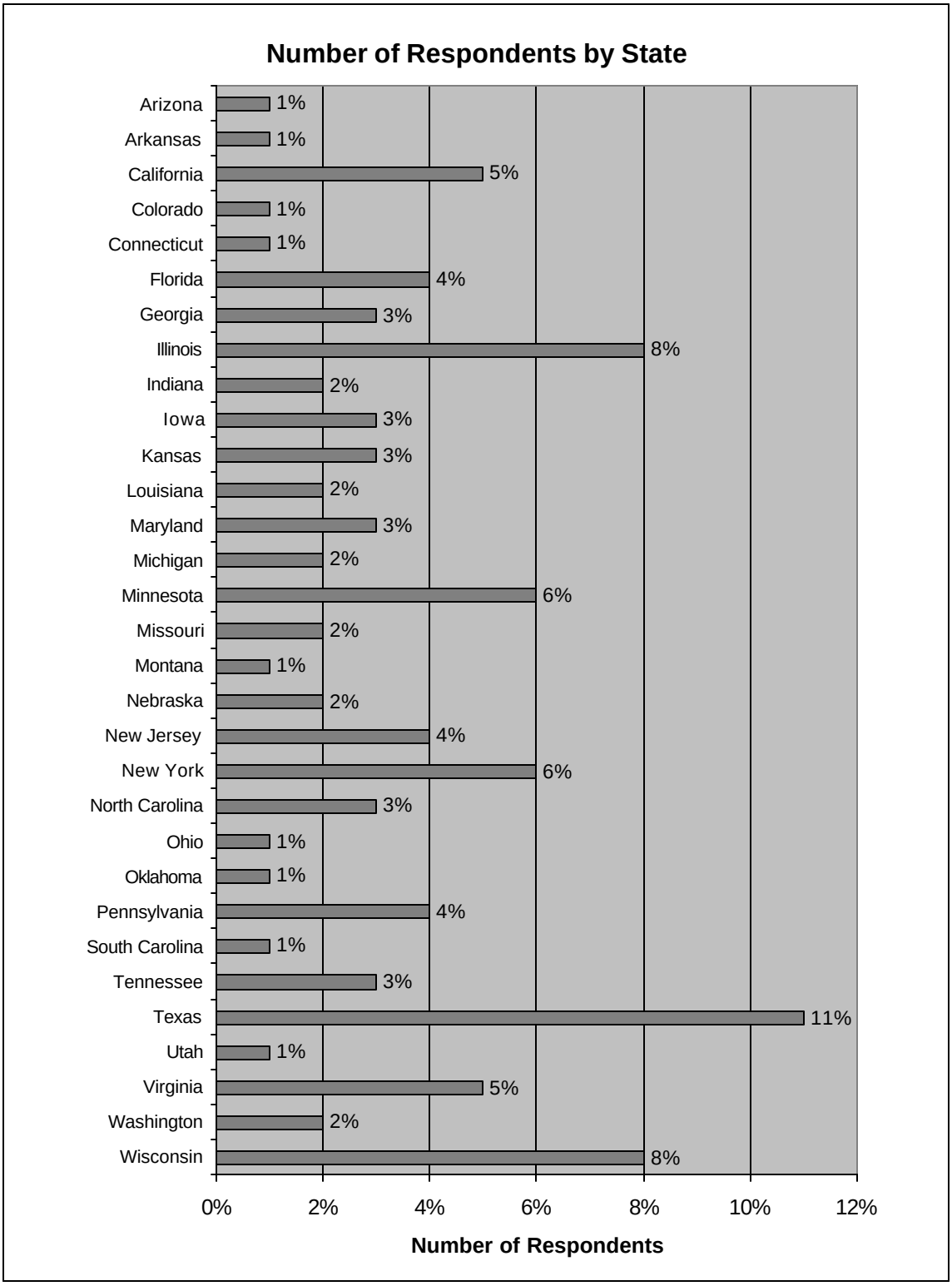
Chart 16-4: Physical Site Geographic Locations (n=100) Q5



Respondents by State

In addition to providing the statistics on the number of physical site locations by region, we also looked at the data to determine the number of respondents by state. The most frequent region listed was Texas, which was 11% of the study respondents doing streaming in the enterprise. Wisconsin and Illinois followed Texas; both were listed, respectively, by 8% of respondents. The concentrations of respondents in these regions likely signify the high percentage of respondents who are in the Manufacturing, and Professional, Scientific, and Technical Services lines of business, as discussed in the previous section. New York (6%) and Minnesota (6%) were the next regions represented by respondents in this study.

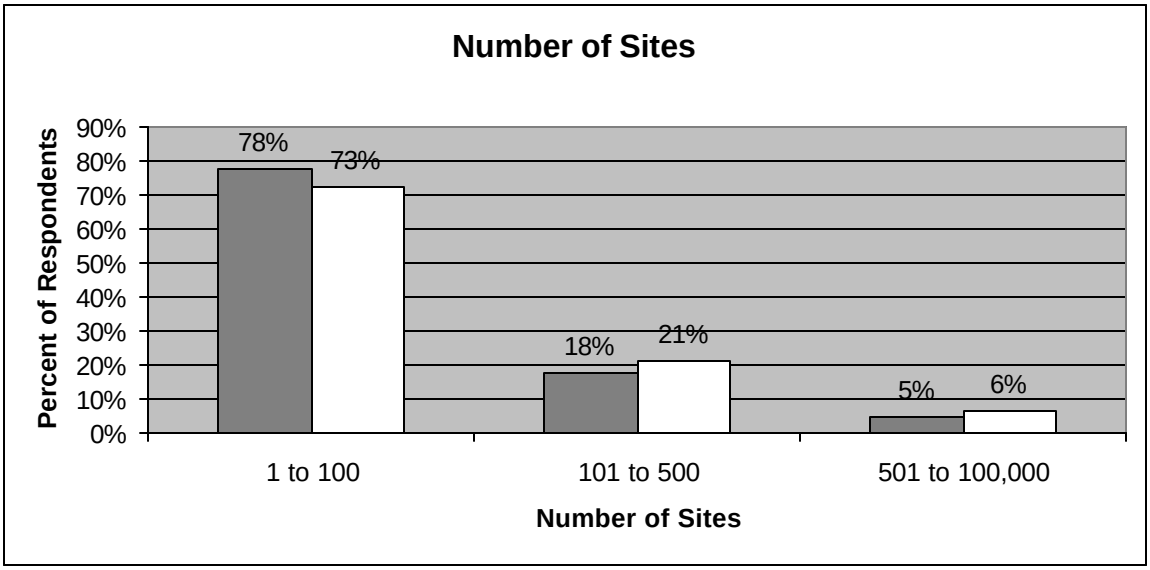
Chart 16-5: Number of Respondents by State (n=100)



Number of Sites

In this question, respondents were asked about the total number of physical site locations their organizations have for this year and next year. We categorize the number of sites into three groupings: "one to 100," "101 to 500," and "501 to 100,000" sites. Seventy-eight percent of respondents replied that their organizations have one to 100 physical site locations. This will decrease by 5% from 78% this year to 73% next year. Organizations with 101 to 500 site locations will increase from 18% (2001) to 21% (2002). Respondents who work for organizations with 501 to 100,000 physical locations reflect an anticipated increase from 5% currently to 6% next year. Chart 16-5 below shows the percentage of organizations by number of physical site locations. Figures in the chart may or may not add up due to rounding.

Chart 16-6: Number of Sites (n=85,80) Q6



Supply Side Analysis

The bulk of our study covers the demand-side, and consists of interviews with the target customers. In this supply-side section, we interviewed product manufacturers and service providers regarding their perception of the market including strategies, product categories, acquisitions, market direction, target customers, streaming and CDN applications, challenges and competitors. In this section we discuss how supply side perceptions align with demand-side research.

Enterprise Strategies

Product manufacturers and service providers have similar strategies to address enterprise prospects, but most do not have a complete end-to-end solution of products and/or services to offer. While there are many definitions of what a complete solution entails, we believe it must include all facets of content creation to delivery of content. Only a few vendors are strategically partnered to include all the components in an end-to-end streaming solution. The basic categories include Content Creation, Infrastructure, Management, and Delivery Services. Table 17-1 below identifies the types of products and services by solution category.

The table shows where product manufacturers and service providers fit relative to one another in the market. Clearly, partnerships will play a key role in successfully addressing the needs of potential customers. Product manufacturers are partnering with other manufacturers and service providers to fill portions of their end-to-end solution.

Table 17-1: Streaming and CDN Products and Services for the Enterprise

		Products Manufacturers	Service Providers
End to End Solution	Content Creation	Production, Editing, Encoding, Transcoding, Application Development, Asset Management	Production, Editing, Encoding, Transcoding
	Infrastructure	Servers, Streaming Software, Storage, CDN Nodes, QoS Mechanisms, Security, Appliances, Performance Technologies, DRM	Professional Services, Installation, Integration, Managed Services, Storage Services, Network Build-out, Network Design
	Management	Streaming Asset Management, Network Capacity, Streaming Capacity, Simultaneous Streams, Streaming Demographics of Users, Content Management	Management Interface, User Interface, Reporting, Streaming Statistics
	Delivery Services	On-demand Streaming, Live Streaming, Secure Streaming, Static CDNs, Dynamic CDNs, Professional Services, Installation, Integration, Managed Services, Network Design	Intranet Streaming, Extranet Streaming, eCDNs, Extranet eCDNs

Product manufacturers are targeting enterprise and service providers. While most vendors target their solutions to service providers, many are modifying their solutions to address the enterprise market. Interviews with supply-side vendors indicate that no common vertical market stands out for specific market targeting, with some vendors targeting the financial vertical, while others are targeting education. In addition, vendors report that there is no single media standard for streaming and that all product manufacturers will need to address all media formats.

Content Creation

Our demand-side research shows that most large organizations have an AV group, and therefore the capacity to create streaming media content. Streaming technology is relatively new, and likely few have the capacity to create live streamed events for executive communications to maintain corporate alignment with employees. New technology implementations in the enterprise require a significant amount of customer hand holding in order to ensure value and a return on their investment. Products and services must be consistent with customer needs. The current market demand has created an environment where partnerships with synergistic vendors will make a difference.

Infrastructure

To most of our respondents, implementing enterprise streaming and eCDNs is a novel proposition. As we have seen with our research, most organizations lack the expertise and time to implement enterprise-wide solutions. Not all vendors (product manufacturers and service providers) have professional services, which we see as a requirement for infrastructure implementation. For product manufacturers, most prospects will need assistance with assessing their needs for key infrastructure components, such as servers, software, appliances, security, QoS interoperability, and security. Product manufacturers should team up with integrators or service providers to provide installation, integration, managed services, and network design services.

Service providers have a wealth of expertise in building IP networks for applications such as streaming. Providers of enterprise streaming services should include professional and network services. Managed “on-net” (within the enterprise network) service solutions are likely to be attractive to enterprise IT decision makers, most of whom, as our research has shown, lack the time or expertise to deploy enterprise streaming. Sixty-one percent of respondents cited Extranet partners as the recipient of streaming media in 2002. However, once streaming traffic leaves the enterprise network and traverses the Internet, quality control is lost. The primary target of providers of enterprise streaming solutions should include performance streaming services for “off-net” Extranet partners.

Management

Our research indicates that one of the major barriers to implementing streaming in the enterprise is network capacity. Unmanaged streaming is a bandwidth intensive application that can cripple enterprise network performance. Most IT managers understand this; however, most are not aware of the streaming management capabilities of streaming products

today. Streaming solutions must be manageable from several dynamics, including network capacity, demographics, asset management, and security. Our research in the vendor community (both product manufacturers and service providers) revealed that most products and services do not include end-to-end management features. However, partnerships with synergistic solution providers will provide better, well-rounded solutions to accommodate customer requirements.

The management console that customers interface with will be a strong point of differentiation. The challenge for developers is the varied level of expertise that resides with enterprise customers. Successful graphical interfaces will likely include a tiered architecture that allows a simplified top layer view with detailed drill-down capabilities.

Services

Services will be a major point of differentiation for product manufacturers and service providers. For product manufacturers, enterprise streaming and CDN products must be capable of delivering on-demand, live, and secure content. Based on respondents' use of eCDN solutions, Intranet traffic includes static, dynamic, and secure content types. These types are market entry requirements. Product manufacturers must include professional and integration services to overcome implementation obstacles.

Few providers have announced their intention to target enterprises with streaming and eCDN services. Our research has shown that no single provider type has an advantage in the eyes of our respondents. When asked about the provider type they plan to use for enterprise streaming, no category of service providers stood out. Providers of enterprise streaming services should offer Internet, Intranet, and Extranet streaming with usage based bundles. eCDN services should include Extranet partners, and add performance delivery to "off-net" users.

Few vendors address the full range of an end-to-end solution from content creation to delivery of content, while most product manufacturers' eCDN solutions include streaming functionality. This explains why enterprise streaming and eCDN usage are so tied together.

Technology Use

Streaming Media

According to interviews with vendors (product manufacturers and service providers), enterprises will likely offer trial implementations of streaming this year and launch full streaming services by next year. This expectation is somewhat consistent with our findings. The quartile analysis of streaming servers, number of simultaneous streams, and expected streaming capacity indicated an early adopter market. Most respondents that are implementing streaming are doing so in a conservative manner.

The top two applications that vendors expect customers to implement for streaming in the enterprise are e-learning and live executive broadcast. These expectations are in alignment with our research findings. Streaming will be driven by specific business applications such as e-learning and corporate communications (live company address or quarterly results announcements). The ROI for streaming will be an easy concept readily accepted once applications are rolled out widely in the enterprise.

Streaming is no longer solely for entertainment use. Streaming has found its calling as a business application tool. There are definite business applications that vendors anticipate will offer high growth. Enterprises that have a widely distributed workforce are the earliest adopters due to the returns of streaming solutions versus conventional communication methods and travel requirements. Streaming is ideal for the broadcast communications requirements needed by enterprises today, without the extravagant cost of the traditional broadcasting medium.

Content Delivery Network Solutions

Based on our supply-side surveys and interviews with vendors, the number one application that drives the adoption of CDN usage, and the most frequently discussed use of CDNs, is streaming media. The two specific applications of streaming media, as mentioned by enterprise streaming vendors, are e-learning and corporate communications. Both enterprise streaming and CDN vendors' observations are justified in our research.

Few providers are currently offering true eCDN services, thus, responses were limited.

The future direction for eCDN infrastructure includes added functionality, such as translation technology. This technology would enable the network to recognize a source media file and convert the media on the fly to the required media format of the recipient streaming server, device, or desktop. This would eliminate the need to encode for several media formats and bit rates.

Standards Development

Most of the enterprise streaming and CDN vendors are members of the Internet Engineering Task Force (IETF) because they feel it addresses the future direction of technology standards. The IETF group is concerned with the evolution of the Internet architecture and the solving of the Internet's technical problems, and is a respected body in streaming and CDN standards.

Those offering streaming solutions also participate in the Internet Streaming Media Alliance (ISMA). The ISMA is a forum devoted to the creation of specifications that accelerate the adoption of streaming rich media (video, audio and associated data) over Internet Protocol (IP) networks.

Vendor Profiles

Our vendor profiles are broken down into four basic groups, Streaming Products, Streaming Services, CDN Products, and CDN services. The product categories were further broken out into hardware and software.

In chart 17-1 and 17-2, we have provided a quick reference of vendors plotted by eStreaming, eCDN, hardware, software, services, webcasting, peer-to-peer, and price categories. By looking up a particular vendor, the reader can determine if the company is an eStreaming and/or eCDN vendor, if they offer hardware, software, and/or services, and if their technology includes peer-to-peer or webcasting capabilities. A symbol in the price column indicates that we have some pricing information on that particular vendor's products and/or services.

The company information, such as prices, products, services, and corporate descriptions, presented in this section was derived from publicly available resources such as print and online publications, the respective company's Web site, and product and service literature. The information has been edited by the HTRC Group to be free, to the best of our abilities, of marketing claims and to maintain a neutral description of products and services. The registered trade and service marks contained in this section are properties of their respective companies. The list of companies profiled in this section may not be all-inclusive.

Chart 17-1: Enterprise Streaming and CDN Vendor Matrix

Company	eStreaming	eCDN	Hardware	Software	Services	Webcasting	Peer-to-Peer	Price
2netFX	●			●				●
3 CX, Inc.	●	●			●			
Activate	●				●	●		
Akamai	●	●			●	●		
Amnis Systems	●		●	●				
Anystream	●			●				●
Apple Computer - QuickTime	●			●				
Avid Technology, Inc.	●		●	●				
Burstline.com	●				●	●		
CacheFlow	●	●	●					●
Cidera	●				●			
Cisco Systems, Inc.	●	●	●	●				●
Digital Fountain	●			●				●
Digital Island/Cable & Wireless	●	●			●			
Digital Lava	●			●				●
Digital Pipe, Inc.	●	●		●	●			
e-Media, LLC	●		●	●	●			
eMikolo Networks	●	●		●			●	
enScaler, Inc.	●	●		●				
Eveo, Inc.	●			●				
Globix Corp. - Streaming Media	●				●	●		
iBEAM Broadcasting	●				●			
InfoLibria	●	●		●				●
Inktomi Corporation	●	●		●				●
iStream TV, Inc.	●		●					●
Kasenna, Inc.	●	●		●				
Lucent Technologies	●	●	●					
Media 100, Inc.	●			●				●
MediaOnDemand.com	●				●			
Microsoft Corporation	●			●				
MidStream Technologies	●		●					
Mirror Image Internet, Inc.	●	●			●			
nCube	●		●					
Network Appliance	●	●	●					●
Nortel Networks		●	●					
Optibase	●		●					
Qwest Communications		●			●			
RealNetworks, Inc.	●			●				●
Reliacast	●			●				
SeeItFirst, Inc.	●			●	●	●		
Speedera Networks, Inc.	●	●			●			

Chart 17-2: Enterprise Streaming and CDN Vendor Matrix cont'd

Company	eStreaming	eCDN	Hardware	Software	Services	Webcasting	Peer-to-Peer	Price
Starbak Communications	●		●					●
StreamCenter	●			●				●
Streaming21, Inc.	●			●				
Sun Microsystems, Inc./Cobalt		●	●	●				●
Surgient Networks	●	●	●					
Talkway Communications	●				●			
Vantum	●		●					●
Vbrick	●		●	●				●
Vividon, Inc.	●	●	●					●
Volera, Inc.	●	●		●	●			
vTrails		●			●		●	
Weema Technologies	●	●		●			●	
Worldstream Communications	●				●	●		
XOsoft, Inc.	●	●		●				
Yahoo! Broadcast Services	●				●	●		

Streaming Vendors

Streaming Products - Hardware

Amnis Systems
www.amnisinc.com

Amnis Systems of Palo Alto, CA was formerly known as Optivision, Inc. Amnis Systems develops, manufactures and delivers MPEG network video products for video creation, management and distribution. Amnis Systems supplies network-based streaming video solutions for broadband multimedia applications such as distance learning, corporate training, video courier services, telemedicine, surveillance and visual collaboration. The company's products provide the network infrastructure hardware and software products for MPEG streaming video applications supporting IP, ATM and WAN-based networks.

PRODUCTS AND SERVICES
Optivision provides network centric products for streaming industry standard MPEG digital video for use in cable, satellite, wireless, LAN and WAN applications such as corporate communications, content distribution, e-commerce, and others. Optivision products offer the following features:

> *NAC-3000* or *VS-Pro* products with mpegNet software capture video content from any source (cable, air, satellite, tape, live).
>
> *VS-Pro with mpegStudio Pro software, or NAC-3000 or VS-Pro with mpegNet software* store video locally or in remote network video servers.
>
> *NAC-3000 or VS-Pro products with mpegNet software* transmit live, streaming video across a computer or public network.
>
> *LiveMap Network Management software* manages video distribution as a part of the total application.
>
> *LivePlayer* software or *mpegNet* software with NAC-3000 or VS-Pro products play live, streaming or stored video on a TV monitor, desktop PC, or set-top box.
>
> mpegStudio Pro software and the VS-Pro product can playback stored video on a TV monitor.

Product:_____NAC-3000
Company:_____Amnis Systems

Attributes
*Dimensions-rack height:*_____half-width 1 rack unit
*Extensibility/modularity:*_____MPEG-1 QSIF through MPEG-2 Full D1
Transcoding support (bit rate, per bandwidth connection):
MPEG-2: 2 to 15 Mbps, MPEG-1: 56kbps to 5 Mbps
Streaming format types: _____MPEG-2 Full D-1, MPEG-2 Half D-1, MPEG-1 SIF, MPEG-1 QSIF
Web server compatibility: _____Optivision mpegNet based systems
*Network Interfaces:*_____10/100 Mbps Ethernet
Product type:_____MPEG encoding server
Protocols:_____RAW UDP/IP, Retransmission, FEC, RTP (future), Other UDP/IP based protocols are also supported

Product:_____NAC-4000
Company:_____Amnis Systems

Attributes
*Dimensions-rack height:*_____Half-width 1 rack unit
*Extensibility/modularity:*_____MPEG-1 QSIF through MPEG-2 Full D1
Transcoding support (bit rate, per bandwidth connection):
MPEG-2: 2 to 8 Mbps, MPEG-1: 56kbps to 5 Mbps
Streaming format types: _____MPEG-2 DVB, MPEG-2Full D-1, MPEG-2 Half D-1, MPEG-1 SIF, MPEG QSIF
*Network Interfaces:*_____10/100 Mbps Ethernet
*Protocols:*_____RAW UDP/IP, Retransmission, FEC, RTP, and other UDP/IP based protocols

Product:_____VS-2311B mpegStudio Pro
Company:_____Amnis Systems

Attributes
*Dimensions-rack height:*_____4 rack units
*Storage Capacity:*_____Internal: 9 to 18 GB
Transcoding support (bit rate, per bandwidth connection):
MPEG-2: 2 to 15 Mbps, MPEG-1: 56k bps to 5 Mbps
*Streaming format types:*_____MPEG-2 Full D-1, MPEG-2 Half D-1, MPEG-1 SIF, MPEG-1 QSIF
*Network Interfaces:*_____Ethernet 10/100 Mbps, V.35/EIA530, T1, OC-3/ATM, Gigabit Ethernet

Product:_____VS-Pro
Company:_____Amnis Systems

Attributes
*No. of Simultaneous Streams:*__1 to 5 independent live streaming video receiver channels
*Dimensions-rack height:*_____4 rack units
*Extensibility/modularity:*_____MPEG-1QSIF to MPEG-2
Transcoding support (bit rate, per bandwidth connection):
32 to 192 kbps for Mono, 64 to 384 kbps for Stereo
*Streaming format types:*_____MPEG-2 Full D-1, MPEG-2 Half D-1, MPEG-1 SIF, MPEG-1 QSIF
*Network Interfaces:*_____Ethernet 10/100 Mbps (standard) (EIA-10/100), V.35/EIA530 (from 1 to 4) (V35P/530P), T1 (from 1 to 4) (T1P), OC-3/ATM (OC-3A), Gigabit Ethernet (G-ETH)

Product:_____NAC-3000DVB
Company:_____Amnis Systems

Attributes
*Dimensions-rack height:*_____1 rack unit
*Extensibility/modularity:*_____MPEG-1 QSIF through MPEG-2 Full D1
Transcoding support (bit rate, per bandwidth connection):
MPEG-2: 2 to 15 Mbps, MPEG-1: 56kbps to 5 Mbps
*Streaming format types:*_____MPEG-2DVB, MPEG-2Full D-1, MPEG-2 Half D-1, MPEG-1 SIF, MPEG-1 QSIF
*Network Interfaces:*_____10/100 Mbps Ethernet, DVB-ASI/C
*Protocols:*_____RAW UDP/IP, Retransmission, FEC, RTP (future), Other UDP/IP based protocols also supported

Avid Technology, Inc. - Internet Solutions Division

www.trilligent.com

Avid Technology, Inc. of Tewksbury, MA has built a business creating, manipulating and managing digital media for broadcasters, filmmakers and interactive game developers. Avid has a division, Avid Internet Solutions (AIS), that is focused on helping streaming service providers, content delivery networks and corporate enterprises store, deliver, manage and monetize rich media on the Web.

Avid understands that performance issues are affecting the online distribution of digital media. The requirements of high-bandwidth content exceed the capacity of existing server and storage systems that are designed for handling rapid, but small, data transactions, not the lengthy (e.g., full-length feature films), large object transactions presented by digital media.

PRODUCT

Trilligent Cluster is a streaming media system created to deliver dynamic content (streaming media and other high bandwidth content), such as movies, trailers, games and videos, to broadband-connected PCs.

It is composed of media servers, load balancers and a shared storage pool, tuned to provide performance and linear scalability in a streaming media solution.

Product:	The Trilligent Family Cluster
Company:	Avid Technology

Attributes

Operating System:	Windows 2000 Server
No. of Simultaneous Streams:	2,000-60,000 simultaneous unique streams
Dimensions-rack height:	6 rack units to dual 42 rack units
Extensibility/modularity:	Linear Scalability: 200Mbps to 5000Mbps aggregate bandwidth
Storage Capacity:	54GB-3.6TB
Streaming format types:	Supports all leading streaming formats.
Web server compatibility:	Windows Media Technologies, RealServer, QuickTime, Vsoft VideoClick (MPEG-1, MPEG-2), and Streaming21 Media Server
Network Interfaces:	100 Base T or Gigabit Ethernet connection
Product type:	Streaming
Protocols:	UDP, TCP, MMS, HTTP, RTSP, and RTP

CacheFlow

www.cacheflow.com

CacheFlow of Sunnyvale, CA builds and sells content networking appliances and services that accelerate, manage, and distribute static, streaming, dynamic and application content. CacheFlow's end-to-end product portfolio includes edge and server accelerators, network-based content management and distribution devices, Real, Microsoft, Apple and MPEG 4 streaming services, Websense and Secure filtering extensions, and SSL encryption and acceleration technology. The cIQ Content Delivery Architecture combines the ingredients of a CDN, including content acceleration, content management, and content routing, with the content intelligence of cIQ to allow networks to communicate between devices, adapt to usage patterns and personalize content.

PRODUCTS AND SERVICES

cIQ Starter Kit helps enterprises deploy strategic applications and manage where, when and how multimedia and Web content gets distributed to the network edge. The cIQ Starter Kit includes the components of a content delivery network (CDN) - content delivery, content distribution, content management, reporting, and intelligent content services. The kit is based on CacheFlow's cIQ Content Delivery Architecture which uses content acceleration appliances with an open content management platform. The kit comes with CacheFlow cIQ Director (1 unit), 6000 Series cIQ Edge Accelerators (2), 600 Series cIQ Edge Accelerators (4), Streaming media licenses (either Real or Microsoft) (6), and WebTrends Enterprise Suite (trial).

cIQ Director is an open distribution management system that integrates hardware and software into an appliance form factor. cIQ Director is an integral component of CacheFlow's cIQ Content Delivery Architecture. It is designed to manage, distribute and synchronize static, dynamic, secure application and multimedia content from the data center to the network edge.

cIQ Streaming Services was designed to help users increase performance and offer quality, scalability and reliability for streaming applications.

EDGE ACCELERATORS

The *CacheFlow Edge Accelerator CA-600* Series of edge accelerators are used by enterprises, ISP's, and other organizations to manage and control Web traffic growth, while accelerating the delivery of content to users. The accelerator is deployed between users and the Internet or at remote sites, and manages requests for content. Since the CacheFlow Edge Accelerator

interacts with every request for Web content, it decides if access to the requested content is appropriate or up-to-date, according to policies set by the enterprise or service provider. The CA-600 products offer content filtering services that check each user request against a database of potentially objectionable sites, organized by category to make policy administration simple and manageable.

CacheFlow Edge Accelerators 6000 Series consists of performance content delivery solutions for enterprises, ISPs, educational institutions and government agencies. Edge Accelerators allow organizations to manage, distribute and accelerate content. The CA-6000 is deployed between users and the Internet, and manages requests for Web and multimedia content. Edge accelerators also provide content filtering services to allow users access to appropriate content only, according to policies set by the enterprise or service provider.

SERVER ACCELERATORS

The *Server Accelerator SA-700* series is designed to improve the performance, scalability, security and manageability of high-traffic Web sites. The SA-700 hardware is designed for Web server acceleration, featuring a high RAM-to-disk ratio and a built-in Secure Sockets Layer (SSL) encryption/decryption processor. This processor offers and manages more secure sessions, allowing the SA-700 to accelerate the delivery of both public (HTTP) and private (HTTPS) content. The SA-700's system software, called cIQ CacheOS Server Edition, is tuned for the workload of a high-traffic Web site. The software includes features like an "Akamaizer", which automatically prepares content for the Akamai FreeFlow network, and protection against Denial-of-Service attacks, which can crash a Web site.

The *Server Accelerator SA-7000* Series is designed to improve the performance, scalability, security and manageability of high-traffic Web sites. Deployed in front of any Web server, the SA-7000 accelerates the delivery of Web content to users and serves more content than a single Web server. The SA-7000 Series is tuned for the workload of a high-traffic Web site. The SA-7000's hardware architecture and cIQ CacheOS Server Edition software are designed to handle heavy transaction loads. The SA-7000 products integrate Secure Sockets Layer (SSL) capabilities to offload CPU-intensive HTTPS sessions, offering the management of more secure sessions than a standard Web server. The SA-7000 also includes features like an "Akamaizer," which automatically prepares content for the Akamai FreeFlow network, and protection against malicious Denial-of-Service attacks, designed to crash Web sites.

Product:_____CIQ Director
Company:_____CacheFlow

Attributes
*Operating System:*_____CacheOS, Java Runtime Environment, Windows 98/NT/2000, or Solaris
*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____Disk drives: 20GB
*Warranty:*_____1-year Hardware, 90-day 24x7 technical support, next-business-day hardware replacement, and software support; extended and upgraded support plans available.
*Form Factor:*_____19” rack-mountable
*Network Interfaces:*_____(2) 10/100 Base-T
*Protocols:*_____HTTP, HTTPS, and FTP

Product:_____Edge Accelerator-6000
Company:_____CacheFlow

Attributes
*Operating System:*_____CacheOS 3.1
*Price:*_____starts at $21,995, or $24,995 or 88,995
*Dimensions-rack height:*_____4 rack units 177.8mm (7.0 in.)
*Storage Capacity:*_____2x18 GB Ultra2 SCSI, 4x18 GB Ultra2 SCSI, 8x18 GB Ultra2 SCSI (Optional CA-6585 * expansion kit allows for additional 8x18 GB Ultra2 SCSI)
*Warranty:*_____Standard Warranty- 1-year hardware and 90-day software and technical phone support, including 90-day CacheSupport 24x7; extended and upgraded support plans available.
*Form Factor:*_____19” rack-mountable
*Web server compatibility:*_____Microsoft IIS, Apache, iPlanet (independent of specific Web server)
*Network Interfaces:*_____supports up to (1) integrated and (3) additional 10/100/1000 Base-T interfaces
*Product type:*_____Streaming, edge cache hardware

Product:_____Server Accelerator-700
Company:_____CacheFlow

Attributes
*Operating System:*_____CacheOS Server Edition
*Price:*_____starts at $9,995
*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____Disk Drives: 1x20GB IDE, 2x18GB Ultra-Wide SCSI, 4x18GB Ultra-Wide SCSI
*Warranty:*_____1-year 24x7 technical support, 90-day next-business-day hardware replacement; extended and upgraded support plans available.
*Form Factor:*_____19” rack-mountable
*Network Interfaces:*_____(2) 10/100 Base-T
*Product type:*_____Streaming

Product:_____Server Accelerator-7000
Company:_____CacheFlow

Attributes
*Operating System:*_____CacheOS Server Edition
*Price:*_____$68,995 to $111,995
*Dimensions-rack height:*_____4 rack units
*Storage Capacity:*_____Disk Drives: 2x18 GB Ultra2 SCSI, 8x18GB Ultra2 SCSI
*Warranty:*_____1-year hardware and 90-day software and technical phone support, including 90-day CacheSupport 24x7; extended and upgraded support plans available.
*Network Interfaces:*_____(1) integrated; supports up to (3) additional 10/100/1000 Base-T, 1000 Base-SX, 1000 Base-LX interfaces
*Product type:*_____Streaming

Product:_____Edge Accelerator-600
Company:_____CacheFlow

Attributes
*Price:*_____starts at $4,495 to $19,995

Product:_____cIQ Streaming Services
Company:_____CacheFlow

Attributes
*Streaming format types:*_____RealNetworks RealSystem, Microsoft Windows Media, Apple QuickTime, and MPEG Audio (including MP3) and Video formats
*Protocols:*_____RTP, RTSP, HTTP, MMS, RDT, and PNA

Cisco Systems, Inc.

www.cisco.com

Cisco Systems of San Jose, CA is provider of networking solutions for the Internet. Cisco provides networking solutions that customers use to build an information infrastructure of their own, or to connect to someone else's network. Cisco's offers a range of hardware products to form information networks or give people access to those networks. Cisco serves customers in three target markets:

- Enterprises - Large organization with complex networking needs, spanning multiple locations and types of computer systems. Enterprise customers include corporations, government agencies, utilities and educational institutions.

- Service Providers - Companies that provide information services, including telecommunication carriers, Internet Service Providers, cable companies, and wireless communication providers.

- Commercial - Companies or consumers with a need for their own data networks, as well as connection to the Internet and/or to business partners.

PRODUCTS AND SERVICES

Cisco's *Content Delivery Network solutions* offer video, audio, and large graphics and other high bandwidth files that can be delivered with speed, accuracy and consistency.

CDNs for Enterprise Solutions - Business to Business features include distributed Web hosting, applications hosting, e-commerce, virtual private CDNs, Intranet/Extranet streaming media delivery, and enterprise content access and delivery. Business to Consumer features include static image acceleration, on-demand and live streaming media delivery and hosting, content rating and filtering, distributed dynamic content, and personalization. Cisco CDNs offers streaming media for knowledge sharing, reducing learning costs and motivating employees.

IP multicasting is a bandwidth conserving technology that reduces traffic by simultaneously delivering a single stream of information to thousands of corporate recipients and viewers. Applications that use multicast include videoconferencing, corporate communications, distance learning, and distribution of software, stock quotes, and news. IP Multicast delivers source

traffic to multiple receivers without adding any additional burden on the source or the receivers while using the least network bandwidth.

The *Cisco IP/TV* product family streams video programs to PC users over enterprise networks. The Cisco IP/TV offers video broadcasting and video-on-demand services, management capabilities, scalability, network technologies such as IP multicast, and a viewer interface.

Product:_____Cache Engine-505
Company:_____Cisco

Attributes:

*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____9-18 GB
Network Interfaces:_____(2) auto-sensing 10 Base-T/100 Base-TX ports
*Protocols:*_____WCCP

Product:_____Cisco Cache Engine-550
Company:_____Cisco

Attributes
*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____18 GB
*Network Interfaces:*_____(2) auto-sensing 10 Base-T/100 Base- TX ports
*Protocols:*_____WCCP

Product:_____Cisco Cache Engine-570
Company:_____Cisco

Attributes
*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____36-144 GB (requires a Cisco Storage array for optimal performance/capacity. Cisco Storage Array provides 6x18GB=108GB of storage.)
*Network Interfaces:*_____(2) auto-sensing 10 Base-T/100 Base-TX ports
*Protocols:*_____*WCCP*

Product:_____Distributed Director
Company:_____Cisco

*Price:*_____Starts at $16,995

Product:_____Content Engine-560
Company:_____Cisco

Attributes
*Price:*_____$14,995
*Dimensions-rack height:*_____1.72 in. (43.7mm)
*Storage Capacity:*_____144GB; Internal Storage (Ultra2 SCSI): (2) 18GB drives
*Support options:*_____Storage Array Support
*Network Interfaces:*_____(2) 10BaseT/100BaseTX

Product:_____Content Distributor Manager-4630
Company:_____Cisco

Attributes
*Price:*_____$19,995
*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____Internal- (1) 30GB, 10K RPM, Ultra2 SCSI disk drive
*Network Interfaces:*_____Auto-sensing 10/100Base-T

Product:_____Content Distribution Manager-4650
Company:_____Cisco

Attributes
*Price:*_____$94,995
*Dimensions-rack height:*_____7 rack units
*Storage Capacity:*_____Internal: 140 GB RAID 5
*Network Interfaces:*_____Auto-sensing 10/100Base-T

Product:_____Content Engine-507
Company:_____Cisco
*Price:*_____$5,495

Product:_____Content Engine-590
Company:_____Cisco

Attributes
*Price:*_____$29,995
*Dimensions-rack height:*_____1.72 in. (43.7mm)
*Storage Capacity:*_____252 GB; Internal Storage (Ultra2 SCSI): (2) 18GB drives:
*Support options:*_____Storage Array Support
*Network Interfaces:*_____(2) 10BaseT/100BaseTX

Product:_____Local Director-430
Company:_____Cisco

Attributes
*Price:*_____$32,000 (unlimited server support)
*Dimensions-rack height:*_____5.21in. (13.23cm)
*Form Factor:*_____19” rack-mountable
*Network Interfaces:*_____(4) 10/100 Base-T Ethernet ports, upgradeable to 16 or a maximum of (4) FDDI ports

Product:_____Cisco Local Director-416
Company:_____Cisco

Attributes
*Price:*_____$32,000 (unlimited server support)
*Dimensions-rack height:*_____5.21 in. (13.23cm.)
*Form Factor:*_____19” rack-mountable
*Network Interfaces:*_____Three 10/100 Base-T interface cards

e-Media, LLC

www.e-media.com

e-Media, LLC of Stamford, CT is a convergence company that wraps e-commerce applications around a video stream. e-Media provides solutions for the development, distribution and management of broadband media content for clients. e-Media uses proprietary technology to provide custom e-commerce solutions - whether streaming a live Web event or creating and maintaining a relationship with the revenue-generating, individual consumer.

PRODUCTS AND SERVICES

e-Media's e-commerce streaming *Solution Suite* incorporates both applications and appliances. The Solution Suite is designed to accommodate all of the user's streaming needs.

Applications - e-Media's applications wrap contextual content triggers around the user's streaming media. These Internet based one-to-one streaming platforms allow for a way to add e-commerce streaming to any Web site.

> *Attract* is an entry-level streaming platform that communicates your content on a per-visitor basis, making the user's Web presence more responsive and accountable with each visit. Attract allows companies to add video to their Web site.
>
> *Impact* is an Internet based streaming platform with video-triggered content. The video stream holds visitor attention while relevant content is triggered alongside predetermined points in the video.
>
> *Interact* is an Internet based platform that combines video-triggered content and interactivity. The video holds visitor attention while relevant content is triggered alongside predetermined points in the video. Site visitors respond to the Triggers by bookmarking items into their own Interest List for browsing after the video ends. Interactivity elements include visitor-created interest lists; polls, surveys or sidebars; and chat or "live" online help.
>
> *Transact* is an Internet based e-commerce streaming platform that triggers contextually relevant text at predetermined points during a video stream. Site visitors respond to Triggers by bookmarking items into their Shopping List for purchase after the video ends.

Appliances - e-Media's encoding, streaming hubs and appliances are commerce streaming solutions.

> *Atlanta* is a mobile, on-location encoding device. Atlanta, combined with e-Media's e-commerce streaming, performs merchandising and presentations using e-Media's proprietary media trigger software and multi-encoder technology.
>
> *Catalina* and *Santa Clara* are streaming appliances that support hundreds of simultaneous broadband streams. These appliances address reliability issues by delivering content on the network and offer low-cost maintenance from central core locations.
>
> *Vienna* is an e-commerce streaming appliance that combines all of the content, commerce and customer intelligence for Internet events and broadband applications.

Network - e-Media's network architecture is dedicated to data aggregation and extensive information reporting based on an one-to-one client-server interaction using content caching and geographic load-balancing features that complement streaming, Web serving and e-commerce on the Internet.

Services - e-Media can help the user incorporate and enhance original and/or re-purposed programming delivered via streaming media. Content can be delivered live or on-demand with e-Media's performance distribution capabilities.

> *Encoding* - video can be encoded for 56K, 100K, 300K, 650K and higher, delivering audio and visual value to the user's customers.
>
> *Hosting* - e-Media's hosting capabilities assure a successful Web effort. Their services include bandwidth, disk storage, availability, technical support, and system administration.
>
> *Live Webcasts* - e-Media can assist with the preparation for and production of live events accommodating both single and multi-camera Webcasts.
>
> *Video Ad Serving* - e-Media's video ad serving capability provides options for scheduling video ads, targeting ads, and providing online reporting to advertisers.
>
> *Pay-Per-View / Digital Rights Management* - e-Media delivers integrated solutions for live streaming including "one-ticket, one-

stream" Pay-Per-View (PPV) viewing. This solution uses digital rights management to guarantee a single username/password combination receives only a single stream, preventing multiple people from viewing the same single streaming video.

Design Services - e-Media will design video-driven Web sites and can assist with designing multimedia application interfaces and programming triggered contextual Web pages next to a video.

WebGnosis will allow the Web site owner to maintain textual and graphical data, as well as links, in your Web site with minimal technical involvement.

Product:_____e-Media Sphere
Company:_____e-Media

Attributes
*Computing Platform:*_____100MHz Intel Pentium processor
*No. of Simultaneous Streams:*__over 15 million streams

iStreamTV, Inc.

www.istreamtv.com

iStreamTV, Inc. of New York, NY is a technology development lab dedicated to creating and delivering Internet video. iStreamTV provides encoding services for various streaming video formats using several techniques to enhance quality. Together with partners, iStreamTV offers support for streaming media, live Webcasts, convergence, video-on-demand and interactive television. iStreamTV also provides encoding services and digital delivery systems for feature films over broadband and wireless Internet connections.

PRODUCTS AND SERVICES

Webcaster3 is the factory-produced version of its portable Webcaster. It generates three simultaneous Internet video streams in both RealVideo and Windows Media formats with full-featured audio processing, and comes with a rugged road case. All speeds are supported from modem to broadband for live webcasting, and archiving for video-on-demand. iStreamTV's set-top-box system provides near video-on-demand, along with Web surfing capabilities. It is scalable to serve hundreds of simultaneous viewers, and designed to prevent unauthorized copying. It is remotely managed and also supports TV viewing, games, music, smart card, productivity software, and customizable features.

The *Studio Encoder/Caster* has three independent encoders, each with its own video and stereo audio inputs. Combine this with the user's studio routing switcher or patch bay, and they can send the same video to all three streams where each can be set to a different speed. It can also address each encoder independently, such as three different camera angles of the same scene, or three different satellite feeds or VCRs playing.

Corporate Caster allows webcasting and real-time encoding to the hard drive from any video/audio input. The iStreamTV 2-speed and 3-speed Corporate Casters are ideal for adding to conference rooms, corporate training departments, and videoconference facilities.

Corporate Caster/server adds storage and replication for large audiences or video-on-demand archives. The Corporate Caster/server combines the Caster with a video stream server, capable of generating dozens or hundreds of real-time streams, up to the capacity of the network connection.

Product:_____Corporate Caster & Corporate Caster/Server
Company:_____iStreamTV, Inc.

Attributes
*No. of Simultaneous Streams:*__capable of generating dozens or hundreds of real-time streams
*Price:*_____available in 3 speeds: Corporate Caster 2-speed: $6,000, Corporate Caster 3-speed: $7,000, Caster/server 3-speed: $23,000, Caster/server 2-speed: $31,000, Caster/server 2-speed MR(Microsoft and RealServer licensed for 200 Intranet users): $32,000, Corporate Server Pair, set of 2, with auto-replication, load balancing, etc.: $5000/mo.
*Dimensions-rack height:*_____available in 4-9 rack units
*Storage Capacity:*_____180GB of RAID5
*Warranty:*_____180-day Warranty when bought outright
*Purchase options-cash/lease:*__Daily rental (Per event day), Weekly Rental, Monthly Service Agreement, Purchase outright, Dealer demo units, Reseller/Dealer wholesale sales
*Support options:*_____24/7 Tech Support ($50/incident; 10 incidents included in first year of ownership)
*Network Interfaces:*_____dual 10/100 LAN cards

Product:_____Studio Encoder/Caster
Company:_____iStreamTV, Inc.

Attributes
*Operating System:*_____Windows2000
*Price:*_____4 rack units: $4500.00, 2 rack units: $7500.00
*Dimensions-rack height:*_____choice of compact 2-rack unit (256M SDRAM) or 4-rack unit (provides additional drive bays for user upgrades, additional hard drives, etc.)
*Storage Capacity:*_____Hard Drive: 40G
*Warranty:*_____180-Day Warranty, 180-Day software upgrades
*Purchase options-cash/lease:*__Daily Rental, Weekly Rental, Monthly Service Agreement, Purchase outright, Dealer demo units, reseller/dealer wholesales sales
*Web server compatibility:*_____Windows Media Encoder 7 and 4.1, RealProducerPro 8.5, QuickTime 4.0, Multi-audio VU meter software, Multi-encoder start/stop controls, and Multi-encoder monitoring utility
*Network Interfaces:*_____10/100-network jack
*Product type:*_____Streaming

Product:	WebCaster3
Company:	iStreamTV

Attributes

Computing Platform:	Intel Pentium III processor
Price:	$23,995 MSRP (plus shipping)
Dimensions-rack height:	13” (34cm)
Storage Capacity:	Hard Drive: 12G UDMA high-shock
Warranty:	180 days including all software upgrades that are certified for use with the WebCaster3 during the warranty period. Tech support 24x7.
Purchase options-cash/lease:	Daily Rental, Weekly Rental, Monthly Service Agreement, Purchase outright, Dealer demo units, Reseller/Dealer wholesales.
Support options:	24/7 telephone support
Web server compatibility:	Microsoft Windows Media
Network Interfaces:	RJ45 Ethernet Jack, 10/100 auto-sensing

Lucent Technologies

www.lucent.com/businessunit/icdd.html

Lucent Technologies of Murray Hill, NJ designs and delivers systems, software and services for communications networks for service providers and enterprises. Backed by the research and development of Bell Labs, Lucent focuses on growth areas such as broadband and mobile Internet infrastructure; communications software; Web based enterprise solutions that link private and public networks; and professional network design and consulting services.

PRODUCTS AND SERVICES

Internet Content Delivery and Distribution Business Unit

Internet Content Delivery and Distribution (ICDD) develops, manufactures, services, and markets content delivery products and solutions for service providers and enterprises. ICDD's mission is to solve how to delivery and distribute content on the Internet. ICDD offers the "*imminet*" family of content delivery and distribution products. The "*imminet*" product portfolio includes Bell Laboratories technology and a family of Web caches, Layer 4-7 Web switches, Web streaming and Web appliances designed to accelerate and deliver Web content.

> *imminet WebCache*: The scalable, carrier-grade, *imminet* WebCache helps to eliminate access latency, deliver fresh content, and reduce server overload.
>
> *imminet WebDirector*: The *imminet* WebDirector platform combines high-speed flow setup with wire-speed switching and forwarding performance to improve Web access speed and response time.
>
> *imminet WebCache S100/S200*: The *imminet* WebCache S100 speeds streaming video and audio to the desktop by storing content closer to your end users.
>
> *imminet WebDNS*: The *imminet* WebDNS offers a BIND-based domain name server that links with existing DNS servers to direct content requests to the closest WebCache on the network.

Product:_____Imminet WebCache
Company:_____Lucent Technologies

Attributes
*Operating System:*_____Free BSD
*Price:*_____Depends upon configuration
*Dimensions-rack height:*_____2 rack units
*Storage Capacity:*_____512MB Internal Drives: 20GB IDE
*Warranty:*_____10-year Mean Time Between Failures (MTBF), Lucent Worldwide Services
*Web server compatibility:*_____Microsoft IIS, Apache, iPlanet
*Network Interfaces:*_____(2) RJ-45 100Base-TX
*Product type:*_____Streaming edge cache hardware

Product:_____Imminet WebDirector
Company:_____Lucent Technologies

Attributes
*Operating System:*_____Free BSD, Sun Solaris, Windows NT
*Price:*_____Depends on configuration
*Warranty:*_____1-year hardware, 90-day software
*Form Factor:*_____19" Universal EIA (telco) Rack Tabletop
*Web server compatibility:*_____Microsoft IIS, Apache, iPlanet
*Network Interfaces:*_____10Base-T/100Base-TX, 100Base-FX, 1000Base-SX, 1000Base-LX, Flow Control, VLAN Tagging, Bridging, Ethernet Like MIB, Repeater MIB, Ethernet Interface MIB, SNMPV, SNMP MIB II
*Product type*_____Intelligent Layer 4/7 Web Traffic Switch and Load Balancing Appliance
*Protocols:*_____TCP, UDP, SSL, FTP, Telnet, SMTP, HTTP, IMAP4, LDAP, NNTP, POP3, DNS, BootP, TFTP, and SNMP

Product:_____Imminet Dynamic Cache-100
Company:_____Lucent Technologies

Attributes
*Operating System:*_____Free BSD, but migrating to Linux soon
*Web server compatibility:*_____Microsoft IIS, Apache, iPlanet

Product:_____Imminet WebCache S100
Company:_____Lucent Technologies

Attributes
*Operating System:*_____Free BSD
*No. of Simultaneous Streams:*__streams up to 54GB
*Price:*_____depends upon configuration
Dimensions-rack height:_____2 rack units
*Storage Capacity:*_____750MB Internal Drives: (3) 18GB SCSI for storage, (1) 20GB IDE for system
*Form Factor:*_____19" rack mountable
*Web server compatibility:*_____Microsoft IIS, Apache, iPlanet
*Network Interfaces:*_____2 RJ-45 100Base-TX
*Product type:*_____Streaming media caching gateway
*Protocols:*_____TCP, UDP, SSL, FTP, Telnet, SMTP, HTTP, IMAP4, LDAP, NNTP, POP3, DNS, BootP, TFTP, and SNMP

Product:_____Imminet WebDNS-100
Company:_____Lucent Technologies

Attributes
*Operating System:*_____Free BSD
*Price:*_____Depends upon configuration
*Dimensions-rack height:*_____2 rack units
Storage Capacity:_____1 GB
*Web server compatibility:*_____Microsoft IIS, Apache, iPlanet
*Network Interfaces:*_____(2) RJ-45 100Base-TX
*Product type:*_____Content Delivery Routing

MidStream Technologies

www.midstream.com

MidStream Technologies of Bellevue, WA is a developer of hardware for streaming multiple-format narrow and/or broadband digital media at wire-speed. A single two rack-unit appliance is capable of delivering multi-gigabit sustained throughput. A multiple unit configuration provides built-in load balancing, failover reliability and the ability to deliver millions of concurrent streams. MidStream's hardware can support many streaming formats simultaneously and allows for software and appliance upgrades in the field.

PRODUCTS AND SERVICES

MidStream Streaming Server - offers scalability. From a single box, it can serve over 16,000 broadband (100 Kbps) streams. As the user needs more streams, the user can add more boxes. All hardware components can be replaced in the field without taking the unit out of service and without disrupting streams. MidStream allows for reconfiguration of stream characteristics and bit rates in real-time to prevent slow downs and improve quality of service. The box can encrypt each individual stream to provide security and as well as for content providers to offer streamed content, such as movie rentals and music sales.

Product:_____MidStream Streaming Server
Company:_____MidStream

Attributes
*Operating System:*_____Capable of streaming through multiple popular formats from a single box
*No. of Simultaneous Streams:*__can serve up to 16,000 broadband (100Kbps) streams
*Dimensions-rack height:*_____2 rack units (3.5")
*Storage Capacity:*_____Internal: up to 1.4TB/system External: Dual Fibre Channel, GBIC Module, Fibre SC, Conner D89, HSSDC, (CATS when available)
Transcoding support (bit rate, per bandwidth connection):
28.8Kbps-9 Mbps
*Network Interfaces:*_____RJ-45
*Product type:*_____Streaming Server

nCUBE

www.ncube.com

nCUBE of Foster City, CA is a provider of scalable broadband streaming media solutions. nCUBE's video streaming appliances are being utilized by a diverse lot of cable television, media and telecommunications customers. nCUBE integrates systems, software and professional services to meet the demands of broadband, IP and DSL video networks. nCUBE's Hypercube architecture has scalability, cost and performance advantages over general purpose servers and other appliances for video streaming applications. nCUBE provides solutions for broadband video-on-demand, IP streaming media, and advertising insertion. The company's core product line, the n4 streaming media appliance, can scale from 100 megabits per second to 128 gigabits per second of streaming media from a single system. nCUBE provides an interactive television and video-on-demand solution including servers, software management tools, and content management software.

PRODUCTS AND SERVICES

The *Hypercube technology* uses multiple computer processors as opposed to a single central processor or PC. These multiprocessors are interconnected in a multi-dimensional cube or hypercube, so that they can communicate and cooperate along with eliminating bottlenecks and video degradation. There is no single path bottleneck and no degradation of video quality. Adaptive routing provides load balancing of data streams and routes data around failed nodes if they occur.

MediaCUBE 4 is a third generation streaming appliance. It is designed specifically for the technical requirements of streaming media. It has the ability to support content libraries from a single copy of content. The MediaCUBE 4 requires the smallest footprint, the least power and cooling, and has the fewest moving parts of any streaming server. The MediaCUBE 4 is capable of delivering 44,000 simultaneous streams at 3 Megabits per second per stream with no content replication.

Broadband Video-On-Demand Solutions - nCUBE provides a range of Video-on-Demand (VoD) solutions for the broadband industry, generating revenue for operators. They provide modular VoD solutions that simplify the process of planning, launching and operating a VoD service for cable television and telecommunications networks. nCUBE's VoD systems are focused on the three VoD-enabling areas: Streaming, Infrastructure, and Subscribers.

> *nABLE*, the nCUBE VoD management system, provides operators with a VoD system management toolset accessed via a browser-based

management interface. nABLE performs stream bandwidth allocation, asset management, and content distribution while providing operators with a single view of the entire VoD network.

The *nCUBE On-Demand Application* offers VoD for a range of existing set-top boxes, electronic programming guides, subscriber management systems, and billing systems.

Internet Broadband Streaming Solutions include everything needed to launch revenue-generating services based on IP streaming media, not just hardware, but also management software and professional services. nCUBE's streaming media users can range from DSL customers to corporations.

Advertising Solutions offer a server capable of inserting advertisements into both analog and digital networks, saving the operator capital and operating costs. nCUBE's *Sky Vision* software allows the user to manage the insertion operations of a single headend or multiple headends from a single location.

The *Solutions Delivery* team works closely with customers to determine the solution for their needs and then prepares the system for trial or production deployment. As the solution is prepared for installation, the *Educational Services* team works with the operator's personnel to certify them in appropriate technologies and occupational requirements. Once the solution has been verified in the lab and operator personnel are trained, the nCUBE *Systems Deployment* team plans, manages, and executes all aspects of the system installation. As the Systems Deployment teams complete installation and production readiness of the solution, the customer is transitioned to the nCUBE *Technical Support* that operates on a 24x7x52 rapid-response to ensure critical operations are maintained.

Product:_____n4 System
Company:_____nCube

Attributes
*No. of Simultaneous Streams:*__over 44,000 (3Mbps streams)
*Dimensions-rack height:*_____8.45” (21.46cm)
*Storage Capacity:*_____9 GB to over 184 TB
*Network Interfaces:*_____QAM 64, QAM 256, DVB-ASI, ATM OC-3, ATM OC-12, and 10/100 Base-T Gigabit Ethernet
*Product type:*_____Streaming

Network Appliance

www.netapp.com

Network Appliance, Inc. of Sunnyvale, CA is a provider of network file storage and content delivery solutions. The company offers the concept of the "network appliance," a dedicated, specialized product that performs a single function. NetApp storage and content delivery platforms (filers and NetCache appliances) are coupled with content distribution and reporting software. These solutions offer data management from the back-end data center to the edge of the network.

PRODUCTS AND SERVICES

Network Appliance Content Delivery - Network Appliance provides an integrated center-to-edge solution that allows the user to store, deliver, and manage content.

> *NetCache* appliances improve content delivery by mirroring content closer to the end users, eliminating network and server bottlenecks that slow down and even terminate delivery. Network Appliance transforms the customer's network with streaming media, content distribution, virus scanning, and ad insertion. The NetCache family includes three product lines: NetCache C1100, NetCache C3100, and NetCache C6100. For entry-level applications, the NetCache C1100 series suits remote offices and local POPs at the edge of the network. The mid-range C3100 series addresses environments that are growing rapidly or have regional offices. At the high end, the NetCache C6100 series delivers performance for large data centers and maximum bandwidth locations.

Content Delivery Software - Serving content and information to users at the edge of the network requires software and hardware that are designed to deliver reliability and performance. NetApp's edge delivery appliances to provide multiprotocol content delivery performance. Using a common platform, their distribution, management, and reporting solutions connect the users from the edge of the network back to the core data centers.

> *ContentDirector* - Network Appliance offers "center-to-edge" content distribution and management capability through its ContentDirector application. ContentDirector provides secure distribution of content from storage appliances across global networks to multiple content delivery appliances. In addition, it provides the tools to automate distribution of Internet content including streaming media and graphics. By linking filers and NetCache appliances, ContentDirector

creates a solution for content storage, distribution, and delivery. This solution offers the benefits of data management, performance Web and streaming media acceleration, and a content distribution solution.

ContentReporter offers the ability to analyze content usage, network performance, and infrastructure load. ContentReporter integrates with NetApp appliances to provide network administrators a method to gauge their network's effectiveness. Enterprises, Internet service providers (ISPs), content delivery networks (CDNs), and content providers can gain visibility to file usage patterns, activity levels, and error rates to manage their content delivery infrastructure and plan for future growth. ContentReporter parses the aggregated data to an ODBC-compliant database, which allows administrators to create a variety of reports such as performance analysis, activity, and usage and billing.

Product:	Content Reporter Server
Company:	Network Appliance

Attributes

Operating System:	Windows NT Server 4.0 SP 5 or greater, Windows 2000(server, advanced server)
Computing Platform:	Pentium II 500MHz or greater
Price:	starts at $20,000
Storage Capacity:	1GB disk or greater
Product type:	Streaming
Database Compatibility:	Oracle 8i, MS SQL 7.0, and Sybase 11.5

Product:	Content Director
Company:	Network Appliance

Attributes

Price:	starts at $40,000
Operating System:	Windows NT 4.0 w/Service Pack 5.0, Windows 2000 Server, Windows 2000 Server, Windows 2000 Advanced Server, Solaris v2.7 and 2.8

Product:	NetCache
Company:	Network Appliance

Attributes

Price:	NetCache Family C1100/3100/6100 series, C700series C6100-$74,000, or $57,000 to $200,000, C1105-$10,950, or $8,000 to 19,000 (based on configuration), C1100-$3950 hardware, $2000 software, C720s-base $16,950, C720s 2 disk version-approx. $10,000
Dimensions-rack height:	4.3cm (1.70”) 22.2cm (8.75”)
Storage Capacity:	256MB-3GB
Network Interfaces:	(2) Full Duplex 10/100Base-T Ethernet Onboard (1) Optional Network Connectivity Single or Quad Port 10/100 Base-T Ethernet; Gigabit Ethernet (C3 100-2max; C6 100-6max)
Protocols:	HTTP, FTP, and NNTP

Optibase

www.optibase.com

Optibase of Herzliya, Israel is a provider of broadband digital video streaming solutions. Its server platforms offer video streaming over IP and ATM networks for applications such as distance learning, business TV and monitoring. Optibase is also developing media transmission servers that will offer streaming of rich media over the Internet. Rich media applications vary from video-enhanced e-commerce, Internet TV, video-on-demand services, addressed advertising, advanced caching, streaming live events and more.

PRODUCTS AND SERVICES

Systems - Optibase's MPEG-4, MPEG-2 and MPEG-1 streaming servers allow service providers and operators to deploy broadcast TV over IP networks and streaming media services over the broadband Internet.

> *MGW 2000* is a multi-channel, rack-mounted video streaming server designed to serve as the core of video networking and streaming solutions for broadband networks. It transmits live and pre-recorded streams over broadband terrestrial and wireless networks such as DSL, Ethernet LANs, satellite, cable and LMDS.
>
> *MGW 3100* is a video-over-IP rack-mount system that bridges digital video and high-speed data networks. It serves as a media gateway between DVB and IP. MGW 3100 is ideal for applications such as backhaul video over IP networks or bridging DVB and IP interfaces at headend installations. MGW 3100's Remote Session Manager allows the user to control unicast and multicast transmissions from one MGW 3100 system to single or multiple MGW 3100 receiving systems. The Remote Session Manager can communicate with one transmitter and up to 20 receivers simultaneously and allows configuration, operation and ongoing monitoring of the transmission.

Open Systems - Optibase offers a line of MPEG/ Dolby Digital encoding gateways and MPEG-2 DVB to IP interface gateways as well as various streaming software packages that allow the deployment of streaming applications based on open system platforms.

Developer Tools - Optibase developer packages are designed for system integrators and OEMs who want to develop their own digital video and video streaming applications or integrate Optibase's platforms into their systems.

System integrators, OEMs and developers who want to develop video streaming applications based on Optibase's range of Video Server Transmission platforms and End Point solutions can join *the Video Streaming Developer Club*. The club offers direct access to Optibase's expertise in video streaming and video transmission technology and system integration, which helps the user cut development cycles

Product:_____MGW-2000
Company:_____Optibase

Attributes
*Operating System:*_____Windows NT 4.0 SP 3 or up
*Computing Platform:*_____Pentium II 350
*Dimensions-rack height:*_____2 rack units
*Extensibility/modularity:*_____up to 6 MGE-100/200, MGE-200D encoding modules, field swappable
*Storage Capacity:*_____128 MB RAM
*Network Interfaces:*_____(2) 10/100 Base-T Ethernet, Ultra-wide SCSI, RS232 serial port
*Protocols:*_____UDP Multicast and Unicast, 2' 10/100 Base-T with Full Duplex or Half Duplex support, RTP Transport-RFC 1889, RFC 2250

Product:_____MGW-3100
Company:_____Optibase

Attributes
*Dimensions-rack height:*_____1 rack unit
*Extensibility/modularity:*_____Upgradeable to dual processors; Memory upgradeable to 4GB
*Network Interfaces:*_____100BT Gigabit Ethernet (option)
Protocols:_____UDP Multicast or Unicast, RTP-RFC 1889, RFC 2250, TCP/IP, RTSP-RFC 2326

Starbak Communications

www.starbak.net

Starbak Communications of Westerville, OH is dedicated to helping large and mid-tier organizations reduce the cost and complexity of delivering streaming media to customers, employees, and business partners through the development of all-in-one server appliances built with embedded operating systems. These solutions are designed to be integrated into existing network infrastructures while providing performance, including the ability to stream multiple formats from a single unit. Starbak builds LINUX based video streaming solutions.

PRODUCTS AND SERVICES

The *Torrent Streaming Media Appliance* offers three servers for the cost of one. The Torrent supports QuickTime, Windows Media and native MPEG streaming formats in a single unit simultaneously. Multiple formats from a single server reduce server space and administration. A Web based interface administers the Torrent streaming server which allows the user to add and remove streams, establish authorizations, and set up unicast and multicast sessions. At 1U, Torrent is a small rack mounted appliance. The Torrent can receive up to 10 live Windows Media Encoder sessions, and simultaneously stream these ten live sessions to a total of 1,000 viewers. Torrent comes in two versions to match your power requirements. There is Torrent 100 with 100 Mbps Ethernet output and Torrent 1000 with Gigabit Ethernet output.

The *Torrent CE Streaming Media Conference Engine* is a streaming media conferencing appliance. It allows the user to Webcast videoconferences. Connect the Torrent CE into a multi-point videoconferencing bridge and stream that video signal out to the audience with a Windows Media or QuickTime player. The Torrent CE also transforms the videoconference room into a Webcast studio by connecting to an existing H.323 videoconferencing station and broadcast the video across the Internet.

Product:	Torrent-CE
Company:	Starbak Communications

Attributes

Price:	$14,995.00
Dimensions-rack height:	1 rack unit
Storage Capacity:	512MB Internal: 30GB Storage External: Ultra-2 SCSI support
Streaming format types:	QuickTime, Windows Media, and native MPEG streaming formats
Network Interfaces:	10/100 Mb Base-TX Auto-Sense Connector: RJ-45 on rear panel
Protocols:	MMS, RTSP, and RTP

Surgient Networks

www.surgient.com

Surgient Networks of Austin, TX provides deterministic, scalable and open platforms based on a network application enabling architecture. Surgient Networks' Deterministic Asymmetric Switching (DAS) architecture combines networking, storage and computing elements into a single, scalable and open platform. These platforms reside at multiple points throughout the network, which allow throughput of content from storage onto the network.

PRODUCTS AND SERVICES

No product information was made to the public at the time of this research.

Vantum

www.vantum.com

Vantum of Boulder, CO has created a video appliance on a programmable platform that can sense, capture, compress, analyze, record and stream video and audio over IP networks. The video appliance contains an integrated JavaScript interpreter that allows it to be customized for specific vertical applications. The Vantum video appliance provides video by using the MPEG family of compression algorithms. The video appliance integrates into the enterprise IP management infrastructure by supporting industry standard protocols such as DHCP, SNMP and SNTP. Vantum Active Video Appliances use programmable image rules to combine analysis and control with the capture and recording of digital video and audio.

PRODUCTS AND SERVICES

Vantum C1d is an active video appliance with an integrated camera and hard disk. It connects directly to an IP network and streams digital video and audio. The appliance can also store video and audio locally.

Vantum C1 is an active video appliance with an integrated camera. This appliance is similar to the C1d and does not contain an integrated hard disk. This is primarily used for applications requiring storage and retrieval at a central video server.

Vantum M1d enables existing devices that output analog video, such as ultrasound machine and legacy video cameras, to the enterprise network. The device also includes an integrated hard disk for storage and retrieval functions.

Vantum M1 is a similar device to the M1d It does not include an integrated hard disk.

Product:	C1 + C1D Intelligent Video Appliances with Integrated Camera
Company:	Vantum

Attributes

Operating System:	Windows NT 4.0, 98, ME, &2000
Computing Platform:	Pentium II 250-MHz processor or faster
Price:	$1,300 - $2,500
Dimensions-rack height:	2.75”
Storage Capacity:	64MB of RAM
Network Interfaces:	ActiveX enabled; RJ-45, 10/100 Base-T Ethernet, Auto-Sensing
Product type:	Streaming
Protocols:	DHCP, BOOTP, SNTP, and RTP

Product:_____M1 + M1D Intelligent Video Appliances for MPEG Migration
Company:_____Vantum

Attributes
*Operating System:*_____Windows NT 4.0, 98, ME, &2000
*Computing Platform:*_____Pentium II 250-MHz processor or faster
*Price:*_____$1,300 - $2,000
*Storage Capacity:*_____64MB RAM
*Network Interfaces:*_____RJ-45, 10/100 Base-T Ethernet, Auto-Sensing
*Product type:*_____Streaming
*Protocols:*_____RTP, DHCP, BOOTP, and SNTP

Product:_____Vantum IDE
Company:_____Vantum

Attributes
*Operating System:*_____Windows NT 4.0, 98, ME, &2000
*Computing Platform:*_____Pentium II 250-MHz processor or faster
*Storage Capacity:*_____64MB of RAM
*Network Interfaces:*_____Ethernet Interface
*Product type:*_____Streaming

Vbrick

www.vbrick.com

VBrick Systems, Inc. of Wallingford, CT is a broadband communications equipment & software systems manufacturer. The company develops, markets, sells and supports multifunction products and services for the delivery of one-way and two-way streaming digital television. Their products target interactive video, streaming, video security, and broadband network access. VBricks are embedded video network appliances that offers one-way and two-way MPEG video over the network.

PRODUCTS AND SERVICES

The *VBrick network appliance* is an audio and video encoder and decoder that offers the transmission and delivery of video and audio signals over standard switched Ethernet, ATM, T1/E1, xDSL, satellite, or microwave networks. It is a full duplex MPEG encoder and decoder. Vbrick Systems offers six different lines of encoders, decoders, and encoder/decoders for MPEG1 or MPEG2.

StreamPump is a video server offering streaming MPEG technology. It delivers 30 frames per second television to the Windows desktops and to TV monitors via IP multicast. One StreamPump can deliver audio/video content to an unlimited number of players. StreamPump and StreamPlayerII package offers a complete corporate broadcast station. With a VBrick appliance, the user can stream live content, and view any content on TV monitors. The StreamPump also includes a built-in scheduler, for starting a stream at a pre-selected date and time and run a stream continuously until the stop date and time, and a built-in Stream Editor for editing streams on the fly.

StreamPlayerII is a streaming MPEG audio/video viewer and recorder that provides live television to the desktop. It detects and displays live VBrick Program Guides, allowing the user to select any video stream for viewing. *StreamPlayerII* empowers Microsoft Media Player to display live MPEG video. StreamPlayerII displays the Title, Author, and Copyright information within Media Player.

VBCAP Transcoder is a software program for Windows that converts a live MPEG video stream to standard JPEG images in real time. The program receives live MPEG video over an IP network from a remote VBrick 3200 (or from a local file) and creates JPEG "snapshots" of the video at a user-defined interval. VBCAP then automatically sends the JPEG images to the Web server allowing the user to view live images, or saves each image to disk for security archive.

VBrickCam is a Java applet that allows Web browsers to display a continuous series of images that are located on the Web server, and display those images with smooth cross fading between each image. VBrickCam allows the display to be sequenced between four different images, providing the ability to display different live video feeds, or alternate between videos and static images for information or promotional purposes. No "plug-in" or desktop application installation is required, and a viewer can experience low frame rate video using any browser that supports Java

Product:_____Stream Player II
Company:_____Vbrick

Attributes
*Operating System:*_____Windows 95/98/2000/NT
*Computing Platform:*_____200 MHz Pentium I, 450Mhz Pentium II
*Storage Capacity:*_____32MB RAM, 10MB hard disk space for installation
*Streaming format types:*_____Apple QuickTime Player, Windows Media Player

Product:_____VBCap Transcoder
Company:_____Vbrick

Attributes
*Operating System:*_____Windows 95/98/2000/NT
*Computing Platform:*_____266 MHz Pentium
*Storage Capacity:*_____64MB RAM, 1MB hard disk
*Product type:*_____Streaming Transcoder
*Protocols:*_____standard FTP

Product:_____Vbrick-1000, 2000, and 3000 series
Company:_____Vbrick

Attributes
*Price:*_____starts at $7,495
*Dimensions-rack height:*_____2.3”
*Streaming format types:*_____Microsoft Windows Media Player and Cisco IP/TV Viewer
*Network Interfaces:*_____Ethernet, ATM (OC-3 and 25Mbps), RS-422, T1/E1 through external DSU’s

Product:_____Vbrick-4000, 5000, and 6000 series
Company:_____Vbrick

Attributes
*Price:*_____starts at $7,495
*Dimensions-rack height:*_____5.8cm (2.3in.)
*Network Interfaces:*_____10/100 Mbps Ethernet via RJ-45 Auto-Sense full/half duplex, UDP/RTP, Unicast/Multicast, DiffServ (QoS)

Vividon, Inc.

www.vividon.com

Vividon, Inc. of Sudbury, MA develops content delivery servers that are designed for streaming video and audio. Vividon's solution makes broadband ISPs and network service providers ready to deliver video on the Internet with speed and efficiency. The edge-deployed streaming media servers will deliver a range of rich media to end users at quality of service levels, and will offer new revenue opportunities for service and content providers. Vividon's streaming delivery system is suited for network edge deployments that minimize the distance between content and consumers. Vividon's Streaming Delivery Accelerators (SDAs) can support thousands of concurrent narrow and broadband rich media streams. The Vividon streamer provides delivery of high-density multimedia content by reducing demands on the original content server, first mile WAN connection and the Internet backbone.

PRODUCTS AND SERVICES

The *Streaming Delivery Accelerator* is designed for concurrent streaming throughput from 100 Mbps to over OC12 rates. This device is used for edge, core or enterprise applications. Vividon system capabilities are based on content streams being pulled from disk and can utilize the underlying Internet WAN and backbone infrastructure to fulfill current and future streaming needs. The SDA line of products include the SDA-1000 (1U for enterprise applications), SDA-2000 (2U for edge applications), and SDA-5000 (5U for core network applications).

The *Vividon Service Manager* (VSM) provides the ability to configure, monitor and manage remotely deployed SDAs. The VSM is available as a Linux application or as an integrated system. It provides aggregate network level performance metrics, the ability to configure and monitor devices regarding ID, status, warnings and threshold limits, and content management.

Product:_____VividOn Streaming Delivery Appliance (SDA)-1000
Company:_____VividOn

Attributes
*No. of Simultaneous Streams:*__1,700
*Dimensions-rack height:*_____1 rack unit for enterprise applications
*Storage Capacity:*_____108 GB
*Network Interfaces:*_____LAN (2) 10/100 Ethernet
*Protocols:*_____HTTP, MMS, and RTSP/RTP

Product:_____VividOn Streaming Delivery Appliance (SDA)-2000
Company:_____VividOn

Attributes
*No. of Simultaneous Streams:*__4,500
*Price:*_____start at $16,495 (depend on specific configuration options selected)
*Dimensions-rack height:*_____2 rack units for edge applications
Storage Capacity:_____180 GB
*Network Interfaces:*_____LAN (1) GB Ethernet
*Product type:*_____Streaming Delivery Appliance
Protocols: _____HTTP, MMS, and RTSP/RTP

Product:_____Streaming Delivery Appliance (SDA)-5000
Company:_____VividOn

Attributes
*No. of Simultaneous Streams:*__9,500
*Dimensions-rack height:*_____5 rack units for core network applications
*Storage Capacity:*_____360GB
Transcoding support (bit rate, per bandwidth connection):
650Mbps
*Network Interfaces:*_____Dual Gigabit Ethernet
*Product type:*_____Streaming Delivery Appliance
Protocols:_____HTTP, MMS, and RTSP/RTP

Streaming Products - Software

2netFX
www.2netfx.com

2netFX of San Jose, CA is a provider of software solutions for Intranet and broadband Internet media delivery. They provide broadband Internet and Intranet multimedia streaming over IP-based network solutions for enterprises, education, and government organizations. They also deliver digital video to desktop PCs, television sets and kiosks utilizing the Internet protocol (IP). Their range of media network applications includes Distance Learning, Corporate IntraWeb Training, One-To-Many Conferencing, Remote Surveillance, and Tele-Medicine. 2netFX's offers multicast broadband streaming solutions. Their video streaming software allows Intranet and broadband Internet users to experience video and audio at their desktops. With their datacasting capability, they are able to offer the delivery of simultaneous graphics, text, advertising, statistics and other data.

Organizations can setup virtual television broadcasting stations on their networks where a number of users can access multicast video broadcasts, all while maintaining low network bandwidth requirements. Utilized for high-traffic networks and low-latency delivery, 2netFX offers streaming solutions for Satellite, LAN/WAN, Gigabit Ethernet, ATM, xDSL, Cable Modem, Internet-2 and other broadband network environments.

PRODUCTS AND SERVICES
HDTV over IP Server & Player - HDTV multicast streaming solutions over standard IP-based networks offering video streams per bandwidth.

StreamRider Player is a customizable and integrateable media player that plays multicast or unicast program streams for viewing.

ThunderCastIP Server **-** A Web manageable video streaming and management server engine for applications.

CastFX Desktop Broadcaster provides Multicast broadcasting of MPEG video from your desktop.

Streaming Application Media **-** A hardware/software solution designed to encode and deliver video on-demand and live multicast streaming for LAN/WAN, satellite and other broadband Internet applications.

Product:_____Streaming Application Media
Company:_____2NetFx

Attributes
*Price:*_____$29,995
*Storage Capacity:*_____40Gb – hundreds of TB

Product:_____ThunderCastIP Advanced Media Server Software
Company:_____2NetFx

Attributes
*Operating System:*_____Windows 2000, Linux (HP UNIX in development)
*Price:*_____$4,999.00
*Streaming format types:*_____MPEG-1, MPEG-2, and HDTV
*Network Interfaces:*_____Fast Ethernet, Gigabit Ethernet, ATM, Fiber, Satellite, and Internet2
*Product type*_____Streaming Media Server Software
*Protocols:*_____TCP, UDP, RTP, IGMP, SAP, SDP, IP

Product:_____StreamRider Advanced Media Player Software MPEG & HDTV
Company:_____2NetFx

Attributes
*Operating System:*_____Windows 95/98/NT 4.0/2000, (Linux in development)
*Price:*_____$29.00/seat
*Storage Capacity:*_____128MB RAM
Streaming format types:_____ MPEG-1, MPEG-2, MPEG-4/H.263 (Minerva VNP 4.0 & QuickTime required), HDTV (480p, 720p, 1080I)
*Network Interfaces:*_____10/100 Mbps Ethernet, Gigabit, and ATM
*Product type:*_____Streaming Media Player
*Protocols:*_____RTP, MMS, OPV, RAW, RTP, UDP, IGMP, IP, SAP, SDP

Amnis Systems

Please refer to the Streaming Products - Hardware section.

Anystream

www.anystream.com

Anystream, Inc. of San Diego, CA is an Internet infrastructure software company offering the convergence of the broadcast and Internet content production environments. Its Agility encoding platform creates and distributes Internet streaming media to any platform or device, regardless of connection speed or media format. Anystream's scalable, IP-based software architecture was developed from experience in distributed and parallel computing technologies and digital video and image processing, and is platform-, codec-, and device-independent.

PRODUCTS AND SERVICES

Media Markup Language (MML) specification is an XML-based common language and architecture that facilitates automatic exchanging, updating, supplying and controlling of streaming assets between networked partners and affiliates.

*Agility Edge Encoding Platfo*rm is an extension of Anystream's scalable, fault-tolerant streaming media encoding software, designed for edge network service providers. By pushing encoding to the edge of the Internet, Agility Edge lets network providers and content owners deliver a streaming experience to a range of consumers.

The *Agility Enterprise Encoding Platform* is a platform for streaming media production and distribution. This platform delivers a single, constant view of streaming media production, insulating users from the underlying process complexities.

Agility Live Webcasting for Agility Enterprise Encoding Platform clients can integrate multiple live event Webcasts into their streaming media production process, all through a single interface that automates manual intensive procedures. Multiple simultaneous live events can be Webcasted in real time to the Internet in different formats and bitrates.

In the *Agility Workgroup Encoder*, Anystream scales the power of its Agility Enterprise encoding platform for the needs of the workgroup. The Agility Workgroup encoder delivers a solution that allows video professionals to re-purpose content - regardless of source - to the Web in all formats by automating the steps of streaming media production.

Product: Agility Workgroup SE
Company: Anystream

Attributes
Operating System: Windows NT 4.0/2000
Computing Platform: Dual Intel Pentium III workstations
Price: $19,995.00
Streaming format types: Real, Real G2, Real Video 8, Real Audio 8, Microsoft Windows Media, Apple QuickTime, PacketVideo, MP3, MPEG-1m DVD-Compliant MPEG-2 Program Stream

Product: Agility Edge
Company: Anystream

Attributes
Price: Pricing depends on the size and complexity of the client's environment, and the degree of the professional services required to deploy it within their organization.
Streaming format types: MPEG-1, MPEG-2
Product type: Streaming Media Encoding Software

Product: Agility Workgroup Encoder
Company: AnyStream

Attributes
Operating System: Windows NT 4.0
Computing Platform: Dual Intel Pentium II workstations
Price: $44,995.00
Streaming format types: Real, Real G2, Real Video 8, Real Audio 8, Microsoft Windows Media, Apple QuickTime, Packet Video, MP3, MPEG-1, DVD-Compliant MPEG-2, Program Stream (optional)
Protocols: NTSC, SMPTE

Product: Agility Enterprise
Company: AnyStream

Attributes
Operating System: Windows NT 4.0
Computing Platform: Intel Pentium III Xeon Servers
Price: Price depends on size and complexity of the client's environment, and the degree of the professional services required to deploy it within their organization.
Web server compatibility: Microsoft Internet Information Server, Netscape Enterprise Server, Allaire, ColdFusion, Other Application Servers, Client Support, Microsoft Internet Explorer (native support), and Netscape Communicator
Product type: Streaming
Database Compatibility: Microsoft SQL Server, Oracle Server, Informix Universal Server, Sybase Adaptive Server, and Other ODBC-compliant Databases
Protocols: NTSC, SMPTE, and PAL

Apple Computer - QuickTime

www.apple.com/quicktime/products/

Apple Computer of Cupertino, CA offers QuickTime 5, a digital media standard. QuickTime is a file format that is used for media authoring and includes a suite of applications. QuickTime is an extensible track-based file format. Each track delivers a different element of rich media content, such as video, audio, interactivity, and HTML behavior. QuickTime allows Mac and Windows users to play back audio and video on their computers. QuickTime is known as a platform for media development. It allows publishers to capture video and audio, to author digital media content, and to add interactivity to deliver media on the Internet or on CD-ROM. QuickTime includes a library of multimedia applications such as:

QuickTime Player: a standalone application for multimedia playback on the user's computer.

QuickTime Pro: a professional-level upgrade to QuickTime Player provides content authoring and media encoding capabilities.

QuickTime Streaming Server: Real-time Transport Protocol/Real-time Streaming Protocol-based streaming server for delivering media in real time over the Internet from Mac OS X Server.

Darwin Streaming Server: an open source version of QuickTime Streaming Server. In addition to source code, pre-built binaries that share the same code base are available for Windows, Solaris, Linux and FreeBSD. Darwin Streaming Server is server technology that allows the user to send streaming QuickTime data to clients across the Internet using RTP and RTSP protocols.

Product:	Darwin Streaming Server 3
Company:	Apple Computer

Attributes

Operating System:	Linux (RedHat 5.2 and later, 6.2 recommended), Solaris 7 (SPARC), Free BSD 3.5, Windows NT Server 4.0/ Windows 2000 Server
Streaming format types:	QuickTime, AVI
Product type:	Streaming Server

Product:_____QuickTime5
Company:_____Apple Computers

Attributes
*Price:*_____download free
*Upgrade paths:*_____upgrade to QuickTimePro: $29.99

Product:_____Quick-Time Streaming Server-3
Company:_____Apple Computer

Attributes
*Operating System:*_____Power Mac G4, Macintosh Server G4, or Power Macintosh G3
*No. of Simultaneous Streams:*__more than 3,000 simultaneous streams
*Price:*_____download for free
*Streaming format types:*_____QuickTime, AVI
*Protocols:*_____HTTP

Avid Technology, Inc. - Internet Solutions Division

Please refer to the Streaming Products - Hardware section.

Cisco Systems, Inc.

Please refer to the Streaming Products - Hardware section.

Digital Fountain

www.digitalfountain.com

Digital Fountain of Fremont, CA is a provider of "Meta-Content" technology for Internet content delivery. Fountain Servers generate "Meta-Content" equations that mathematically represent the content, from which an unlimited number of users can reconstruct a copy of the original content. Digital Fountain's "Meta-Content" can reconstruct the original content regardless of order or lost packets. "Meta-Content" is made up of multiple meta-content packets, each of which represents elemental information from the body of content. This allows content owners, service providers, and enterprises to build business models for content delivery, since the cost for delivering rich media can be fixed and independent of audience size.

Digital Fountain can handle a set of overlapping users with the same number of servers. Caching solutions, in combination with Digital Fountain technology, can offer distribution of content. Digital Fountain is designed to offer load reductions as a stand alone high-demand content server. When Digital Fountain servers are used with a multicast or broadcast network, content is served centrally, the architecture for frequently updated content.

PRODUCTS AND SERVICES

Digital Fountain's Fountain Servers allow enterprise businesses and content providers' networks to handle streaming media and downloads, regardless of how large or how popular the content.

Streaming Fountain is a streaming media solution that combines the Internet with broadcast television: on-demand access to video with delivery costs that remain fixed regardless of audience size. Streaming Fountain uses "Meta-Content" technology to allow enterprises, content providers, and content delivery networks to deliver content-rich media via their Intranet or the Internet. This Fountain Server is a streaming solution designed for the multicast of on-demand streaming applications. It lets a number of concurrent users watch the entire content, regardless of when they join the multicast.

Download Fountain distributes large files to either an entire corporate enterprise or a television-scale Internet audience via a single server. Download Fountain uses "Meta-Content" technology to transfer files at higher performance levels. Users can concurrently download large files, especially multi-megabyte files, with reliability exceeding FTP technology. This Fountain Server replaces conventional FTP servers, and delivers content to millions of users using multicast and up to 20,000 users using

unicast in a compact content delivery appliance. It also includes a Web-based application for managing content as well as for reporting on client usage. A Fountain Plug-in is a client software with download-status features, including pause and resume, and with automatic retrieval and installation of updates.

Product:	Download Fountain
Company:	Digital Fountain

Attributes

Operating System:	Windows 98/NT/2000
Computing Platform:	Pentium 166
Price:	start at $40,000.00
Dimensions-rack height:	1 rack unit
Storage Capacity:	32MB RAM
Web server compatibility:	Microsoft Internet Explorer 4.01 or later, Netscape Navigator 4.01 or later
Network Interfaces:	Output: Gigabit Ethernet x 2, 1000 Base-SX multi-mode fiber interface and SC connections
Protocols:	UDP, FTP, and SNMP

Product:	Streaming Fountain
Company:	Digital Fountain

Attributes

Operating System:	Windows 98, NT, 2000
Computing Platform:	Pentium II 400MHz
No. of Simultaneous Streams:	10,000 (near-VHS quality), 4,000(near DVD quality)
Price:	starts at $40,000.00
Dimensions-rack height:	3 rack units
Streaming format types:	MPEG1 or MP3, ASF, WMV, WAV, RealAudio, RealVideo, QuickTime, MOV
Network Interfaces:	Gigabit Ethernet x 2, Gigabit Ethernet x 4, Gigabit Ethernet x 6, 1000 Base-SX Multi-mode Fiber Interface and SC connection

Digital Lava

www.digitallava.com

Digital Lava of Marina Del Rey, CA provides rich media software and services that allow Fortune 1000 companies to create, manage and deliver on-demand business communications. The company's rich media technology integrates video and audio content with text, graphics, animations and Web links. Digital Lava's software and services are used in learning, marketing, communications and e-commerce applications.

PRODUCTS AND SERVICES

Digital Lava Publishing Services partners with the user to develop the best solution for their needs. Their in-house support team will help the user convert existing media assets into a rich media format, and if necessary, create new content.

Production and Technical Services

Production Services provide a way to convert the user's information resources into messages. From slight modification of existing material to the creation of entirely new content, production services also offer project management, video transcription, video encoding, and asset synchronization.

Custom Services offer graphics, video editing and videography, foreign language translation, and interactive content development.

Web Hosting offers support for hosting rich media. Digital Lava can advise and assist the user with in-house or outsourcing needs. In addition, they offer Internet, Intranet or Extranet hosting options.

Consulting Services

Best Strategies Services will help the user develop content strategies for their own communications, from re-purposing existing assets to creating custom content to deployment of the end product, and development of "best practices" guidelines. They can help the user determine the combination of applications and services to help achieve more dynamic and effective communications.
Technical Consulting understands the latest in video and streaming media industry standards. Because of this understanding and how media is deployed, Digital Lava can integrate their solutions within the user's IT environment.

Digital Lava Applications

Digital Lava can transform intellectual capital into a knowledge resource using its rich media technology.

HotFoot and *HotFoot Host for Microsoft PowerPoint*, and *HotFoot Host* are products that combine voice and graphics into an interactive, on-demand browser-based presentation that can be distributed over the Internet.

Publisher is a rich mixed-media publishing application. It allows content producers to publish interactive rich media communications. Publisher allows for the re-purposing of existing media assets and integrates, links, and synchronizes electronic media assets such as video, audio, interactive graphics and PowerPoint slides, into an interactive rich media application.

Product:_____HotFoot
Company:_____Digital Lava

Attributes
*Operating System:*_____Microsoft Windows 95/98/NT
*Computing Platform:*_____Intel Pentium 166Mhz with 32Mb RAM
*Streaming format types:*_____Windows Media Player 6.1

Product:_____Video Visor
Company:_____Digital Lava

Attributes
*Price:*_____$5,000 - $6,000 to digitize, encode, and publish an hour of video, and $150.00 per desktop to license Video Visor Client

Digital Pipe, Inc.
www.digitalpipe.com

Digital Pipe, Inc. of Foster City, CA is a provider of Intranet-based content delivery networks (iCDN) that offers scalable distribution and delivery of streaming video, Web content, and interactive applications over their existing private IP networks. Digital Pipe's technology allows local storage and delivery of streaming media and other bandwidth intensive applications within enterprise communications networks. Digital Pipe offers an outsourced solution called nCORE (Intranet Content Optimization and Replication Engine), that includes the infrastructure, applications, content and services required to build and to maintain an iCDN.

PRODUCTS AND SERVICES

nCORE is the heart of Digital Pipe's content delivery solution. It stands for Intranet Content Optimization and Replication Engine. nCORE combines everything needed to experience streaming media and other bandwidth-intensive applications over the user's corporate network: Infrastructure, Services, Content, and Applications.

Services - Digital Pipe can design the solution, implement it, and manage it. They also provide rich media consulting, content creation and augmentation creative services, and controlled Netcasting for broadcasting timely events.

Content - Digital Pipe works with each client to build a library of materials from a variety of sources including existing corporate content (VHS, CD-ROM, or other media formats), online training and newly created company content.

Applications - iCDNs need software to organize, manage, and deliver content. Digital Pipe has software applications that include learning management systems for content organization and tracking, streaming software for desktop content delivery, content management software for caching and distribution across the network, and Digital Pipe's COREcast technology for content management, distribution, caching, and remote monitoring.

Infrastructure - iCDNs require a platform of specialized servers in addition to the existing IP network for delivery of rich media to every desktop. Digital Pipe configures and installs encoding servers, storage/distribution servers, and caching servers.

e-Media, LLC

Please refer to the Streaming Products - Hardware section.

enScaler, Inc.

www.enscaler.com

enScaler of Sunnyvale, CA is a provider of middleware solutions for infrastructure providers, content providers and enterprises who deliver streaming content and rich media applications. The company's suite of middleware platforms and Web-based applications allows content delivery networks, hosting providers, Web portals, carriers, access providers and enterprises to provision and manage streaming media services and applications. The platforms offer streaming formats, as well as partnered encoding, hosting and content delivery services. enScaler's infrastructure product line serves the needs of multiple provider segments - service providers, access providers, broadband and streaming portals and content peering infrastructures.

mediaScaler is a media management platform to deploy streaming services The platform delivers an integrated suite of services required to upload, host, manage, publish and distribute a company's media assets. The platform includes applications for pay-per-view, ad insertion, interactive and synchronized media and live webcasting.

mediaCommunity is a self-publishing platform targeted at video enabled subscribers with Web cams and capture.

mediaSubscriber is a video-on-demand subscriber platform that includes authentication, gallery, billing and reporting.

mediaPeer and *mediaOperations* offer application-level content and services exchange across peered networks.

Eveo, Inc.

www.eveobiz.com

Eveo, Inc. of San Francisco, CA is a Web video company that provides a solution for creating, aggregating, managing, promoting and distributing original video over the Internet for e-businesses and Web sites with video. The Eveo Video Platform is the company's set of technologies, applications and services. It offers a digital media solution, from content production to streaming.

PRODUCTS AND SERVICES

The *Eveo Video Platform* is a way to create and distribute streaming video and can be deployed to deliver customized streaming video suitable to the user's Web site design, brand or experience. The platform is able to create or locate custom content suitable to the user's needs. Eveo has customizable solutions for various industries looking to use streaming video for various applications.

The Video: If the user has existing videos, Eveo will adapt the user's video to stream on their Web site. If custom video is needed, Eveo offers complete video production services.

The Player: The Eveo Video Player is customized to seamlessly match the look and feel of the user's Web site. Features include: customized links to related subject matter, advertising opportunities (such as banner ads, sponsor/partner logos, and advertisements that roll before or after the featured video), maps (for view of the destinations featured), search functions, and send-a-friend functions (allows customers to recommend subjects of interest to others).

Product:_____Eveo Video Platform
Company:_____Eveo, Inc.

Attributes
*Streaming format types:*_____Windows Media, Real Media, and QuickTime

InfoLibria

www.infolibria.com

InfoLibria of Waltham, MA develops Internet infrastructure solutions that address a range of networking needs. They offer caching and streaming products for various types of content-driven businesses to accelerate and manage the delivery of static and streaming Web content along with minimizing bandwidth expenditures and network bottlenecks. The company's solutions allow service providers, carriers, satellite broadcasters and enterprises to distribute, manage, accelerate and deliver the video and static media required for broadcast applications on the Web. Enterprises can use InfoLibria's technology to allow real-time corporate broadcasts, distance training applications and other strategic communication programs that enhance employee, partner and customer relationships.

PRODUCTS AND SERVICES

Content Commander is a content management subsystem that controls the replication, pre-positioning, authentication and tracking of content. This is InfoLibria's platform for the replication, management and distribution of Web-based objects and streaming audio and video files to the edge of the network. Content Commander manages content on the user's multicast, unicast, or hybrid networks and provides a desired Web and streaming media experience.

MediaMall is a streaming media system that scales to deliver thousands of live and on-demand broadband streams from a single node and supports various media formats, including Windows Media, Real, QuickTime, and MPEG. MediaMall also allows the user to insert tailored multimedia content, such as advertisements, a service that can be sold to sites. The MediaMall solution set includes various applications such as Edgecasting and Live-Edgecasting.

> *Edgecasting* offers performance for streaming media by pre-positioning files close to users, at POPs.
>
> *Live-Edgecasting* builds upon the Edgecasting architecture and adds support for the multicasting of live events.

Dynacache is a performance caching appliance that optimizes bandwidth usage and enhances network performance by storing and delivering HTTP objects from the edge of the Internet. Dynacache offers ftp caching, DNS caching, HTTP streaming, content pre-positioning, content freshness checks,

log file management and report generation, true IP client, and real-time hit forwarding and usage tracking.

Content Operating System (COS) is an open software platform that allows the connection and administration of InfoLibria's infrastructure solutions.

Content Services provide a range of productions and encoding services to transform audio and video into streaming media. Content Services can provide audio and video production planning, video production, video editing, on location production, 2D/3D effects, titling, music, encoding, live encoding for Webcasts, and DVD authoring.

Product:_____Content Commander
Company:_____InfoLibria

Attributes
*Operating System:*_____InfoLibria Content Operating System (COS)
*Price:*_____starts at $14,995
*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____1GB, 512MB System Disks: 36GB SCSI, 18GB SCSI
*Network Interfaces:*_____(2) 10/100

Product:_____Media Mall G-class
Company:_____InfoLibria

Attributes
*Dimensions-rack height:*_____1 rack unit – 3.5 rack units
*Storage Capacity:*_____MediaMall Controller: 36-72GB, MediaEngine: 18GB, MediaStor: 180GB-2TB
*Streaming format types:*_____MediaMall Controller: HTTP streaming, MediaEngine: Microsoft Windows Media, RealNetworks, Apple QuickTime, MediaStor: N/A
Form Factor:_____rack-mountable
*Network Interfaces:*_____MediaMall Controller: Dual 10/100, *MediaEngine:* Dual 10/100 and (1) 10/100/1000, MediaStor: Fibrechannel fabric

Product:_____Media Mall E-Class Systems
Company:_____InfoLibria

Attributes
*Dimensions-rack height:*_____1 rack unit
*Extensibility/modularity:*_____30Mbps to 46bps
*Storage Capacity:*_____36GB (E-100), 54-108GB (E-200)
*Streaming format types:*_____Windows Media, Real, QuickTime, and MPEG
*Form Factor:*_____rack-mountable
*Network Interfaces:*_____(2) 100Base-T Ethernet (E-100), Gigabit Ethernet (E-200)

Product:_____DynaCache
Company:_____InfoLibria

Attributes
*Operating System:*_____Content Operating System (COS)
*Price:*_____DynaCache220I v2.0.5: $24,995.00, DynaCache5: $7500.00, DynaCache10: $15,000.00, DynaCache40: $50,000.00
*Dimensions-rack height:*_____1 rack-unit
*Storage Capacity:*_____512MB or 1GB upgrade, System & Log Disks 20.4GB IDE
*Form Factor:*_____rack-mountable
*Network Interfaces:*_____(2) 10/100 (DynaCache5), Dual 10Base-T/100Base-T (DynaCache30)

Product:_____MediaMall M-class Systems
Company:_____InfoLibria

Attributes
*Dimensions-rack height:*_____1 rack unit Attached Storage (M-300 only): 4 rack units
*Storage Capacity:*_____36GB(M-100), 54-108GB (M-200), 365-730 GB (5-10 drives) Intelligent Storage (SAN) (M-300)
*Streaming format types:*_____Microsoft Windows Media, RealNetworks, Real 8, Apple QuickTime, etc.
*Form Factor:*_____rack-mountable
*Network Interfaces:*_____(2) 100Base-T Ethernet (M-100), Gigabit Ethernet (M-200 & 300)

Inktomi Corporation

www.inktomi.com

Inktomi Corporation of Foster City, CA develops and markets scalable applications for the Internet infrastructure. Inktomi's business is divided into Network Products, comprised of solutions for network caching, content distribution, and media broadcasting; Search Solutions, which include general Web search and related services and enterprise search; and Wireless technologies. Inktomi's solution for CDNs consists of the Traffic Server network cache platform and Content Delivery Suite (CDS) for content distribution and management. Inktomi's software is designed for use by global enterprises, media companies and service providers in the Internet access, backbone, broadband, hosting and content markets.

PRODUCTS AND SERVICES

Content Networking Solutions are comprised of Inktomi Media Products and Inktomi Network Products. They provide an origin-to-edge platform for the distribution, delivery, and management of IP content. The Content Networking Platform provides business solutions for enterprises and service providers, combining content routing, monitoring and management with edge, storage and application capabilities.

Inktomi Media Products provide large-scale, live and on-demand broadcasts with application-level networking. Adaptive content routing allows the products to deliver live streams with reliability and routing around network or node outages. This solution provides bandwidth efficiency and includes support for multiple formats, including audio, video and Internet protocols. On-demand media caching at the edge of the network offers both efficiency and quality of service.

> The Inktomi Media Products solution is based on a *Media Distribution Network* (MDN), dedicated to streaming media that resides on top of an existing IP network infrastructure. The MDN distributes broadcast streams to the edge of the network, where edge servers deliver the audio and video direct to the audience. The solution gathers and delivers information back to the service provider while streams are being sent to the audience. The MDN can determine when and how to thin or reroute traffic to maintain reliability and responsiveness. It also gathers information on audience size, location and behavior. The MDN consists of:
>
> *MediaBridge* - application-level, software-based broadcasting nodes deployed on an existing network

MediaBridge ServerLinks - installed on media servers, they support various media player formats and extend to the edge of the network.

Broadcast Manager - monitors network performance and measures audience statistics.

Inktomi Traffic Server Media-IXT is a streaming media cache that delivers live and on-demand multimedia content. Traffic Server Media-IXT integrates with the Traffic Server network cache, storing audio and video files at the edge of the network, close to end users, and streaming them to users. It is able to serve different streaming formats, as well as all the traditional protocols supported by Traffic Server, from one edge device.

Inktomi Traffic Server C-Class for Service Providers provides scalable performance caching. The Traffic Server C-Class optimizes bandwidth and improves quality of service for end users, while allowing for administration, control and management. The extensible platform supports a range of operating systems and allows the addition of services such as URL filtering, virus protection, user authentication, and content transformation for wireless devices.

Inktomi Traffic Server E-Class for Enterprises optimizes bandwidth and improves quality of service by providing a scalable performance caching solution. Like the C-Class, this server integrates with the Inktomi Content Delivery Suite and Inktomi Media Products, ensuring delivery of content and applications.

Inktomi Content Delivery Suite is a solution for content distribution, delivery and management. The synchronized delivery ensures all qualified users have access to the same information at the same time, worldwide, which improves customer and partner relationships and communications. Real-time monitoring, timely alerts and service reports combined with centralized, real-time collection of site statistics offers information about network traffic and content usage.

Content Distributor Engine is Inktomi's OEM version of the Inktomi Content Delivery Suite. The Content Distributor Engine replicates and synchronizes the delivery of content across network servers and caches, combining content distribution and mirroring with redundancy and fault tolerance. Using agent/manager architecture and a proprietary communications protocol, Inktomi Content Distributor

provides content updates to Web servers and caches over a TCP/IP-based network, and works securely through firewalls.

Content Manager uses Content Delivery Suite Agents located at distributed servers and caches to capture log files and other system statistics and consolidates them in real time in a relational database. The Java-based Content Manager Console provides access to the database and processes the data according to administrator-defined policies, giving customized and relevant views of how content is performing across the network. Content Manager also tracks whether service level requirements are being met, and offers specific actions to be taken if thresholds are being approached.

Media Publisher offers a cataloging, managing and publishing enterprise media content solution. Media Publisher allows enterprises to organize, schedule, personalize and display rich media content through an online catalog of programs organized into customizable channels and categories. This product incorporates features that allow for the creation, administration and instant archiving of live presentations. Additionally, Media Publisher includes Inktomi Search Software, facilitating the search and retrieval of rich media content published online.

Inktomi Traffic Core software is a policy-driven content routing system that manages the flow of Internet Protocol (IP) based traffic as it travels from the core to the edge of the network. The product serves as the nucleus within distributed networks. Based on Inktomi's Application-Level Networking technology, a content-aware transport protocol that creates software routing capability on top of existing hardware routers and switches, Inktomi Traffic Core inter-operates with existing IP networks and improves their efficiency without requiring additional deployment of IP multicast hardware. Traffic Core software transmits only one copy of a piece of content to multiple recipients along with redirecting content around network failures or congestion using the most efficient route. In addition, this product distributes and controls text, graphics, applications, and live and on-demand streaming media to multiple types of delivery vehicles, such as Web, cache, media and application servers.

Inktomi Traffic Edge, based on the Traffic Server network cache platform and Application-Level Networking technology, is designed as a "universal edge node." The product is an edge delivery system that optimizes the distribution of static and streaming content by storing content close to end users. The product works with the Inktomi Traffic Core software to offer consistent content delivery. This software, compatible with server hardware and other end-user devices, also provides authentication control to manage access to

streaming content through LDAP and content filtering technology. In addition, it can support value-added service plug-ins such as content transformation, filtering and virus checking.

Inktomi Traffic Controller software integrates with Inktomi Traffic Core and Traffic Edge products to deliver a network management solution. It provides control and visibility of content, bandwidth and usage data through a graphical interface. Based on Application-Level Networking technology, Inktomi Traffic Controller software aggregates network performance and usage information of Web servers, media servers and caches to provide real-time monitoring and management of network characteristics and performance. This software also provides audience-viewing metrics for measuring content usage as well as fulfilling regulatory compliance procedures.

Product:_____Inktomi Content Delivery Suite
Company:_____Inktomi

Attributes
*Operating System:*_____Windows NT 4.0, Windows 2000, Linux (common variant such as RedHat), Solaris, Unix, Free BSD, SGI Irix, HP-UX
*Computing Platform:*_____Inktomi Traffic Server
*Price:*_____$50,000 for Content Manager per Machine; $50,000 for Content Distributor per machine; Agents $4,000 per CPU
*Web server compatibility:*_____Microsoft IIS, Apache, iPlanet
*Database Compatibility:*_____Oracle Enterprise DBMS 8.0, 8.1, 8.1.5, SQL Server ODBC Driver 7.0, MS SQL Server 11.9.2

Product:_____Inktomi Traffic Server C-class
Company:_____Inktomi

Attributes
*Operating System:*_____Windows NT 4.0, Linux (common variant such as RedHat), Solaris, Unix, Free BSD, SGI Irix, HP-UX
*Price:*_____$24,000 per CPU
*Network Interfaces:*_____100MB Ethernet or Gigabit Ethernet
*Protocols:*_____HTTP 1.0 and 1.1, FTP, NNTP

Product:_____Traffic Server Media-IXT
Company:_____Inktomi

Attributes
*Operating System:*_____Sun Solaris, Linux, Windows 2000, Hewlett Packard HP-UX
*Computing Platform:*_____Inktomi Traffic Server
*Streaming format types:*_____RealNetworks RTSP/PNA, Microsoft Windows Media WMT, Apple QuickTime Passthrough Proxy
*Network Interfaces:*_____100MB Ethernet or Gigabit Ethernet
*Protocols:*_____HTTP 1.0 and 1.1, FTP, NNTP

Product:	Traffic Server E-class
Company:	Inktomi

Attributes

Operating System:	Windows NT 4.0, Linux (common variant such as Redhat), Solaris, Unix, Free BSD, SGI Irix, Hewlett Packard HP-UX
Price:	$17,000 per CPU
Web server compatibility:	Microsoft IIS, Apache, iPlanet
Network Interfaces:	100MB Ethernet or Gigabit Ethernet
Protocols:	HTTP 1.0 and 1.1, FTP, NNTP

Kasenna, Inc.

www.kasenna.com

Kasenna of Mountain View, CA provides streaming media ventures with the software foundation to build video delivery infrastructures. Kasenna develops infrastructure software for the delivery and management of on-demand and live streaming video over wire-line and wireless networks. Kasenna's technology is a platform that provides a foundation for the video delivery process. It is a modular set of integrated functions core to the video delivery process: video content management, video content distribution, and streaming delivery and commerce. Elements of Kasenna's software technology include:

Video Content Management and Metadata - content management capabilities provide control over acquiring, securing and managing content. It then distributes that content to various points and delivers it to end users connected through various networks. Metadata is the descriptive information of a media file such as format, bit rate, frame rate, location of the content, copyright, and author. This information is stored in the relational database bundled with Kasenna platforms and provides the intelligence needed for video content management and video content distribution.

Video Content Distribution (VCD) - content distribution is a function impacting video and commerce capabilities. The Kasenna VCD architecture provides the functionality for distributed, edge serving architectures which bypass the video-degrading congestion on the Internet. It also solves the problems in content distribution techniques, the costs of broadband video storage, latency and asset control.

Commerce-enablement - Kasenna's platform for broadband video. The software contains commerce capabilities through its Authorization, Authentication and Accounting API's that allow functions such as billing and accounting.

Multiple Network, Multiple Client Support - Kasenna's technology provides a common infrastructure for video delivery over multiple wire-line (broadband, cable, etc) and wireless (2G, 3G) networks to a variety of clients such as PCs, set-top boxes and mobile devices.

PRODUCTS AND SERVICES

MediaBase is software for video content delivery with integrated modules for video content management, video content distribution, streaming and commerce. The Enterprise Edition forms the video delivery foundation for

standard centralized enterprise applications. The Network Edition provides the content distribution capabilities to extend deployments into distributed environments so enterprises can serve multiple locations. The Network Edition product can also provide network service providers with the core software to build the video delivery infrastructure for content delivery networks.

Kasenna provides software technology for a number of streaming media applications: video-on-demand; interactive television media archive and browse; learning-on-demand; corporate communications; and adding streaming media services to existing xDSL, cable, satellite, and private networks.

Product:	Kasenna MediaBase Network Edition
Company:	Kasenna
Attributes	
Operating System:	SGI:IRIX 6.5.10,Linux: RedHat 7.0, Sun Solaris: 8.0
No. of Simultaneous Streams:	no limits on number of streams available
Streaming format types:	MPEG-1, MPEG-2, MPEG-4(coming soon), MP3, QuickTime, RealVideo and RealAudio (using G2 server), Windows Media (using Windows Media Server on NT)
Web server compatibility:	Apache, iPlanet(coming soon)
Network Interfaces:	IP (10Base-T to Gigabit Ethernet), ATM (IRIX and Solaris)
Database Compatibility:	Bundled Informix database, support for external Oracle databases
Protocols:	Streaming Control: RTSP, CORBA Streaming Data: UDP/IP, RTP/UDP/IP, ATM (IRIX)

Product:	Kasenna MediaBase Enterprise Edition
Company:	Kasenna, Inc.
Attributes	
Operating System:	SGI:IRIX 6.5.10, Linux: RedHat 7.0, Solaris 7 & 8
Streaming format types:	MPEG-1, MPEG-2, MP3, QuickTime, RealVideo & RealAudio using G2 server, Windows Media using Windows Media Server on NT (IRIX), MPEG-4 (coming soon)
Web server compatibility:	Apache, iPlanet (Linux & Solaris)
Network Interfaces:	IP (10Base-T to Gigabit Ethernet), ATM (IRIX & Solaris)
Database Compatibility:	Bundled Informix database, support for external Oracle databases
Protocols:	RTSP, CORBA Compliant

Media 100, Inc.
www.media100.com

Media 100, Inc. of Marlboro, MA is a provider of digital media software and systems for creating and delivering video and audio on the Internet, DVD, CD-ROM and broadcast media. Media 100's digital media solutions Digital Media Workflow model help users to create interactive digital media content for broad distribution. Media 100 concentrates on the development of software and systems for the delivery of video for digital broadcast, DVD, and Internet based streaming media.

PRODUCTS AND SERVICES

iFinish 4 is a Windows-based system designed for the demands of interactive media production as well as traditional broadcast. Video and Web professionals can produce interactive streaming content in various streaming formats; MPEG-1 and MPEG-2 for CD-ROM and DVD production; and video for traditional broadcast and videotape distribution. With iFinish 4 and EventStream technology, the user can author interactive commands into video directly from within the editing environment. Add URL flips, animated "hot spots," or trigger other Web events like Flash or Shockwave animations or JavaScripts from within the editing environment.

iFinish 4 DVD Edition combines the creative features and processing power of iFinish 4 with real-time MPEG-2 encoding, real-time MPEG diagnostics and preview, and a complete DVD authoring environment within a self-contained workflow. iFinish 4 DVD Edition offers monitoring and preview tools so the user can see the results during the encoding process.

iFinish 4 PowerGrade System Series are turnkey systems for digital video, streaming, DVD and broadcast production.

Media 100i offers video quality, which means uncompressed quality without uncompressed storage costs. Because any image that the user creates or shoots has many identical pixels, Media 100 has engineered algorithms that compress and store these pixels, which then rebuild the video images as they originally appeared with less space than storing uncompressed images. With Media 100i, the user can create *interactive* streaming video as the core content. As the video plays, Media 100i has the ability to synchronize other events on a Web page, such as opening URLs, triggering text and graphics, launching animations and more. Media 100i is a system that offers the power to create video, author interactivity into it, compress it for any streaming format, and build a Web site around it.

Media 100 also offers the *Media 100 RFE* which is a remote field editor that is a full streaming media production system in a compact package.

Media 100 *CineStream* offers interactive dynamic media in various formats such as Windows Media, Real or QuickTime. Using streaming technology from Media 100's video production system, this software-based authoring tool is built on Media 100's Streaming Media Workflow model, which allows video content to leverage the interactive nature of the Web. EventStream technology allows you to insert interactive commands into video directly from the timeline. Streaming media files can contain "Buy Me!" links, URL flips or user directed branching of video clips.

Cleaner 5 is a camera-to-Web streaming solution. Cleaner 5 captures, authors, encodes and publishes streaming media in various formats such as QuickTime, Real, or Windows Media at various connection speeds. Cleaner 5's EventStream authoring allows the user to add stream navigation, synchronize HTML to streaming media, and embed "Buy Me!" links and interactive hot spots. The built-in StreamPublisher technology allows the user to publish finished projects directly to a streaming server.

StreamRiver Networks is Media 100's streaming media services division. They provide encoding (audio and video compression) and hosting (delivery) services for Internet broadcasters, Web designers and digital media content creators. StreamRiver Networks leverages Media 100's streaming tools and technology to provide streaming services through affiliate service centers in media centers worldwide. StreamRiver has developed image and audio processing expertise and a proprietary encoding operation to support encoding in any streaming media format. It also leverages Media 100 and iFinish streaming media production systems for digitizing and manipulating source material.

Product:	CineStream
Company:	Media100, Inc.

Attributes

Operating System:	Windows 98/ME/2000. OHCI 1394 interface for video capture/playback requires Windows 98 Second Edition or Windows 2000. MAC: MAC OS 8.6 or later
Computing Platform:	Pentium II Processor
Price:	CineStream3 (Win software): $499.00, CineStream3 (MAC software): $499.00, CineStream3 (w/1394, Windows): $599.00
Storage Capacity:	MAC: 128MB RAM, Windows: 128MB RAM

Product:_____Cleaner5
Company:_____Media100, Inc.

Attributes
*Operating System:*_____Windows 98/NT4.0/2000. OHCI 1394 interface for video capture/playback requires Windows 98SE/2000, MAC: Mac OS 8.6 and later
*Price:*_____$599.00 upgrade: $179.00
*Storage Capacity:*_____Mac: 64MB Windows95/98: 64MB WindowsNT/2000: 96MB
*Streaming format types:*_____QuickTime, RealSystem, Windows Media, MP3, MPEG-1, and MPEG-2

Product:_____Ifinish4
Company:_____Media100, Inc.

Attributes
*Operating System:*_____Microsoft Windows 2000
*Computing Platform:*_____Intel
*Price:*_____Ifinish Powergrade DV: $5,995.00, Ifinish Powergrade Streaming Edition: $8,995.00, Ifinish Powergrade DVD Edition: $16,995.00, Ifinish Powergrade Broadcast Edition: $18,995.00, Ifinish V20 DV: $2,995.00, Ifinish V40: $4,995.00, Ifinish V60: $6,490.00, Ifinish V80: $14,995
*Streaming format types:*_____MPEG-1, MPEG-2, and M-JPEG

Product:_____Media100 I
Company:_____Media100, Inc.

Attributes
*Operating System:*_____Mac OS 9.0x
*Computing Platform:*_____Macintosh CPU
*Price:*_____Media100/I/le w/DV: $2,995.00, Media 100 I/lLx: $5,995.00, Media 100 I/Lx w/Lossless: $9,995.00, Media100 I/Lx w/DV: $7,490.00, Media 100 I/Lx-DV w/Lossless: $11,490.00, Media 100 I/xs: $9,995.00, Media 100I/xr: $17,995.00
*Storage Capacity:*_____256MB RAM
*Streaming format types:*_____QuickTime, Real, Windows Media, Sorenson Video, Cinepak, MPEG-1, MPEG-2, MPEG-4

Microsoft Corporation

www.microsoft.com/ windows/windowsmedia/

Microsoft Corporation of Redmond, WA is a provider of software, services and Internet technologies for personal and business computing. The Windows Media Technologies Group of Microsoft offers Windows Media, a digital media platform, which provides audio and video to consumers, content providers, solution providers, software developers and corporations. Windows Media offers an integrated rights-management solution and a scalable streaming technology. Windows Media Technologies includes Windows Media Player for consumers, Windows Media Services for servers, Windows Media Tools for content creation, and the Windows Media Software Development Kit for software and hardware developers. Some applications of communicating with streaming media include delivery of corporate-wide e-broadcasts, on-demand learning, corporate communications, e-learning, and promotion and advertising.

PRODUCTS AND SERVICES

Windows Media Technologies 7 is Microsoft's streaming media technology. This technology offers enterprises a way to communicate with employees, partners, and customers. Enterprises can offer a rich media experience, which makes possible corporate communications, e-learning, and sales/marketing. Windows Media Technologies 7 includes a codec, called Windows Media Screen 7. This codec allows screen activity, such as that found in training programs, helpdesk support, and software demos, to be captured and streamed at dial-up bit rates, with resolution and detail.

Windows Media Player delivers a consumer digital media experience for users to find, organize, and play their digital media.

Windows Media Format is a secure format for film, television, computer, and CD-sourced digital media content.

Windows Media Encoder is a professional production tool for converting both live and prerecorded audio, video, and computer screen images into the Windows Media Format for live and on-demand delivery.

Windows Media Rights Manager is a digital rights management system that offers content providers and retailers a platform for the secure distribution of digital media content.

Windows Media SDK consists of a family of components that allow product vendors, content developers, and systems administrators to make their applications and Web sites secure and Windows Media-compatible.

Windows Media Services running on a Microsoft Windows 2000 Server is a scalable server for distributing digital media files in the enterprise and on the Internet.

Product:_____Windows Media Player 7.1
Company:_____Microsoft Corporation

Attributes
*Operating System:*_____Microsoft Windows98SE/2000Professional/ME
*Computing Platform:*_____Pentium or AMD Athlon K6 266MHz processor of faster
*Price:*_____Downloadable for free
*Storage Capacity:*_____64MB RAM

RealNetworks, Inc.

www.realnetworks.com

RealNetworks of Seattle, WA is a provider of media delivery products and services on the Internet. It develops and markets software products and services designed to allow users of personal computers and other consumer electronic devices to send and receive audio, video and other multimedia services using the Web. With RealSystem iQ, featuring Neuralcast Technology, RealNetworks can deliver digital media experiences to consumers—including Internet audio and video available on various platforms.

PRODUCTS AND SERVICES

Content creation tools from RealNetworks and their partners allow the user to convert existing media (VHS tapes, live feeds, .avi files, digital photos, etc.) into streaming media files for live events or on-demand content for the Internet or corporate Intranets. RealNetworks products include RealSystem Producer Plus, RealSlideShow Plus, and RealPresenter Plus along with special bundle packaged solutions.

RealSystem iQ is a digital media delivery system, provides scalable solutions for broadcasters, enterprises, ISPs and content-delivery networks. They offer products such as RealSystem Server 8 and RealSystem Proxy 8.

> *RealSystem Server 8 Basic* is a free, 1-year standards-based digital media server that delivers choreographed multimedia presentations (RealAudio 8, RealVideo 8, Flash animation, images, slides, and streaming text) over the Internet or corporate intranets to up to 25 simultaneous users. This server will allow the user to start streaming audio, video, and rich media to their audience.
>
> *RealSystem Server 8 Plus* is a standards-based digital media server that streams audio, video, and rich media on the Internet and Intranet. RealSystem Server Plus supports over 45 media types including RealVideo 8 with VHS-quality for broadband viewers, RealAudio 8 with CD-quality at 64 Kbps, streaming MP3 and streaming Flash 4 animations.
>
> *RealSystem Server 8 Intranet* offers two versions: the RealSystem Server Intranet 500 with Authentication and the RealSystem Server Intranet 200. The *Intranet 500* allows the user to deliver audio or video to up to 500 simultaneous users, without affecting other network functions. This solution includes unlimited distribution of the

RealPlayer Intranet, a player designed for corporate deployments. The Authentication Extension lets the user offer file-by-file security on media assets while monitoring who has accessed which assets. The *Intranet 200* is similar to the Intranet 500. It allows the user to deliver audio or video to up to 200 simultaneous users, without affecting other network functions. This solution also includes unlimited distribution of the RealPlayer Intranet.

RealSystem Server 8 Professional offers three types of solutions: the Standard Professional, the Professional Webcasting, and Professional Infrastructure. The *Standard Professional Solution* starts with a 100-stream RealSystem Server Professional, RealProducer Plus and RealPresenter Plus content authoring tools. It also adds 12 months of upgrades and support along with a video-capture card. This combination is designed for further growth allowing the user to buy more capacity as needed, along with business-building extensions for Authentication and Advertising. The *Professional Webcasting Solution* combines a 400-stream RealSystem Server Professional with the Authentication Extension, Advertising Extension and 12 months of upgrades and support. This streaming that supports up to 400 simultaneous users and pay-per-view business models, and lets the user offer in-stream advertising. The *Professional Infrastructure Solution* offers RealSystem Server Professional as a distributed, self-aware network that bypasses bandwidth constraints in the network. This solution gives the user flexibility in deployment to reach a large audience and meets the demands of content delivery networks and hosting providers.

RealSystem Proxy 8 is a secure streaming media proxy cache that provides ISPs and enterprises the ability to reduce bandwidth requirements for content entering their networks. Proxy 8 improves content management by respecting content rights through a server-to-proxy authentication process, securely storing cached content and splitting live feeds, and providing management of resources at any point on the network.

Product:_____Osprey-100
Company:_____RealNetworks

Attributes
*Operating System:*_____Windows95/NT4.0&5.0
*Computing Platform:*_____Pentium Processor
*Price:*_____$199.00
*Warranty:*_____30-day money-back guarantee

Product:_____RealSystem Producer Plus

Company:_____RealNetworks

Attributes

*Operating System:*_____Windows95/98/ME/NT4.0, MAC 8.6 &9.0, Linux 2.2x w/ glibc 2.1, Linux 2.2x w/glibc 2.1, Solaris 2.7 and Solaris 8

*Computing Platform:*_____Pentium200, Pentium III, PowerPC, G4 400 MHz or faster, Ultra5, Ultra60

*Price:*_____$199.95

*Storage Capacity:*_____32 MB RAM-256 MB RAM

Warranty:_____30-day money back guarantee

Reliacast

www.reliacast.com

Reliacast, Inc. of Herndon, VA is a provider of audience management solutions that make streaming media economically viable. Their audience measurement, management and control technologies allow a range of webcasting services. With Reliacast, providers are able to authenticate, identify and classify end users, measure users' experience and interaction throughout an event, and audit and align value-added business and billing models with the delivery of value-added services. With Reliacast, unicast and multicast streams can be monetized into revenue streams. The user can scale events to large audiences, collect detailed audience demographics, measure and report data flow for billing purposes before, during and after the Webcast event. Reliacast offers software solutions that gives network providers, content deliverers and enterprises the ability to know and manage who is watching streamed live, on-demand and channel programming. Reliacast helps manage the delivery of content through end user registration, identification, authentication, measurement and reporting.

PRODUCTS AND SERVICES

The *Reliacast Solution* consists of the ReliaServer, Net Agent, the Virtual Turnstile, and R-Ticket software components. These components reside in the service providers' network, linking and processing event interaction from the end-user to the content provider through the network. Both the service and content providers have live views of event data.

> The *ReliaServer* software is a multi-tiered Web-based application used to control the entire Net Agent network. The first tier, the Event Console component, is a Java-enabled Web browser that lets the user view and manage all Reliacast events held on the network, displays end user data, provides information on the health of the Net Agent network, allocates R-Tickets to Content Providers, and creates reports. The remaining tiers are collectively referred to as the ReliaServer, which runs on a Solaris platform in the network where the application or the live event is delivered. These tiers consist of the enterprise class Web server, the application server (functions as the core business and transaction processing system), and the transaction machine (interfaces the Net Agent network via the Live Event Audit Protocol - LEAP)
>
> *Net Agent* software is installed on servers located at the edge or POPs in a network and act as conduits between the ReliaServer and the end users. Each Net Agent uses LEAP to communicate with the end user's

Virtual Turnstile, other Net Agents, and the ReliaServer. The Net Agent's functions are to support the Virtual Turnstile in authentication, measurement and control of end users for a Reliacast event, to gather and log data on end users, and to forward event and end user information to the ReliaServer.

The *Virtual Turnstile* and *R-Ticket* are software components required by the end user to access a Reliacast event. R-Ticket is an encrypted software license used to identify each end user for access to a specific event. These components are available to the end user as a part of selecting and registering for an event via the content provider's Web site. The Virtual Turnstile is a Web based agent that runs on the end user's PC. It initially, checks for minimum software requirements such as the correct runtime environment or media player and then forwards the end user to the appropriate location to upgrade their software if needed or allows them to register for the Event. After the end user receives an R-Ticket, the Turnstile connects with the closest Net Agent to determine if the end user can view the Reliacast event over the Internet or Intranet.

LEAP (*Live Event Access Protocol*) is a control level protocol that runs on Reliacast components to provide auto configuration as well as monitoring of traffic and network components. LEAP also facilitates communication between the Turnstiles, Net Agents, and the ReliaServer.

StreamCenter

www.streamcenter.com

StreamCenter of Murray Hill, NJ creates technology for the delivery and control of streaming audio and video over shared IP networks. StreamCenter offers a streaming Quality of Service solution and viewer-experience reporting & diagnosis tools. The solutions are designed for the enterprise, network infrastructure providers and service providers that offer streaming. StreamCenter is offering a content delivery approach that is addressing congestion problems beyond-the-edge, which is from the edge to the viewer. Streamcenter feels the “beyond-the-edge” or “last-mile” is an area of streaming congestion. StreamCenter is focused on creating delivery solutions to offer accountable stream delivery without expensive private bandwidth provisioning and infrastructure.

PRODUCTS AND SERVICES

InCompass Quality offers streaming delivery beyond the edge to the viewer. Underlying this product is InCompass, StreamCenter's platform that uses intelligence to address congestion and delivery problems on any shared IP network. InCompass Quality is deployed as a software overlay to existing network infrastructure, and works with streaming media players. InCompass Quality uses traffic control algorithms and network models to manage stream delivery through congestion. InCompass Quality provides Content Delivery Networks (CDNs) and Internet service providers (ISPs) with a Quality of Service (QoS) software overlay.

InCompass Reporter is a service that complements the InCompass Quality product with historical performance and usage metrics of viewer experience. InCompass Reporter tracks the actual service level by measuring delivery at the endpoint, on the viewer desktop. InCompass Reporter provides viewer experience and network congestion measurement and analysis to customers.

InCompass Quality and InCompass Reporter are built on the *InCompass stream delivery platform*, which integrates network congestion models, real-time measurement, diagnosis, and response systems to provide stream management capabilities. The InCompass platform and solution suite provides source-to-viewer stream delivery and endpoint verification of delivery. StreamCenter customers can differentiate their services by extending Service Level Agreements beyond their networks to the viewer location.
(Note: Streamcenter provides Quality of Service Reporting on Streaming)

Product:_____InCompass Reporter
Company:_____StreamCenter

Attributes
*Computing Platform:*_____InCompass Stream Delivery Platform

Product:_____InCompass Solutions
Company:_____StreamCenter

Attributes
*No. of Simultaneous Streams:*__10,000
*Price:*_____$50,000 + annual maintenance fee

Streaming21, Inc.

www.streaming21.com

Streaming 21 of Los Gatos, CA is a provider of scalable streaming technology and platform solutions for the broadband market. It develops video-streaming technologies that allow broadband and Internet service providers to deliver video and audio over the Internet. Their software offers content broadcasting, Web delivery, and video-on-demand, while providing tracking, billing, and managing transactions.

PRODUCTS AND SERVICES

Media Server handles standard media formats, provides Java-based remote management, offers access to distributed video warehouses, supports up to 300 simultaneous streams per server, and offers load balancing between multiple servers, network cards, and processors.

Media Caster offers scalable, fault tolerant, integrated scheduled and live video streaming. It also offers a Web based remote and local management console and a scheduling system with multi-channel program guides.

Media Emailer creates two-way video mail communications that can be streamed from Media Server to individual recipients. This product offers personalized email advertisements to viewers based on specific profiles. From a personal greeting to a videoconference, Media Emailer facilitates group collaborations.

Product:	MediaCaster
Company:	Streaming21, Inc.

Attributes

Operating System:	Microsoft Windows NT server 4.0 SP3 or later, Microsoft NetShow 3.0 or later, Java 1.2 environment for remote administration
Computing Platform:	Pentium II 400 MHz or up
Storage Capacity:	128MB RAM or more
Streaming format types:	MPEG-1 &2, ASF, MP3
Network Interfaces:	100 Ethernet, Gigabit Ethernet, and ATM
Protocols:	HTTP, RTP, RTSP, and IP

Product:_____Media Server
Company:_____Streaming21, Inc.

Attributes
*Operating System:*_____Microsoft Windows NT4.0 SP3 or later
*Computing Platform:*_____Pentium 200 MHz MMX or up
*No. of Simultaneous Streams:*__300 simultaneous streams per server
*Price:*_____Downloadable for free
*Storage Capacity:*_____128MB RAM or more
*Transcoding support:*_____bit rate, per bandwidth connection: 28.8Kbps to 16 Mbps
*Streaming format types:*_____MPEG-1, MPEG-2, MP3, ASF, and VCD
*Network Interfaces:*_____100 Ethernet, Gigabit Ethernet, and ATM
*Protocols:*_____HTTP, RTP, RTSP, IP, and DAT

Product:_____MP3 Server
Company:_____Streaming21, Inc.

Attributes
*Operating System:*_____Windows NT Server 4.0 SP3 or later, Microsoft NetShow 3.0 or later, Java 1.2 environment for remote administration
*Computing Platform:*_____Pentium 200 MHz MMX or up
*No. of Simultaneous Streams:*__1500 simultaneous CD quality MP3 streams per server
*Price:*_____Download for free
*Storage Capacity:*_____128 MB RAM or more
Transcoding support (bit rate, per bandwidth connection):
32Kbps to 320 Kbps
*Streaming format types:*_____MP3
*Network Interfaces:*_____100 Ethernet, Gigabit Ethernet, and ATM
*Protocols:*_____HTTP, RTP, RTSP, and IP

Product:_____S21 Streaming Player
Company:_____Streaming21, Inc.

Attributes
*Operating System:*_____Microsoft Windows 98, 2000 or NT 4.0
*Computing Platform:*_____Pentium 166 MHz MMX or up
*Price:*_____Download for free
*Storage Capacity:*_____32MB RAM or more
*Streaming format types:*_____MPEG-1, MPEG-2, MP3, ASF, AVI, and VCD (DAT)
*Protocols:*_____ HTTP, RTP, RTSP, and IP

Vbrick

Please refer to the Streaming Products - Hardware section.

XOsoft, Inc.

www.xosoft.com

XOsoft of Somerset, NJ offers a solution for delivering complex content using incremental update technology, real-time mirrors and caches. Incremental updates send only the changes within an individual Web page instead of the entire page, solving the problem of cache validation. This allows for rapid delivery of complex content in less time and with less infrastructure. XOsoft also provides monitoring and service management capabilities. As a result, XOsoft's solution combines technology and quality service for a user-optimized Web experience. Its modular solutions are scalable and designed to integrate with carrier-grade networks. XOsoft accelerates content delivery from clone servers deployed at the peripheral "edges" of the Internet. Using globally deployed servers and local caches, XOsoft delivers both dynamic and static content, and Web sites are updated in real-time.

PRODUCTS AND SERVICES

XOsoft invented incremental cache updates methodology for content delivery solutions. XOsoft has created a model for content delivery, one that uses existing networks more intelligently and efficiently. XOsoft works on any network of any size, for all types of content, providing performance whether on a wireless network, a wireline network, carrier, storage, VPN or a company LAN. XOsoft is network independent. Beyond the patented incremental update technology, XOsoft relies on real-time mirrors and caches along with intelligent monitoring, routing and redirection. XOsoft also provides monitoring and service management capabilities allowing them to collect demographic information about site usage. XOsoft's content replication/synchronization solution is designed to ensure every user, regardless of location, is viewing the latest content at the same time. Through XOsoft's network independent software, and traffic routing, the integrity of the content is preserved.

Streaming Products - Software - Webcasting

SeeItFirst, Inc.
www.seeitfirst.com

SeeItFirst, Inc. of Fremont, CA is a provider of interactive streaming media solutions and services. They deliver timely and entertaining content while increasing revenue opportunities and cost savings for content owners. The company offers products and services to yield video-on-demand and Webcasts derived from a Web-based, interactive streaming platform. This interactivity offers ways to create and deploy enhanced content, and convey information. The company offers licensed products, professional services and fully outsourced solutions for interactive video-on-demand and interactive Webcasts. Their SIFstream Interactivity Platform allows any content owner to use an online authoring environment to create interactive streaming media applications by synchronizing live or stored video with any Web content. Users of media players can control the video and stop at any point to interact with higher resolution views, as well as transact with information, e-commerce and e-business objects that correspond frame-by-frame to the video content.

PRODUCTS AND SERVICES
SeeItFirst Live! is an online Webcast production solution that facilitates a producer's ability to complement live video with dynamic content such as Web graphics, related links, and online applications. The user can author, publish and deploy Webcasts that yield dynamic and interactive content for promotion, e-commerce, e-learning and entertainment purposes.

SeeItFirst GLIDELive is a real-time interactive Webcast production tool that allows producers the ability to synchronize Webcast content to live and pre-defined e-commerce, e-business and information content as the Webcast is being served. This allows content owners to supplement their Webcast event by presenting information and transaction content (such as advertising, presentation slides, etc.) "in context" to the live event. Interactivity can be implemented regardless of what vendor is hosting or serving the live video stream and what media player is being employed. The system also supports syndication rules to allow multiple Web sites to use the same live video stream but customize the interactivity for their viewers.

SeeItFirst STEPLive is an optional software solution which provides 'on-the-fly' encoding and indexing of live video content for Internet distribution to media players, and at the same time, captures the live session for subsequent

video on-demand applications and the serving of still images from the Webcast.

SeeItFirst Now! is an online solution that facilitates content owners ability to encode, author, publish, update and deploy streaming videos and the associated interactive content for promotion, e-commerce, e-learning and entertainment purposes. Content owners, regardless of Web and video proficiency, can enrich the viewing experience using SIFstream technology to synchronize Web assets to video content and to serve images from the video content during a streaming session.

SeeItFirst GLIDENow! offers an online authoring environment to couple information and Web links within frames surrounding the video content. This allows the user to enjoy a requested video that has branding, communication, personalization and transaction opportunities built-in and presented during optimal times in a streaming session.

SeeItFirst STEPNow! is an optional software solution that automates indexing and encoding video content for Internet distribution to media players and allows interactivity. This suite makes it possible for content administrators to establish publishing rules supporting Microsoft and RealNetworks platforms to streamline the production process. This allows video content to be requested "on-demand" and served over the Internet.

SeeItFirst StreamCD! is a complement to SeeItFirst Now! It allows content owners to create an interactive streaming media session on a CD-ROM. Once an interactive video-on-demand project has been published within SeeItFirst Now!, the utility allows the account owner to select a project to be ported to a playable CD-ROM. The system obtains and downloads the Web pages, images and other content that had been synchronized to the streaming video.

SeeItFirst StreamPPT! is a complement to SeeItFirst Now! and SeeItFirst Live! It streamlines the process of transporting PowerPoint presentation slides into an interactive streaming media session. Once an interactive video-on-demand project has been published within SeeItFirst Now!, the utility allows the account owner to select a PowerPoint presentation to be ported and inserted as a JPEG or GIF file content to be synchronized to the live or archived streaming video.

SeeItFirst Professional Services group can tailor SeeItFirst products and services to meet the user's requirements, and in a modular or in a comprehensive structure as appropriate. SeeItFirst offers services in all aspects of the streaming video process including both live and archived video content creation, post production, management, capturing, encoding, hosting,

serving, reporting, interactivity, creative, training, installation, customization and consulting. SeeItFirst also offers pre-packaged, turnkey solutions for deployment of video streaming applications such as e-learning, event Webcasting, direct video e-mail, corporate policy guides, customer service and online content channels.

Product:_____SeeItFirst Live!
Company:_____SeeItFirst

Attributes
*Streaming format types:*_____Microsoft, RealNetwork

Streaming Products - Software - Peer-to-Peer

eMikolo Networks
www.emikolo.com

eMikolo Networks of New York, NY is a startup developing Internet infrastructure software built upon its collaborative technology platform. It is a provider of Intelligent Distribution Network (IDN) technology that accelerates content distribution and improves content delivery performance. Its Demand Driven Access (DDA) technology leverages five technologies: content distribution and management, content routing, edge detection, peer-to-peer, and caching. The DDA offers a solution that relieves the load on a network infrastructure's Web servers.

PRODUCT
Demand Driven Access is an appliance that plugs into an IP-based network. This appliance creates a scalable network by distributing a "thin agent" to all users. The DDA then creates a Common Object List (COL) that contains the largest, most frequently requested Web objects to be delivered over the network. This configurable list ensures that Web based content (static, dynamic, and/or streaming) is delivered to provide highly available services.

The COL serves as the data source for *Edge Detection*, a patent-pending technology that determines the best route for content to travel at any given moment. Edge Detection maps current Internet users, and creates transient content caches at the end user level. This method provides distribution of updated, local content closer to the end user.

Weema Technologies

www.weema.com

Weema of Cambridge, MA develops streaming media technologies for the creation, delivery, and storage of audio and video over the Internet. Weema's proprietary streaming media technology allows media broadcasters and corporate users to conduct audio and video Webcasts. The Weema infrastructure is a distributed, peer-to-peer network made up of intelligent nodes. Weema has developed three generic applications to support live broadcasting, distance education and view-on-demand. Weema intends to publish and support a simple Application Program Interface that will allow any Web developer to create their own streaming applications, with access to the Weema network. Weema Technologies has developed streaming media software, for deployment onto any combination of servers, storage devices, or cache devices to create a scalable streaming media network. Streaming content creators (broadcasters) can connect to this network through a Web browser and begin broadcasting video and audio.

PRODUCTS AND SERVICES

Live streaming server - Weema's symmetric server architecture creates a "many-to-many" streaming media broadcast network. The server can serve hundreds of thousands of simultaneous broadcasters and viewers. It supports multiple streaming media formats, both live and on-demand, on a single server. It handles large numbers of simultaneous incoming and outgoing streams and continues operations during periods of rapid connections and disconnections. It also allows live broadcasting and viewing through a Web browser, without the need for additional specialized software.

Weema's *Network Management System* is built for scalability and low operating costs. Automatic bandwidth provisioning allows a telephone-like network, eliminating the need to reconfigure for each streaming media event. The system allows low ongoing operating costs through resource allocation, self-optimization routines, load balancing, and assimilation of new broadcast nodes.

Weema Application Wizards handle the steps involved in encoding and uploading files. Weema Wizards also guide broadcasters through the process of creating and conducting a live broadcast or training session. Applications can be used for broadcasting live events, distance learning, sales presentations, corporate communications, and personal profiles.

Product:_____Enterprise WebCasting Suite
Company:_____Weema Technologies

Attributes
*Operating System:*_____Windows 98/NT/2000

Product:_____Streaming Delivery Suite
Company:_____Weema

Attributes
Streaming format types:_____Windows Media, Real, QuickTime, and Shoutcast

Streaming Services

3 CX, Inc.
www.3cx.com

3CX of San Jose, CA is a rich-content (rc) delivery company whose core competencies include broadband streaming and synchronized rich-content technology. 3CX has developed the UNIVO platform as a foundation for Internet rich-content delivery services. UNIVO is a combination of 3CX's broadband streaming and rich-content synchronization technologies combined with RichNet, a delivery network designed to accelerate the performance of rich-content and high-traffic Web sites. 3CX furnishes the customer with the equipment to deploy streaming media and rich-content solutions. 3CX delivery platform delivers broadband rich-content globally to support a large number of geographically distributed users and allow them to access rich-content with minimum latency.

PRODUCTS AND SERVICES
rcManager - allows the user to store and manage their audio, video and rich media library. Video, rich-content presentations, PowerPoint documents and many other types of files can be uploaded to 3CX's content delivery network and remotely managed through a Web based interface.

rcMail - combines streaming video, email, and Web delivery technologies to allow large-scale distribution of rich-content.

rcOndemand - allows the user to deliver rich media when or where it is required. The UNIVO service platform allows the user to integrate rich-content into any Web page, eLearning portal or eCommerce platform. The user may embed the video into the Web pages, have a pop-up player and chose between multiple video formats and players.

rcPresenter - allows the user to create interactive rich-content presentations via any Web browser. UNIVO's synchronization engine allows the user to integrate video with multiple PowerPoint slides, HTML pages, and text documents. Viewers have the ability to pause, skip around and take tests in the rcPresenter application. The user can create courses for on-demand viewing or broadcasting live Webcasts with PowerPoint slides and dynamic HTML pages.

rcWebcast - gives the user the ability to integrate other types of interactive media and chat into their Webcasts. The 3CX's Webcasting team can capture

any signal, encode it for delivery, and broadcast it over RichNet, the 3CX network of data centers.

3CX Rich Content Servers - deliver MPEG 1, 2, and 4 video-on-demands, and live MPEG broadcasting of lectures, meetings, event briefings, and surveillance.

ixJet Streaming - provides on-demand video delivery service such as instructor lectures, company's training materials, movies, or music from the desktop. ixJet is a streaming engine that streams at a range of bit rates, from 28.8kps up to 8Mbps, to deliver rich-content over broadband channels.

ixJet Live - delivers up-to-the-minute financial market updates, world news, corporate briefings, lectures, seminars, and public programming to any PC reachable by the Internet, corporate Intranet, wireless, or satellites.

RichNet is 3CX's network of data centers for delivering rich-content. 3CX developed a set of technologies for offering the delivery of streaming media and rich-content. This set includes global load balancing scheme, profile-based replication technology, adaptive caching technology, and rich-content routing technology.

> Rich-Content Routing Scheme - ensures that the user's content is served from a location that is geographically closest to the viewer. RichNet determines what data center is closest to the viewer and streams the video from that point. The data centers are designed to support concurrent streams and are scalable to support concurrent viewers.
>
> Adaptive Caching Technology and Profile-Based Replication - ensures content is only replicated to data centers in the geographic areas it is needed. Replicating content reduces storage and bandwidth charges and it offers a degree of scalability, which reduces the burden on RichNet of unnecessary replication of large video files.

The *UNIVO/RichNet platform* is a content delivery platform that combines the applications to create, manage and distribute rich-content with a global network for rich-content delivery. UNIVO is a suite of Web based applications that allows users to create, manage and distribute rich-content over various networks to various devices. The RichNet delivery network offers performance for a flow of content to customers.

Akamai

www.akamai.com

Akamai of Cambridge, MA provides businesses with dependable, performance delivery of streaming media, Web content and Internet applications through services that are scalable and manageable. Akamai's global coverage ensures that content is always close to users. Akamai is focused on addressing the needs of e-commerce companies and content providers that view Web performance as a critical component to their success. Akamai's content delivery and interactive media services allow Web site owners to deliver content with performance and reliability.

PRODUCTS AND SERVICES

Akamai Network

Akamai addresses Web congestion by delivering Web content, streaming media and applications from the edge of the Internet. Akamai's global server deployment is a multi-carrier network that offers many options for routing content when individual networks are overloaded or out of service. Akamai's network is fault tolerant and is partnered with carriers, satellite and terrestrial providers both domestically and internationally to deliver content, applications and streaming media at the edge of the network.

Content Delivery Services

EdgeSuite service provides delivery of the client's entire Web site while allowing the client to differentiate through personalization and dynamic content assembly. EdgeSuite is a managed edge service that incorporates whole site delivery, local and global load balancing, content routing and customer care.

FreeFlow service speeds Web page download times, while diminishing traffic to the client's origin server. FreeFlow continuously monitors Internet conditions and determines the delivery route and optimal "edge server" for each Web site request.

Digital Parcel Service (DPS) combines Akamai's content delivery capabilities with digital rights management services, allowing content providers to securely and flexibly package, sell, and distribute digital content with speed and performance.

Streaming Services

Akamai delivers live event Webcasts (complete with video production, encoding, and signal acquisition services), streaming media on demand, 24/7 Webcasts and a variety of streaming application services based upon their

EdgeAdvantage platform. All services include comprehensive usage reports so clients can measure the effectiveness of their own streaming content.

FreeFlow Streaming utilizes Akamai's SteadyStream technology and their fault tolerant network to deliver both live and on-demand streaming media. SteadyStream transfers the original streams to Akamai's edge servers located close to end-users.

Streaming Applications - Akamai designs and builds streaming media applications that complement EdgeAdvantage based streaming services. These applications help their customers capitalize on Web interactivity and the value of streaming media whether they used them for entertainment purposes or business-to-business needs.

> *Akamai Forum* is their streaming media application solution, which is available to enterprise customers and fulfillment-oriented services partners. The system allows businesses to produce live and interactive Web broadcasts for corporate communications, training, product launches, or any type of real-time information sharing. Akamai Forum offers the ability to create and manage a range of live and on-demand programs and accommodates a variety of studio and production broadcast options.
>
> *Akamai Conference* is a private-labeled, automated OEM service available through telecom partners. The system introduces the benefits of streaming media as an extension of telephone and video conference calls. Telecommunications companies and service bureaus can offer business customers the ability to conduct enhanced communications over the Web.
>
> *Internet Broadcasting Services* - With their production, signal acquisition and encoding services, Akamai delivers a full-service solution to create a live Web event. Akamai handles the entire process of assembling a streaming media production in any format the client wants - Apple QuickTime, RealNetworks, or Microsoft Windows Media.

EDGE SERVICES

EdgeScape service allows the customer to identify the geographic location from which users access their Web site and the network origin of the user's request. Using Akamai's EdgeAdvantage platform, mapping technology, and network, EdgeScape maps user IP addresses to their geographic and network point of origin.

Global Traffic Management

FirstPoint is a global traffic management service for content providers with geographically distributed Web servers. FirstPoint reduces connection errors and offers Web site performance. By continuously monitoring Internet conditions and the performance of a customer's various mirrored sites, FirstPoint maintains an up-to-date map of the best routes around Internet outages, congestion, and other content roadblocks. When a user makes a request for the content provider's Web site, FirstPoint knows which mirrored site is suited to serve the content and directs the request to that site.

Cidera

www.cidera.com

Cidera of Laurel, MD is provider of satellite-based delivery of broadband content to the edge of the Internet. Through its satellite-based distribution network for the Internet, Cidera offers a means of transporting broadband content for content providers, aggregators, and distributors. Cidera uses a satellite technology designed to transport high-bandwidth data to ISPs and DSL and cable access providers. Cidera provides a managed global Internet broadcast platform that improves the delivery of rich media. The company serves content service providers, as well as broadband and dialup Internet access providers, offering distribution and hosting for Web content, streaming media (audio and video), live Webcasts, large databases, and Usenet news over the Internet.

PRODUCTS AND SERVICES

Internet Broadcast Backbone - Cidera has designed a broadcast backbone for the Internet, which provides an infrastructure platform using a high-speed satellite network to transport content to the edge of the Internet, where end users gain access.

Cidera Streaming Media Service allows content providers, aggregators, and distributors to deliver live streaming video and audio content into Cidera's servers located at numerous access points. By sending live streams via Cidera's satellite broadcast network, content delivery networks can expand their presence at the critical edge of the Internet.

Cidera Big File Mover allows content providers, aggregators, and distributors to deliver very large video, audio, software, and data files to locations at numerous access points. Cidera's satellite datacasting technology transports files of any size above Internet congestion and down to any number of Internet or private distribution points, including the user's office LAN.

Cidera Cache Turbocharging allows Internet service providers to improve the performance of their local cache for Web content, which reduces bandwidth use and offers service quality to end users.

Cidera Usenet News Service allows Internet service providers to access news articles, audio files, and graphics files from all public Usenet newsgroups, which reduces bandwidth use and offers service quality to end users. ISPs can off-load the Usenet news traffic and free up their existing bandwidth for other uses.

Cidera NetDirect Service provides expanded bandwidth via satellite to areas with limited terrestrial Internet access. Cidera NetDirect is a solution that allows individual users to request Web content and have it delivered to the ISP via Cidera's satellite broadcast network.

Digital Island/Cable & Wireless

www.digitalisland.com

Digital Island of San Francisco, CA is a provider of managed Internet infrastructure for enterprises to offer their customers a satisfactory Web experience in order to drive e-Business transactions. The company integrates managed hosting, content delivery and network services to bypass Internet congestion and offer fast and relevant interactions. Digital Island's Global e-Business Delivery Network allows Web experiences that customers demand such as delivering secure data transmissions, streaming media, frequent updates, or mission-critical applications. Cable & Wireless of London, England recently acquired Digital Island. Digital Island will become a wholly owned subsidiary of Cable & Wireless led by the current Digital Island management team.

PRODUCTS AND SERVICES

Streaming Media Solution - Digital Island provides media content management and delivery solutions that allow companies to deploy, manage, monetize, protect and deliver streaming media content on the Internet. Digital Island's suite of content delivery and application services allows companies to launch a service offering. As a global e-Business Delivery Network, Digital Island provides end-user experience worldwide via five integrated services:

> *Hosting Services* - an outsourced Web hosting solution that includes server management by a team of engineers.
>
> *Network Services* - e-Business applications are delivered via their private, global backbone, and offered by data centers and network operations centers.
>
> *Content Delivery Services* - Footprint, Digital Island's global content delivery network, is complemented by their Footprint Streaming Solutions, which speeds content to the edge for users across the globe.
>
> *Application Services* -This portfolio of tools improves the deployment, local relevance, security, and scale of Internet applications, and includes TraceWare, which provides geographic intelligence, and VistaWare, which provides near real-time customer reports on traffic passing through the network.

Professional Services - provide the services, expertise, and manpower to manage the complex needs of Digital Island's customers who want an outsourced solution.

Content Delivery Services - move content closer to the end user and ensure a fast and locally relevant customer experience.

A component of Content Delivery Services is *Footprint*, the Content Delivery Network capable of distributing major content types, including streaming media, authenticated content, and dynamic content. This service offers Web site performance and ensures customers receive access to content, regardless of demand.

Digital Island provides streaming media through their *Footprint Streaming Services*, which allow companies to deliver rich media audio, video, and animation to more users around the globe.

Footprint also provides security and authentication features. *FootprintSecure* complements other features like cookie-based or querystring-based Authentication, HTTP authentication to provide a distributed platform for secure and authenticated content delivery.

Digital Island's content delivery architecture is also differentiated by various *Enabling Technologies*. From their Commerce Content Distributors (CCDs) to their caching and mirroring technologies, Digital Island Content Delivery Services offers content routing, including rich media.

Content Peering Solutions
Digital Island's content peering program called the *Footprint Private Content Exchange (PCX)* incorporates Digital Island's existing NextEdge initiative plus other Digital Island's technologies such as Footprint Best Distributor Selection (BDS) technology. The PCX program accommodates service providers that need to operate a regional content delivery network and want to offer Digital Island's reach when a request for content is made outside of their network presence. Digital Island inter-connects the Footprint network to the carrier's network to facilitate exchange as needed.

Private peering under the PCX program integrates a higher level of customization and technology features. This includes policy based routing between networks based on geographic routing rules and edge server load; intelligent redirection, which finds the fastest path routing between edge servers and end users; and cache coupling, which allows carrier-deployed caches to be managed by the Footprint network.

As a part of its public content peering strategy, Digital Island has been chosen to assume the role of operator for Content Bridge and is responsible for quality of service for performance, operational support, billing and settlement for content delivery among Content Bridge member networks. Digital Island will offer the reach of its Footprint content delivery network, intellectual property and operational expertise to reduce time to market to deploy and implement content delivery services. Content Bridge allows hosting providers, content delivery network service providers, and access providers to share usage of networks at the content and application level.

e-Media, LLC

Please refer to the Streaming Products - Hardware section.

Globix Corp. - Streaming Media

www.globix.com/streaming/index.html

Globix Corporation of New York, NY is a provider of managed Internet services and connectivity. It has solutions for streaming media, including access to global markets. Globix's solution combines the infrastructure of their high-speed global network and Internet Data Centers with their technical experience in on-site production, Webcasting, encoding, hosting, signal acquisition and diverse media-on-demand services.

Globix's infrastructure allows them to support multiple streaming technologies such as Real Networks, Windows Media, and Apple QuickTime. They also maintain relationships and contracts with those technology companies in the streaming media industry.

PRODUCTS AND SERVICES

Globix *Streaming Media Encoding Services* provides translation of traditional audio and video media to a variety of digital formats. These services assist companies in preparing existing audio and video assets for presentation on the Internet or on corporate Intranets. Encoding is performed in-house in the Globix digital encoding studio, ensuring quick turnaround and quality transfers. Globix does not outsource encoding services, and therefore, they offer quick and reliable solutions. Their encoding capabilities allow them to encode from narrowband up to MPEG-2.

Live and Media-on-Demand Hosting Services - The Globix Streaming Media Delivery services provide live event media hosting in a variety of bit-rates and formats. Streams are delivered via Globix's fault tolerant Tier-1 backbone to the Internet via several network access points and/or providers, including a direct connection to America Online's backbone. Globix's Delivery Services is able to aggregate bandwidth through multiple connection points to simultaneous users worldwide. In addition to delivery, Globix Delivery Services generates statistics for each live event, identifying the number of connections to clients' media, the bandwidth used and connection time.

Live Production Services

Consulting Services: Services include site inspections, requirement analysis, solution architectures, and general consulting related to media streaming.

Logistical Services: The Globix Event team will check that everything required to deliver a stream from an event site to a streaming server is in place, and will act as a primary contact for their customers.

Production Services: Globix audio and video technicians/engineers will produce the feeds required by the encoding systems using Globix equipment. The feeds can be archived to a variety of traditional and digital formats.

Real-Time Encoding Services: Using Globix "RoadEncoders", a combination of software and hardware for producing media streams, standard audio and/or video streams can be digitized onsite in a variety of formats including Microsoft Windows Media Technologies, RealNetworks and Apple QuickTime.

Delivery Services: Using ISDN dialup accounts, public networks, and/or private networks, the Globix Event team can deliver streams in a variety of bitrates and formats to streaming servers on the Internet. Streams may also be delivered to Intranet servers, but a site and/or network analysis must be performed first.

Archival Services: Using traditional media (i.e. DV, VHS, DAT, etc.) or encoded media (files on a variety of media types), Event Services can create archives of events they produce for customers. Encoded archives can also be hosted by Globix's Streaming Media Delivery Services for on-demand viewing following the event.

Signal Acquisition Services - Globix's satellite uplink and downlink capabilities provide flexibility in production. Globix can take a feed from a satellite transmission, downlink it to their Globix POP and encode it in a range of formats. In instances where crews are scheduled to uplink the user's content to a satellite, Globix's satellite acquisition capabilities can provide a solution rather than sending out a separate Webcast production team. The Globix Content Delivery Network allows Globix to broadcast live events and other media throughout the Globix fiber optic network and the Internet exchange points it connects to, thereby reducing latency and improving the end user's experience. This solution allows up to 125,000 simultaneous viewers to request video and audio streams.

Globix EarthCache is an Internet content delivery system with caching servers deployed globally across the edges of the Globix Internet backbone network. EarthCache is an Internet backbone content delivery service that can control content delivery to the edge of the destination network. To provide intelligence and fault tolerance, Globix controls both content caching and routing. Frequently viewed content sits closer to the end user and is served by the EarthCache infrastructure at the edge, not by the source Web server at the core of the colocation and Web hosting network. Earthcache offers Web site performance, Web content and page delivery, and streaming media delivery.

iBEAM Broadcasting

www.ibeam.com

iBEAM Broadcasting Corp. of Sunnyvale, CA is a provider of streaming communications solutions. The iBEAM solutions for enterprise and media customers include interactive Webcasting, streaming advertising insertion, syndication and pay-per-view management, and secure licensed download services. iBEAM has a distribution network of connected satellites and has developed a Streaming Media Network (SMN) that offers quality and reliability for streaming media transmission. Satellite is their distribution mechanism for streams on the iBEAM network and it offers a scalable delivery platform.

PRODUCTS AND SERVICES

MaxCaster is a set of components that include a satellite dish downlink, a fault tolerant, Dell server, and an Extreme Networks Layer-2 switch. The MaxCaster system allows iBEAM to serve the desired content closest to the requesting end user via its satellite network downlink.

On-Target for Internet Content Providers - streaming ad insertion application allows Internet Content Providers (ICPs) to increase revenues, while they reduce transmission costs.

On-Target for Advertisers and Agencies - allows advertisers and their ad agencies to run targeted streaming commercials. On-Target delivers messages with motion video, fidelity audio, and an audience.

Activecast is a turnkey solution for producing and delivering interactive broadcast events over the Web. iBEAM offers vertical packages, including Web seminars, corporate communications, tradeshow and conference, Web-based training, and financial communications. Activecast's standard features include a customizable browser-based viewer, integrated streaming video and audio, synchronized slides, text, chat, e-commerce integration, Web-browsing, producer-controlled, "on-the-fly" Web links, audience management including registration, pay-per-view, and subscription/restricted access, and event planning, management, and production services. It offers broadcast distribution including signal acquisition, encoding services, hosting, and distribution over the iBEAM Streaming Media Network, event monitoring and reporting, including audience statistics, and live and on-demand delivery.

Pay-Per-View (PPV) Manager application allows the user to charge a monetary or informational "fee" to access an Activecast event. This has

revenue applications for the media and entertainment fields, and offers access control, registration, and user information collection for corporate events.

Syndication Manager application allows content providers to extend the reach of streams beyond their own user bases with total security and reporting. The content provider can distribute streams to affiliates and ensure that their streams are secure against piracy in general.

On-Guard application for secure digital downloads uses Microsoft's Digital Rights Management (DRM) technology. It gives content providers the ability to set rules for streaming.

PureStream Encoder and Radio Solution allows radio stations to put their content onto the Web. The encoder is capable of maximizing the fidelity of audio streams to allow a signal even at lower bit rates. iBEAM also packages their live ad insertion capabilities, nationwide DSL signal acquisition, and 24/7 stream and network monitoring with this solution.

SERVICES

iBEAM has a family of services designed to shorten the process of streaming the user's content. These services include distribution services; continuous or 24x7 live Webcasting; on-demand streaming services; live event or time-specific streaming service; recurring live events service; and as-needed live Webcasting service for continuous streams.

MediaOnDemand.com

www.mediaondemand.com

MediaOnDemand.com of New York, NY is a streaming multimedia application service provider (ASP) with a content distribution network. The company creates solutions for clients and other public and private entities. It owns and operates a full-service Webcast and broadcast studio at the Jacob K. Javits Convention Center in New York City. MediaOnDemand creates streaming media solutions by integrating production, encoding, synchronized multimedia, and hosting and distribution. MediaOnDemand wraps their range of streaming multimedia services into customized Webcast packages. From providing techniques for branding a Webcast to integrating sophisticated live Q&A, polling, or chat applications, they provide the tools necessary for maximizing exposure in enhanced streaming media formats.

PRODUCTS AND SERVICES

MediaOnDemand provide clients with a range of solutions offering live event streaming, production services, interactive design and development, encoding, and hosting and syndication.

Webcast Solutions - MediaOnDemand can create Webcasts for either live, on-demand or in both formats. They capture the user's content, encode the data and add graphics, slides, content navigation and links to targeted content. These materials can be integrated into a MediaOnDemand Webcast format called Media Modules.

Video Production and Broadcast Services - offers a range of video production and broadcasting services for both the Internet and television. Their in-house crews provide field production for live events, broadcast-to-tape services and both linear and non-linear editing. They can set up a full-service studio at remote venue locations.

Satellite Services - MediaOnDemand can transmit content via satellite for distribution over the Internet or television. If an event location doesn't have a satellite feed, they can use a mobile satellite truck to transfer the user's content.

Media Player Interface Design - allows the user to develop customized Webcasts that maintain their corporate identity throughout the presentation. Along with customizing the background graphics inside of the player, design services can integrate links to targeted content and interactive video bookmarks that allow viewers to navigate the user's Webcast presentation.

On-site and Off-site Capabilities - MediaOnDemand's encoding solutions give the user the option of having content formatted on-site at the user's event or off-site at one of MediaOnDemand's Technical Operations Centers (TOCs). To transmit content from the user's venue to their facilities, they use fiber, satellite or ISDN connectivity, depending on the capabilities available at the event site.

Cross-platform Solutions - they encode content across multiple media platforms so that Webcasts can be viewed over various streaming media players: Real, Windows Media or QuickTime.

Hosting Services - provide servers to keep the user's data secure and high-bandwidth network connectivity for distribution. For clients with special bandwidth and security needs, MediaOnDemand has relationships with streaming media partners to have the client's data hosted and delivered through three of the largest data ISPs.

Syndication programs can add new perspectives to the user's site as well as provide an opportunity to profit from the distribution of the user's own content.

The *Liveplus Package* offers live and on-demand formats in a single branded solution. First, MediaOnDemand produces a live Webcast to capture the user's event as it's happening. Then, when the event finishes, they re-purpose the video streams and any other element the Webcast used by encoding them in an on-demand format that maintains the same look and feel of the live presentation. Customization options include branded interface, synchronized slides, surveys, ad banners, polling, password protection, chat, registration, Q&A, and video index points.

Media Modules are visually enhanced on-demand Webcasts that integrate graphics, text, animation and interactive elements. This solution offers navigable media content as well as linking to Web sites that contain additional information and e-commerce opportunities. Customization options include branded interface, synchronized slides, surveys, ad banners, polling, password protection, chat, registration, modem switching, and video index points.

Mirror Image Internet, Inc.

www.mirror-image.com

Mirror Image Internet of Woburn, MA is a provider of Internet content delivery solutions that improves Web performance by delivering content regardless of location or demand. Mirror Image is able to offer content delivery to enterprises, hosting service providers, content providers and service providers. Mirror Image does not rely on a distributed network of server appliances. Mirror Image's Content Access Point (CAP) facilities combine connectivity, processing power, storage and control. The CAP architecture provides a platform to deliver a range of value-added services, from content distribution to media streaming and managed caching.

PRODUCTS AND SERVICES

Content Distribution Services are performance solutions that distribute fresh content, adding speed and scalability to Web sites. For enterprises, the *instaContent Service* enhances Web site performance by placing content closer to end users worldwide. This approach helps eliminate Internet congestion, allowing e-businesses to provide Web site visitors with faster downloads and the delivery of more content, including large, graphic files and digital assets such as copyrighted text and pictures, news stories, software, music and video. For hosting service providers, the *FireSite* service combines a server-side software agent with a network of peered servers to increase a Web site's capacity while providing performance and consistency.

Media Streaming Services - The *instaStream Audio & Video Service* offers a medium for organizations looking to deliver streaming media to a global audience. This scalable service offers a pay-as-you-grow delivery vehicle for streaming media. In addition, this service optimizes connections, serves media over an unlimited number of streams and scales to control surges in streaming media demand 24 hours a day, 7 days per week.

Managed Caching Services - The *instaSpeed Booster Service* is a managed caching solution that delivers fresh content. Acting as a second-stage cache, this service enhances all ICP-Standard local cache products by raising overall cache hit rates.

Content Access Point (CAP) infrastructure provides content providers, service providers and enterprises with a platform that delivers Web content to end users. As a secure and managed layer on top of the Internet, each CAP offloads origin servers and networks by placing content at locations closer to users worldwide. Delivering content locally improves Internet performance by beating latency and bypassing Internet congestion.

Speedera Networks, Inc.

www.speedera.com

Speedera Networks of Santa Clara, CA offers their Universal Delivery Network (UDN) service that is powered by a content distribution network with global traffic management, and implemented as a subscription service. Speedera has deployed a global network of servers on the Internet's backbones to provide a turnkey, services-based solution that provides responsiveness, uptime, and scalability. The Speedera UDN service moves content from Web sites to the edge of the Internet. It provides global load balancing across multiple origin sites and across the content delivery network, through routing of client requests. Speedera UDN provides a service-based approach to delivering the desirable Web experience, with performance, availability, and scalability. Speedera offers multiple services running on the Universal Delivery Network. Speedera's services are delivered to customers as outsourced services with monthly subscription charges. A Web interface is available for customer access to monitoring information, including network status as well as real-time and historical statistics on a per customer basis.

PRODUCTS AND SERVICES

Speedera Traffic Balance Service provides a global load balancing solution as an outsourced service. It routes client requests to the best origin Web site for performance and availability. In the event of an origin site failure, it fails over to the remaining origin sites. With a dedicated worldwide network of traffic managers and network probes, Traffic Balancer makes its decisions based on real-time network, server and application health criteria. By monitoring such variables as network latency, link outages, packet loss, CPU utilization, and application availability, Speedera routes users' content requests to the best server.

Speedera's Content Delivery Service provides a content delivery service that speeds Web content to end users worldwide. Utilizing its global traffic management technology, Speedera designed and built a network for content delivery on the Internet. Speedera's Content Delivery Service uses a dedicated network of caching servers deployed at points of presence on the backbone networks throughout the Internet.

The *Speedera Download service* provides a method for delivering digital goods, software, games, updates, MP3 and more, to customers via download from the user's Web site. Speedera Download uses a dedicated network of edge servers deployed on the backbone networks throughout the Internet to store downloadable content at the edge of the Internet for request fulfillment.

It uses a proprietary Global Traffic Management system to direct end-users' requests to the best available download server. Speedera Download also collects complete sets of logs to help the user analyze the popularity of its products.

The *Speedera Failover Service* is a solution that monitors single-location Web sites and redirects traffic to Speedera Web servers in the event of failure. Speedera's Failover Service uses a network of monitoring probes and failover Web servers deployed on backbone networks that serve static content in the event the user's Web site is unavailable.

Speedera SSL Service improves performance of the origin Web site by offloading and distributing the task of serving the SSL-encrypted content to servers within the Speedera network. Speedera uses a dedicated network of caching servers deployed on the backbone networks throughout the Internet. This edge network allows secure content to be served quickly and reliably. The SSL Service uses Speedera's Global Traffic Management technology to optimize performance and availability.

With *Speedera Streaming Services*, the user can deliver on-demand and live streams for Web based seminars, on-demand training, product launches, shareholder meetings, corporate communications, sporting events and entertainment from the Speedera network. The user can engage the audience with audio/video, synchronized slides, live Web links and polling.

Talkway Communications

www.talkway.com

Talkway Communications of Fremont, CA is a Video Content Delivery Service Provider. Regardless of location (office, home, or the road), connection speed (28.8 to T3), or technical know-how (no software required for playback, VCR-like controls), anyone can send and receive audio/video content using Talkway technology. Talkway allows companies to inject their communications and e-marketing services with audio and video. Companies can add audio and video content into a variety of Internet applications and services, including personal email, direct marketing, employment sites, corporate communications, personals, greeting cards and banner ads. Talkway customers are supported by an audio/video-enabling infrastructure that includes video playback and recording technology, video hosting and distribution, streaming video encoding and expert customer support. Talkway's product offering is divided into communications and e-marketing suites. Talkway allows online communication providers to incorporate audio and video content into many Internet applications such as e-mail, instant messaging, corporate communications, and auctions.

Communications Suite

PersonalTalk allows any user with a Pentium-class computer, a Web camera, and a microphone to create Talkway enabled audio/video messages. The user downloads a 240kb recorder plug-in and using the VCR-like controls, records an audio/video message, which is integrated into a communications service application the user provides, whether it be e-mail, e-greeting, career site, etc. Talkway can also incorporate this functionality into Web sites so those site visitors can have the ability to send their own created video content. After a Web site is video-enabled, the end user audio/video message content is compressed and uploaded to the Talkway server. The Talkway server then sends a separate email notification to the recipient. When the recipient retrieves the message, the video is streamed through an accompanying 54kb player applet. Talkway hosts all of the video content on its servers, so users do not have to deal with downloading video attachments and with storing bulky player or recorder applications and large video files on their hard drives.

CorporateTalk Express is Talkway's application that puts audio and video in corporate e-mail. Companies can use video for internal and external communications (executive communications, company newsletters, sales announcements, press announcements, investor relations, customer relations, etc). The technology combines Java, encoding and streaming to enhance communications. Talkway can design a custom portal page for each client.

The package will include an Application Protocol Interface, a CD-ROM that installs an ActiveX recorder, complete template, storage, bandwidth, service level agreement, security, and quality camera/desktop lighting. In this application, video content is also compressed and uploaded to the Talkway server. The Talkway server then sends a separate email notification to the recipient and when the recipient retrieves the message, the video is streamed through an accompanying player applet. Talkway hosts all of the video content on its servers, so users avoid the hassle of downloading video attachments and will never need to store bulky player or recorder applications and large video files on their hard drives.

e-Marketing Suite

MarketTalk is designed for corporate customers who have a need to distribute video content for product and service marketing efforts. Talkway can customize and integrate video-enabling technology into the user's Web site. Once the site has gone through the setup process, the customer provides Talkway with the video content in analog VHS, 8mm, or digital formats. Talkway handles the video compression and will upload the content to the Talkway server. From there, the video is streamed to a player applet that is integrated into the company's application and is ready to be distributed to the customer's recipient database. As a Video Service Provider, Talkway has built a scalable, 24/7 data center designed for video applications. Talkway offers the ability to track customer viewing preferences. Companies that license Talkway technology receive reports that include information about the number of users that viewed the audio/video message and the frequency that the message was viewed.

AdTalk technology delivers streaming audio/video content into Web page banner advertisements regardless of user connection bandwidth. AdTalk can be integrated into an HTML banner ad by using a JavaScript API. After the AdTalk API is invoked from a Web page, it waits until the entire page has been displayed before loading a Java applet that streams the audio/video content to the banner. For corporate customers with video content, Talkway can customize and integrate video-enabling technology into their Web site. Talkway Communications has built a scalable, 24/7 data center designed for video applications. Our infrastructure ensures secure video content that remains accessible to customers regardless of user volume and concurrency. Talkway's encoding technology offers audio/video streams at the lowest transmission speeds. This feature allows both analog and digital media to be encoded into streaming media content. Talkway offers the ability to track customer viewing preferences. Companies that license Talkway technology will receive reports that include information about the number of users that viewed the audio/video message and how frequently the message was viewed.

Volera, Inc.

www.volera.com

Volera, Inc. of San Jose, CA is a Novell subsidiary. Volera Inc. is a provider of a platform for managing the delivery of content across the Internet. Volera's suite of content networking products are tailored to the needs of content publishers, Internet service providers, Web hosting companies and corporate enterprises that want to accelerate data flow and control the delivery of content, rich media and secure data. Volera's core technology is the Excelerator 2.0 platform, a proxy/cache platform that provides Internet acceleration and content networking solutions to Internet service providers, Internet data centers and server appliance manufacturers. Volera distributes its solution, Content Exchange, in conjunction with Internet data centers and content distribution networks.

PRODUCTS AND SERVICES

Volera Content Exchange is a hosted Web site acceleration service and is offered through Web-hosting providers. As a managed service, Content Exchange gives the Web site delivery speed and scalability. Content Exchange acts as a front-end accelerator to a Web site by serving static content directly from its caches to users requesting pages. Content Exchange is powered by the Volera's Excelerator. It can serve up to 12,300 Web requests per second and can maintain over 300,000 persistent connections to the Web site. Content Exchange provides services for site acceleration, distribution and management:

Volera's *Excelerator*, formerly known as the Internet Caching System (ICS), is an appliance-based solution that can be installed and configured to specific needs. Excelerator accelerates the delivery of content over the Internet. It delivers a quick Web response time and throughput by accelerating user access to the Internet and by accelerating the delivery of a Web site to users.

Media Excelerator adds streaming media delivery support to Excelerator. It can be deployed in a variety of environments to address server-side scalability, network distribution, and edge delivery. Media Excelerator offers passing of disparate formats, stream splitting for broad distribution of live and scheduled events, on-demand caching and delivery, and reverse and forward proxy.

Volera's *Secure Excelerator* transforms insecure Web connections into secure, encrypted communication links using the Secure Sockets Layer (SSL) protocol. Secure Excelerator is a value-added service for the Excelerator

caching appliance line. The Secure Excelerator converts the Web server's existing HTTP data stream into a secure SSL channel, in real-time.

Volera's *Velocity CDN* provides tools, technologies and expertise that service providers and enterprises need in order to deploy custom content delivery networks. Velocity CDN allows customers to deliver quality of service and support the delivery of rich and streaming media business applications such as e-Learning, corporate communications, video-on-demand, and online collaboration. The Velocity CDN Suite offers a set of tools made up of Volera's caching software, Excelerator, and its add-ons, Media Excelerator and Secure Excelerator. Velocity CDN allows enterprises to deliver streaming business applications over their own content distribution networks.

Professional Services is a newly created organization within Volera. Volera will offer through its Professional Service Group access to experience and expertise in architecting, integrating, and operating a CDN. This group will work in tandem with Volera's system integrator partners including Nortel Networks' Global Professional Services and Cambridge Technology Partners.

Product:_____Media Excelerator
Company:_____Volera

Attributes
*Pricing:*_____If upgrading from ICS to Excelerator 2.0, $4,790

Product:_____Streaming Delivery Suite
Company:_____Weema

Attributes
Streaming format types:_____Windows Media, Real, QuickTime, and Shoutcast

Yahoo! Broadcast Services

fusion.yahoo.com/resource_center/broadcastservices/index.html

Yahoo! Inc. of Santa Clara, CA is an Internet communications, commerce, and media company that offers a comprehensive branded network of services. Yahoo! Broadcast Services Group provides audio and video content and services through a scalable digital distribution network designed to deliver audio and video to audiences via the Internet through both dial-up and broadband connections.

Yahoo! Broadcast Services is a provider of Internet broadcasting solutions and supporting tools for businesses and content providers to deliver corporate communications messages via audio and video streaming. Applications include product launches, press conferences, e-learning, seminars, keynote addresses, annual shareholder meetings, quarterly earnings calls and corporate TV channels. Yahoo! Broadcast Services offers audio and video content and services through a distribution network designed to deliver via the Internet through both dial-up and broadband connections. Yahoo! Broadcast Services offers a broad range of turnkey, Internet communications services to meet these demands for delivering information to customers, shareholders and employees.

PRODUCTS AND SERVICES

Webcasting Services include live and 24/7 audio/video broadcasting, on-demand audio/video hosting, Internet & Intranet broadcasting, "Self-service" audio/video hosting, pay-per-view broadcasting, secured broadcasting, and multicasting services.

A/V Production Services include live Webcast engineering, audio/video production, and audio/video satellite uplinking and downlinking

Web and Multimedia Development include synchronized multimedia (support for SMIL & other technologies, etc.), front-end interface development (including registration, polling, surveying, and testing), and Macromedia Flash and Flash Generator development.

Consulting include Internet communications planning workshops and Intranet broadcasting solutions.

Other Services include back-end site architecture and development, Webcast and Web site security, e-commerce deployment, and Web site hosting

Yahoo! Broadcast Services can also offer business Webcasts with a variety of tools. Tools like Flash introduction, push/user-driven slides, phonebytes (for frequent updates to Webcast page), question manager, report manager, presentation manager, embedded video player, Windows Media Player Multicast, Broadband Feed, and Tell-A-Friend are also available.

Streaming Services - Webcasting

Activate
www.activate.com

Activate of Seattle, WA is a webcasting service provider. Activate's services include event Webcasting for business communications and consumer live events, on-demand and replay webcasting of audio and video content to enhance Web sites, and live 24x7 webcasting for radio, TV and Internet-only programming. Activate is able to provide webcasting in industry standard media formats for such events as product launches, conferences, presentations, and earnings calls to employees, customers, and investors. They have experience working with enterprises and small businesses, traditional media, and Internet-based companies. They are a majority-owned operating company of CMGI, Inc. and their headquarters are located in Seattle, Washington.

PRODUCTS AND SERVICES
Event Webcasting Services- offers a range of announcements or entertainment events to the target audience at any location on the Internet. Services include ActivePlayer, Active Conference Center, Activate Show, Activate Roadshow, and Activate Special Events

24x7 - Live - increases beyond normal broadcast limitations by webcasting audio or video programming continuously from the user's Web site. Services include Activate Internet Radio and Activate Internet Television. Active Audio allows the user's communication to be quickly encoded and broadcasted via the Internet, such as financial commentaries, news updates, or new product announcements.

Replay! replays, reuses, and recycles the user's programming for on-demand webcasting and availability via the Web.

Advertising Services- offers ad insertion into the user's Webcast to help the user generate additional revenue and increase ad targeting options with content designed for the user's market segment. This can be accomplished with video banner ads, video "click-through" ads, and audio ads with banners. Activate offers these services through an alliance with Adforce, an online provider of centralized, outsourced ad management and delivery services.

Akamai

Please refer to the Streaming Services section.

Burstline.com

www.burstline.com

Burstline is a webcasting solution provider to support live streaming and on-demand media. Burstline is an aggregation and distribution network using unicast and multicast technology. Their scalable servers sit on the Internet backbone and were designed to deliver interactive media. Burstline shortens the workload needed to incorporate streaming into their Net strategy, e-business and corporate communications.

PRODUCTS AND SERVICES

Online Internet Broadcast Studio is a fully configured "studio in a box."

Web Casting Services include full production services, on-site encoding and back-end integration along with other streaming features such as password protection, interactivity and managed services

Hosting Service for delivering live events in Real and Windows Media formats, and uploading and re-broadcasting video-on-demand movies for playback along with monthly pricing and access to monitor traffic.

Globix Corp. - Streaming Media

Please refer to the Streaming Services section.

SeeItFirst, Inc.

Please refer to the Streaming Products - Software - Webcasting section.

Worldstream Communications

www.worldstream.com

WorldStream Communications of Bellevue, WA provides interactive communication services to deliver meetings, presentations, training, and other work-related "events" to the desktop. Interactive communications combines streaming audio and video with the interactivity of PowerPoint slides, polls, quizzes, Q&A, group and private chat, and links along with live data reporting that tracks user participation, feedback, questions asked, and quiz and poll responses. Their solution is the WorldStream Desktop Suite, a hosted application with four service levels that offer choices when creating and delivering events, live or on-demand. Some applications for interactive communications with geographically dispersed audiences include conducting meetings, training employees, communicating with sales and channel partners, and managing investor relations.

PRODUCTS AND SERVICES

Desktop Audio allows the user to record and deliver an audio message from the desktop, similar to making a phone call. Desktop Audio can be customized to include logos, banners, and text messages. The user can make the event available for live or on-demand listening, so participants can playback and participate at their convenience. Event access management functions include open registration or restricted access for higher security. Reports can be accessed online, with information including who attended and how long they stayed.

Desktop Video allows the user to record and deliver communications with video. Applications include video announcements, training, and special events. It can be customized with logos, banners, and text messages. Live and on-demand and event access management functions are available. Attendance and access records can be accessed online.

Desktop AudioPlus allows the user to create an interactive, on-demand audio presentation that the audience can view right from their desktop. The user can narrate PowerPoint slides and offer audience feedback polls. Participants can e-mail questions and comments to the presenter. Applications include company-wide communications, online training, and sales and marketing updates. This service also allows for event access management and online viewing of access reports.

Desktop Interactive service integrates all of the communication tools into one solution. This service allows the user to create interactive presentations, meetings or events using streaming audio or video, PowerPoint slides, images/graphics, banners and hyperlinks, polls, quizzes, presenter Q&A, and chat, in any combination for live or on-demand.

Yahoo! Broadcast Services

Please refer to the Streaming Services section.

CDN Vendors

CDN Products - Hardware

CacheFlow

Please refer to the Streaming Products - Hardware section.

Cisco Systems, Inc.

Please refer to the Streaming Products - Hardware section.

Lucent Technologies

Please refer to the Streaming Products - Hardware section.

Network Appliance

Please refer to the Streaming Products - Hardware section.

Nortel Networks

www.nortel.com

Nortel Networks is an Internet and communications provider with capabilities including optical Internet, wireless Internet, local Internet, e-Business, and personal Internet. Nortel Networks serves the emerging and existing needs of service providers, carriers, dotcoms, small and medium sized businesses, and large corporations around the world.

PRODUCTS AND SERVICES

Alteon ACEswitch 180 line of Ethernet Web switches provides per port selectable 10/100/1000 Mbps Ethernet connectivity on every port. With nine-Gigabit ports, the Alteon 180 is suited for performance Web server farms and the aggregation of 10/100 Mbps Ethernet ports. With the Alteon Web OS traffic-control software, the Alteon 180 delivers performance traffic management functions within a single platform including local and global server load balancing, application redirection, filtering and content-intelligent Layer 7 switching such as cookie parsing and URL load balancing.

Alteon ACEdirector is an integrated services front-end switch that provides a range of high-speed traffic management functions. Built on a distributed processing architecture, ACEdirector products support Alteon Web OS Internet traffic control services. The ACEdirector delivers simultaneous support for Layer 2, 3 and 4 through 7 switching. The ACEdirector combines a collection of traffic management services within an Ethernet switch, designed for switching hundreds of thousands of Web sessions every second. Local and global server load balancing, application redirection, Secure Sockets Layer (SSL) load balancing, URL-based redirection and load balancing and TCP/IP filtering functions are performed in one Web switch. The ACEdirector employs two RISC processors on each of its eight 10/100 Mbps ports. The ACEdirector can switch Web sessions at high speeds; up to 200,000 sessions per second can be load-balanced.

Product:_____Alteon AceSwitch 180
Company:_____Nortel Networks

Attributes
*Computing Platform:*_____Alteon Web OS traffic control software
*Dimensions-rack height:*_____3.47”
*Network Interfaces:*_____10/100/1000 Mbps Ethernet Connectivity
*Protocols:*_____TCP, UDP, HTTP, HTTPS, FTP, SMTP, POP3, IMAP, SSL, DNS, Radius, Telnet, and NNTP

Product:	Alteon AceDirector
Company:	Nortel Networks

Attributes

Dimensions-rack height:	3.47”
Network Interfaces:	10Base-T/100Base-TX, 10/100 full or half duplex with RJ-45 connections
Protocols:	TCP, UDP, HTTP, HTTPS, FTP, SMTP, POP3, IMAP, SSL, DNS, Radius, Telnet, and NNTP

Sun Microsystems, Inc./Cobalt Networks, Inc.

www.sun.com/hardware/serverappliances/index.html
www.sun.com/storage/media-central/index.html

Sun Microsystems, Inc., of Palo Alto, CA is a provider of industrial hardware, software and services for the Internet. Sun also manufactures UNIX-based computers, storage appliances, and multi-use servers for corporate networks and Web sites. Recently, Sun purchased Cobalt Networks, Inc. of Mountain View, CA. Cobalt Networks is a subsidiary of Sun and it manufactures Linux server appliances, network storage appliances, caching devices, and server management software.

PRODUCTS AND SERVICES

Server Appliances

The *Sun RaQ 4 server* is a high-volume server appliance. It includes built-in and integrated Web server, email server, FTP server, Web publishing and dynamic content (ASP) hosting. The Sun RaQ 4 server can be dedicated to one application, such as streaming media, firewall, database, or caching services, for the enterprise or the small and medium-size enterprise data center.

The *Sun RaQ XTR server* is an integrated Web server, email server, FTP server, Web publishing, dynamic content (ASP) server for Web and application hosting environments. The XTR adds gigahertz-class performance, as well as hot-swappable drives and RAID Level 5 support.

The *Sun Cobalt CacheRaQ 4 appliance* is built on the same OS in the RaQ 4 server appliance platform. The OS is based on Linux 2.2.14. The CacheRaQ 4 appliance is pre-configured with all the necessary hardware and software for Web caching. The Sun Cobalt CacheRaQ 4 appliance provides quicker Web access and stores content.

The *Sun Cobalt Qube 3 appliance* is an Intranet and Internet server appliance integrated with Web-based applications and tools. Standard applications and services, such as e-mail and Web support, are pre-installed and pre-configured. The Qube 3 server serves Web pages; shares files across the network; processes e-mail; serves as a firewall and improves network performance via caching.

Video Storage and Servers

Sun StorEdge Media Central Streaming Server software is streaming media server software. The software is designed to be client- and format-agnostic and to support multiple formats. It shortens the digital asset management

process by allowing the user to stream in the same format that they employ to capture, edit, and store content.

Product:_____Sun Cobalt CacheRaQ 4 Server Appliance
Company:_____Sun Microsystems

Attributes
*Price:*_____small $1,799.00, medium $1,999.00, large $2,499.00
*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____small 20GB, medium 20GB, and large 20GB
*Form Factor:*_____rack-mountable
*Network Interfaces:*_____10/100Base-T

Product:_____Sun Cobalt RaQ 4 Server Appliance
Company:_____Sun Microsystems

Attributes
*Price:*_____small $1,499.00, medium $2,699.00, large $3,599.00
*Dimensions-rack height:*_____1 rack unit
*Storage Capacity:*_____small 10GB, medium 20GB, and large 60GB
*Form Factor:*_____rack-mountable
*Network Interfaces:*_____10/100 Ethernet
*Protocols:*_____FTP

Product:_____Sun StorEdge Media Central Streaming Server
Company:_____Sun Microsystems

Attributes
*Operating System:*_____Solaris 2.7
*Storage Capacity:*_____256 MB RAM
Transcoding support (bit rate, per bandwidth connection):
28.8kb/s through 1.5Mb/s
*Protocols:*_____RTP, RTSP, RTCP, and SDP

Product:_____Sun Cobalt Qube3
Company:_____Sun Microsystems

Attributes
*Operating System:*_____Windows, MacOS, or Unix (any flavor)
*Price:*_____small $1,149.00, large $2,099.00
*Storage Capacity:*_____small 10GB, large 40GB
*Database Compatibility:*_____Interbase6, MySQL & Postgres

Surgient Networks

Please refer to the Streaming Products - Hardware section.

Vividon

Please refer to the Streaming Products - Hardware section.

CDN Products - Software

Cisco Systems, Inc.

Please refer to the Streaming Products - Hardware section.

Digital Pipe, Inc.

Please refer to the Streaming Products - Software section.

EnScaler, Inc.

Please refer to the Streaming Products - Software section.

InfoLibria

Please refer to the Streaming Products - Software section.

Inktomi Corporation

Please refer to the Streaming Products - Software section.

Kasenna, Inc.

Please refer to the Streaming Products - Software section.

Sun Microsystems, Inc./Cobalt Networks, Inc.

Please refer to the CDN Products - Hardware section.

Volera, Inc.

Please refer to the Streaming Services section.

XOsoft, Inc.

Please refer to the Streaming Products - Software section.

CDN Products - Software - Peer-to-Peer

eMikolo Networks

Please refer to the Streaming Products - Software - Peer-to-Peer section.

Weema Technologies

Please refer to the Streaming Products - Hardware - Peer-to-Peer section.

CDN Services

3 CX, Inc.

Please refer to the Streaming Services section.

Akamai

Please refer to the Streaming Services section.

Digital Island/Cable & Wireless

Please refer to the Streaming Services section.

Digital Pipe, Inc.

Please refer to the Streaming Products - Software section.

Mirror Image Internet, Inc.

Please refer to the Streaming Services section.

Qwest Communications International

http://www.qwest.com/largebusiness/products/esolutions/hosting/hostingICE.html

Qwest Communications of Denver, CO is a provider in Internet-based data, voice, image and multimedia communications. Qwest's network offers the exchange of multimedia content - images, data and voice. Qwest combines their fiber network with a line of Web hosting services, managed solutions, Internet access, private networks, wireless data and other technologies and applications.

PRODUCTS AND SERVICES

The Qwest *Intelligent Content Environment* is a range of services that are designed to serve static and rich media Internet content creating scalable Web sites. Combining the Qwest fiber network and CyberCenter facility presence, the Qwest Intelligent Content Environment provides a solution for Internet and Intranet content delivery. The Qwest Intelligent Content Environment includes content switching and Internet CDNs.

Content Switching optimizes Web server performance with local and global load balancing based on content (URL, language type, and browser type). No staff with specialized expertise needed because Qwest manages the content.

Internet Content Delivery Network offers a content acceleration network comprised of a central content management system that controls decentralized caches placed across the Qwest network to replicate and serve content to end users. Qwest manages and supports static and rich media content delivery. Streaming audio and video services are offered without the user purchasing additional software or a server.

Speedera Networks, Inc.

Please refer to the Streaming Services section.

Volera, Inc.

Please refer to the Streaming Services section.

CDN Services - Peer-to-Peer

vTrails
www.vtrails.com

vTrails of Ramat Gan, Israel, offers media delivery solutions that utilize peer-to-peer networking, smart routing, and edge network capabilities. The vTrails System delivers streaming content to large audiences while reducing bandwidth consumption. Based on patent-pending Full Duplex Packet Cascading (FDPC) technology, the vTrails System supports streaming broadcasts of any kind at any bit rate. vTrails develops technologies that provide media delivery solutions for the enterprise/corporate and entertainment markets with associated audience reporting. vTrails' products are based on routing and peer-to-peer technologies that addresses the bandwidth and infrastructure limitations.

PRODUCTS AND SERVICES
vTCaster sits at the broadcast source and processes IP requests. It integrates with standard media servers and operates within the IP network.

vTPass is a thin end-user software that integrates with standard media players and joins the user to the distribution network.

vTReport is a reporting application that tracks stream requests, regional information, stream duration, user count, and usage habits.

vTControl is an online broadcast management application providing control over the system and offering management of the vTrails System performance in real-time.

vTStorage is the vTrails System data storage center.

vTEdge is edge server technology implemented in a Media Delivery Network to remove load from the network and move content closer to the end-user.

Appendix A

2001 Streaming Media and CDNs in the Enterprise Study Questionnaire

Hello, may I speak with _____, please?

Hello, my name is _____, from the HTRC Group. We are currently gathering research with US based organizations regarding their plans for Streaming Media in the Enterprise in order to help product manufacturers and service providers offer better products and services. With your participation, we would like to send you a copy of the summary results at the end of April. First...

[If name on list is not available, probe for MIS Director or IT Manager.]

Screening Section

1. Do you have detailed knowledge of your network, including network plans, streaming media technology plans, storage, bandwidth, management, performance, and challenges? (Check one)
   1._____Yes
   2._____No (terminate, ask for a reference)
   3._____Don't know/Refuse (terminate, ask for a reference)

2. Approximately how many employees are in your entire organization? (Fill in number)

   Number of employees:_____ (If less than 500, terminate)

   Don't Know/Refuse:_____ (Go to Q.2a enter 99999 for Don't Know/Refused

[If respondent says "Refused/DK" in Q.2, ask Q2a.]

2a. Would you say your company has 500 employees or more or does it have less than 500 employees?
   1._____500+ employees
   2._____Less than 500 employees (Terminate)
   3._____Don't know/Refused [DO NOT READ] (Terminate)

(Definition for Streaming media: Streaming media can either be live audio or video, which means transmitting it to its audience in real-time with minimal delay, or on-demand, which means producing and storing it until the end user requests delivery. Streaming media includes RealVideo/Audio, QuickTime, and Microsoft Media Technology)

3. Do you use or plan to use streaming media technology in your network now? Do you plan to use streaming media technology by March of 2002? (Check all that apply)

Streaming use	**March 2001**	**March 2002**
1. Use streaming media	_____	_____
2. No	_____	_____
3. Don't know/Refuse (terminate, ask for a reference)	_____	_____

[IF Q.3 = "1. STREAMING MEDIA" FOR EITHER YEAR THEN GO TO Q.4, ELSE IF Q.3 = "2. NO" FOR EITHER YEAR THEN **GO TO EXIT QUESTIONNAIRE**, ELSE (IF Q.3 = "3. DON'T KNOW/REFUSE" FOR BOTH YEARS) TERMINATE, ASK FOR REFERRAL.]

4. Of the following categories of decision makers, which would best describe your position when purchasing products or services? Are you a... (Read list. Check one)
   1._____Primary decision maker
   2._____Secondary decision maker, that is you have *significant* influence on product or service procurement, or an
   3._____Ancillary (an-sil-a-ree) decision maker, where you have *some* influence on product or service procurement, or do you have
   4._____No influence on purchase decisions? (Terminate, ask for a reference)
   5._____Don't know (Terminate, ask for a reference)

5. In which of the following regions of the world does your organization have physical site locations? (Read list. Check all that apply)
   1._____North America
   2._____South America
   3._____Europe
   4._____Asia Pacific
   5._____Middle East/Africa
   6._____Other [Do not read, Specify]_____
   7._____Don't know/Refused [DO NOT READ]

6. How many total physical site locations does your organization currently have? How many will your organization have by March of 2002? (Fill in number)

Locations	**March 2001**	**March 2002**
1. Number of sites	_____	_____

[Range 1-999999 -- Enter 999999 for DK or refused]

7. What is your organization's line of business? (Check all that apply, do not read list)

1 _____ Accommodation and Food Services
2 _____ Administrative and Support and Waste Management and Remediation Services
3 _____ Agriculture, Forestry, Fishing and Hunting
4 _____ Arts, Entertainment, and Recreation
5 _____ Construction
6 _____ Educational Services
7 _____ Finance and Insurance
8 _____ Health Care and Social Assistance
9 _____ Information
10 ____ Management of Companies and Enterprises
11 ____ Manufacturing
12 ____ Mining
13 ____ Professional, Scientific, and Technical Services
14 ____ Public Administration
15 ____ Real Estate and Rental and Leasing
16 ____ Retail Trade
17 ____ Transportation and Warehousing
18 ____ Utilities
19 ____ Wholesale Trade
20 ____ Other [Specify]_____
21 ____ Refused [DO NOT READ]
22 ____ Don't know [DO NOT READ]

Streaming Equipment

8. Which of the following best describes the streaming media hosting strategy for your network? (Check only one -- Read list)

_____1. Self-hosted: host server(s) in your own network

_____2. Hosted: streaming content is hosted on service provider's server

_____3. Hybrid colocation: host servers both in service provider's network and your own network

_____4. Or is it something else:_____

_____5. Don't know/Refuse *[Do not read]*

9. What is the total capacity of your network in Mega bits per second? What will it be by March of 2002? (Fill in number)

Network Capacity	**March 2001**	**March 2002**
1. Mega bits per second	_____	_____

[Range 0-999999999 -- Enter 999999999 for DK or refused]

[SKIP BY YEAR BASED ON Q.3 FOR Q.10-14]

10. Of your total enterprise network capacity, currently what percent of your total traffic is streaming? What percent will it be by March of 2002? (Fill in percentage)

Traffic	**March 2001**	**March 2002**
1. Percent of traffic (streaming)	_____%	_____%

[Range 0-100 -- Enter 999 for DK or refused]

11. How many total data centers do you use to host streaming media content? By March of 2002? (Fill in number)

Data Centers	**March 2001**	**March 2002**
1. Number of data centers	_____	_____

[Range 0-9999 -- Enter 9999 for DK or refused, If 1=0 for both years, continue]

12. Approximately what percent of your organization's employees have streaming enabled computers? Approximately what percent by March of 2002? (Fill in percentage)

Computers	**March 2001**	**March 2002**
1. Percent of streaming enabled computers	_____%	_____%

[Range 0-100-- Enter 999 for DK or refused]

13. Regarding the capacity of your enterprise streaming infrastructure, how many simultaneous streams do you currently use? By March of 2002? (Fill in number)

Streams	**March 2001**	**March 2002**
1. Number of simultaneous streams	_____	_____

[Range 1-9999999999 -- Enter 9999999999 for DK or refused]

14. How many total streaming servers do you currently have in your enterprise network now? By March of 2002? (Fill in number)

Servers	**March 2001**	**March 2002**
1. Number of streaming servers	_____	_____

[Range 0-999 -- Enter 999 for DK or refused, If 1=0 for both years, continue]

[SKIP BY YEAR BASED ON Q.3]

15. What streaming server software do you currently use in your network? Plan to by March of 2002? (*Read list, check all that apply, probe for other*)

Service	March 2001	March 2002
1. Microsoft Media	_____	_____
2. Real Networks Real Video	_____	_____
3. Real Networks Real Audio	_____	_____
4. Apple QuickTime	_____	_____
5. MP3/M3U server software	_____	_____
6. Cisco IP TV	_____	_____
7. Any others? (Specify, probe for other)	_____	_____
8. Do not use Streaming Server Software [Do not read]	_____	_____
9. Don't know/Refuse [Do not read]	_____	_____

[SKIP BY YEAR BASED ON Q.3]

16. What operating system do you currently use for your streaming servers? Plan to use by March of 2002? (*Read list, check all that apply, probe for other*)

Operating System	March 2001	March 2002
1. Do not use Streaming Server Software	_____	_____
2. Windows 2000	_____	_____
3. Windows NT	_____	_____
4. Unix	_____	_____
5. Linux	_____	_____
6. Solaris	_____	_____
7. Mac OS	_____	_____
8. Other (Specify, probe for other)	_____	_____
9. Don't know/Refuse [Do not read]	_____	_____

[SKIP BY YEAR BASED ON Q.3]

Streaming Services Section

17. Which of the following enterprise streaming media functions does your company outsource now? Which will you outsource by March 2002? (*Read list, check all that apply, probe for others*)

Streaming Function	March 2001	March 2002
1. Content production	_____	_____
2. Streaming network build-out	_____	_____
3. Streaming network design	_____	_____
4. Streaming network operations	_____	_____
5. Digital rights management for streaming media	_____	_____
6. Storage services for streaming media	_____	_____
7. Are there any others (Specify)	_____	_____
8. None [Do not read]	_____	_____
9. Don't know/Refuse [Do not read]	_____	_____

18. Which of the following service provider types would you prefer to use for enterprise streaming services? (Check all that apply) (Read list -- Rotate)

_____ 1. _____Hosting provider (for example, Exodus)

_____ 2. _____Content delivery provider (for example, Akamai)

_____ 3. _____National facilities based ISP (for example, e-spire)

_____ 4. _____International ISP (for example, AT&T)

_____ 5. _____Streaming service provider (for example, iBeam)

_____ 6. _____Integrators (for example, Accenture)

7. _____Are there any other service provider types: _____

8. _____None *[Do not read]*

9. _____Don't know/Refuse *[Do not read]*

19. On a scale of 1 to 7 where 1 is do not agree and 7 is strongly agree, please rate the following reasons for considering outsourcing streaming services? (Fill in rating, probe for other) (Read list – Rotate 1-4) (8 = Don't know)

_____ 1. _____Do not have in-house expertise

_____ 2. _____It costs less to outsource rather than buy streaming applications

_____ 3. _____IT overloaded with other tasks

_____ 4. _____New applications are difficult to keep up with

_____ 5. _____Are there any others (specify)

[SKIP BY YEAR BASED ON Q.3]

Streaming Technology Uses Section

20. Which of the following types of streaming media does your company use now? Which will you use by March of 2002? (*Read list, check all that apply, probe for others*)

Service	March 2001	March 2002
1. Audio	_____	_____
2. Video	_____	_____
3. Are there any others (Specify)	_____	_____
4. Don't know/Refuse [Do not read]	_____	_____

[SKIP BY YEAR BASED ON Q.3]

21. Of your streaming media traffic, what are the percentages for the following types of traffic? What will these percentages be by March 2002? (fill in percentages) (Read list)

Service	March 2001	March 2002
1. Enterprise streaming traffic (Within your enterprise network, e.g. Intranet)	_____%	_____%
2. Extranet streaming traffic (Outside your enterprise network)	_____%	_____%
Totals must add up to 100 Total:	100%	100%
3. Don't know/Refuse [Do not read, enter **999**]	_____	_____
4. None [Do not read, enter **997**]	_____	_____

[SKIP BY YEAR BASED ON Q.3]

22. Of the following ways to deliver streaming media, which do you use now? Which will you use by March 2002? (Check all that apply) (Read list)

Service	March 2001	March 2002
1. FTP (File Transfer Protocol)	_____	_____
2. Streaming media server	_____	_____
3. Outsourced to service provider	_____	_____
4. Don't know/Refuse [Do not read]	_____	_____
5. None [Do not read]	_____	_____

[SKIP BY YEAR BASED ON Q.3]

23. Which of the following does your company use streaming media for now? Which do you plan to use by March of 2002? (Streaming media includes RealVideo/Audio, QuickTime, and Microsoft Media Technology) (Check all that apply, probe for other) (Read list – Rotate all except 9-11)

Service	March 2001	March 2002
1. Training for employees	_____	_____
2. Training for customers and suppliers	_____	_____
3. Intra-company meetings and collaboration	_____	_____
4. Business to business collaboration	_____	_____
5. Investor relations	_____	_____
6. Marketing events	_____	_____
7. Increasing communications within your organization	_____	_____
8. Increasing communications with external organizations	_____	_____
9. Are there any others? (specify)	_____	_____
10. Don't know [Do not read]	_____	_____
11. None [Do not read]	_____	_____

[SKIP BY YEAR BASED ON Q.3]

24. Which of the following kinds of streaming audio and video does your company use now? Which will you plan to use by March of 2002? (Streaming media includes RealVideo/Audio, QuickTime, and Microsoft Media Technology) (Check all that apply) (Read list)

Service	**March 2001**	**March 2002**
1. On-demand Streaming media content (Streaming media that is produced, then stored on Web site)	_____	_____
2. Live Streaming media content (Streaming media that is captured at the source and transmitted to an audience with a minimal level of delay)	_____	_____
3. Secure streaming content (content that is secured using technologies such as SSL)	_____	_____
4. Don't know [Do not read]	_____	_____
5. None [Do not read]	_____	_____

[if Q24-1 for either year, ask 25]

25. For audio and video *on-demand* streaming, which of the following streaming formats do you use or plan to use? (Check all that apply) (Read list – Rotate except 10-11)

1.____Real Audio

2.____Real Video

3.____Microsoft Media Technology

4.____QuickTime

5.____MPEG 1

6.____MPEG 2

7.____MPEG 4

8.____MP3 or M3U

9.____Cisco IP TV

10.___Are there any other applications? _____

11.___Don't know/Refused *[Do not read]*

[if Q24-2 for either year, ask 26]

26. For audio and video *live streaming* media, which of the following streaming formats do you use or plan to use? (Check all that apply) (Read list – Rotate except 10-11)

1.____Real Audio

2.____Real Video

3.____Microsoft Media Technology

4.____QuickTime

5.____MPEG 1

6.____MPEG 2

7.____MPEG 4

8.____MP3 or M3U

9.____Cisco IP TV

10.___Are there any other applications? _____

11.___Don't know/Refused *[Do not read]*

[SKIP Q.27 & 27A BY YEAR BASED ON Q.3]

Streaming Media Creation

27. Does your company create streaming media content in 2001? (check only one)

_____ 1. _____Yes

_____ 2. _____No

_____ 3. _____Don't know (skip as NO would)

27a. Does your company plan to create streaming media content by 2002? (check only one)

_____ 1. _____Yes

_____ 2. _____No

_____ 3. _____Don't know (skip as NO would)

[SKIP BY YEAR BASED ON Q.27 & 27A]

28. Which of the following streaming media creation functions does your company currently perform internally? By March 2002? (*Read list, Check all that apply, probe for others*)

Streaming	**March 2001**	**March 2002**
1. Production (Production includes the audio or video recording and editing of content)	_____	_____
2. Encoding (Encoding includes translating audio or video into a streaming media technology format, such as Real Video)	_____	_____
3. Asset management (Managing video and audio archives)	_____	_____
4. Streaming media application development	_____	_____
5. Are there any others (Specify)	_____	_____
6. Don't know/Refuse [Do not read]	_____	_____

[SKIP Q.29 & 29A BY YEAR BASED ON Q.3]

29. Does your company currently outsource the creation of streaming media content? (check only one)

_____ 1. _____Yes

_____ 2. _____No

_____ 3. _____Don't know

29a. Does your company plan to outsource the creation of streaming media content in 2002? (check only one)

_____ 1. _____Yes

_____ 2. _____No

_____ 3. _____Don't know

[SKIP BY YEAR BASED ON Q.29]

30. Which of the following streaming media creation functions does your company currently outsource? By March 2002? (*Read list, check all that apply, probe for others*)

Streaming	March 2001	March 2002
1. Production (Production includes the audio or video recording and editing of content)	_____	_____
2. Encoding (Encoding includes translating audio or video into a streaming media technology format, such as Real Video)	_____	_____
3. Asset management (Managing video and audio archives)	_____	_____
4. Streaming media application development	_____	_____
5. Are there any others (Specify)	_____	_____
6. Don't know/Refuse [Do not read]	_____	_____

Extranet Streaming Use

[SKIP Q. 31 & 31A BASED ON Q.3]

31. Do you currently use enterprise streaming media with partners, suppliers, or customers? (check one)
    1. Yes:_____
    2. No:_____
    3. Don't Know/Refuse:_____

31a. Do you plan to use enterprise streaming media with partners, suppliers, or customers by March 2002? (check one)
    1. Yes:_____
    2. No:_____
    3. Don't Know/Refuse:_____

[SKIP BY YEAR BASED ON Q.31 & 31A]

32. Which of the following types of external organizations does your company plan to use streaming media now? By March 2002? (*Read list, check all that apply, probe for others*)

Organization	March 2001	March 2002
1. Customers	_____	_____
2. Suppliers	_____	_____
3. Business Partners	_____	_____
4. Are there any others (Specify)	_____	_____
5. Don't know/Refuse [Do not read]	_____	_____

Storage Section

33. Approximately what is your total storage capacity need in Gigabytes (GB) for all data on your network? By March 2002? (*Fill in number*)

Storage	March 2001	March 2002
1. Total storage need in GB	_____	_____

[Range 1-9999999999, enter 9999999999 for Don't know/refused]

34. Currently, what percent of your total storage is centralized? What percent is distributed? What will those percentages be by March of 2002? (*Fill in percentage*)

Storage	March 2001	March 2002
1. Centralized storage (storage in a central location)	_____%	_____%
2. Distributed storage (storage distributed in many locations)	_____%	_____%
Totals must add up to 100 Total:	100%	100%

[Enter 999 for Don't know/refused]

35. Approximately what is the total storage capacity need in Gigabytes (GB) for the following types of data? By March 2002? (*Read list, probe for other*)

Storage Type	March 2001	March 2002
1. Audio streaming media storage	_____	_____
2. Video streaming media storage	_____	_____
3. Video-on-demand (not using streaming technology)	_____	_____
4. CAD files (Computer Assisted Design)	_____	_____
5. Databases	_____	_____
6. Are there any others (Specify)	_____	_____
7. Don't know/Refuse [Do not read, enter 999 for Don't know/Refused]		

36. Which of the following types of storage technologies does your company use for all data now? By March 2002? (*Read list, check all that apply, probe for other*)

Storage Technology	March 2001	March 2002
1. Storage area networks (SAN)	_____	_____
2. Network attached storage (NAS)	_____	_____
3. Direct-attached storage (storage connected via SCSI (Sk-uzzy) connection)	_____	_____
4. RAID	_____	_____
5. Storage services	_____	_____
6. Are there any others (Specify)	_____	_____
7. Don't know/Refuse [Do not read, enter 999]	_____	_____

[SKIP BY YEAR BASED ON Q.3]

37. Which of the following types of storage technologies does your company use for streaming media now? By March 2002? (*Read list, check all that apply, probe for other*)

Storage Technology	March 2001	March 2002
1. Storage area networks (SAN)	_____	_____
2. Network attached storage (NAS)	_____	_____
3. Direct-attached storage (storage connected via SCSI (Sk-uzzy) connection)	_____	_____
4. RAID	_____	_____
5. Storage services	_____	_____
6. Distributed caching appliance	_____	_____
7. Distributed caching software	_____	_____
8. Are there any others (Specify)	_____	_____
9. Don't know/Refuse [Do not read, enter 999]	_____	_____

Enterprise Content Delivery Section

For this survey we will define **enterprise content delivery network (CDN) technology** as a solution that enables content to be intelligently delivered through an overlay network of CDN devices, such as caches, located strategically close to end users. By delivering frequently accessed content, organizations can reduce bandwidth demand on local area networks (LANs) and wide area networks (WANs).

38a. Do you currently use content delivery technology in your network? (Check one)

1._____Yes
2._____No
3._____Don't know/Refuse

38b. Do you plan to use content delivery technology in your network by March 2002? (Check one)

1._____Yes
2._____No
3._____Don't know/Refuse

[IF "NO" OR "DON'T KNOW" TO BOTH YEARS, SKIP TO Q.44]

[SKIP BY YEAR BASED ON Q.38A & 38B]

38c. Which of the following enterprise content delivery network functions do you outsource now? Which will you outsource by March 2002? (*Read list, check all that apply, probe for others*)

CDN Functions	March 2001	March 2002
1. CDN network design	_____	_____
2. CDN network build out	_____	_____
3. CDN network operation	_____	_____
4. Managed CDN services for *External* network	_____	_____
5. Digital rights management for enterprise CDN	_____	_____
6. Consulting and professional services	_____	_____
7. Are there any others (Specify)	_____	_____
8. None [do not read]	_____	_____
9. Don't know/Refuse [Do not read]	_____	_____

[SKIP BASED ON Q. 38A & 38B]

39. Which of the following ways do you currently use content delivery products or services in your enterprise network? Which do you plan to use March of 2002? (*Read list, check all that apply*)

CDN Content	March 2001	March 2002
1. Distribute *static* HTTP content for Intranet Web Pages	_____	_____
2. Distribute *dynamic* content for Intranet Web Pages (dynamic content is HTTP pages that are built on the fly)	_____	_____
3. Pre-cache video streaming content throughout enterprise network for video-on-demand	_____	_____
4. Pre-cache audio streaming content throughout enterprise network	_____	_____
5. File distribution, including documents news and reports throughout the enterprise network	_____	_____
6. Live streaming events (for example event briefings and management presentations)	_____	_____
7. Are there any others (specify)	_____	_____
8. Don't know/Refuse [Do not read]	_____	_____

[SKIP Q.40 & 41 - BASED ON Q. 38A & 38B]

40. What content delivery products do you currently use in your network? (Open ended)
    1. Don't know/Refuse
    2. Don't currently use
    3. Specify:_____

41. What content delivery products do you plan to use in your network in 2002? (Open ended)
    1. Don't know/Refuse
    2. Don't currently use
    3. Specify:_____

42. Why do you use or plan to use content delivery technology? (Open ended)
    1. Don't know/Refuse
    2. Don't currently use
    3. Specify:_____

43. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following features when choosing content delivery network products for enterprise CDNs? (Fill in rating) Rotate answers 1-8--Enter 8 for DK or refuse

_____ 1. _____Software based CDN product solution

_____ 2. _____Appliance based CDN product solution

_____ 3. _____Security features

_____ 4. _____Digital rights management capabilities

_____ 5. _____Offers on-demand streaming features

_____ 6. _____Offers live streaming features

_____ 7. _____Performance to end users

_____ 8. _____Performance testing reports based on 3rd party lab results

_____ 9. _____Are there any other features that are important when choosing a content delivery service provider? *[Specify other feature]*

Go to Q 45

44. Why don't you use or plan to use content delivery technology? (Open ended)
    1. Don't know
    2. Specify:_____

Bandwidth and Performance Section

45. Which of the following technologies does your company currently use to increase network performance now? Which technologies will your company use by 2002? (Check all that apply) (Read list)

Performance Technologies	March 2001	March 2002
1. Local Load balancing	_____	_____
2. Global Load balancing	_____	_____
3. Bandwidth optimization and traffic shaping products (e.g. Xedia)	_____	_____
4. Reverse Proxy Cache (server acceleration)	_____	_____
5. Distributed caching	_____	_____
6. Multicast	_____	_____
7. Push technologies (e.g. Marimba, Tibco)	_____	_____
8. Content Delivery Products (e.g. CacheFlow, Inktomi, and Infolibria.)	_____	_____
9. Quality of service (QoS) mechanisms (e.g. MPLS, DiffServe)	_____	_____
10. Any other technologies Specify: _____	_____	_____
11. Don't know/Refuse [Do not read]	_____	_____
12. None [Do not read]	_____	_____

46. Which of the following Quality of Service technologies does your company currently use to increase performance on your network now? Which technologies will your company use by 2002? (Check all that apply) (Read list)

QoS	**March 2001**	**March 2002**
1. MPLS	_____	_____
2. DiffServ	_____	_____
3. ATM	_____	_____
4. RSVP	_____	_____
5. IPv6 (IP version 6)	_____	_____
6. Any other technologies (Specify)	_____	_____
7. Don't know/Refuse [Do not read]	_____	_____
8. None [Do not read]	_____	_____

47. What are the top three bottlenecks within your enterprise network? (A bottleneck is a choke point in the network where network performance is affected by congestion) (Open-ended. Allow up to 3 responses)
   1. Don't know/Refuse
   2. Specify: _____

48a. Which of the following statistics do you CURRENTLY gather and use for streaming media content? (Check all that apply) (Read list – Rotate except 10-11)

_____ 1. _____Number of concurrent users

_____ 2. _____Bit rate at which users are accessing streaming content

_____ 3. _____Streaming content most frequently accessed

_____ 4. _____Users geographic location

_____ 5. _____Content Meta data information (Streaming content information)

_____ 6. _____Buffer time

_____ 7. _____Number of buffers required

_____ 8. _____Average round trip time (RTT) to users

_____ 9. _____Are there any other statistics: _____

10. _____None *[Do not read]*

11. _____Don't know/Refuse *[Do not read]*

48b. Which of the following statistics WOULD YOU LIKE TO gather and use for streaming media content? (Check all that apply) (Read list – Rotate except 10-11, show only answers not mentioned in Q48a, show all if 48a=10-11)

_____ 1. _____Number of concurrent users

_____ 2. _____Bit rate at which users are accessing streaming content

_____ 3. _____Streaming content most frequently accessed

_____ 4. _____Users geographic location

_____ 5. _____Content Meta data information (Streaming content information)

_____ 6. _____Buffer time

_____ 7. _____Number of buffers required

_____ 8. _____Average round trip time (RTT) to users

_____ 9. _____Are there any other statistics: _____

10. _____None *[Do not read]*

11. _____Don't know/Refuse *[Do not read]*

Capacity Planning Section

49. What are the top three challenges when planning for network growth? (Open ended. Allow up to 3 responses)
   1. *Don't know/Refuse*
   2. *Specify:*_____

50. What tools do you use to determine when your network needs additional capacity? (Open ended. Allow up to 3 responses)
   1. *Don't know/Refuse*
   2. *Specify:*_____

SLAs

51. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the following service level agreements for streaming services when choosing a service provider? (Fill in rating) Rotate 1-6--Enter 8 for DK or refused

_____ 1. _____Latency measured from streaming server to end user

_____ 2. _____Availability

_____ 3. _____Time to repair

_____ 4. _____End user experience based on 3rd party validation (e.g. Keynote)

_____ 5. _____Average round trip time (RTT) to user

_____ 6. _____End user experience based on service provider validation

7. _____Are there any other SLAs that are important for content delivery services when choosing a service provider for site connectivity? *[Specify other agreement]*

Revenue and Expenditures Section

[SKIP BY YEAR BASED ON Q.3]

52a. How much does your company spend or plan to spend on the following expenditure areas for 2001? (Fill in expenditures)

Expenditures 2001

[Range 0-9,999,999,999 -- Enter 9,999,999,998 for refused. Enter 9,999,999,999 for DK]

1. Streaming management products $_____
2. Enterprise streaming services $_____
3. Streaming media content creation $_____
4. Outsourcing streaming media services $_____
5. Streaming server software $_____
6. Caching $_____
7. Streaming hardware, not including multi-purpose operating system servers (e.g. Unix server, NT server) $_____
8. Multi-purpose operating system servers (e.g. Unix server, NT server) used for streaming in the enterprise $_____
9. Are there any others (specify) _____ $_____

[SKIP BY YEAR BASED ON Q.3]

53a. How much does your company plan to spend on the following expenditure areas for 2002? (Fill in expenditures)

Expenditures	2002
[Range 0-9,999,999,999 -- Enter 9,999,999,998 for refused. Enter 9,999,999,999 for DK]	
1. Streaming management products	$_____
2. Enterprise streaming services	$_____
3. Streaming media content creation	$_____
4. Outsourcing streaming media services	$_____
5. Streaming server software	$_____
6. Caching	$_____
7. Streaming hardware, not including multi-purpose operating system servers (e.g. Unix server, NT server)	$_____
8. Multi-purpose operating system servers (e.g. Unix server, NT server) used for streaming in the enterprise	$_____
9. Are there any others (specify) _____	$_____

Market Messaging

54. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following attributes when choosing a *service provider* for streaming services? (Fill in rating) Rotate answers 1-9--Enter 8 for DK or refuse

_____ 1. _____Ability to expand streaming bandwidth capacity immediately

_____ 2. _____Service provider reputation

_____ 3. _____Service and support

_____ 4. _____Established service provider (e.g. AT&T, UUNet)

_____ 5. _____Service providers' network buildout plans

_____ 6. _____Offers on-demand streaming services

_____ 7. _____Offers live streaming services

_____ 8. _____Performance to end users

_____ 9. _____Offers professional services

_____ 10. _____Are there any other features that are important when choosing a content delivery service provider? *[Specify other feature]*

55. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following attributes when choosing a *product manufacturer* for streaming hardware and software? (Fill in rating) (Rotate answers 1-12--Enter 8 for DK or refuse)

_____ 1. _____Future product plans

_____ 2. _____Product manufacturer reputation

_____ 3. _____Service and support

_____ 4. _____Established product manufacturer (e.g. CacheFlow, Cisco, Inktomi)

_____ 5. _____Offers professional services

_____ 6. _____Bandwidth prioritization and management

_____ 7. _____Software based streaming product

_____ 8. _____Appliance based streaming product

_____ 9. _____Performance

_____ 10. _____Cost per stream

_____ 11. _____Manageability

_____ 12. _____Reporting functions

_____ 13. _____Are there any other features that are important when choosing a content delivery service provider? *[Specify other feature and score]*

56. On a scale of 1 to 7, where 1 is not useful and 7 is very useful, please rate the following sources for learning about new products and services? (Fill in rating) (Rotate questions 1-11--Enter 8 for DK or refused)

_____ 1. _____Trade magazines

_____ 2. _____Traditional seminars

_____ 3. _____Trade shows

_____ 4. _____Vendor Web sites

_____ 5. _____Online magazines

_____ 6. _____Vendor white papers

_____ 7. _____Trade show conference sessions

_____ 8. _____Online seminars

_____ 9. _____Independent white papers

_____ 10. _____Web-based seminars

_____ 11. _____Vendor sales

12. _____Are there any other sources that are important for learning about new products and services? *[Specify other source]*

57. What are the top 3 publications that are most influential in your purchase of streaming products and services? (Open ended, do not read list, allow up to 3 responses)

1. Don't know/Refuse
2. Specify:_____
3. Internet Week
4. Information Week
5. Interactive Week
6. Internet World
7. eWeek
8. Info World
9. Network World
10. Network Magazine
11. PC Magazine
12. Network Computing
13. America's Network
14. CRN
15. Enterprise Linux
16. Government Computer News
17. Linux World

Challenges Section

58. What are the top 3 barriers for implementing streaming media in the enterprise? (Open ended, allow up to 3 responses)
    1. Don't know/Refuse
    2. Specify:_____

59. What is the title of the person or persons responsible for making the final decision on streaming products or services? (Record all that apply, read list as necessary)

_____ 1. _____Chief Technology Officer (CTO)

_____ 2. _____Chief Executive Officer (CEO)

_____ 3. _____Chief Financial Officer (CFO)

_____ 4. _____Chief Operations Officer (COO)

_____ 5. _____Chief Information Officer (CIO)

_____ 6. _____Director of Information Systems

_____ 7. _____VP of Technology

_____ 8. _____Other, Specify Title: _____

9. _____Don't know/Refuse *[Do not read]*

60. What are the largest <u>technical</u> challenges associated with streaming, your company faces? (Open ended)
    1. Don't know/Refuse
    2. Specify:_____

61. What are the largest <u>business</u> challenges associated with streaming, your company faces? (Open ended)
    1. Don't know/Refuse
    2. Specify:_____

62. Approximately what is the annual revenue for your company? (Fill in revenue)

    Annual revenue: $_____

    [Range 0-9,999,999,999 -- Enter 9,999,999,998 for refused. Enter 9,999,999,999 for DK]

Thank you for participating in the HTRC Groups' enterprise streaming study. We will email you a PDF version of the executive summary for your participation at the end of April.

Just to confirm, do I have the correct e-mail address? *Verify e-mail address*
Thank you very much for your time.

Exit Questionnaire

Enterprise Content Delivery Section

For this survey we will define **enterprise content delivery network (CDN) technology** as a solution that enables content to be deterministically delivered through an overlay network of CDN devices, such as caches, located strategically close to end users. By delivering frequently accessed content, organizations can reduce bandwidth demand on local area networks (LANs) and wide area networks (WANs).

E1. Do you use or plan to use content delivery technology in your network by March 2002? (Check one)

1._____Yes
2._____No (Go to Q8)
3._____Don't know/Refuse (terminate)

E2. Which of the following enterprise content delivery network functions do you outsource now? Which will you outsource by March 2002? (*Read list, check all that apply, probe for others*)

CDN Functions	March 2001	March 2002
1. CDN network design	_____	_____
2. CDN network build out	_____	_____
3. CDN network operation	_____	_____
4. Managed CDN services for *External* network	_____	_____
5. Digital rights management for enterprise CDN	_____	_____
6. Consulting and professional services	_____	_____
7. Are there any others (Specify)	_____	_____
8. None [do not read]	_____	_____
9. Don't know/Refuse [Do not read]	_____	_____

(IF Q.E2 = 8 – NONE- SKIP TO Q.E8)

E3. Which of the following ways do you currently use content delivery products or services in your enterprise network? Which do you plan to use March of 2002? (*Read list, check all that apply, probe for others*)

CDN Content	March 2001	March 2002
1. Distribute *static* HTTP content for Intranet Web Pages	_____	_____
2. Distribute *dynamic* content for Intranet Web Pages (dynamic content is HTTP pages that are built on the fly)	_____	_____
3. Pre-cache video streaming content throughout enterprise network for video-on-demand	_____	_____
4. Pre-cache audio streaming content throughout enterprise network	_____	_____
5. File distribution, including documents news and reports throughout the enterprise network	_____	_____
6. Live streaming events (for example event briefings and management presentations)	_____	_____
7. Do not use content delivery technology [do not read]	_____	
8. Are there any others? [Specify]	_____	_____
9. Don't know/Refuse [Do not read]	_____	_____

[if Q.E3=2001 #7, do not ask Q.E4]

E4. What content delivery products do you currently use in your network now? (Open ended)
1. Don't know
2. Specify:_____

[if Q.E3=2002 #7, do not ask Q.E5]

E5. What content delivery products do you plan to use in your network in 2002? (Open ended)
1. Don't know
2. Specify:_____

E6. Why do you use or plan to use content delivery technology? (Open ended)
1. Don't know/Refuse
2. Specify:_____

E7. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following features when choosing content delivery network products for enterprise CDNs? (Fill in rating). Rotate answers 1-10--Enter 8 for DK or refuse

_____ 1. _____Software based CDN product solution

_____ 2. _____Appliance based CDN product solution

_____ 3. _____Security features

_____ 4. _____Digital rights management capabilities

_____ 5. _____Offers on-demand streaming features

_____ 6. _____Offers live streaming features

_____ 7. _____Performance to end users

_____ 8. _____Performance testing reports based on 3rd party lab results

_____ 9. _____Are there any other features that are important when choosing a content delivery service provider? *[Specify other feature]*

[QE7 1-9, Skip to conclusion]

E8. Why don't you plan to use content delivery technology? (Open ended)
1. Don't know
2. Specify:_____

Thank you for participating in the HTRC Groups' enterprise streaming study. We will email you a PDF version of the executive summary for your participation at the end of April.

Just to confirm, do I have the correct e-mail address? *Verify e-mail address*
Thank you very much for your time.

Appendix B

Data Summary

Q2 Approximately how many employees are in your entire organization?

(n=98)

Number of Employees

From	To	Number	Percent
500	1,000	23	23%
1,001	5,000	29	30%
5,001	25,000	22	22%
25,001	200,000	24	24%

	All	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Mean	22,206	776	3,079	14,773	72,667
Median	5,000	800	3,000	13,500	64,500
Mode	5,000	1,000	5,000	20,000	30,000
Std. Dev	37,370	188	1,333	5,895	47,175

*Two respondents replied that they have more than 500 employees, but no specific number was given

Q3 Do you use or plan to use streaming media technology in your network now? Do you plan to use streaming media technology by March of 2002?

(n=232)

	2001		2002	
Streaming	Number	Percent	Number	Percent
Yes	82	35%	98	42%
No	150	65%	134	58%

Q4 Of the following categories of decision makers, which would best describe your position when purchasing products or services?

n=100

Decision Maker	Number	Percent
Primary	25	25%
Secondary	45	45%
Ancillary	30	30%

Q5 In which of the following regions of the world does your organization have physical site locations?

n=100

Geographic Region	Number	Percent
North America	100	100%
Europe	55	55%
Asia Pacific	51	51%
South America	35	35%
Middle East/Africa	32	32%

Q6 How many total physical site locations does your organization currently have? How many will your organization have by March of 2002?

Number of Sites		2001		2002	
From	**To**	**Number**	**Percent**	**Number**	**Percent**
1	100	66	78%	58	73%
101	500	15	18%	17	21%
501	100,000	4	5%	5	6%

(n=85)		(n=80)	
2001		**2002**	
Mean	1474.98	Mean	1648.14
Median	21	Median	24.5
Mode	100	Mode	200
Std. Dev	10898.142	Std. Dev	11246.314

Q7 What is your organization's line of business?

n=100

Number	Percent	Type of Organization
34	34%	Manufacturing
17	17%	Professional, Scientific, and Technical Services
14	14%	Educational Services
8	8%	Public Admin, Gov't/Military
7	7%	Information
5	5%	Utilities
4	4%	Finance and Insurance
4	4%	Health Care and Social Assistance
3	3%	Transportation and Warehousing
3	3%	Retail Trade
2	2%	Construction

*Note one respondent operates in 2 categories

Q8 Which of the following best describes the streaming media hosting strategy for your network?

(n=100)

Hosting Strategy	Number	Percent
Self-hosted	59	59%
Hybrid colocation	22	22%
Hosted	15	15%
Other	1	1%
Don't Know/Refused	3	3%

Other Response:
CONGLOMERATION OF ALL THREE

Q9 What is the total capacity of your network in Mega bits per second? What will it be by March of 2002?

Network Capacity (Mbps)	2001 Number	Percent	2002 Number	Percent
0 to 10	11	18%	6	12%
11 to 100	29	48%	22	42%
101 to 1,000	16	27%	18	35%
1,001+	4	7%	6	12%

(n=60) 2001		(n=52) 2002	
Mean	509.52	Mean	830.81
Median	100	Median	100
Mode	100	Mode	100
Std. Dev	1447.08	Std. Dev	1971.91

Q10 Of your total enterprise network capacity, currently what percent of your total traffic is streaming? What percent will it be by March of 2002?

Percent Total of Streaming Traffic	2001 Number	Percent	2002 Number	Percent
0 to 10	57	77%	41	52%
11 to 50	13	18%	32	41%
51 to 100	4	5%	6	8%

(n=74) 2001		(n=79) 2002	
Mean	12.07	Mean	18.8
Median	5	Median	10
Mode	5	Mode	10
Std. Dev	19.45	Std. Dev	21.34

	2001	2002
1st Qtile	0.5%	2.2%
2nd Qtile	2.3%	8.0%
3rd Qtile	7.3%	16.5%
4th Qtile	39.1%	49.0%

Q11 How many total data centers do you use to host streaming media content? By March of 2002?

Number of Data Centers	2001 Number	Percent	2002 Number	Percent
1 to 10	78	89%	73	82%
11 to 50	7	8%	13	15%
51 to 1,000	3	3%	3	3%

(n=88) 2001		(n=89) 2002	
Mean	18.9	Mean	46.87
Median	1	Median	3
Mode	1	Mode	1
Std. Dev	109.62	Std. Dev	321.31

Q12 Approximately what percent of your organization's employees have streaming enabled computers? Approximately what percent by March of 2002?

Percent Streaming Enabled PCs	**2001 Number**	**Percent**	**2002 Number**	**Percent**
0 to 25	17	21%	15	16%
26 to 50	17	21%	17	18%
51 to 75	7	9%	12	13%
76 to 100	39	49%	52	54%

(n=80) **2001**		(n=96) **2002**			**2001**	**2002**
Mean	61.93	Mean	71.2	1st Qtile	11.6%	21.8%
Median	72.5	Median	87.5	2nd Qtile	51.9%	63.7%
Mode	100	Mode	100	3rd Qtile	85.0%	92.9%
Std. Dev	34.91	Std. Dev	32.05	4th Qtile	100%	100%

Q13 Regarding the capacity of your enterprise streaming infrastructure, how many simultaneous streams do you currently use? By March of 2002?

# of Simultaneous Streams	**2001 Number**	**Percent**	**2002 Number**	**Percent**
1 to 100	43	90%	58	87%
101 to 1,000	3	6%	4	6%
1,001 to 25,000	2	4%	5	7%

(n=48) **2001**		(n=67) **2002**			**2001**	**2002**
Mean	155.94	Mean	642.48	1st Qtile	1	1.5
Median	4.5	Median	10	2nd Qtile	2.8	7.1
Mode	1	Mode	10	3rd Qtile	15.8	24.2
Std. Dev	602.56	Std. Dev	2718.50	4th Qtile	604.2	2,503.1

Q14 How many total streaming servers do you currently have in your enterprise network now? By March of 2002?

Number of Streaming Servers	**2001 Number**	**Percent**	**2002 Number**	**Percent**
1 to 50	66	94%	64	91%
51 to 500	3	4%	4	6%
501 and above	1	1%	2	3%

(n=70) **2001**		(n=70) **2002**			**2001**	**2002**
Mean	31.36	Mean	42.56	1st Qtile	0	1.6
Median	2	Median	5	2nd Qtile	1	3.4
Mode	0	Mode	2	3rd Qtile	3.6	8.8
Std. Dev	125.2	Std. Dev	143.91	4th Qtile	123.8	170.8

Q15 What streaming server software do you currently use in your network? Plan to by March of 2002?

Type of Streaming Software	2001 (n=100) Number	Percent	2002 (n=100) Number	Percent
Microsoft Windows Media	56	56%	61	61%
Real Networks Real Video	48	48%	52	52%
Real Networks Real Audio	45	45%	46	46%
Apple QuickTime	21	21%	20	20%
Cisco IPTV	13	13%	24	24%
MP3/M3U Server Software	12	12%	15	15%
Others	2	2%	2	2%
Do not Use Streaming Software	24	24%	3	3%
Don't Know/Refused	2	2%	16	16%

Q16 What operating system do you currently use for your streaming servers? Plan to use by March of 2002?

Operating Sys Software	2001 (n=100) Number	Percent	2002 (n=100) Number	Percent
Windows NT	53	53%	50	50%
Windows 2000	32	32%	61	61%
Unix	25	25%	28	28%
Solaris	14	14%	16	16%
Linux	11	11%	13	13%
Mac OS	9	9%	11	11%
Other	5	5%	7	7%
Do Not Use	21	21%	2	2%
Don't Know	4	4%	5	5%

Other Responses:

2001 CISCO PROPRIETARY OS
HOSTED BY SOMEONE ELSE
MICROSOFT EXCHANGE
NOVELL
WIN98

2002 CISCO CDN
IT'S HOSTED BY SOMEONE ELSE
MICROSOFT EXCHANGE
NOVELL
WIN 95
WIN98 (2)

Q17 Which of the following enterprise streaming media functions does your company outsource now? Which will you outsource by March 2002?

Outsourcing	2001 (n=100) Number	Percent	2002 (n=100) Number	Percent
Content production	19	19%	26	26%
Streaming network build-out	12	12%	15	15%
Storage services for streaming media	12	12%	17	17%
Streaming network design	11	11%	19	19%
Streaming network operations	11	11%	14	14%
Digital rights mgmt, streaming media	5	5%	10	10%
None	64	64%	46	46%
Don’t know/Refuse	8	8%	15	15%

Q18 Which of the following service provider types would you prefer to use for enterprise streaming services?

(n=100)	**2001**	
Service Provider Types	**Number**	**Percent**
International ISP	24	24%
Streaming provider	20	20%
Hosting provider	20	20%
National ISP	19	19%
CDN Provider	19	19%
Integrators	13	13%
Others	4	4%
None	18	18%
Don't know/Refuse	12	12%

Other Responses:
IN-HOUSE (2)
LOCAL SERVICE PROVIDERS
DOT-MAIL

Q19 On a scale of 1 to 7 where 1 is do not agree and 7 is strongly agree, please rate the following reasons for considering outsourcing streaming services?

Percent	**Total**	**Rated 5-7**	**Reasons for Outsourcing**
76%	99	75	IT overloaded with other tasks
55%	99	54	Do not have in-house expertise
54%	99	53	New applications are difficult
44%	98	43	It costs less to outsource

Additional Responses:
BUSINESS CLIMATE
EASIER FOR EXTERNAL PURPOSES
FOLLOWING GENERAL TREND
MANAGERIAL
SMALL BUSINESS INCENTIVES

Q20 Which of the following types of streaming media does your company use now? Which will you use by March of 2002?

	2001 (n=100)		**2002** (n=100)	
Streaming Media Types	**Number**	**Percent**	**Number**	**Percent**
Video	72	72%	97	97%
Audio	71	71%	88	88%
Others	1	1%	4	4%
None	19	19%	2	2%
Don't know/Refuse	4	4%	0	0%

Other Responses:
2001 TAPE BACKUP

2002 DOCUMENT
MP3
TAPE BACKUP
WHITE BOARD

Q21 Of your streaming media traffic, what are the percentages for the following types of traffic? What will these percentages be by March 2002?

(n=68)

2001 Enterprise		**2001 Extranet**	
Mean	56.59	Mean	43.41
Median	70	Median	30
Mode	100	Mode	0
Std. Dev	38.45	Std. Dev	38.45

(n=86)

2002 Enterprise		**2002 Extranet**	
Mean	57.91	Mean	42.09
Median	65	Median	35
Mode	100	Mode	0
Std. Dev	35.22	Std. Dev	35.22

Streaming Media Traffic: Enterprise	**Number 2001**	**Percent 2001**	**Number 2002**	**Percent 2002**
0 to 25%	24	34%	23	26%
26 to 50%	10	14%	18	20%
51 to 100%	37	52%	47	53%

Streaming Media Traffic: Extranet	**Number 2001**	**Percent 2001**	**Number 2002**	**Percent 2002**
0 to 25%	36	51%	40	45%
26 to 50%	9	13%	20	23%
51 to 100%	26	37%	28	32%

Q22 Of the following ways to deliver streaming media, which do you use now? Which will you use by March 2002?

	2001 (n=100)		**2002** (n=100)	
Streaming Delivery	**Number**	**Percent**	**Number**	**Percent**
Streaming media server	46	46%	65	65%
File Transfer Protocol	40	40%	46	46%
Outsourced to service provider	16	16%	21	21%
None	23	23%	2	2%
Don't Know/Refused	5	5%	7	7%

Q23 Which of the following does your company use streaming media for now? Which do you plan to use by March of 2002?

Streaming Media Uses	**2001** (n=100) Number	Percent	**2002** (n=100) Number	Percent
Training for employees	57	57%	80	80%
Increasing internal communications	55	55%	75	75%
Intra-company meetings and collaboration	52	52%	71	71%
Increasing external communications	43	43%	58	58%
Training for customers and suppliers	41	41%	56	56%
Marketing events	38	38%	55	55%
Business to business collaboration	33	33%	48	48%
Investor relations	16	16%	29	29%
None	23	23%	2	2%
Others	2	2%	3	3%
Don't Know	0	0%	1	1%

Q23 Other Responses

2001 EDUCATION
PUBLIC OUTREACH PROGRAMS

2001 DISTANCE EDUCATION
EDUCATION
VIDEOCONFERENCING

Q24 Which of the following kinds of streaming audio and video does your company use now? Which will you plan to use by March of 2002?

Streaming Audio/Video Uses	**2001** (n=100) Number	Percent	**2002** (n=100) Number	Percent
On-demand Streaming media content	59	59%	81	81%
Live Streaming media content	44	44%	59	59%
Secure streaming content	37	37%	56	56%
None	23	23%	2	2%
Don't Know	1	1%	3	3%

Q25 For audio and video on-demand streaming, which of the following streaming formats do you use or plan to use?

(n=83)

On-Demand Streaming Formats	**2001 Number**	**Percent**
Real Audio	58	70%
Real Video	58	70%
Microsoft Media	53	64%
QuickTime	31	37%
MPEG 2	24	29%
MP3 or M3U	24	29%
Cisco IP TV	23	28%
MPEG 1	21	25%
MPEG 4	19	23%
Others	1	1%
Don't know/Refused	6	7%

Other Responses:
MACROMEDIA

Q26 For audio and video live streaming media, which of the following streaming formats do you use or plan to use?

(n=62)

Live Streaming Formats	**2001 Number**	**Percent**
Microsoft Media	45	73%
Real Video	42	68%
Real Audio	41	66%
QuickTime	24	39%
MPEG 2	18	29%
MP3 or M3U	18	29%
Cisco IP TV	18	29%
MPEG 1	16	26%
MPEG 4	15	24%
Others	3	5%
Don't know/Refused	4	6%

Other Responses:
INTERNAL APPLICATIONS
NONE

Q27 Does your company create streaming media content in 2001?

(n=82)

Create Streaming Media Content	**2001 Number**	**Percent**
Yes	61	74%
No	19	23%
Don't Know	2	2%

Q27a Does your company plan to create streaming media content by 2002?

(n=98)

Create Streaming Media Content	**2002 Number**	**Percent**
Yes	82	84%
No	9	9%
Don't Know	7	7%

Q28 Which of the following streaming media creation functions does your company currently perform internally? By March 2002?

Internal Streaming Media Creation Functions	**2001** (n=100)		**2002** (n=100)	
	Number	**Percent**	**Number**	**Percent**
Production	50	50%	69	69%
Encoding	46	46%	57	57%
Asset Management	39	39%	54	54%
Streaming Media App Development	35	35%	54	54%
Others	2	2%	1	1%
None	40	40%	19	19%
Don't Know/Refuse	1	1%	2	2%

Other Responses:
2001 LIVE
WE OUTSOURCE IT CURRENTLY

2002 LIVE

Q29 Does your company currently outsource the creation of streaming media content? (check only one)

(n=82)

Outsource Streaming Media Content	**2001 Number**	**Percent**
Yes	27	33%
No	51	62%
Don't Know	4	5%

Q29a Does your company plan to outsource the creation of streaming media content in 2002?

(n=98)

Outsource Streaming Media Content	**2002 Number**	**Percent**
Yes	34	41%
No	43	52%
Don't Know	21	26%

Q30 Which of the following streaming media creation functions does your company currently outsource? By March 2002?

Outsource Streaming Media Creation Functions	**2001** (n=34)		**2002** (n=34)	
	Number	**Percent**	**Number**	**Percent**
Production	20	59%	26	76%
Streaming Media App Development	17	50%	23	68%
Encoding	15	44%	22	65%
Asset Management	11	32%	16	47%
Others	1	3%	1	3%
None	8	24%	1	3%
Don't Know/Refuse	2	6%	1	3%

Other Responses:
2001 BUSINESS PRESENTATION

2002 BUSINESS PRESENTATION

Q31 Do you currently use enterprise streaming media with partners, suppliers, or customers?

(n=100)

Enterprise Streaming Partners, etc.	**2001 Number**	**Percent**
Yes	39	48%
No	58	71%
Don't Know	3	4%

Q31a Do you plan to use enterprise streaming media with partners, suppliers, or customers by March 2002?

(n=100)

Enterprise Streaming Partners, etc.	**2002 Number**	**Percent**
Yes	60	61%
No	29	30%
Don't Know	11	11%

Q32 Which of the following types of external organizations does your company plan to use streaming media now? By March 2002?

Types of External Organizations	**2001** (n=60) **Number**	**Percent**	**2002** (n=60) **Number**	**Percent**
Customers	29	48%	44	73%
Business Partners	23	38%	37	62%
Suppliers	15	25%	27	45%
Others	1	2%	3	5%
None	21	35%	0	0%
Don’t know/Refuse	0	0%	0	0%

Other Responses:

2001 EDUCATION

2002 DISTRIBUTORS
EDUCATION
SHARE HOLDERS

Q33 Approximately what is your total storage capacity need in Gigabytes (GB) for all data on your network? By March 2002?

(n=47) **2001**		(n=41) **2002**	
Mean	12,487	Mean	20,391
Median	1,000	Median	2,000
Mode	100	Mode	2,000
Std. Dev	46066.133	Std. Dev	79136.643

Total Storage Capacity (GB)	**Number 2001**	**Percent 2001**	**Number 2002**	**Percent 2002**
0 to 1,000	29	62%	16	39%
1,001 to 5,000	8	17%	13	32%
5,001+	10	21%	12	29%

Q34 Currently, what percent of your total storage is centralized? What percent is distributed? What will those percentages be by March of 2002?

(n=92)		(n=92)	
2001		**2001**	
Centralized Storage		**Distributed Storage**	
Mean	61.74	Mean	38.26
Median	70	Median	30
Mode	100	Mode	0
Std. Dev	32.246	Std. Dev	32.246

(n=90)		(n=90)	
2002		**2002**	
Centralized Storage		**Distributed Storage**	
Mean	63.67	Mean	36.33
Median	70	Median	30
Mode	100	Mode	0
Std. Dev	30.838	Std. Dev	30.838

Percent of Total Storage Centralized	**Number 2001**	**Percent 2001**	**Number 2002**	**Percent 2002**
0 to 25%	17	18%	16	18%
26 to 50%	19	21%	15	17%
51 to 100%	56	61%	59	66%

Percent of Total Storage Distributed	**Number 2001**	**Percent 2001**	**Number 2002**	**Percent 2002**
0 to 25%	41	45%	40	44%
26 to 50%	21	23%	26	29%
51 to 100%	30	33%	24	27%

Q35 Approximately what is the total storage capacity need in Gigabytes (GB) for the following types of data? By March 2002?

(n=38)		(n=36)	
2001	**Audio**	**2002**	**Audio**
Mean	83.84	Mean	132.47
Median	42.5	Median	44.5
Mode	10	Mode	100
Std. Dev	125.854	Std. Dev	176.378

(n=35)		(n=33)	
2001	**Video**	**2002**	**Video**
Mean	139.14	Mean	147.3
Median	100	Median	100
Mode	100	Mode	100
Std. Dev	189.916	Std. Dev	190.315

(n=26)		(n=28)	
2001	**VOD**	**2002**	**VOD**
Mean	112.69	Mean	134
Median	60	Median	98
Mode	100	Mode	100
Std. Dev	168.761	Std. Dev	179.493

(n=28)		(n=27)	
2001	**CAD**	**2002**	**CAD**
Mean	87.64	Mean	123.26
Median	45	Median	65
Mode	10	Mode	100
Std. Dev	118.569	Std. Dev	149.608

(n=34)		(n=31)	
2001	**Databases**	**2002**	**Databases**
Mean	149	Mean	164.13
Median	100	Median	100
Mode	100	Mode	100
Std. Dev	219.597	Std. Dev	221.871

Other Responses:

2001 BASIC USER FILES
E-MAIL
FILE SERVICE
FILE STORAGE
FLAT FILES
GEOPHYSICAL DATA
IMAGE DATA, REMOTELY SENSED
MAINFRAME - HUGH
MEMORY FARMS
OPERATING SYS BACKUPS
PICTURES
SALES AUTOMATION PROGRAMS
SOFTWARE
TAPES
TEXT FILES
TRANSACTION DATA
USER DATA HOME FILES
USER FILES
WEB AND PROGRAMMING

2002 BACKUP SERVER OS
E-MAIL
FILE SERVER
FILE STORAGE
FLAT FILES
GEOPHYSICAL DATA-6000 GB
MEMORY FARMS
PICTURES
SALES AUTOMATION PROGRAMS
TEXT FILES
TRANSACTION
USER FILES (2)
WEB AND PROGRAMMING-OFFICE FILES

Q36 Which of the following types of storage technologies does your company use for all data now? By March 2002?

All Data	**2001** (n=100)		**2002** (n=100)	
Types of Storage Technology	**Number**	**Percent**	**Number**	**Percent**
Direct-attached storage	78	78%	75	75%
RAID	78	78%	78	78%
Storage area networks	43	43%	55	55%
Network attached storage	43	43%	47	47%
Storage services	27	27%	30	30%
Others	4	4%	3	3%
Don't know/Refuse	2	2%	4	4%

Other Responses:

2001 ATTACHED BY FIBER
FIBER CHANNEL
OPTICAL JUKEBOX, SIMILAR TO RAID
OPTICAL STORAGE

2002 FIBER CHANNELS
OPTICAL STORAGE
SAME AS ABOVE; RAID-LIKE JUKEBOX

Q37 Which of the following types of storage technologies does your company use for streaming media now? By March 2002?

Streaming Media	**2001** (n=100)		**2002** (n=100)	
Types of Storage Technology	**Number**	**Percent**	**Number**	**Percent**
RAID	44	44%	62	62%
Direct-attached storage	42	42%	57	57%
Storage area networks	23	23%	41	41%
Network attached storage	22	22%	35	35%
Distributed caching appliance	16	16%	27	27%
Distributed caching software	16	16%	28	28%
Storage services	14	14%	18	18%
Others	2	2%	3	3%
None	18	18%	2	2%
Don't know/Refuse	14	14%	10	10%

Other Responses:

2001 FIBER CHANNEL
OPTICAL STORAGE

2002 ATTACHED STORAGE BY FIBER
FIBER CHANNEL
OPTICAL STORAGE

Q38a Do you currently use content delivery technology in your network?

(n=100)

Content Delivery in Network	**2001 Number**	**Percent**
Yes	30	30%
No	65	65%
Don't Know	5	5%

Q38b Do you plan to use content delivery technology in your network by March 2002?

(n=100)

Content Delivery in Network	2002 Number	Percent
Yes	54	54%
No	27	27%
Don't Know	19	19%

Q38c Which of the following enterprise content delivery network functions do you outsource now? Which will you outsource by March 2002?

CDN Functions Outsourced	2001 (n=54) Number	Percent	2002 (n=54) Number	Percent
CDN network design	11	20%	16	30%
CDN network build out	8	15%	13	24%
Consulting/professional services	8	15%	16	30%
CDN network operation	5	9%	7	13%
Digital Rights Mgmt for eCDN	5	9%	7	13%
Managed CDN services (External)	4	7%	8	15%
None	40	74%	22	41%
Don't know/Refuse	1	2%	7	13%

Q39 Which of the following ways do you currently use content delivery products or services in your enterprise network? Which do you plan to use March of 2002?

Enterprise Content Delivery Product/Service Usage	2001 (n=54) Number	Percent	2002 (n=54) Number	Percent
Distribute dynamic content (Intranet)	26	48%	42	78%
Distribute static HTTP content (Intranet)	25	46%	43	80%
File Distribution	23	43%	39	72%
Pre-cache video streaming (for VOD)	22	41%	38	70%
Pre-cache audio streaming	18	33%	34	63%
Live streaming events	16	30%	38	70%
None	24	44%	0	0%
Don't know/Refuse	0	0%	3	6%

Q40 What content delivery products do you currently use in your network?

(n=30)

CDN Products	2001 Number	Percent
Specify	13	43%
None	0	0%
Don't Know	17	57%

Open ended Responses:
(3) CISCO
(3) REAL NETWORKS
AKAMAI
ALTEON
APACHE SERVERS
CACHE SERVER

Q40 Continued...

COMPUTERLAND
CURRICULUM
DELL
DOCUMENTUM
HP
IBM
IE 5
MS STREAMING
ONLINE COURSES
PCZONE
PI (MFG DATA)
TIVOLI MGMT SOFTWARE
WEBSONS
WINDOWS MEDIA PLAYER

Q41 What content delivery products do you plan to use in your network in 2002?

(n=54)	**2002**	
CDN Products	**Number**	**Percent**
Specify	22	41%
None	0	0%
Don't Know	32	59%

Open-ended Responses:
(9) CISCO
(6) MICROSOFT
(6) REAL NETWORKS
AKAMAI
APACHE SERVERS
CACHE SERVER
CURRICULUM
DELL
DOCUMENTUM
HP
IBM
IE 5
LIVE ONLINE INSTEAD OF TAPED VIDEO
NETWORK APPLIANCE
ONLINE COURSES
QUICKTIME
STREAMING VIDEO
TIVOLI
WEBSONS

Q42 Why do you use or plan to use content delivery technology?

2001 (n=54)

Number	**Percent**	**Reasons for CDNs**
25	46%	Better Performance
17	31%	ROI/Reduce Costs
7	13%	Ease Operations
5	9%	Training
2	4%	Remain Competitive

Q43 On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following features when choosing content delivery network products for enterprise CDNs?

n=54

Percent	Total	Rated 5-7	CDN Provider Features
92%	52	48	Performance to end users
89%	53	47	Security features
73%	52	38	Offers on-demand streaming features
73%	52	38	Offers live streaming features
65%	52	34	Performance testing reports (3rd party)
63%	52	33	Software based CDN product solution
63%	52	33	Digital rights management capabilities
62%	50	31	Appliance based CDN product solution

Other Responses:
ABILITY TO SCHEDULE DOWNLOADS
COMPREHENSIVE MGMT SCHEME
CURRENT INFRASTRUCTURE, SCALABILITY
HETEROGENIOUS INTEGRATION
INTEGRATION WITH LOTUS NOTES
PERFORMANCE
PRICE
SPEED
SUPPORT

Q44 Why don't you use or plan to use content delivery technology?

n=35

Percent	Number	Reasons for No CDNs
34%	12	No Need
34%	12	Not Evaluated Yet
26%	9	Budget
9%	3	Network Sufficient

Q45 Which of the following technologies does your company currently use to increase network performance now? Which technologies will your company use by 2002?

n=100

	2001		2002	
Network Performance Technologies	Number	Percent	Number	Percent
Local Load balancing	66	66%	76	76%
Bandwidth optimization/Traffic Shaping	49	49%	58	58%
Multicast	45	45%	48	48%
Distributed caching	41	41%	51	51%
Global Load balancing	37	37%	48	48%
Quality of service (QoS) mechanisms	35	35%	43	43%
Reverse Proxy Cache	30	30%	35	35%
Push technologies	29	29%	35	35%
Content Delivery Products	23	23%	31	31%
Others	3	3%	2	2%
None	8	8%	2	2%
Don't know/Refuse	3	3%	4	4%

Other Responses:

2001 ANY NET TECHNOLOGY
ENTERPRISE
V LANS

2002 V LAN
ENTERPRISE

Q46 Which of the following Quality of Service technologies does your company currently use to increase performance on your network now? Which technologies will your company use by 2002?

n=100	**2001**		**2002**	
QoS Technologies	**Number**	**Percent**	**Number**	**Percent**
ATM	45	45%	48	48%
IPv6	20	20%	35	35%
MPLS	19	19%	21	21%
DiffServ	12	12%	15	15%
RSVP	11	11%	15	15%
Others	4	4%	1	1%
None	21	21%	11	11%
Don't know/Refuse	18	18%	21	21%

Other Responses:

2001 CISCO
FRAME RELAY
IP VERSION 4
T1

2002 CAMPUS ETHERNET

Q47 What are the top three bottlenecks within your enterprise network?

n=100

Percent	**Number**	**Bottlenecks**
53%	53	Insufficient Bandwidth
19%	19	Hardware
14%	14	Applications
4%	4	ATM
2%	2	Cost
2%	2	Large Files
2%	2	Maintenance
2%	2	Security
15%	15	Other
4%	4	None

Q48a Which of the following statistics do you CURRENTLY gather and use for streaming media content?

(n=100)

Statistics Collected	Number	Percent
Number of Concurrent Users	59	59%
Users geographic location	46	46%
Bit rates	45	45%
Average round trip time (RTT) to users	41	41%
Most frequently accessed content	39	39%
Buffer time	33	33%
Number of buffers required	33	33%
Content Meta data info (Streaming content)	17	17%
Others	1	1%
None	23	23%
Don't know/Refuse	7	7%

Other Reponses:
BANDWIDTH NUMBERS

Q48b Which of the following statistics WOULD YOU LIKE TO gather and use for streaming media content? *Note Q48b responses are in addition those of Q48a

(n=100)

Statistics Wanted	Number	Percent
Most frequently accessed content	31	31%
Number of buffers required	30	30%
Buffer time	29	29%
Bit rates	29	29%
Average round trip time (RTT) to users	27	27%
Content Meta data info (Streaming content)	26	26%
Number of Concurrent Users	26	26%
Users geographic location	22	22%
Others	0	0%
None	15	15%
Don't know/Refuse	13	13%

Q49 What are the top three challenges when planning for network growth? (Open-ended)

n=100

Percent	Number	Network Growth Challenges
54%	54	Budget
47%	47	Predicting Demand
22%	22	Legacy Network
16%	16	Technology Churn
6%	6	Storage
4%	4	Network Management
3%	3	Network Maintenance
22%	22	Other

Q50 What tools do you use to determine when your network needs additional capacity?

n=100

Percent	Number	Capacity Planning Tools
14%	14	Complaints
11%	11	Network Sniffers
6%	6	Custom Application
6%	6	HP Openview
77%	77	Other

Q51 On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the following service level agreements for streaming services when choosing a service provider?

Percent	Total	Rated 5-7	SLAs for Service Providers
90%	94	85	Availability
85%	94	80	Time to repair
76%	94	71	Average round trip time (RTT) to user
71%	94	67	Latency measured from streaming server to end user
66%	93	61	End user experience based on 3rd party validation
65%	94	61	End user experience - service provider validation
7%	96	7	Others

Q52a How much does your company spend or plan to spend on the following expenditure areas for 2001?

Expenditures for 2001			
Number	***Mean***	***Std Dev***	***Expense***
25	$1,611,800	3,492,183	Streaming management products
23	$929,565	2,199,014	Enterprise streaming services
26	$944,884	2,362,407	Streaming media content creation
16	$978,125	1,756,190	Outsourcing streaming media services
25	$244,200	617,742	Streaming server software
17	$396,352	962,518	Caching
24	$950,791	2,223,801	Streaming hardware, not including servers
23	$1,406,130	2,754,705	Multipurpose operating system servers
18	$26,862,222	59,307,212	Others

Q53a How much does your company plan to spend on the following expenditure areas for 2002?

Expenditures for 2002			
Number	***Mean***	***Std Dev***	***Expense***
20	$1,539,250	4,648,496	Streaming management products
20	$644,250	1,578,360	Enterprise streaming services
23	$851,523	2,268,452	Streaming media content creation
15	$857,333	2,559,913	Outsourcing streaming media services
20	$386,500	1,107,067	Streaming server software
17	$620,294	1,288,547	Caching
22	$610,318	1,147,051	Streaming hardware, not including servers
23	$2,499,130	6,627,514	Multipurpose operating system servers

Q54 On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following attributes when choosing a service provider for streaming services?

n=100

Percent	**Total**	**Rated 5-7**	**Desired Service Provider Attributes**
88%	95	84	Service and support
81%	95	77	Service provider reputation
77%	95	73	Ability to expand streaming bandwidth capacity
76%	95	72	Established service provider
75%	95	71	Offers live streaming services
75%	95	71	Performance to end users
72%	93	67	Offers professional services
66%	93	61	Service providers' network buildout plans
65%	94	61	Offers on-demand streaming services
		11	Other features

Q55 On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following attributes when choosing a product manufacturer for streaming hardware and software?

n=100

Percent	**Total**	**Rated 5-7**	**Streaming Product Manufacturer Attributes**
97%	98	95	Service and support
96%	99	95	Performance
92%	99	91	Manageability
88%	99	87	Product manufacturer reputation
85%	99	84	Bandwidth prioritization and management
83%	98	81	Reporting functions
82%	99	81	Established product manufacturer
80%	99	79	Cost per stream
76%	99	75	Software based streaming product
75%	97	73	Future product plans
71%	98	70	Offers professional services
62%	98	61	Appliance based streaming product
		3	Other features

Q56 On a scale of 1 to 7, where 1 is not useful and 7 is very useful, please rate the following sources for learning about new products and services?

n=100

Percent	Total	Rated 5-7	Scored for Learning
75%	99	74	Vendor Web sites
74%	100	74	Independent white papers
70%	99	69	Web-based seminars
69%	100	69	Trade magazines
69%	100	69	Vendor white papers
66%	98	65	Online seminars
65%	99	64	Trade show conference sessions
64%	100	64	Online magazines
64%	99	63	Traditional seminars
61%	100	61	Trade shows
53%	98	52	Vendor sales

Q57 What are the top 3 publications that are most influential in your purchase of streaming products and services?

(n=100)

Percent	Publication
15%	Network World
13%	Network Computing
7%	eWeek
7%	Network Magazine
6%	Information Week
6%	Computer World
5%	Info World
4%	Internet World
4%	Digital Video
4%	Web Techniques
3%	Interactive Week
3%	PC Magazine
3%	Government Computer News
3%	Linux World
3%	EDN
3%	New Media Magazine
2%	Internet Week
2%	PC WEEK
1%	America's Network
1%	Enterprise Linux
1%	AV Video Multimedia Producer
1%	Business Communications Review
1%	CIO
1%	Cisco Packet
1%	Communications Design
1%	Communication Weekly
1%	Communications for ACM
1%	Communications Week
1%	Computer Telephony
1%	Converge

Q57 Continued...

Percent	Publication
1%	EE DESIGN
1%	EMEDIA
1%	FEDERAL TECHNOLOGY
1%	INFO STORE
1%	LAN MAGAZINE
1%	LIGHT READING (FIBER OPTIC EMPHASIS)
1%	MAC ADDICT
1%	MACWORLD
1%	MANUFACTURER DOCUMENTATION
1%	MEDIA TECH
1%	MEDIAB
1%	MICRO WAREHOUSE
1%	MOBILE COMPUTING
1%	MSDN MAGAZINE
1%	MULTIMEDIA PRODUCER
1%	NETWORKING
1%	NETWORKING COMMUNICATIONS
1%	NEWSWEEK
1%	PRESENTATION
1%	PRODUCTIVITY POINT
1%	SERVER EXPERT
1%	SERVER WORKSTATION EXPERT
1%	SMART COMPUTING
1%	STREAMING MEDIA MAGAZINE
1%	STREAMING MEDIA.COM
1%	SYLLABUS
1%	TELE.COM
1%	UPSIDE
1%	VARI BUSINESS SERVICE
1%	VIDEO PRODUCER
1%	WEB SITES IN GENERAL FOR EVALUATIONS
1%	WIN2000 MAGAZINE
1%	WINDOWS
1%	WIRED
1%	WIRELESS
1%	WIRELESS REVIEWS
4%	NONE
34%	DON’T KNOW/REFUSE

Q58 What are the top 3 barriers for implementing streaming media in the enterprise?

(n=88)

Percent	Barrier for Implementing Streaming
55%	Cost
31%	Staffing Resources
29%	Bandwidth
16%	Need Network Upgrade
14%	ROI
9%	Technology Maturity
4%	Security
3%	Content Development
7%	Other

Q59 What is the title of the person or persons responsible for making the final decision on streaming products or services?

(n=100)

Percent	Title
23%	Director of Information Systems
18%	Chief Information Officer (CIO)
7%	VP of Technology
5%	Chief Executive Officer (CEO)
5%	Chief Financial Officer (CFO)
3%	Chief Technology Officer (CTO)
1%	Chief Operations Officer (COO)
32%	Other Title:
11%	Don't know/Refuse
1%	City Manager
1%	Computer Engineer
1%	College Dean
1%	Dept MGR of Telecommunications
1%	Dir. of C-Tech
1%	Director
1%	Division Director
1%	EVP of IS
1%	Executive VP
1%	Integrating Managers
1%	MIS Department
1%	Multimedia Manager
1%	Network Architect
1%	Network Manager
1%	Operations Manager
1%	Plant Manager
1%	Program Manager
1%	Purchaser
1%	Scattered
1%	School Board
1%	Services Manager
1%	Shared Decision
1%	Software Engineering Manager ENG MGR
1%	Software Manager
1%	Sr. Design Architect
1%	Surgeon General
1%	VP CIS
1%	VP E-Commerce
2%	President
2%	VP of IS

Q60 What are the largest technical challenges associated with streaming, your company faces?

(n=87)

Percent	Technical Challenges for Streaming
49%	Network Capacity
28%	Technology
13%	Cost
3%	Security
3%	Support
19%	Others

Q61 What are the largest business challenges associated with streaming, your company faces?

(n=76)

Percent	Business Challenges for Streaming
26%	ROI
21%	Cost
15%	Understanding Technology
11%	Implementation
9%	Content
8%	Others
5%	None

Q62 Approximately what is the annual revenue for your company?

(n=57)

Annual revenue:	
Mean	$1,661,136,842
Median	$500,000,000
Mode	$50,000,000
Std Dev	2,542,096,567

EXIT QUESTIONNAIRE

EQ-Q2 Approximately how many employees are in your entire organization?

(n=131)

Mean	33,697
Median	1,500
Mode	500
Std. Dev	222761.587

*Note one respondent only revealed company had more than 500 employees

EQ-Q2a (n=132)

Percent	Number	Number of Employees
100%	132	500+ employees
0%	0	Less than 500 employees
0%	0	Don't know/Refused

EQ-Q3 Do you use or plan to use streaming media technology in your network now? Do you plan to use streaming media technology by March of 2002?

(n=232)

Streaming	2001 Number	Percent	2002 Number	Percent
Yes	82	35%	98	42%
No	150	65%	134	58%

EQ-1 Do you currently use content delivery technology in your network?

(n=132)

Content Delivery in Network	2001 Number	Percent
Yes	9	4%
No	123	53%

EQ-2 Which of the following enterprise content delivery network functions do you outsource now? Which will you outsource by March 2002?

CDN Functions Outsourced	2001 (n=9) Number	Percent	2002 (n=9) Number	Percent
Consulting/professional services	5	56%	5	56%
CDN network build out	2	22%	2	22%
CDN network design	2	22%	2	22%
CDN network operation	2	22%	2	22%
Digital Rights Mgmt for eCDN	2	22%	2	22%
Managed CDN services (External)	2	22%	3	33%
None	4	44%	3	33%

EQ-3 Which of the following ways do you currently use content delivery products or services in your enterprise network? Which do you plan to use March of 2002?

Enterprise Content Delivery Product/Service Usage	2001 (n=6) Number	Percent	2002 (n=6) Number	Percent
Distribute static HTTP content (Intranet)	4	67%	6	100%
Distribute dynamic content (Intranet)	2	33%	5	83%
File Distribution	2	33%	3	50%
Pre-cache audio streaming	0	0%	2	33%
Live streaming events	0	0%	1	17%
Pre-cache video streaming (for VOD)	0	0%	1	17%
None	1	17%	0	0%
Don’t know/Refuse	1	17%	0	0%

EQ-4 What content delivery products do you currently use in your network now?

CDN Product Use	(n=5) Number	Percent
Specify	0	0%
No	0	0%
Don't Know	5	100%

EQ-5 What content delivery products do you plan to use in your network in 2002?

CDN Product (n=6)

Use	Number	Percent
Specify	1	17%
No	0	0%
Don't Know	5	83%

Response:
MICROSOFT PRODUCTS

EQ-6 Why do you use or plan to use content delivery technology?

(n=6)

2002 Number	Percent	Reason for Using Content Delivery
6	100%	Specify
0	0%	No
0	0%	Don't Know

Responses:
2001 COST REDUCTION
DIRECT THE INFORMATION TO THE APPROPRIATE GROUPS
DISTRIBUTION OF TIME AND COST
FOR TRAINING AND/OR DYNAMIC ORDER CONTROL
PLAN TO OUTSOURCE IT
TO EQUALLY DISTRIBUTE INFORMATION, TO ENABLE PEOPLE TO ATTEND

2002 MEETINGS WHICH ARE OTHERWISE DIFFICULT TO SCHEDULE
QUALITY IMPROVEMENT

EQ-7 On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following features when choosing content delivery network products for enterprise CDNs?

Percent	Rated 5-7	Number	Enterprise CDN Products
100%	6	6	Performance to end users
83%	5	6	Software based CDN product solution
83%	5	6	Security features
67%	4	6	Performance testing reports (3rd party)
60%	3	5	Appliance based CDN product solution
50%	3	6	Offers live streaming features
40%	2	5	Offers on-demand streaming features
33%	2	6	Digital rights management capabilities
0%	0	6	Others

EQ-8 Why don’t you plan to use content delivery technology?

(n=79)

Percent	Number	Reasons for no CDNS
82%	65	No Need
13%	10	Cost Prohibitive
8%	6	Network Sufficient
8%	6	Evaluating
5%	4	Not Familiar

Appendix C

Verbatim Responses

Q8 Which of the following best describes the streaming media hosting strategy for your network?

Other response

CONGLOMERATION OF ALL THREE

Q15 What streaming server software do you currently use in your network? Plan to by March of 2002?

Other responses
CISCO CDN TECHNOLOGY (2)
SHOCKWAVE-MACROMEDIA
MPEG
VIDEO VARIETY

Q16 What operating system do you currently use for your streaming servers? Plan to use by March of 2002?

Other responses

2001 CISCO PROPRIETARY OS
HOSTED BY SOMEONE ELSE
MICROSOFT EXCHANGE
NOVELL
WIN98

2002 WIN98 (2)
CISCO CDN
IT'S HOSTED BY SOMEONE ELSE
MICROSOFT EXCHANGE
NOVELL
WIN 95

Q18 Which of the following service provider types would you prefer to use for enterprise streaming services?

Other responses
IN-HOUSE (2)
LOCAL SERVICE PROVIDERS
DOT-MAIL

Q19 On a scale of 1 to 7 where 1 is do not agree and 7 is strongly agree, please rate the following reasons for considering outsourcing streaming services?

Other responses
BUSINESS CLIMATE
EASIER FOR EXTERNAL PURPOSES
FOLLOWING GENERAL TREND
MANAGERIAL
SMALL BUSINESS INCENTIVES

Q20 Which of the following types of streaming media does your company use now? Which will you use by March of 2002?

Other responses
2001
TAPE BACKUP
2002
DOCUMENT
MP3
TAPE BACKUP
WHITE BOARD

Q23 Which of the following does your company use streaming media for now? Which do you plan to use by March of 2002?

Other responses
2001
EDUCATION
PUBLIC OUTREACH PROGRAMS

2001
DISTANCE EDUCATION
EDUCATION
VIDEOCONFERENCING

Q25 For audio and video on-demand streaming, which of the following streaming formats do you use or plan to use?

Other responses
MACROMEDIA

Q26 For audio and video live streaming media, which of the following streaming formats do you use or plan to use?

Other Responses
INTERNAL APPLICATIONS
NONE

Q28 Which of the following streaming media creation functions does your company currently perform internally? By March 2002?

Other Responses
2001
LIVE
WE OUTSOURCE IT CURRENTLY

2002
LIVE

Q30 Which of the following streaming media creation functions does your company currently outsource? By March 2002?

Other Responses
2001
BUSINESS PRESENTATION

2002
BUSINESS PRESENTATION

Q32 Which of the following types of external organizations does your company plan to use streaming media now? By March 2002?

Other Responses
2001
EDUCATION

2002
DISTRIBUTORS
EDUCATION
SHARE HOLDERS

Q35 Approximately what is the total storage capacity need in Gigabytes (GB) for the following types of data? By March 2002?

Other responses
2001
BASIC USER FILES
E-MAIL
FILE SERVICE
FILE STORAGE
FLAT FILES
GEOPHYSICAL DATA
IMAGE DATA, REMOTELY SENSED
MAINFRAME - HUGH
MEMORY FARMS
OPERATING SYS BACKUPS
PICTURES
SALES AUTOMATION PROGRAMS
SOFTWARE
TAPES
TEXT FILES
TRANSACTION DATA
USER DATA HOME FILES
USER FILES
WEB AND PROGRAMMING

2002
BACKUP SERVER OS
E-MAIL
FILE SERVER
FILE STORAGE
FLAT FILES
GEOPHYSICAL DATA-6000 GB
MEMORY FARMS
PICTURES
SALES AUTOMATION PROGRAMS
TEXT FILES
TRANSACTION
USER FILES
USER FILES
WEB AND PROGRAMMING-OFFICE FILES

Q36 Which of the following types of storage technologies does your company use for all data now? By March 2002?

Other Responses
2001
ATTACHED BY FIBER
FIBER CHANNEL
OPTICAL JUKEBOX, SIMILAR TO RAID
OPTICAL STORAGE

2002
FIBER CHANNELS
OPTICAL STORAGE
SAME AS ABOVE; RAID-LIKE JUKEBOX

Q37 Which of the following types of storage technologies does your company use for streaming media now? By March 2002?

Other Responses
2001
FIBER CHANNEL
OPTICAL STORAGE
2002
ATTACHED STORAGE BY FIBER
FIBER CHANNEL
OPTICAL STORAGE

Q40 What content delivery products do you currently use in your network?

2001 CDN Products
CISCO (3)
REAL NETWORKS (3)
AKAMAI
ALTEON
APACHE SERVERS
CACHE SERVER
COMPUTERLAND
CURRICULUM
DELL
DOCUMENTUM
HP
IBM
IE 5
MS STREAMING
ONLINE COURSES
PCZONE
PI (MFG DATA)
TIVOLI MGMT SOFTWARE
WEBSONS
WINDOWS MEDIA PLAYER

Q41 What content delivery products do you plan to use in your network in 2002?

2002 CDN Products
CISCO (9)
MICROSOFT (6)
REAL NETWORKS (6)
AKAMAI
APACHE SERVERS
CACHE SERVER
CURRICULUM
DELL
DOCUMENTUM
HP
IBM
IE 5
LIVE ONLINE INSTEAD OF TAPED VIDEO
NETWORK APPLIANCE
ONLINE COURSES
QUICKTIME
STREAMING VIDEO
TIVOLI
WEBSONS

Q42 Why do you use or plan to use content delivery technology?

25 Better Performance
ABILITY TO CAPTURE FASTER
AND MINIMIZE LATENCY IN GETTING INFORMATION OUT
BETTER PERFORMANCE
CLEANER AND FASTER
DECREASE LOAD ON LAN CIRCUITS
EFFICIENCY
ENSURE RELIABILITY
FOR BETTER EFFICIENCY
GET BETTER COMMUNICATIONS
HOPEFULLY IT WILL BE MORE EFFICIENT
PERFORMANCE IMPROVEMENT
IT IS EFFICIENT
EFFICIENCY
BETTER PERFORMANCE
MORE DYNAMIC CONTENT
SPEED
SPEED UP DELIVERY
SPEED, REDUCE NET UTILIZATION, REDUCED SERVER LOAD
TO DELIVER CONTENT FASTER
TO DISTRIBUTE INFORMATION MORE EFFICIENTLY
TO HAVE BETTER COMMUNICATION

Better Performance continued
TO MAKE THREE CAMPUS DISTRICTS AVAILABLE TO STUDENTS
SPEED UP FREQUENT UPDATES
BETTER PERFORMANCE
FASTER DISTRIBUTION TOOL

17 ROI/Reduce Costs
BUSINESS PURPOSES
COLLABORATION WITH PARTNERS
CONTRACT TO THE CUSTOMERS
ECONOMY
IT IS BENEFICIAL FOR OUR COMPANY AS SALES AND TRAINING TOOLS
OPTIMIZE COST SAVINGS
OVERALL IT WILL PROBABLY BE CHEAPER
PRIMARILY BANDWIDTH LIMITATIONS AND BETTER USE OF BANDWIDTH
REDUCE TRAVEL
SAVE BANDWIDTH
THE COMPANY-FOR TRAINING AND CORPORATE COMMUNICATIONS TO REDUCE TRAVEL
TIME SPLITTING
TO REDUCE TRAVEL COST
WE HOPE TO REDUCE BANDWIDTH
REDUCES MANPOWER
SO WE CAN BRING THE LECTURES TO THE STUDENTS ON DEMAND MORE EFFICIENTLY
MORE EFFECTIVE COLLABORATION BETWEEN DIFFERENT GROUPS

7 Ease Operations
ALLOWS TO PROVIDE STREAMING CONTENT EASILY
BECAUSE IT IS MORE CONVENIENT FOR PEOPLE SO IT IS MORE EFFICIENT
BECAUSE WE DON'T HAVE TRAINED RESOURCES FOR DEVELOPING IT OURSELVES
EASE OF INFORMATION TRANSFER
FREES UP MY TIME
MAKE IT EASIER TO GET THINGS DONE
REAL IS EASY TO USE

5 Training
FOR TRAINING, COURSE CONTENT DELIVERY
EDUCATION
EMPLOYEE TRAINING
TRAINING
TRAINING

2 Remain Competitive
KEEP UP WITH COMPETITION
KEEPING UP WITH WHAT OTHER COMPANIES ARE DOING

Q43 On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following features when choosing content delivery network products for enterprise CDNs?

Other responses
ABILITY TO SCHEDULE DOWNLOADS
COMPREHENSIVE MGMT SCHEME
CURRENT INFRASTRUCTURE, SCALABILITY
HETEROGENEOUS INTEGRATION
INTEGRATION WITH LOTUS NOTES
PERFORMANCE
PRICE
SPEED
SUPPORT

Q44 Why don't you use or plan to use content delivery technology?

12 Not Evaluated Yet
HAVEN'T GOTTEN AROUND TO IT
IT IS BEING INVESTIGATED
NEEDS TO GO THROUGH CORP OFFICE
NOT IN OUR PREVIEW OF OPS NOW
NOT IN THAT TIME FRAME
NOT PART OF PLAN
THE USES AREN'T SPECIFIC ENOUGH TO PLAN FOR
WE ARE AT EARLY STAGES OF EVALUATING WHAT TO DO WITH THAT
WE ARE NOT LEADING EDGE ENOUGH
WE HAVEN'T GOTTEN AROUND TO IT
WE MIGHT EXAMINE IT
WE'RE JUST VERY CENTRALIZED AND THOSE CHANGES WOULD BE A MASSIVE

12 No Need
DOESN'T FIT OUR APPLICATIONS
DOESN'T MAKE SENSE TO REPLICATE THE INFORMATION
DON'T HAVE THE NEED FOR IT
MOST OF OUR USE IS INTERNAL AND SUBJECT TO SMALL DIVISIONAL USE
NO CRITICAL NEED
NO NEED FOR IT
NOT CURRENTLY REQUIRED
NOT ENOUGH TIME TO DEVELOP
NOT THE VOLUME OF TRANSMISSIONS TO JUSTIFY IT YET
TOO DYNAMIC FOR US
WE DO NOT STORE LARGE DATA IN READILY ACCESSIBLE WEB FORMATS
WE DON'T HAVE THE VOLUME THAT REQUIRES THAT WE USE IT

3 Network Sufficient

BANDWIDTH IS NOT A PROBLEM HERE

BECAUSE OF OUR ACTUAL MEDIA SIZE, CACHING IT WOULD BE A WASTE OF MONEY

PREFER TO DELIVER REAL-TIME-WE HAVE ENOUGH BANDWIDTH

Q45 Which of the following technologies does your company currently use to increase network performance now? Which technologies will your company use by 2002?

Other responses

2001

ANY NET TECHNOLOGY

ENTERPRISE

V LANS

2002

V LAN

ENTERPRISE

Q46 Which of the following Quality of Service technologies does your company currently use to increase performance on your network now? Which technologies will your company use by 2002?

Other responses

2001

CISCO

FRAME RELAY

IP VERSION 4

T1

2002

CAMPUS ETHERNET

Q47 What are the top three bottlenecks within your enterprise network?

65 Insufficient Bandwidth

AVAILABILITY

BANDWIDTH (12)

CLIENTS

CONNECTIVITY TO DORMS

DATA CENTER TO REMOTE SITES

END BANDWIDTH

END ROUTERS AT REMOTE SITES

END USER DEVICES

EXTERNAL CONNECTIONS

FIRST MILE LOCAL LOOP

FRAME RELAY

FRAME RELAY, OUTDATED DEVICES

GEOGRAPHY

Insufficient Bandwidth continued
GLOBAL ISP
GLOBAL WAN SPEEDS
INTERFACE TO THE INTERNET
INTERNATIONAL LOCATIONS WITH AVAILABILITY OF BANDWIDTH
INTERNET ACCESS CHANNELS
INTERNET BROWSING
JUST WAN BANDWIDTH CONGESTION
LAN 1 INTERFACE
LAN IN DATA CENTER
LAN TO LAN
LEGACY NETWORKS
LIMITED BANDWIDTH
LOCAL CONNECTIONS
LOCAL SERVICE PROVIDERS AT REMOTE SITES
LOW INTERNET CAPACITY
MAIN INTERNET CONNECTION
OLDER TOPOLOGIES (HUBS AND INTERCONNECTIONS)
ONLY ONE DATA CENTER
OUTSIDE LINES TODAY-IN JULY WE'LL HAVE AN EDU IP ADDRESS-MUCH MORE
OUTSIDE NETWORK ACCESS
PIPELINE OUTSIDE
ROUTING
SERIAL LINKS
SERVER ACCESS
SPEED (2)
STATION TO STATION CONNECTION OVER T-1'S
THE LAN
THE SIZE OF THE NETWORK
THE WAN; THE LINKS BETWEEN THE SITES (64K CURRENTLY-WOULD LIKE TO GO
TRAFFIC
TRAINING
TRANSMISSIONS
TRANSFERRING TO CERTAIN LOCATIONS
UNDERSIZED EXTRANET CONNECTION
WAN (2)
WAN ACCESS
WAN BANDWIDTH
WAN CONNECTIONS
WHEN EUROPE IS ON IN THE MORNINGS RESPONSE IS SLOW, AND ALSO FOR JAPAN
WIDE AREA LINKS

22 Hardware
DATABASE SERVERS
DISK SERVERS
HARDWARE FAILURE
HUBS (3)
INTERNAL WIRING, LAN SERVERS, MULTI-PLATFORM DISTRIBUTION
IP SWITCHING

Hardware continued
LACK OF GOOD QoS FACILITIES AND ROUTERS
LOCAL LAN HUB/BACKBONE
LOCAL WIRING
MAINFRAME CHANNEL SPEEDS
PHYSICAL MEDIA
PRINT SERVERS
SERVER REQUIREMENTS
SERVER SPEED
SERVERS (2)
STORAGE
SWITCH TOPS
TERMINAL SERVERS
UNSWITCHED NODES IN BUILDINGS

14 Applications
CLIENT SERVER APPS
DATABASE ADDITION
DENIO SERVICE TECHS
DUE TO USES-APPLICATIONS
E-MAIL
END USERS COMPUTERS' PROTOCOLS
ENOUGH SERVER CAPACITY
FRAGMENTED STORAGE
GRAPHICAL APPLICATIONS
INTRANET APPS
LAB APPLICATIONS
NAPSTER
ON-DEMAND SERVICES
SIMULTANEOUS USE OF INFO

4 ATM
ATM (2)
ATM MANAGEMENT
THE ATM STUFF

3 Security
FIREWALLS (2)
INCREASING NEED FOR SECURITY, MORE FIREWALL PROTECTION

2 Maintenance
BECAUSE OF HIGH DEMAND ON MAINTENANCE
EMPLOYEES KEEPING UP WITH NEW TECHNOLOGY CHANGES

2 Large Files
CAD DRAWING
SIZE OF WHAT IS BEING DELIVERED

2 Cost
BANDWIDTH PRICE
FINANCE

16 Other
BROADCAST STORMS
CAMPUS SLOWDOWN PERIODS
CASUAL USE OF INTERNET BY USER
EXTERNAL SERVICE PROVIDERS
GETTING COMPANY TO AGREE
IT DEPARTMENT
MANAGEMENT (2)
SMALL FRAME SIZE TRYING TO INTEGRATE WITH GIG ETHERNET
TESTING
UNAUTHORIZED WEB BROWSING, DOWNLOADS TO MFG MACHINERY, SOFTWARE
UNPLANNED OUTAGES
WE DON'T HAVE A LOT OF HEAVY CHOKE POINTS NOW IN OUR DESIGN.
WEAKEST LINK - LEGACY MACHINES
WEB CONTENT DELIVERY TYPE
WELL UNDERSTOOD POLICIES

3 None
AS WE ADD MORE INFRASTRUCTURE WE ADD CAPACITY-WE HAVE GREAT CAPACITY NOW.
AS WE ADD MORE WORK IT MAY ADD CHOKE POINTS.
FAIRLY NEW SYSTEM SO NONE FOR NOW UNTIL STUDENTS ARE ON SYSTEM

Q48a Which of the following statistics do you CURRENTLY gather and use for streaming media content?

Other response

BANDWIDTH NUMBERS

Q49 What are the top three challenges when planning for network growth? (Open-ended)

47 Predicting Demand
AVAILABILITY
BANDWIDTH (9)
BANDWIDTH ALLOCATION
BANDWIDTH REQUIREMENTS
BANDWIDTH MGMT
CAPABILITY
ESTIMATING CUSTOMER GROWTH
ESTIMATION OF CUSTOMER BASE
EXPANDABILITY

Predicting Demand continued
EXPANSION
EXTERNAL DEMAND OF CONTENT WE PUT OUT
FIGURING OUT DEMAND OF CONTENT
GROWTH
HOW MUCH GROWTH
INCREASE IN NUMBER OF USERS
IP CONNECTION TO END USER
MEMORY
NUMBER OF EMPLOYEES AND RESOURCES
NUMBER OF USERS TO ACCESS
PREDICTING AMOUNT FOR USAGE
PREDICTING NEEDS
PROJECTING THE GROWTH
PROTOCOL OVERHEAD-NOT GETTING AS MANY MEGABITS AS NEEDED
QUALITY
SIMULTANEOUS USAGE
SIZE OF PIPES WE NEED (HOW BIG)
SPEED (3)
SPEED OF SERVICE
SPEED TO ACQUIRE WIDE AREA CIRCUITS
THE LOAD CREATED BY APPLICATION
THE MORE WE DEVELOP THE NETWORK UTILITIES THE MORE CAPACITY NEEDED
THE SERVICE PROFILE OF THE APPLICATION-DEMAND ON NETWORK
TRYING TO ANTICIPATE BANDWIDTH USE
UN-ANTICIPATED GROWTH
UNDERSTANDING PEAK AND AVERAGE BANDWIDTH REQUIREMENTS
VOLUME OF TRAFFIC IN THE INCREASED BANDWIDTH REQUIREMENTS
WAN

46 Budget
AVAILABILITY OF RESOURCES
BUDGET (5)
COST (13)
COST OF BANDWIDTH
COST, EASE OF USE, EASE OF IMPLEMENTATION
COST, TIME, PARTS
DISTRIBUTING NETWORK AT LOW COST
DOLLARS
FUNDING (7)
GETTING APPROVAL
GETTING MORE FOR CHEAPER
GETTING THE MONEY, NEW TECHNOLOGY, MIGRATION TO NEW TECHNOLOGY WITHOUT
KNOWING ACQUISITION TIMING
MONEY (6)
PRICING OF EQUIPMENT
REDUCING LABOR COST
RESOURCES

Budget continued
TRYING TO GET EQUIPMENT WE NEED WITHIN BUDGET
WHERE THE DOLLARS ARE COMING FROM

22 Legacy Network
APPLICATIONS
CAN WORK STATIONS AND SERVERS HANDLE DEMAND
DEALING WITH THE LEGACY NETWORK TECHNOLOGIES
DESIGN AND IMPACTING CURRENT USERS OF THE NETWORK
DIVERSITY-DIFFERENT CONTENTS, (GETTING SAME SYSTEM ON ALL CONTINENTS)
FLEXIBILITY (2)
GLOBAL STRUCTURE
IMPLEMENTATION (2)
INFRASTRUCTURE PROBLEMS
IT'S OUT OF DATE BY THE TIME WE IMPLEMENT IT
LOCATION (3)
PHYSICAL PLANT, GEOGRAPHICAL LOCATION, SERVER SPACE
REPLACING OLD COMPUTERS
TECHNOLOGY UPGRADES
USERS, BANDWIDTH, HARDWARE CONFIGURATIONS
WE NEED TO CHANGE OUR OPERATING SYSTEMS (NOVELL CURRENTLY)
WEAKEST LINK, TYPE OF CLIENTS, LEGACY
WHO WE'RE BUYING NEXT AND WHAT THEIR NETWORK CONSISTS OF

16 Technology Churn
THE HIGHLY CHANGING FIELD OF SOFTWARE AND HARDWARE-HAVE TO ADAPT QUICKLY
TECHNOLOGY (3)
KNOWLEDGE BASE IN-HOUSE
MOSTLY GETTING QUALIFIED PEOPLE
NEW TECHNOLOGIES
PERSONNEL
PERSONNEL, SIZE, PRICE
QUALIFIED PEOPLE
TRAINING
TRYING TO STAY AHEAD
UNDERSTANDING TECHNOLOGY REQUIREMENTS, FINDING OUT STATISTICS, NEW
UNDERSTANDING THE TECHNOLOGY ROAD MAP
USER EXPECTATION, NEWER APPLICATIONS
USING RIGHT TECHNOLOGY

6 Storage
STORAGE (4)
STORAGE SPACE AND SPEED CAPABILITIES
NETWORK STORAGE

5 Network Management
CONTENT MONITORING AND EXCLUSION
GEOGRAPHIC LOCATION KNOWLEDGE
HOW DO WE MANAGE THE SPIKES
NETWORK ASSESSMENT
NETWORK MANAGEMENT

3 Network Maintenance
KEEPING IT UP TO DATE
MAINTAIN PRODUCTIVITY
MAINTAINING CURRENT TECHNOLOGY

22 Other
ACCEPTING MOORE'S LAW
ACCESS AVAILABILITY
CHAIN OF COMMAND
CHANGING SHAPE OF COMPANY
CHOOSING SERVICE PROVIDERS
DEPLOYMENT IN INTERNATIONAL AREA
FILL IN GAPS WITH WIRELESS TECHNOLOGY
GATHERING REQUIREMENTS
GETTING DEVELOPERS WITH NETWORK IN MIND
INTERRUPTING BUSINESS
LACK OF PLANNING
MGMT RESISTANCE
PRODUCTION ENVIRONMENT
PROGRAM X (THE ONE I DO NOT KNOW ABOUT)
SCALABILITY
STANDARDIZATION AMONGST ALL THE DIFFERENT USERS
SUPPORT CONTRACTOR
SUSTAINING THE COMPANIES AND THE DIRECTION
THE INABILITY TO PREDICT USER SOFTWARE AND APPLICATION NEEDS
TIME
USERS
FIREWALL SCREENING

Q50 What tools do you use to determine when your network needs additional capacity?

14 Complaints
COMPLAINTS FROM USERS
END USERS
HEAR FROM SITES
HELP DESK CALLS
INFORMAL COMPLAINT SYSTEM
QUANTITY OF COMPLAINING AND MOANING
TELEPHONE (3)

Complaints continued
THE USERS
USER COMPLAINTS (2)
USER RESPONSE
WHEN USERS COMPLAIN

11 Network Sniffers
DISTRIBUTED SNIFFERS
DISTRIBUTED SNIFFERS, MRTG, OPEN VIEW
NETWORK ANALYZERS
NETWORK GENERAL SNIFFER
PROTOCAL SNIFFER
PROTOCOL ANALYSERS
PROTOCOL ANALYZERS WITH TRENDING CAPABILITIES
SNIFFER, CHARIOT SOFTWARE, PEGASUS SOFTWARE
MONITORING TOOLS LIKE NET XRAY AND WHATS UP GOLD
A LOT WITH NET SNIFFERS
NETWORK ASSOCIATES SNIFFERS

6 Custom Application
ALL HOME-GROWN
CUSTOM APPS
CUSTOM PERL SCRIPTS
HOME-GROWN TOOLS
INTERNAL SOFTWARE
MONITORS PURCHASED AND HOME-GROWN

6 HP Openview
HP OPENVIEW (5)
MONITOR TRAFFIC AMOUNTS WITH HP OPENVIEW

79 Other
AGILENT INTERNET ADVISOR
APPLICATION SUPPORT
AVAILABLE BANDWIDTH
BREAKPOINTS OF TOTAL SATURATION
BUMPING BANDWIDTH
CISCO WORKS
CLEARVISION
COMMITTEES
CONCORD NETWORK HEALTH (3)
DIAGNOSTICS ON SERVERS
DOCUMETUM
DOWNSIZING
FLUKE METER
HISTORICAL TRENDING TOOLS LIKE CONCORD
HOW THE SYSTEM IS BEING TAXED NOW
LATENCIES/DELAYS

Other continued

LOOK AT ATM CIRCUITS
LOOK AT CORE BACKBONES
LOOK AT PERCENTAGE BANDWIDTH OVER AND ABOVE A BENCHMARK
MACE, CLOSE EYE
MINIMUM FOR EVERY OPERATOR
MONITOR ALERTS US WHEN WE ARE EXCEEDING ALOTTED BANDWIDTH
MONITOR BANDWIDTH
MONITOR NETWORK CONGESTION-HOW MANY USERS ON NETWORK AT ONE TIME
MONITOR THE RESPONSE TIME
MONITORING FEATURES
MONOTORING TOOLS
MS PRODUCTS, NOT SURE WHAT EXACTLY IT IS
NEEDS ASSESSMENT
NET HEALTH
NET IQ
NETHEALTH
NETWATCH BY NOVELL
NETWORK MGMT SOFTWARE
NETWORK MONITORING TOOLS
NETWORK THROUGHPUT
NETWORK TRAFFIC
NOT CURRENTLY USING ANY TOOLS
NTRG, A GRAPHICS TOOL OVER TIME SERIES
PACKET ROUTING SOFTWARE
PERFORMANCE MONITOR
PERFORMANCE MONITORING TOOLS
PHYSICAL VERIFICATION OF THE HARD DRIVES
PLANNED USER GROWTH
PLANNING (2)
PLOT USAGE CURVES
REACH 70% - BUFFER 30% NEED TO ADD CAPACITY
REVIEW USAGE
RTT SOFTWARE
RUN THE STATISTICS
SENSORS
SNMT I 2002
SOFTWATE MONITORING PACKAGES: FLOWSCAN, ALLOT, CRICKET
SOME TIVOLI COMPONENTS
SOMETIMES WE'LL BRING IN AN OUTSIDE SOURCE TO MONITOR TRAFFIC
SPEED OF OPERATION AND STORAGE CAPACITY
STANDARD TRAFFIC ENGINEERING 101 TYPE STUFF
STATISTICS OF NETWORK AND MANAGEMENT
STUDIES
SURVEYS
TEST TRAFFIC GENERATING TOOLS TPCP
THE CISCO WORKS TOOLS NOW

Other continued

THOSE NOT USED FREQUENTLY ARE ELIMINATED TO ALLOW FOR USE FOR OTHERS
TRENDING
TROUBLE SHOOTING TOOLS
TUNING PACKAGES
UNIX BASED PLATFORMS - OVERLOAD WHEN CADETS GET OUT OF CLASSES
UPCOMING NEEDS
USAGE
VITAL SWEEP
WE LOOK AT PERCENT OF ACTIVE BANDWIDTH
WE MONITOR THE ROUTERS
WE'RE NOT VERY PROACTIVE; WE JUST FIX WHEN NEEDED-FIREFIGHTING
WHAT THE OVERALL REQUIREMENTS ARE FOR THE MACHINES
WHEN IT GETS SLOWER
WHEN THEY ARE SLOWING DOWN

Q57 What are the top 3 publications that are most influential in your purchase of streaming products and services?

Other responses

3%	EDN
3%	GOVERNMENT COMPUTER NEWS
3%	INTERACTIVE WEEK
3%	LINUX WORLD
3%	NEW MEDIA MAGAZINE
3%	PC MAGAZINE
2%	INTERNET WEEK
2%	PC WEEK
1%	AMERICA'S NETWORK
1%	AV VIDEO MULTIMEDIA PRODUCER
1%	BUSINESS COMMUNICATIONS REVIEW
1%	CIO
1%	CISCO PACKET
1%	COMMUNICATION DESIGN
1%	COMMUNICATION WEEKLY
1%	COMMUNICATIONS FOR ACM
1%	COMMUNICATIONS WEEK
1%	COMPUTER TELEPHONY
1%	CONVERGE
1%	EE DESIGN
1%	EMEDIA
1%	ENTERPRISE LINUX
1%	FEDERAL TECHNOLOGY
1%	INFO STORE
1%	LAN MAGAZINE
1%	LIGHT READING (FIBER OPTIC EMPHASIS)
1%	MAC ADDICT
1%	MACWORLD

Other responses continued

1% MANUFACTURER DOCUMENTATION
1% MEDIA TECH
1% MEDIAB
1% MICRO WAREHOUSE
1% MOBILE COMPUTING
1% MSDN MAGAZINE
1% MULTIMEDIA PRODUCER
1% NETWORKING
1% NETWORKING COMMUNICATIONS
1% NEWSWEEK
1% PRESENTATION
1% PRODUCTIVITY POINT
1% SERVER EXPERT
1% SERVER WORKSTATION EXPERT
1% SMART COMPUTING
1% STREAMING MEDIA MAGAZINE
1% STREAMING MEDIA.COM
1% SYLLABUS
1% TELE.COM
1% UPSIDE
1% VARI BUSINESS SERVICE
1% VIDEO PRODUCER
1% WEB SITES IN GENERAL FOR EVALUATIONS
1% WIN2000 MAGAZINE
1% WINDOWS
1% WIRED
1% WIRELESS
1% WIRELESS REVIEWS

Q59 What is the title of the person or persons responsible for making the final decision on streaming products or services?

Other responses

2% PRESIDENT
2% VP IS
1% CITY MGR
1% COLLEGE DEAN
1% COMPUTER ENG
1% DEPT MGR OF TELECOMMUNICATIONS
1% DIR OF C-TECH
1% DIRECTOR
1% DIVISION DIR
1% EVP OF IS
1% EXEC VP
1% INTEGRATING MANAGERS
1% MIS DEPT
1% MULTIMEDIA MGR

Other responses continued

1% NETWORK ARCHITECT
1% NETWORK MGR
1% OPERATIONS MGR
1% PLANT MGR
1% PROGRAM MGR
1% PURCHASER
1% SCATTERED
1% SCHOOL BOARD
1% SERVICES MGR
1% SHARED
1% SOFTWARE ENG MGR
1% SOFTWARE MGR
1% SR DESIGN ARCHITECT
1% SURGEON GENERAL
1% VP CIS
1% VP E-COMMERCE

EXIT QUESTIONNAIRE

EQ5 What content delivery products do you plan to use in your network in 2002?

Other responses

MICROSOFT PRODUCTS

EQ6 Why do you use or plan to use content delivery technology?

Other responses
2001
COST REDUCTION
DIRECT THE INFORMATION TO THE APPROPRIATE GROUPS
DISTRIBUTION OF TIME AND COST
FOR TRAINING AND/OR DYNAMIC ORDER CONTROL
PLAN TO OUTSOURCE IT
TO EQUALLY DISTRIBUTE INFORMATION, TO ENABLE PEOPLE TO ATTEND

2002
MEETINGS WHICH ARE OTHERWISE DIFFICULT TO SCHEDULE
QUALITY IMPROVEMENT

EQ8 Why don't you plan to use content delivery technology?

54 No Need
NO NEED (26)
NO APPLICATION FOR IT
NO APPLICATIONS THAT NEED IT
NO CONTRACTS FOR IT'S USE
JUST NOT NEEDED RIGHT NOW-MAYBE IN ANOTHER YEAR BUT NO PLAN RIGHT NOW
IT IS NOT AN OPTION WE ARE EXPLORING AT THIS TIME

No Need continued
IT HAS NO APPLICATION FOR OUR COMPANY AT THIS TIME
HAVE OTHER THINGS MORE IMPORTANT
EVERYTHING IS MANAGED LOCALLY
NO NEED, WE ARE A PRIVATE NETWORK
NO OUTSOURCING
NO PLANS-DIDN'T THINK ABOUT IT
NO REQUIREMENT FOR IT
NO STREAMING ANY TIME SOON
NO TIME OR EFFORT FOR IT
DON'T LIKE THE TECHNOLOGY-USES WAY TOO MANY RESOURCES ON THE NETWORK,
OTHER WAYS OF REDUCING OUR DRAW, EVERYTHING IS BECOMING SERVER BASED
NOT A STRONG BUSINESS NEED
THE NORMAL CACHING CAPACITIES ARE ADEQUATE
UNIVERSITY-I DON'T SEE MUCH USE FOR IT HERE FOR US
WE ARE JUST NOT THAT LEVEL OF TECHNOLOGY AND DON'T PLAN TO BE THERE
WE ARE NOT PLANNING ON DOING ANY BROADBAND VIDEO-WE ARE A MFG FACILITY
WE ARE NOT THAT ADVANCED YET
WE DO NOT HAVE A USEFUL APPLICATION FOR IT
WE HAVE GOT A LOT OF PROJECTS ON HOLD RIGHT NOW, NOT FEASIBLE
WE HAVE OTHER PROJECTS THAT WILL OVERSEE THESE PROJECTS
WE JUST GOT BOUGHT AND WE ARE GOING TO A CLOSED SYSTEM TO TIGHTEN UP
WHEN I REMOVE STREAMING MEDIA-MY PROBLEMS CLEAR UP
OTHER PROJECTS ARE AHEAD, NOT PRIORITY

10 Cost Prohibitive
48 PERCENT-SO AT THIS POINT IT IS COST PROHIBITIVE, AND JUST THE INITIAL
BUDGET CRUNCH
COST OF THE HARDWARE
CURRENT ECONOMIC SITUATION
FUNDING
MONEY
MY PERSONAL REASON IS I HAVE BEEN DIRECTED TO CUT MY BUDGET BY
NO MONEY
NOT BUDGETED
NOT ENOUGH PROJECTS, FINANCIAL ISSUES

6 Evaluating
AWAITING THE PLANS
FORESEEABLE FOR COMPANY
LOOKING INTO STREAMING MEDIA IN 2002
NOT READY YET
NOT READY YET, NEED TO BUILD A WHOLE NEW NETWORK
TOO NEW TO EVALUATE

6 Network Sufficient

ABOUT TO UPGRADE TO GIGABYTE TECHNOLOGY
DOESN'T FIT OUR OPERATIONS
I JUST DON'T THINK WE HAVE THAT MUCH DEMAND FOR IT HERE AT THE
JUST DON'T HAVE NETWORKS THAT NEED THAT TECHNOLOGY RIGHT NOW
LOW ON PRIORITY LIST
MECHANICAL ENGINEERING FIRM/STREAMING OR CONTENT IS NOT SOMETHING

4 Not Familiar

DON'T KNOW ENOUGH ABOUT IT
DON'T KNOW WHAT IT IS
IT'S NOT DIRECTLY TO THE PUBLIC
JUST ACQUIRED, STREAMING MEDIA NOT HIGH ON LIST

Appendix D

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