

The 2000 Content Delivery Service Study

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About The HTRC Group, LLC

The High-Tech Resource Consulting Group focuses on 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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Recommendations and Key Findings

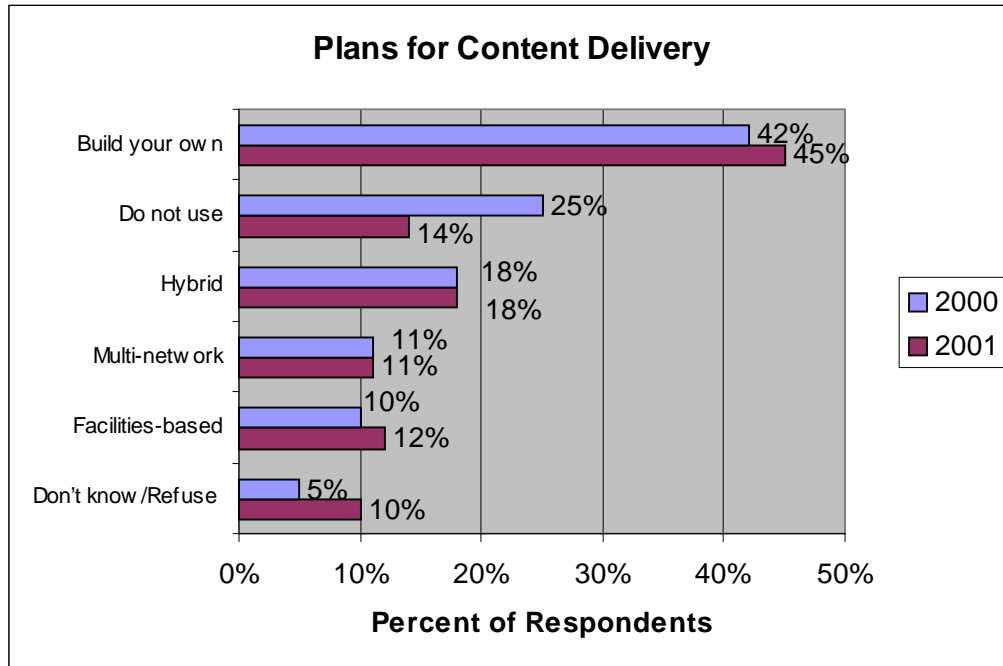
The 2000 Content Delivery Service Study

The Internet continues to grow as both the amount of content and the **population** online increase. The online population is currently **estimated** at nearly 300 million users worldwide and growing. The **growth rate** of content on the Internet is significantly increasing as organizations around the world deploy new content types, such as streaming media and dynamic content, to further Web site differentiation. New Internet-based media types for audio and video are continually developed and used. Aside from Web site content, performance is a fundamental online differentiation.

The use of content delivery network (CDN) services to increase Web site performance is steadily growing. Study respondents from last year and this year, indicated planned use of CDN services increases from 8% in 1999 to 31% in 2001. The results from The 2000 Content Delivery Service Study indicate a strong growth in a largely untapped market. The market for CDN services increases from \$97 million in 2000 to \$2.1 billion by 2003.

Respondent plans to outsource content delivery services to multi-network, facilities-based, and hybrid-based content delivery providers show little overall growth. However, there is a significant increase from last year's study respondents. We believe that when Web site decision makers understand CDN technology and examine resources and planned growth, more will choose content delivery services. The largest number of respondents plan to build a content delivery solution in-house and have a marginal 3% change from 42% in 2000 to 45% in 2001.

Chart ES-1: Plans for Content Delivery (n=100) Q10



The 2000 Content Delivery Service Study examines an emerging service market focused on providing Web sites with performance enhancements utilizing content delivery solutions.

The key findings and recommendations are based on the study results from interviews with target customers (demand side), providers of CDN services (supply side), and CDN product manufacturers (supply side).

The First Campaign

CDN services are in an early market period, where there are no clear market-share winners. Early to market players have capitalized on the marquee Web site customers, such as Yahoo!. So far, sales and marketing campaigns have focused on obtaining the largest Web sites on the Internet, which represent only a handful of the greater total market opportunity.

In order to gauge how successful early CDN product manufacturer and service provider marketing campaigns have been, we asked respondents to name CDN service providers they are familiar with. Respondents' description of content delivery providers ranged widely, with no one provider having more than three responses in 2000 and 2001. The majority of respondents, 66%, could not or refused to name a provider. Although early market CDN providers have been in the market for roughly a year and a half, they are clearly challenged with developing a brand name associated with CDN

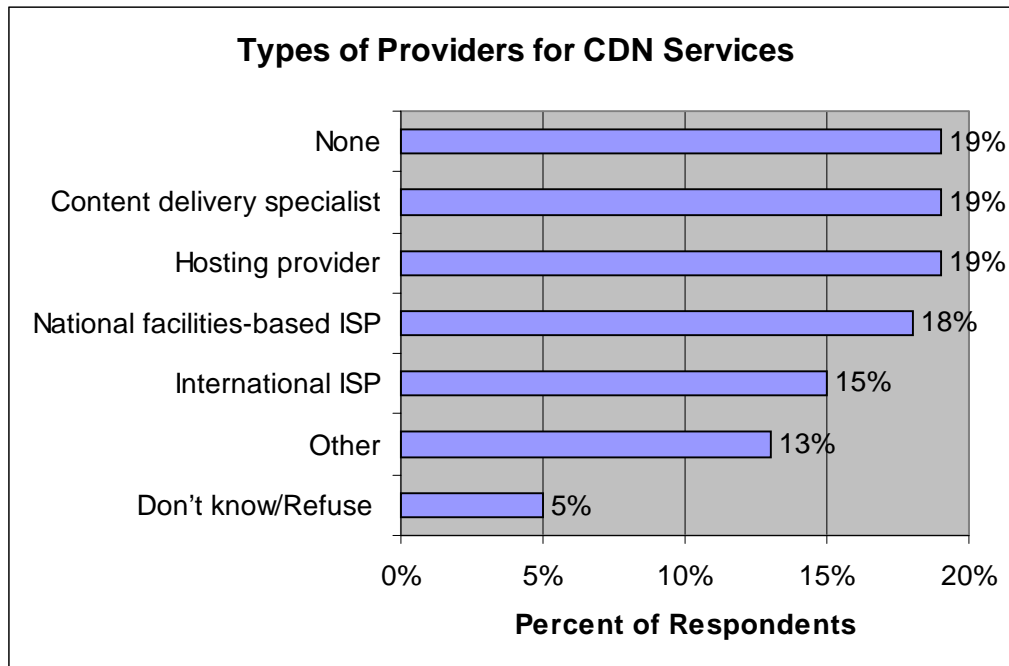
services. No provider had more than 4% “mindshare” with our respondents. Of the 100 respondents only 34 named a service provider. Akamai, AOL, and Earthlink were named most frequently for providers that offer CDN services; however, of the three, Akamai is the only CDN provider. Vignette, Oracle, and Inktomi were also named by respondents, however they are all product manufacturers and not service providers. Responses indicate confusion and lack of clear understanding of CDN products and services.

Historically, early technology markets have been the most successful when target customers understand the technology, as well as the benefits of that new technology. In our opinion, there have been no successful market education campaigns directed at the mass market. Currently most CDN marketing campaigns focus on branding, rather than education. When spending on branding campaigns, CDN product manufacturers and service providers should reference where to learn about new technology.

Product manufacturers and service providers must sell to both technical buyers and business buyers, as both have influence on final product and service purchase decisions. Forty-three percent of study respondents had multiple responses for the person(s) responsible for making the final decision on content delivery products or services. This made it difficult to classify them to definitive categories. The majority of the study respondents identify the chief information officer (CIO) (20%), director of information systems (19%), and Webmaster (15%) as the final decision makers. Sales attempts and marketing material targeting technical decision makers should include detailed technology information positioning the resiliency and redundancy of products and services. Material targeting business decision makers should include case studies, business benefits, and the impact Web site performance has on the bottom line of a company.

We expected a service provider specialized in CDN services would lead by a significant margin; however, there was no significant difference among service provider types. The lack of a single service provider type for content delivery services indicates that there is no pre-conceived barrier for service provider types entering the CDN market. Clearly there is room in the CDN market for multiple service provider types. Chart ES-2 shows respondent's preferred service provider types for CDN services.

Chart ES-2: Types of CDN Providers (n=100) Q16



Study responses to various questions throughout the study indicate that early marketing campaigns focusing on branding have not reached the mass market our respondents represent. There is sufficient room in the content delivery market for providers that are examining content delivery service offerings.

Reaching Out

Web site owners are in a constantly changing industry, where the churn of technology frequently has a direct impact. The people responsible for maintaining Web sites continually struggling to stay abreast of technology changes that affect their Web environments. The second largest challenge respondents faced was keeping up with technology. Similarly, the largest

barrier to subscribing to CDN services, aside from cost, was understanding CDN technology.

We believe the best way to market to decision makers of CDN product and service purchases is through education. Education and awareness marketing campaigns can be costly, especially in a diverse market. CDN service provider Web sites have very technically detailed explanatory material on their Web sites. Early market players have been reluctant to publish technical information. There are few publicly available documents explaining CDN service differentiation, likely because of competitive pressures. Product manufacturers do have technical as well as business-oriented information on their Web sites. Public CDN educational information targeting both business and technical readers remains sparse.

In order to gain a better understanding of the sources that respondents use to learn about new technology, we asked respondents to rate a list of information sources. Of the top sources for information, trade magazines (80%) and vendor Web sites (73%) were rated as critical sources. These two sources should be prioritized by both product manufacturers and service providers as an important medium for marketing to customers.

Manufacturers and providers should strive to be included in columns and articles of significant trade publications along with maintaining good relationships with industry press that cover CDN and hosting services, as well as emerging technology. Product manufacturer and service provider Web sites should market product and service educational material on their site.

Web sites are the most important medium for conveying information to potential customers. Service providers and product manufacturers should place greater emphasis on Web site development. Dollars spent on Web site content differentiation are well spent.

We strongly recommend developing educational material to be made available on your Web site. Business and technical decision makers are two distinct groups. Material targeting these groups should reflect their interests. Business readers should be targeted with the business benefits of a well performing Web site. Technical readers will likely have a varied level of expertise; CDN product manufacturers and service providers should consider creating documents that address high and low levels of expertise.

We recommend service providers and product manufacturers partner to deliver CDN educational seminars online, targeting users with a range of expertise and disciplines. One possibility could be a series of online seminars that target an assortment of business and technical topics. Interested prospects seeking to gain a better understanding of CDN solutions can participate in the live events, or download and view the seminars at a convenient time.

We also recommend examining the possibility of developing an interactive Web-based learning application. Web-based applications such as these can be a valuable resource for potential customers, channel partners, sales people, training, and industry partners.

Positioning

The basic value proposition for CDN products and services may be as simple as performance; however, successfully conveying product and service differentiation among market players can be difficult. Performance was the most frequent response which respondents gave to describe the benefits of a CDN solution. CDN technology can be difficult to understand, as described by our respondents. Market players who market through education will have an advantage by educating prospects on specific technology benefits. Product and service solution positioning should be simplified and made easy to comprehend. Business value propositions should be tied in with revenue gains based on Web site performance. Product and service differentiation should be presented from an educational and awareness prospective.

The largest barrier for subscribing to CDN services, represented by 64% of the study respondents, was cost. It is incumbent upon service providers and product manufacturers to develop explanatory case studies and financial models. Over the past year, new entrants in the CDN market have not driven the price of CDN services down. There are emerging entrants this year that will likely drive the price of CDN services lower. Lower cost services will also drive greater awareness and adoption of CDN services.

Respondents were asked whether they would consider using CDN services from multiple CDN service providers. Nearly half of our respondents indicated they would not and 21% weren't sure. However, a surprising number of respondents, 30%, indicated they would use multiple CDN providers. CDN providers should expect to start sharing some accounts with competitors, and develop value propositions and partnerships accordingly.

Flexible Billing

Billing provides a flexible means to address a range of customer types. Study respondents rated flat rate billing (69%) and fixed service fee with the ability to burst above provisioned bandwidth (66%) as the most important billing types. Service providers should seek to offer multiple billing plans that offer convenient, flat rate billing along with a fixed service fee if the Web site desires to burst above their allocated bandwidth. Forty-nine percent of respondents said that they were interested in usage-based pricing. This shows that Web sites also desire accessible, straightforward billing plans that easily determine their cost of usage.

Company Criteria

Differentiating CDN services is difficult in a competitive market. Service providers have started to offer content delivery services in a variety of flavors, based on levels of performance, service level agreements and service provider features. “Performance to end users” is a fundamental Web site differentiation and was rated critical by 92% of the study respondents. Service providers should seek credible third-party publications for industry performance testing. Marketing material should explain in detail how performance is increased through technology education.

Service and support continues to be one of the most important criteria by which customers judge product manufacturers and services providers. The end user experience will make or break any service, especially with services that include early market technology. With service and support rated critical by 91% of the study respondents, service providers should make significant efforts to develop an excellent reputation for service and support as early as possible. A reputation is only developed over time. Eighty percent of respondents rated a service provider’s reputation as critical when choosing a service provider for CDN services. Service providers should include high profile programs promoting constant customer interaction to maintain customer relationships. Service providers should partner with a company or develop a good public relations group to maintain good press and analyst relations.

SLAs

Service level agreements provide a way for service providers to differentiate and position CDN service offerings. Respondents rated a number of SLA criteria in order to gain a better understanding of desired SLAs. Respondent prioritization of SLA features helps CDN service providers prioritize the development of service and product features as well as market messaging. Availability (92%) and Time to Repair (89%) were rated critical by respondents. Respondents are very concerned with Internet access availability and the uptime and downtime associated with time to repair since these frequently affect service providers’ online reputation.

“Latency measured from the content delivery server to end user” SLAs were rated critical by 71% of respondents. The time, or lag as it is commonly referred to, it takes for content to be delivered from the server to the requester greatly affects user experience. The longer it takes, the likelihood of the user terminating the request increases. Importance of fresh and frequently updated content is reflected by Time to Content Refresh SLAs. Content refresh SLAs were rated critical by 69% of our total respondents. Content professionals need assurances in the form of SLAs to guarantee the freshness of content, critical for frequently changing sites and those that tailor content for each user.

End user experience based on content delivery provider validation (68%) and end user experience based on third party validation (54%) SLAs were rated critical by more than half of our respondents. There is a notable difference (14%) between end user experience based on the service provider and that based on a third party. Although third party validation can add considerable cost and may reduce profit margins, service providers should maintain the capability to validate the end user's experience both internally and externally through a third party, thus offering different levels of end user experience validation in order to optimize margins.

Management

CDN management tools and reports provide a growing area for differentiation. Study respondents use a hodgepodge of tools to plan Web site growth and future requirements. CDN product manufacturers and services providers have the opportunity to develop a wide range of management tools and utilities for customers. Although we questioned respondents in areas which provide insight into content management applications and tools, we recommend developing CDN management tools based on customer feedback. Management feature development should be prioritized based on the needs of current customers.

Partnerships

The nature of innovative technology on the Internet presents a formidable challenge to companies attempting to provide a solution for every need. The capacity to focus remains one of the greatest assets to any company developing and delivering Internet-based solutions. Partnering with companies with synergistic solutions may present a mutually beneficial business scenario.

Synergistic partnerships are a way to provide customers with greater overall value. CDN product manufacturers and services providers should consider mutually beneficial partnerships that extend the overall solution value for customers.

One such service partnership for CDN service providers may be with Scale Eight, an emerging Internet storage infrastructure (ISI) provider. ISI is a layer of Internet infrastructure which provides distributed global file storage and content origin service to owners and distributors of Internet-oriented content. ISI, in particular, addresses the high cost and poor scalability of legacy storage solutions for media rich applications.

ISI is the future of low cost online storage, and is unique in the adoption of a global file system that enables users to access data from any point in the Internet. In a Global File System, authorized customers will see an identical file image (directory tree) from any access point on the World Wide Web.

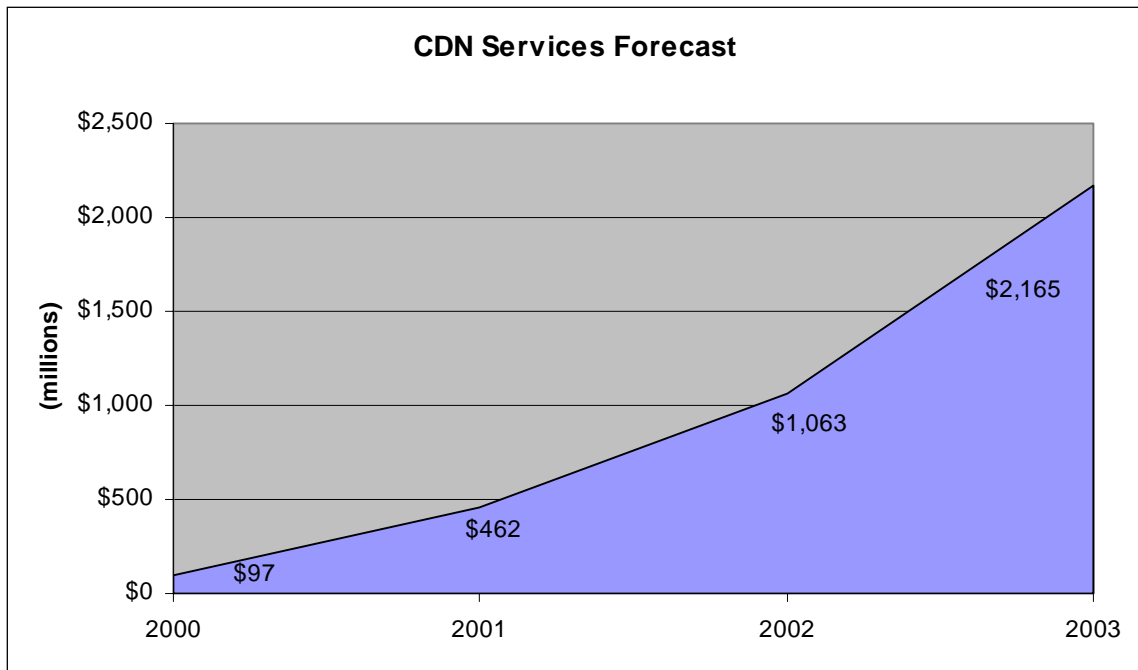
Storage is a universal need for the Internet, and ISI services are complementary to many existing services including CDN services, colocation services, and media management services. CDN providers should examine the benefits of a relationship with an ISI provider such as Scale Eight, Inc.

The Opportunity

CDN Services Forecast

Service providers that offer CDN services are presented with a significant opportunity. Web sites will spend \$97 million in subscriptions to CDN services in 2000, increasing to \$2.2 billion in 2003. Content delivery services include services that intelligently distribute content globally on a network through strategically placed servers, which store and deliver content close to end users. The chart ES-3 below depicts the revenue opportunity for service providers that offer CDN services.

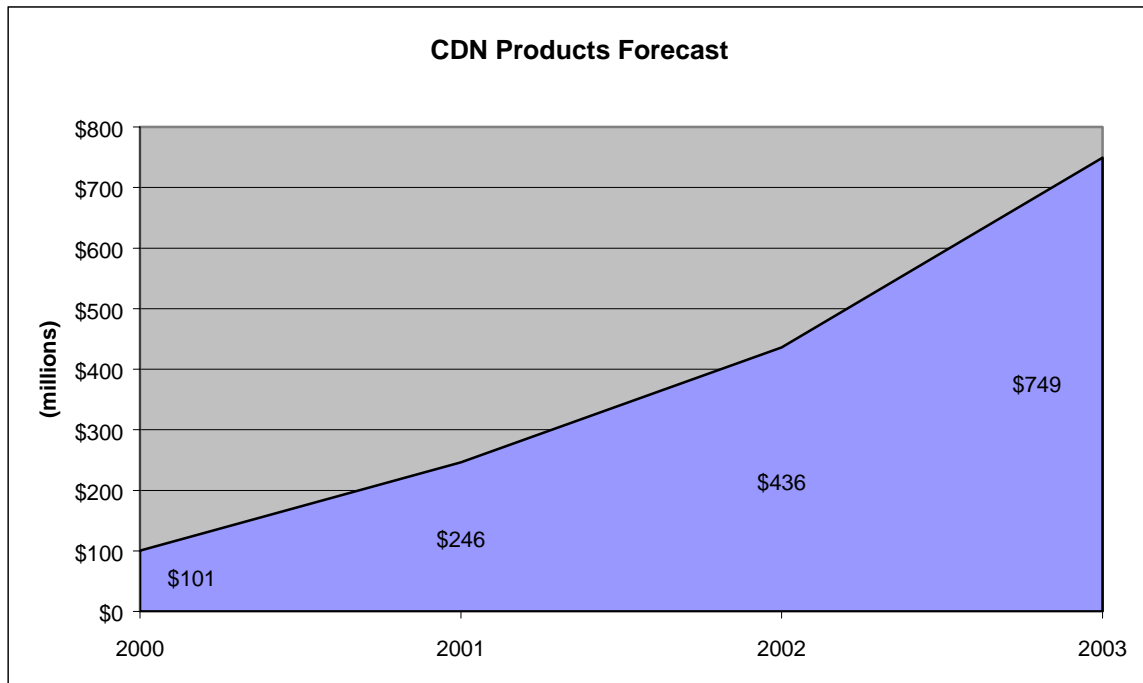
Chart ES-3: Content Delivery Services Forecast



CDN Products Forecast

Product manufacturers that offer CDN products are presented with a growing opportunity. Service providers and Web site owners will spend \$101 million on CDN products in 2000, increasing to \$749 million in 2003. The chart ES-4 below depicts the revenue opportunity for product manufacturers that offer CDN solutions.

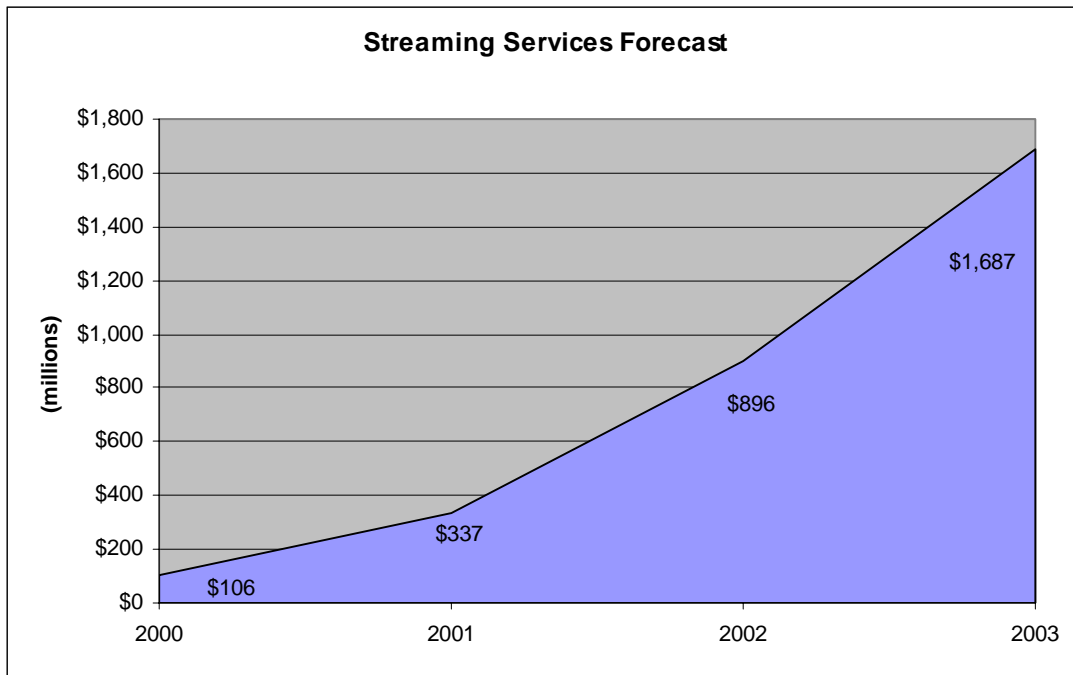
Chart ES-4: CDN Products Forecast



Streaming Services Forecast

Service providers that offer streaming services are presented with a significant opportunity. Web sites will spend \$106 million in performance streaming services in 2000, increasing to \$1.7 billion in 2003. The chart ES-5 below depicts the revenue opportunity for service providers that offer live and on-demand streaming services.

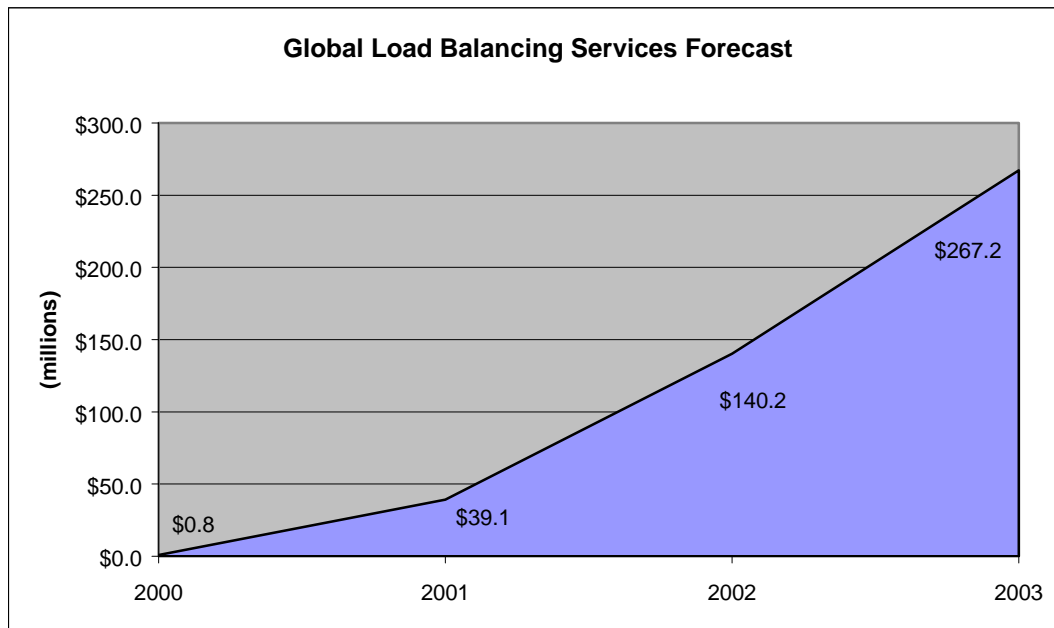
Chart ES-5: Streaming Services Forecast



Global Load Balancing Services Forecast

Service providers that offer global load balancing services have an optimistic outlook for revenue growth through an increasing opportunity. Web site owners will spend \$800 thousand on global load balancing services in 2000, increasing to \$267 million in 2003. The chart ES-6 below depicts the revenue opportunity for service providers that offer global load balancing services.

Chart ES-6: Global Load Balancing Services Forecast



Key Findings

The overwhelming theme across several key questions in the study indicated respondents were not familiar with CDN products and services. Following are key findings from The 2000 Content Delivery Service Study:

- The response to the study survey indicates that the average overall number of content site professionals will likely increase from 52.49 per company in 2000 to 70.8 during 2001.
- Respondents were asked whether they would consider using CDN services from multiple CDN service providers. Nearly half of our respondents indicated they would not. However, 30% indicated they would use multiple CDN providers. Twenty-one percent did not know or declined to answer the question.

- “Performance” was the top reason for subscribing to CDN services cited by 55% of responses; the “Performance” category included a range of benefits such as efficiency, consistency and providing better delivery for customers.
- Caching is the most frequently used technology, as indicated by 56% of the respondents.
- The top three causes for Web site degradations and/or outages for their business were hardware 46%, service provider 32%, and excessive traffic 29%.
- A surprising number of our respondents (64%) plan to use Web-based applications for their Web site.
- The top business challenge, described by 24% of the study respondents, was generating revenue.
- Content development, as described by 27% of respondents, was the largest technical challenge.
- Twenty-two percent of our respondents maintain connections with more than one service provider in 2000, growing to 25% in 2001. Respondents have connections to an average of 1.28 service providers, increasing to 1.39 in 2001.
- The most prevalent Web site Internet configurations, utilized by 69% of the study respondents were self-hosted; that is, Web sites that are hosted on server(s) in the respondent’s own network, with the respondents themselves maintaining the servers and Internet connection.
- Slightly more than half (53%) have more than one data center now, growing slightly to 60% in 2001. Respondents have an average of 2.36 data centers this year, increasing to 2.87 in 2001.
- Dynamic content (87%), static content (85%), and secure content (72%) types make up the majority of respondent Web site content types. There is no significant change in these three popular content types from this year to next year.
- The use of dynamic content increases significantly from 65% in 2000 to 81% in 2001.
- The fastest growing content type is content created with Extensible Markup Language (XML) with 27% this year growing to 67% in 2001.
- Eighty-two percent of the respondents have more than one Web servers in 2000, increasing to 92% in 2001. Only 52% of the respondents use local load balancing technologies in 2000, only slightly increasing to 58% in 2001.

- The average respondent Web site is roughly 30 Gigabytes. Based on the average Web site makeup, our average Web site (of companies with 500 or more employees) would have the following:
 - 18.9 Gigabytes of static content
 - 8.7 Gigabytes of dynamic content
 - 1.5 Gigabytes of secure content
 - 600 Megabytes of on-demand streaming
 - 300 Megabytes of XML-based content
- The use of mirroring at 30% increased to 42% in 2001. Bandwidth optimization products increased from 30% in 2000 to 44% in 2001.
- Reverse proxy caching is increasing in popularity from 19% in 2000 to 27% in 2001. We expect reverse proxy caching to increase significantly, as the market becomes more aware of the benefits.
- Respondents currently subscribe, and plan to subscribe, to a wide range of colocation and hosting providers, with no dominant provider. Based on the verbatim responses, respondents subscribing to lesser known hosting providers are clearly not happy with their current service provider.

The 2000 Content Delivery Service Study

The 2000 Content Delivery Service Study examines an emerging service market focused on providing Web sites with performance enhancements utilizing content delivery solutions.

Content delivery products and services fundamentally improve Web site performance and can have a significant impact on a content provider's bottom line. Since most Web users have little tolerance for slow-loading content, Web performance becomes a key point of differentiation among content providers. (Users are more likely, for example, to purchase while browsing a high-performing e-commerce site.)

For this study, content delivery solutions are services or products designed to distribute content globally over a network through strategically placed servers, intending to intelligently store content close to end users.

In the study, we examine the following:

- Plans for content delivery products and services
- Plans for global load balancing services
- Causes for site performance degradations and outages
- Content site average bandwidth usage, growth, page views, page weight, and unique visitors
- Current and future content types
- Current and future plans for streaming media
- Peak usage bandwidth and peak times of day
- Capacity planning tools and challenges
- Current technology used to increase content site performance
- Current and future Web-based applications
- Content Delivery Provider demand-side marketshare
- Content site Internet connectivity
- Barriers to subscribing to content delivery services
- Content site business and technical challenges
- Final decision maker titles
- Expected service level agreements from content delivery service providers
- Desired service provider features

- The publications considered most influential by content site professionals
- Current and planned hosting and colocation providers
- How content sites view caching technology
- Why content sites plan to subscribe to content delivery services
- Content site planned expenditures
- Content site demographics, including employee breakdown, site type, cacheable content, data center demographics, and site revenue

Using supply- and demand-side information gathered in this study, we examine the opportunity for providers of content delivery services and manufacturers of content delivery products. Forecasts identify the opportunity for content delivery services, content delivery products, streaming media services, and global load balancing services.

Market Background

Web sites differentiate in two fundamental ways: content development and performance. The CDN market emerged in 1999 with the announcement of Akamai Technologies and Sandpiper Networks, both offering new technology and services that dramatically increase Web site performance.

The growth of the Internet continues to blaze forward at an incredible rate. The online population is currently estimated at over 300 million users worldwide. The Internet provides a common connection to personal and professional users globally, enabling a variety of new services. New Internet-based media types are continually developed and used. The growth rate of content on the Internet is significantly increasing as organizations around the world harness developing content types, such as streaming media and dynamic content, to further Web site differentiation.

In 2000, the CDN market continues to heat up with service provider and product manufacturer activity in the form of mergers, acquisitions, and IPOs. New, unannounced start-ups are feverishly working on unique solutions for Web site content performance problems, with their numbers increasing with venture capital investors eyeing the revenue opportunity.

Inktomi and Cisco, separately, have announced the formation of new alliances, both designed to facilitate the CDN market through developing standards, market awareness, and market education.

New providers emerging recently include Speedera Networks, SolidSpeed Networks, EpicRealm, and Orblynx. The introduction of CDN products and services has been well received in the industry, and merger, acquisition, and IPO activity attest to their importance.

The total number of Web sites continues to increase at a staggering pace, fueled by the growing Internet economy. Early adopters of CDN services have been popular Web sites, such as Yahoo!, whose business model is dependant on the Internet. Any Web site that has an interest in performance will likely have an interest in CDN services. Aside from products and services, Web sites have two fundamental differentiating areas, content and performance.

Most CDN providers have begun offering on-demand streaming services. Streaming over the Internet provides a challenging environment where performance enhancement services provide a significant increase in the end user's experience. These services are complementary to CDN services, as they provide performance enhancements by delivering the streamed media from the edge, closer to end users. CDN providers are also offering streaming production and coding services directly or through partnerships. Some CDN providers will likely partner with providers to offer additional services such as storage. Storage is a universal need for the Internet, and ISI services are

complementary to many existing services including content delivery network (CDN) services, colocation services, and media management services. Some CDN providers will likely resell ISI services through partnerships with ISI service providers and product manufacturers.

Study Methodology

To gain a thorough understanding of the opportunity for content delivery products and services, we interviewed 100 Webmasters, Content Managers, and Internet managers, selected at random from content professionals who subscribe to one or more of 20 professional Internet-oriented publications. All respondents 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 the content site (including network plans, bandwidth, management, Web site expenditures, 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 content sites 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.

Interviewers, trained by the HTRC Group, conducted 25-minute telephone interviews using The 2000 Content Delivery Service Study Questionnaire located in the appendix. Greg Howard, Principal Analyst of the HTRC Group, LLC, developed the study questionnaire based on market trends, hot issues, and feedback from content delivery service providers and product manufacturers.

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

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

Quick Take

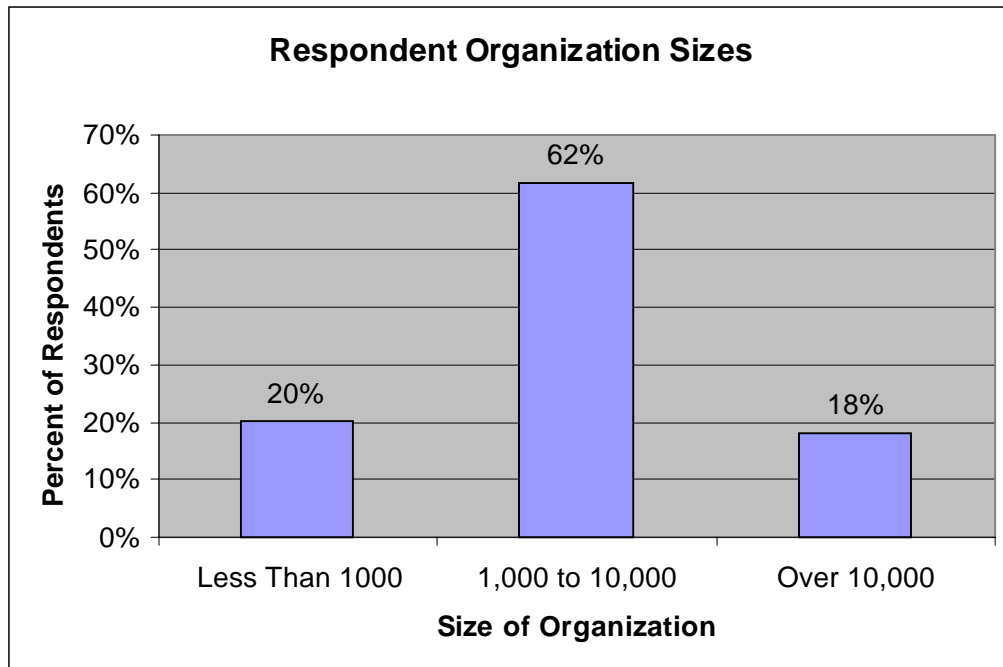
- Number of respondents: 100
- Respondent organizations had 500 or more employees
- All respondents were decision makers
- All respondents had detailed knowledge of their network, including performance, applications and streaming
- Twenty to thirty minute interviews
- Respondents received summary of survey results

Demographics

Company Sizes

Survey responses revealed a wide variety of company sizes, with employees ranging in number from 500 to 600,000, with a mean of 25,489. With this wide range, the mode was 500 and standard deviation 84,877. The largest number of respondents at 62%, were organizations with 1,000 to 10,000 employees. (See Chart 1-1)

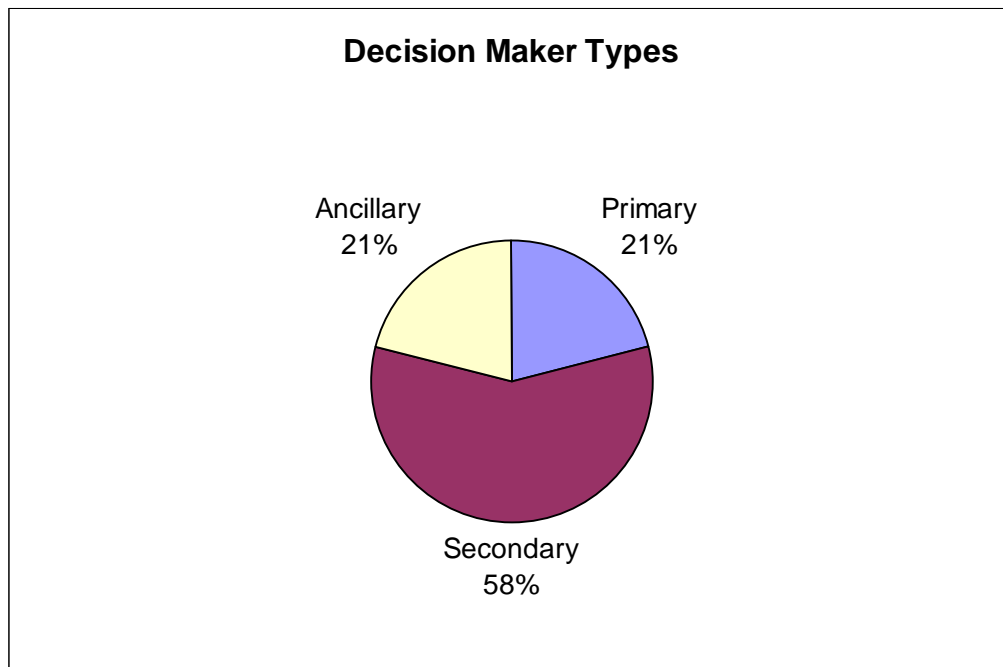
Chart 1-1: Organizational Sizes (n=99) Q2



Decision Makers

Targeting the right decision makers to interview in organizations can be difficult. However, it is necessary in order to obtain dependable data that reflects current buyer thinking. Respondents must have influence on product and service purchase decisions. In Question 3, we asked respondents what type of decision maker they were, including primary decision maker, secondary decision maker, and ancillary decision maker. 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; 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 groups, percentiles were as follows: primary 21%, secondary 58% and ancillary 21%. Chart 1-2 below shows the breakdown of respondent decision maker types.

Chart 1-2: Decision Maker Types (n=100) Q3

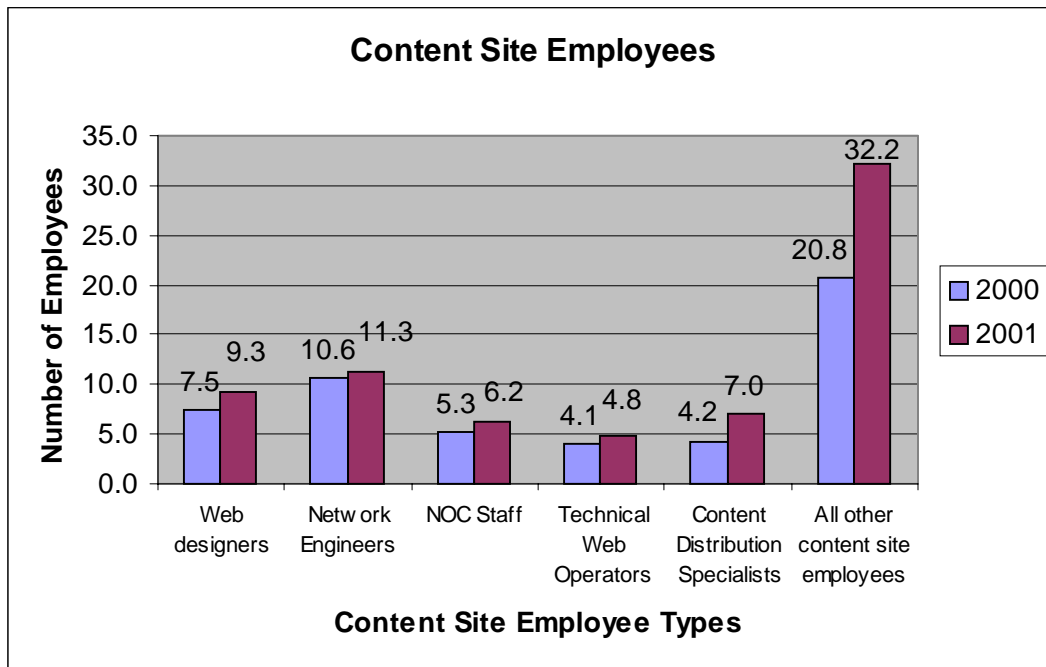


Content Site Employee Types

Content site employees are those whose job function involves working with their company's Web sites. The response to the study survey indicates that the average overall number of content site professionals will likely increase from 52.49 per company in 2000 to 70.8 during 2001. Chart 1-2 below depicts the anticipated increase in Web designers, network engineers, NOC staff, technical Web operators, content distribution specialists, and other content site employees.

With the current scarcity of Web site expertise, planned growth indicates a strong opportunity for outsourced content site services. It should be noted that a reluctance to outsource due to a fear of job loss could be addressed by positioning content delivery and streaming services in a way that extends the capacity and efficiency of existing content site employees rather than replacing them.

Chart 1-3: Content Site Employee Types (n=100) Q4

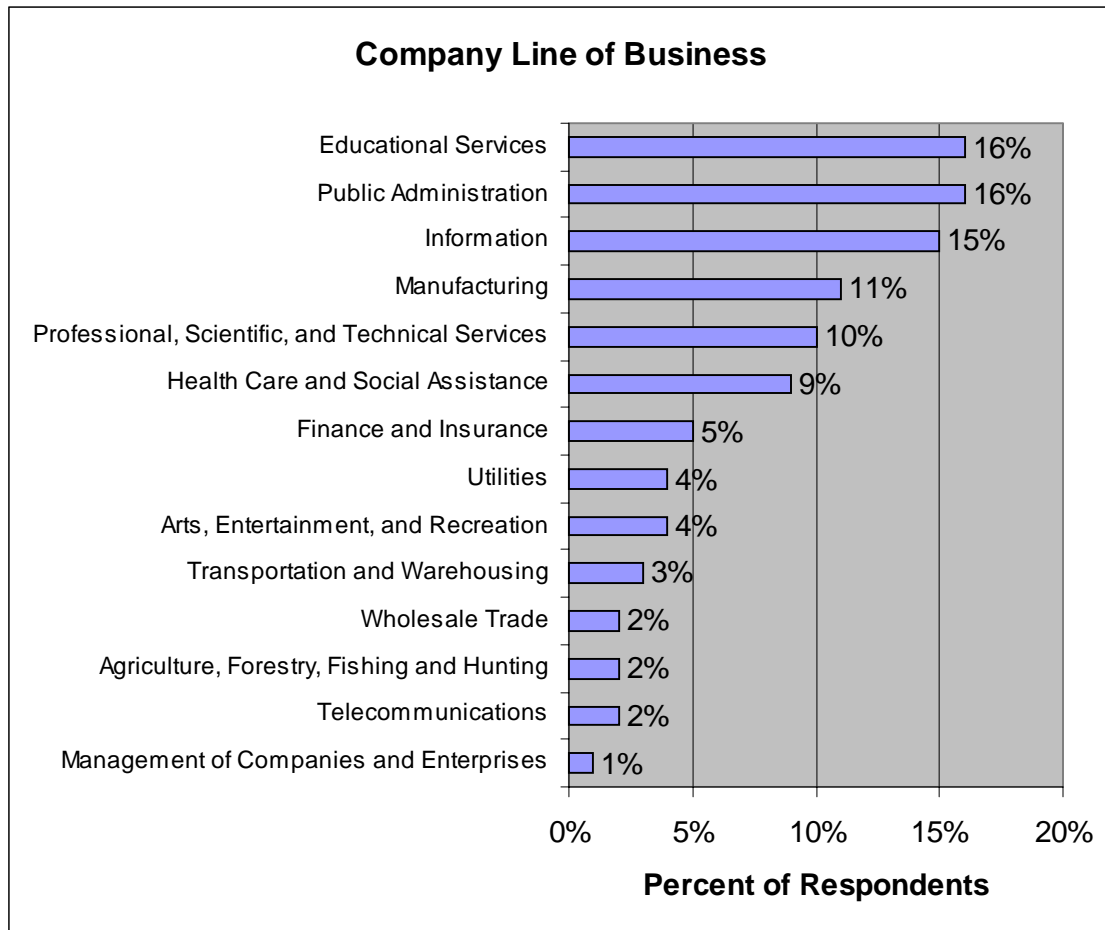


Company Line of Business

Respondents were asked what type of business their company was in, as an open-ended question. Responses to Question 5a ranged from educational services to telecommunications services. Responses were organized into the categories below.

Educational services and public administration both listed at 16%, were the most frequent content site type in the sample, followed by information providers at 15%, and manufacturing at 11%. Chart 1-4 below shows respondent line of business.

Chart 1-4: Company Line of Business (n=100) Q5a

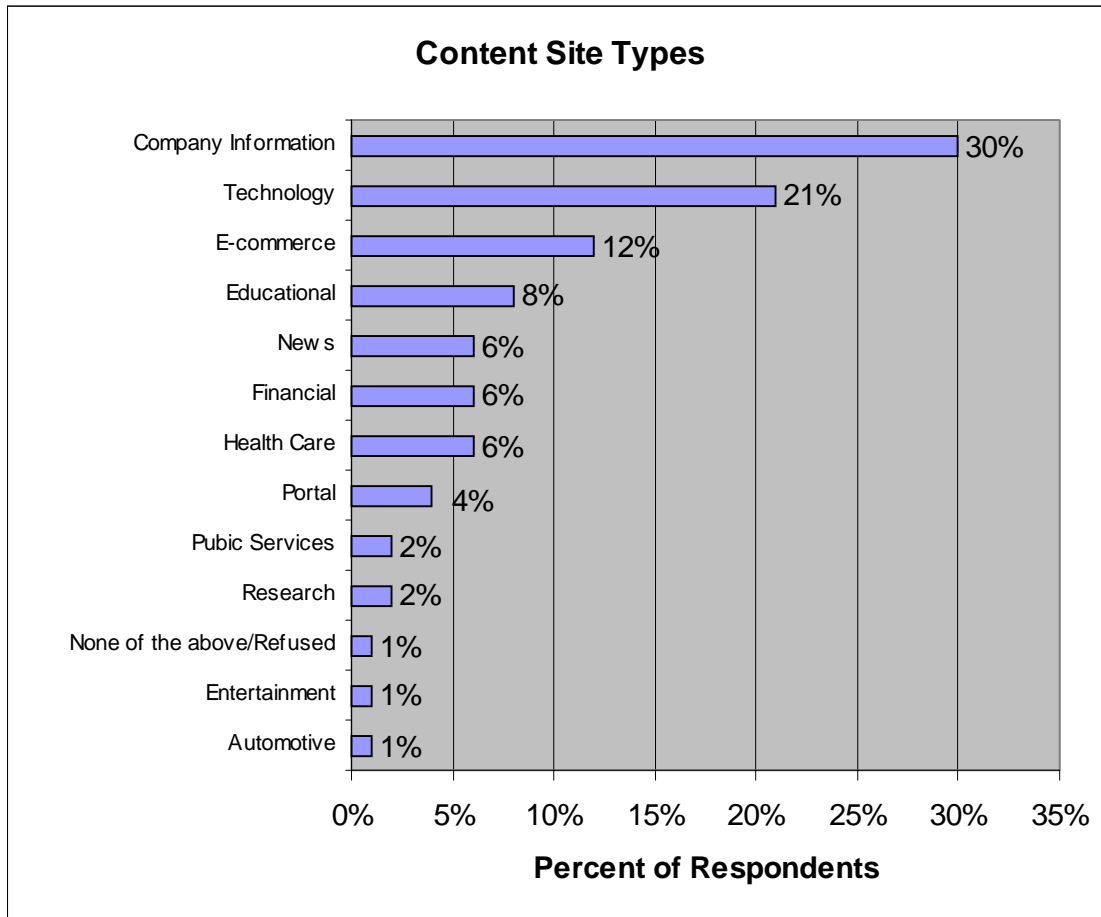


Content Site Types

Respondent content site types ranged from those that offer company information to research and entertainment. As our results show, technology companies are often at the forefront of the early adopters of new technology, continually seeking ways to increase the overall company effectiveness.

Company information sites only offer information about a company and were 30% of our respondents. Technology sites at 21% were the second most frequent Web site type in the study sample, followed by e-commerce at 12%, and educational at 8%. Chart 1-5 below shows respondent content site types.

Chart 1-5: Content Site Types (n=100) Q5b



Site Connectivity

Content Site Configurations

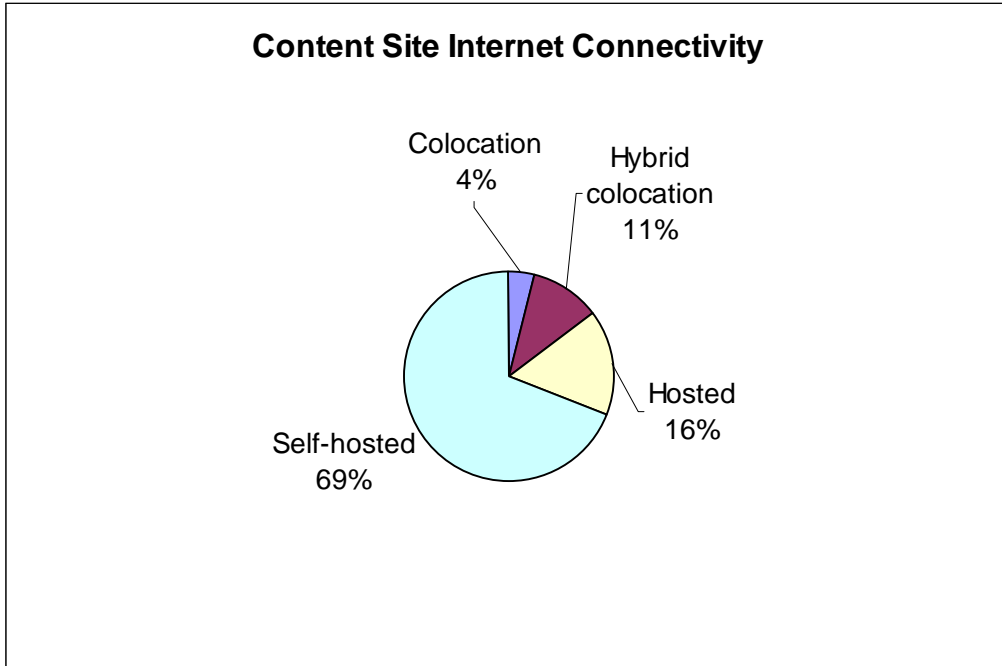
The most prevalent Web site Internet configurations, utilized by 69% of the study respondents were self-hosted; that is, Web sites that are hosted on servers in the respondent's own network, with the respondents themselves maintaining the servers and Internet connection. Hosted content sites, that is, those sites entirely hosted on a service provider's network were employed by 16% of the study respondents.

Hybrid colocation sites were defined as organizations that host Web servers in both a service provider's network and their own network. Eleven percent of the respondents had hybrid colocation site configurations.

Colocation hosted configurations are content sites that host server(s) in a service provider's network. With colocation, respondents own and maintain the server(s) that reside in the service providers' network. Colocation content site configurations are utilized by 4% of the study respondents. Chart 2-1 below shows respondent content site Internet connection types.

The majority of our respondents host their Web site internally, and represent a large opportunity to hosting providers. Service providers should market the benefits of collocating a server in a hosting facility to maintain greater flexibility in bandwidth growth capacity. Those respondents that host their own Web site are dependent on last mile providers for any increase bandwidth capacity. Provisioning additional connections will likely take months, severely restricting growth, which in turn may impact revenue.

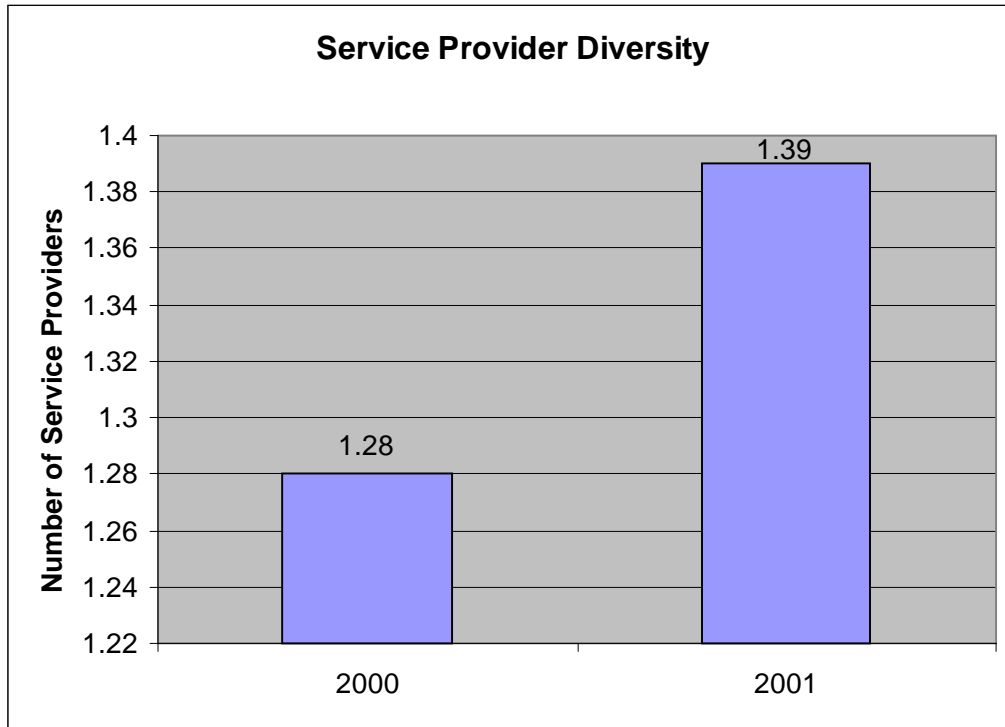
Chart 2-1: Web Site Connectivity (n=100) Q6



Service Provider Diversity

An organization's online presence becomes more important with time. In fact, a poor presence online will reflect negatively on an organization's reputation. Maintaining connections with different service providers is one way to increase Web site uptime, in the unlikely event a service provider should experience service degradations or outages. Twenty-two percent of our respondents maintain connections with more than one service provider in 2000. This is projected to reach 25% in 2001. Respondents have connections to an average of 1.28 service providers, increasing to 1.39 in 2001. Chart 2-2 below shows the average number of service providers respondents use for Web site connectivity.

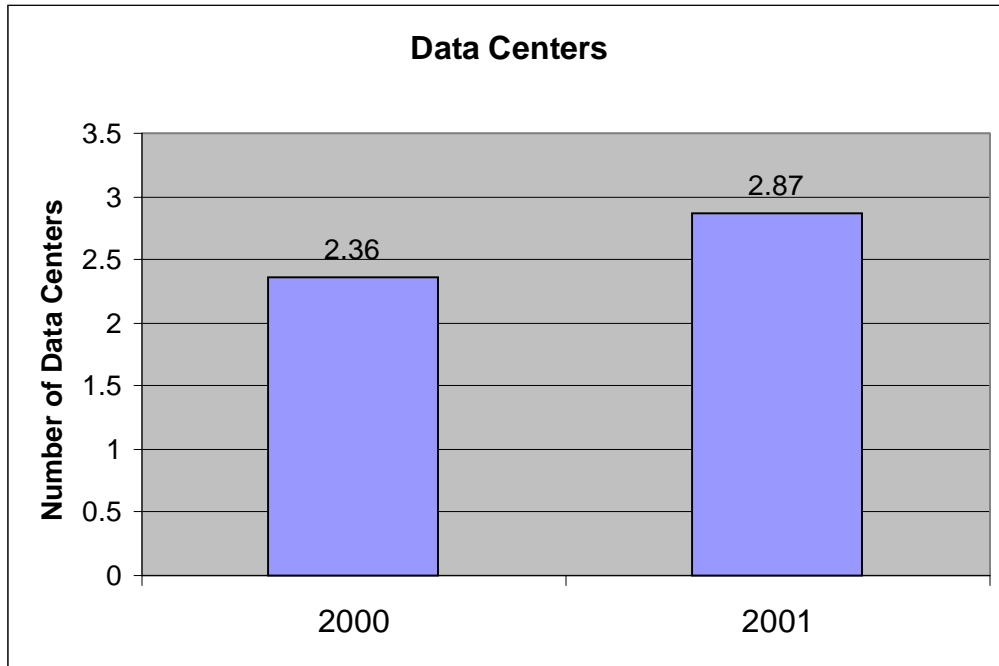
Chart 2-2: Service Provider Diversity (n=97) Q8



Data Centers

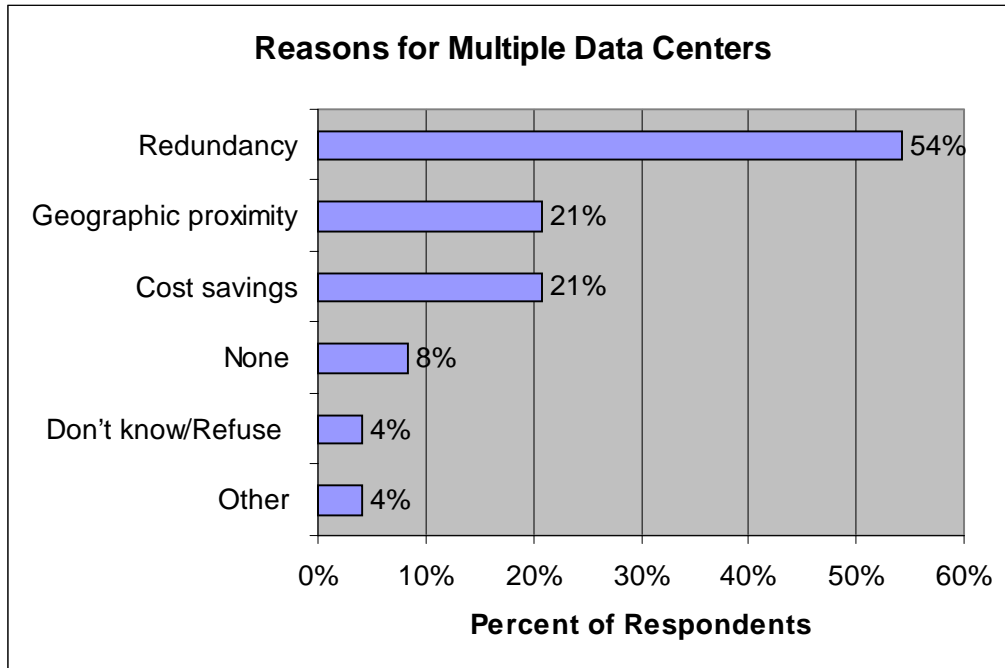
Respondents were asked how many data centers they have now and project for 2001. Slightly more than half (53%) have more than one data center now, growing slightly to 60% in 2001. Respondents have an average of 2.36 data centers this year, increasing to 2.87 in 2001. Chart 2-3 shows respondent data center growth from 2000 to 2001.

Chart 2-3: Data Centers (n=94) Q7a



Respondents with multiple data centers were asked why they have multiple data centers. As expected redundancy, with 54%, was at the most frequent response. Redundancy was followed by geographic proximity and cost savings, both at 21%. Geographic proximity is achieved by building out data centers in strategic areas. For example, a company that has a strong presence in North America and Asia may build data centers to better serve Web site requests from those areas. CDN product manufacturers and service providers should emphasize “Redundancy” messaging for CDN and streaming services. Other responses included data centers for hosting different types of data. In some large scale Web sites, SAN and NAS solutions are necessary and specific types of data are centralized. Chart 2-4 below shows respondent’s reasons for multiple data centers.

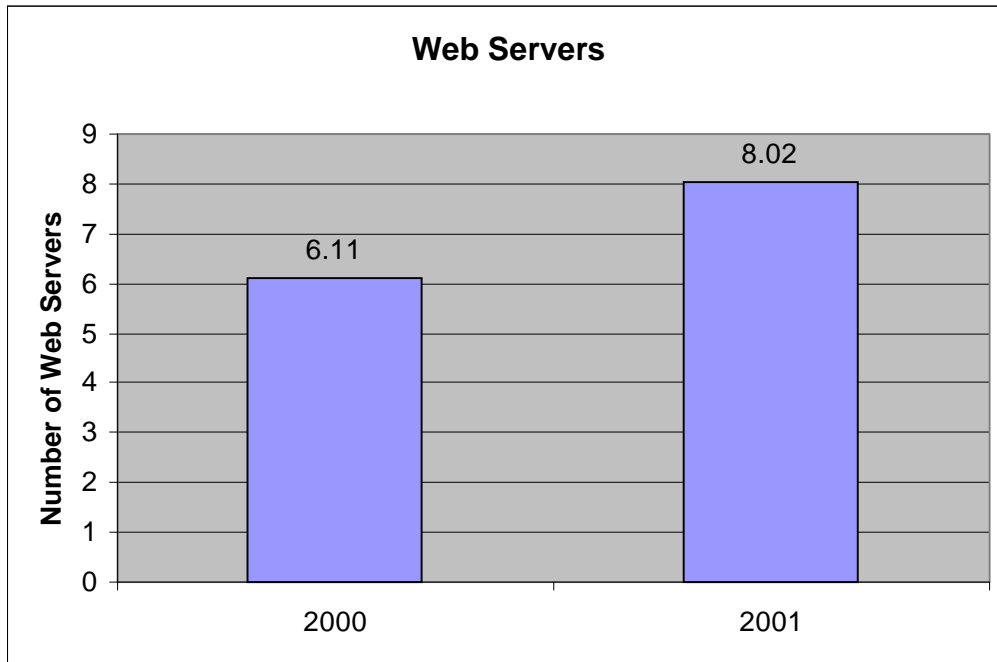
Chart 2-4: Reasons for Multiple Data Centers (n=24) Q8a



Web Servers

Respondents were asked how many Web servers they have now and project for 2001. Respondents average 6.11 Web servers in 2000, increasing to an average of 8.02 Web servers in 2001. Responses for both 2000 and 2001 ranged from 1 to 100 Web servers. Eighty-two percent of the respondents have more than one Web server in 2000, increasing to 92% in 2001. Only 52% of the respondents use local load balancing technologies in 2000, which will slightly increase to 58% in 2001. Chart 2-5 shows respondent Web server growth from 2000 to 2001.

Chart 2-5: Web Servers (n=45) Q7b



Content Delivery Services

Plans for Content Delivery Services

Content Delivery Service Architectures

A content site can use content delivery technology in either of two ways: building out their own content delivery solution, or outsourcing the delivery of content to a multi-network, facilities-based, or hybrid provider of content delivery services. The largest number of respondents plan to build a content delivery solution in-house and have a marginal 3% change from 42% in 2000 to 45% in 2001. The only significant increase occurs with multi-network CDN providers—an increase from 12% in 2000 to 17% in 2001.

The use of CDN services has significantly increased from last year. In *The 1999 Content Delivery Services Study*, only 8% of the respondents used a service provider for CDN services in 1999 with no significant increases in 2000. Last year's study respondents indicated the greatest interest in building an in-house CDN solution. This year, respondents are from larger companies, those with 500 or more employees, and 28% are using or planning to use CDN services, increasing to 31% in 2001.

Those respondents that plan to build their own CDN solution were asked which products they used and planned to use. The majority of the products named were content management tools and content development applications. The current buyer perception of deploying an in-house CDN solution involves content management rather than delivery or distribution. The target market clearly needs to be educated on CDN technology.

Hybrid-based CDN providers are a combination of facilities-based and multi-network. Hybrid-based CDN providers, such as Digital Island, deliver content from an owned and maintained facilities-based network, as well as other networks. Eighteen percent of the respondents are using or plan to use a hybrid-based CDN provider this year and in 2001.

Facilities-based CDN providers can directly resolve network problems if they occur. In order to deliver CDN services on a facilities-based network, the service provider's network should span a large geographic area to distribute content to end users. Facilities-based CDN providers, which own data centers, can provide a single source for most or all Internet services and can bundle services such as colocation, access and content delivery services. Ten percent of the respondents are using or plan to use a facilities-based CDN provider this year, slightly increasing to 12% in 2001.

Multi-network CDN providers place CDN servers in as many facilities-based service provider's networks as possible, targeting networks with many Internet access users. These CDN servers, such as those from Akamai and

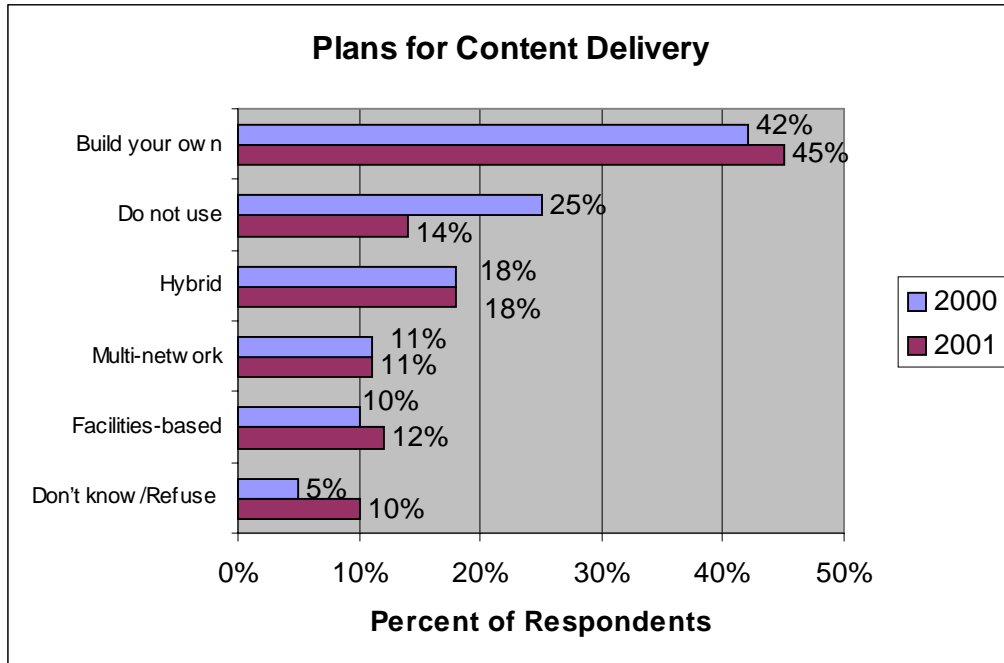
Speedera, comprise a network of many interconnected servers across multiple ISP backbones. Deploying content delivery servers in many individual networks adds resiliency to the multi-network CDN provider’s overall service. Eleven percent of the respondents are using or plan to use a multi-network CDN provider this year and in 2001.

Respondents that had no plans to implement a content delivery solution decreased from 25% in 2000 to 14% in 2001. These respondents may be taking a “wait-and-see” attitude towards new technology that has not been proven in the market.

The change from 2000 to 2001 is in “Don’t Know” responses, increasing from 5% to 10%, supporting the indication of a new market. These respondents have not yet decided how they will address content delivery technology.

Respondent plans to outsource content delivery services to multi-network, facilities-based and hybrid-based content delivery providers show little overall growth. However, we believe that when content site managers examine resources and planned growth, more will choose content delivery services.

Chart 3-1: Plans for Content Delivery (n=100) Q10



CDN Provider Mindshare

In an open-ended question, we asked respondents to name what service providers come to mind when they think about content delivery services. We defined content delivery services as a service or services that give Web content providers (Web sites) the ability to distribute Web site content to end users in multiple locations simultaneously. The majority of respondents, 66%, could not name a provider. Although CDN providers have been in the market for roughly a year and a half, they are clearly challenged with developing a brand name associated with CDN services. Of the 100 respondents only 34 named a service provider. Akamai, AOL, and Earthlink were named most frequently as providers that offer CDN services; however, of the three, Akamai is the only CDN provider. Vignette, Oracle, and Inktomi were all named by respondents; however, they are all product manufacturers and not service providers. These three product manufacturers have CDN or content management products, and may have been named by those respondents developing their own CDN solution. The chart 3-2 below shows respondent familiarity with content delivery providers. Table 3-1 shows additional providers with less than three responses.

Content delivery products and services are still in an early market period, where there are no clear mindshare winners. While there may be early market leaders, such as Akamai, the CDN service market is clearly wide open. New entrants into the CDN product market, such as Cisco, will significantly change the competitive landscape by arming additional service providers with a competitive CDN solution.

Respondents' familiarity with content delivery providers ranged widely, with no one provider having more than four responses in 2000. Study responses indicate that there is sufficient room in the content delivery market for providers who are examining content delivery service offerings.

Chart 3-2: CDN Mindshare (n=100) Q9

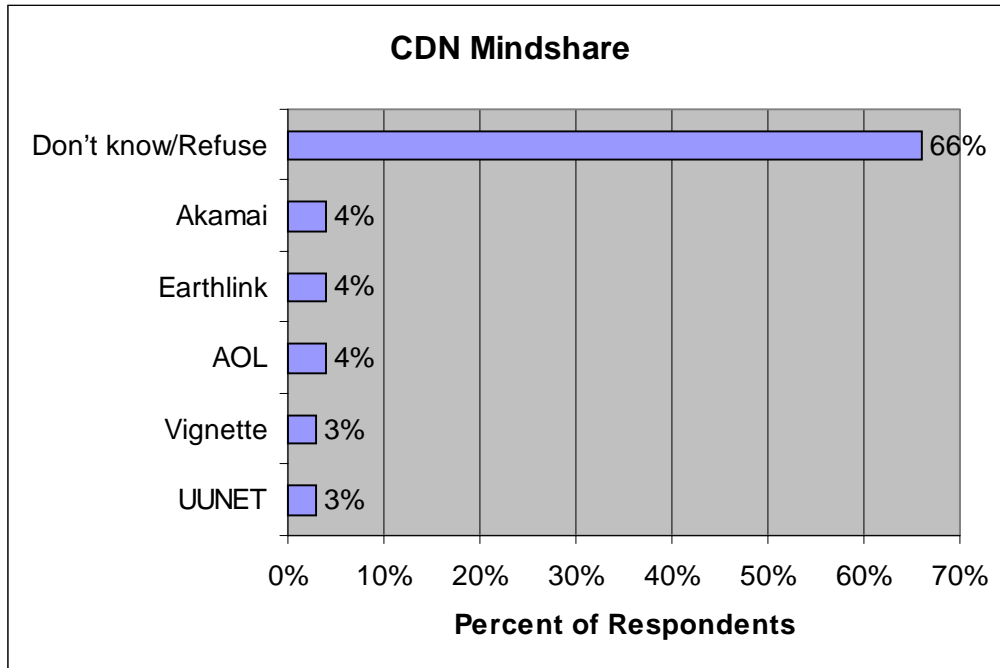


Table 3-1: Other CDN Mindshare Responses (n=22) Q9

Other Responses	
2%	Mindspring
2%	CompuServe
2%	AT&T
2%	Intel
2%	Concentric
2%	Exodus
2%	Oracle
1%	Media One
1%	MCI
1%	Best
1%	USWest
1%	SkyCache (Cidera)
1%	GTE
1%	Bell South
1%	Inktomi

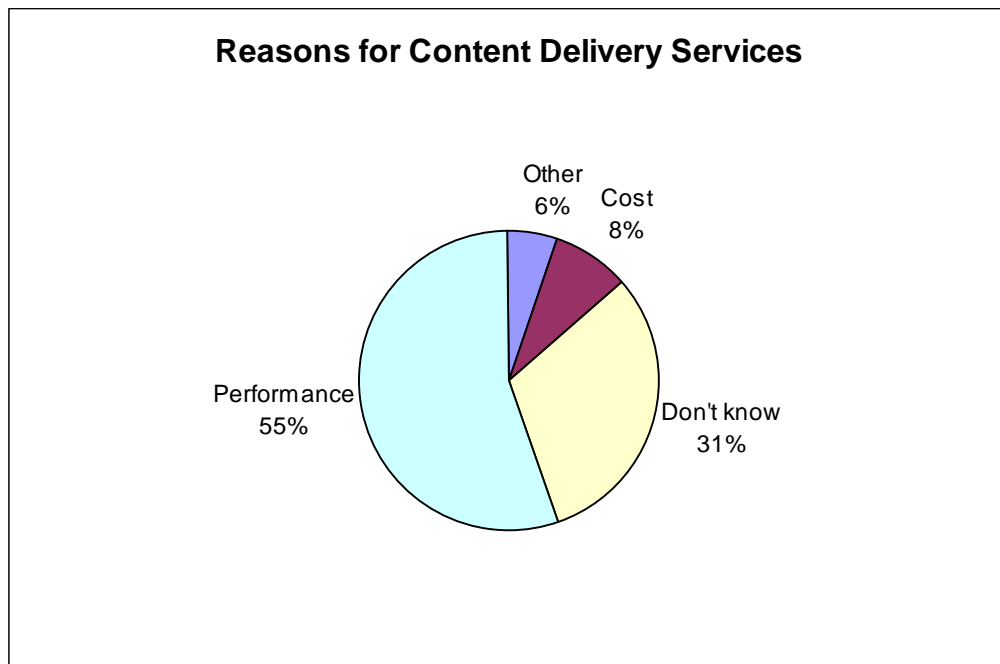
Benefits and Barriers

CDN Benefits

Respondents were asked in an open-ended question why they plan to use content delivery services. Based on responses, descriptions were placed into the following categories: performance, cost, and other. The chart 4-1 below shows categorized respondent descriptions of reasons for content delivery services. Please see the verbatim responses in the data summary for details.

The “Performance” category, representing 55% of our responses from an n of 36, included a range of benefits such as efficiency, consistency and providing better delivery for customers. The “Cost” category, with 8%, viewed the use of CDN services as a way to reduce costs. The majority of our respondents (69%) plan to build their own CDN solution or have no CDN plans. Consequently 64% of the total respondents elected not to list a reason why they plan to use CDN services. Thirty-one percent did not know why they plan to use content delivery services, probably because they know CDNs increase performance, but, do not yet have a full understanding of how content delivery services work.

Chart 4-1: Reasons for Content Delivery Services (n=36) Q13



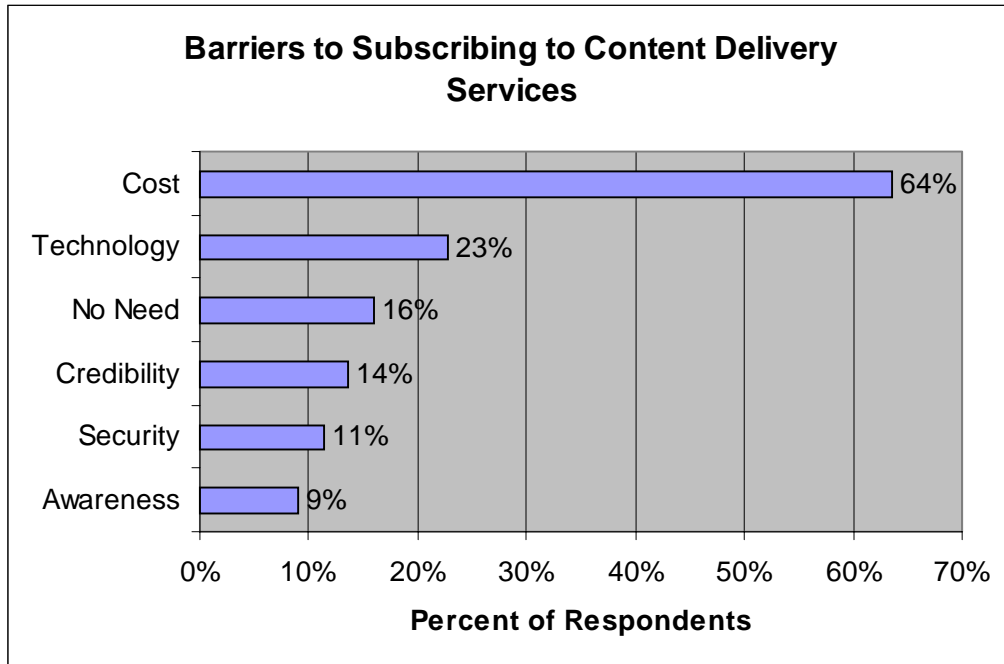
CDN Barriers

Respondents were asked in an open-ended question to describe their top three barriers to subscribing to content delivery services. We categorized responses based on individual answers. As shown in chart 4-2 below, the strongest is Cost, followed by Understanding Technology, and No Need. Since the current buyer thinking of 64% of the study respondents is that the primary reason they are likely not to subscribe to content delivery services is the high cost, it is incumbent upon service providers and product manufacturers to develop case studies and financial models. Over the past year, new entrants in the CDN market have not driven the price of CDN services down. However, there are emerging entrants this year 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.

The second largest barrier, described by 23% of the study respondents, was the lack of understanding of CDN technology. Content delivery technology is new, and can present a challenge to potential customers. Providers of content delivery products and services should create documents 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 service providers' acquisition of new customers.

Most prospects likely view CDN products and services as new technology that must be proven in the marketplace. Credibility (14%) and security (11%) are two significant hurdles to overcome. A large part of credibility in the market is played out in the industry trade publications and reputation. A successful security reputation is developed by an ongoing focus on plugging security holes as soon as they pop up.

Chart 4-2: Content Delivery Services Barriers (n=44) Q51



No Plans

Respondents with *no plans* to either subscribe to CDN services or build an in-house CDN solution were asked why they saw no need for a CDN solution. The bulk of the responses indicate that respondents don't have a need for a high performing Web site, as in the case of a university Web site. Only 12 of the 14 respondents with no plans gave us a description, and their responses are listed below in table 4-1.

Table 4-1: No Plans For Content Delivery Services (n=12) Q10a

<i>No Plans for Content Delivery Services</i>
NO NEED TO AT THIS POINT, MAYBE IN 2 TO 3 YEARS
WE DON'T SEE THE BENEFIT
THERE IS NO PLACE WHERE IT CAN BE CURRENTLY USED
WE HAVE NO NEED
WE HAVE NO NEED FOR IT
BEING AN EDUCATIONAL SITE, IT'S NOT AN AREA WE'RE MOVING INTO YET
I'M NOT SURE WE HAVE A NEED FOR THAT
IT'S TOO EXPENSIVE FOR THE RESULTS WE GET
WE ONLY HAVE DYNAMIC CONTENT
E-COMMERCE NOT GEARED
WE HANDLE EVERYTHING IN HOUSE
IT DOESN'T PROVIDE CONTENT

Current And Future Plans For Service Providers

Content Delivery Providers Types

In order to gain a better understanding of the types of providers that have a perceived advantage in the CDN market, respondents were asked which of the named service provider types they would prefer to procure CDN services from. With multiple responses to our question allowed, responses to our question did not identify one type of provider over another.

We expected that a content delivery specialist provider would lead by a significant margin; however, there was no significant difference among service provider types. The lack of a single service provider type for content delivery services indicates that there is no preconceived barrier for service provider types entering the CDN market. Clearly there is room in the CDN market for multiple service provider types. Chart 5-1 shows respondents' preferred service provider types for CDN services. Table 5-1 below lists the "Other" responses for service provider types.

Chart 5-1: Types of Providers for CDN Services (n=100) Q16

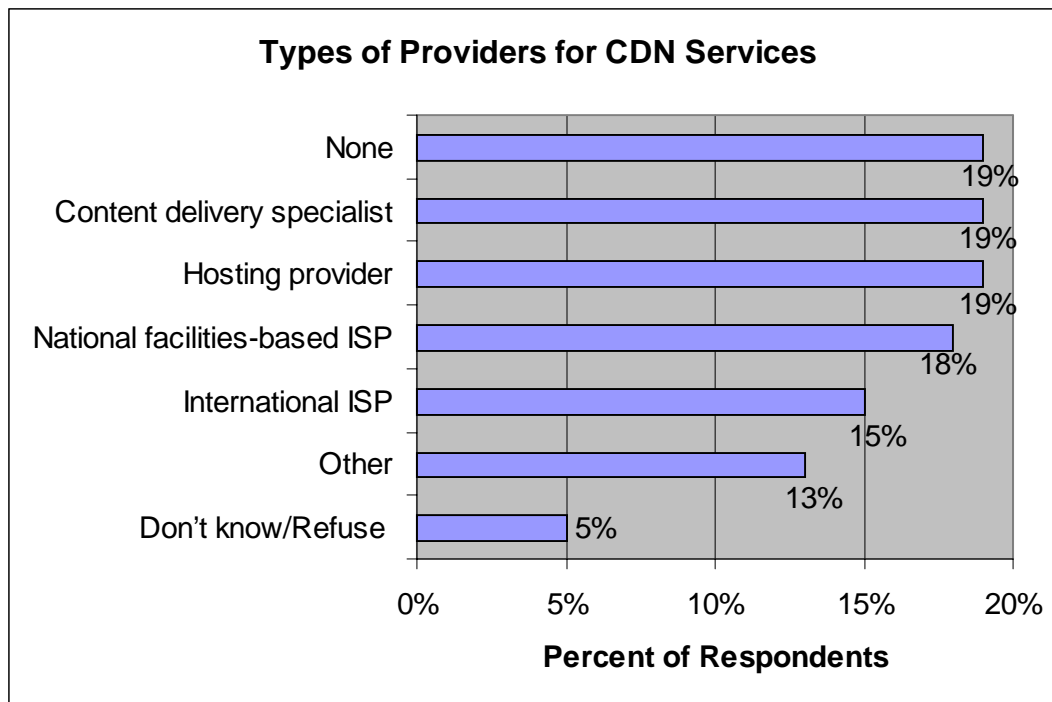


Table 5-1: Other Responses for CDN Providers Types (n=13) Q16

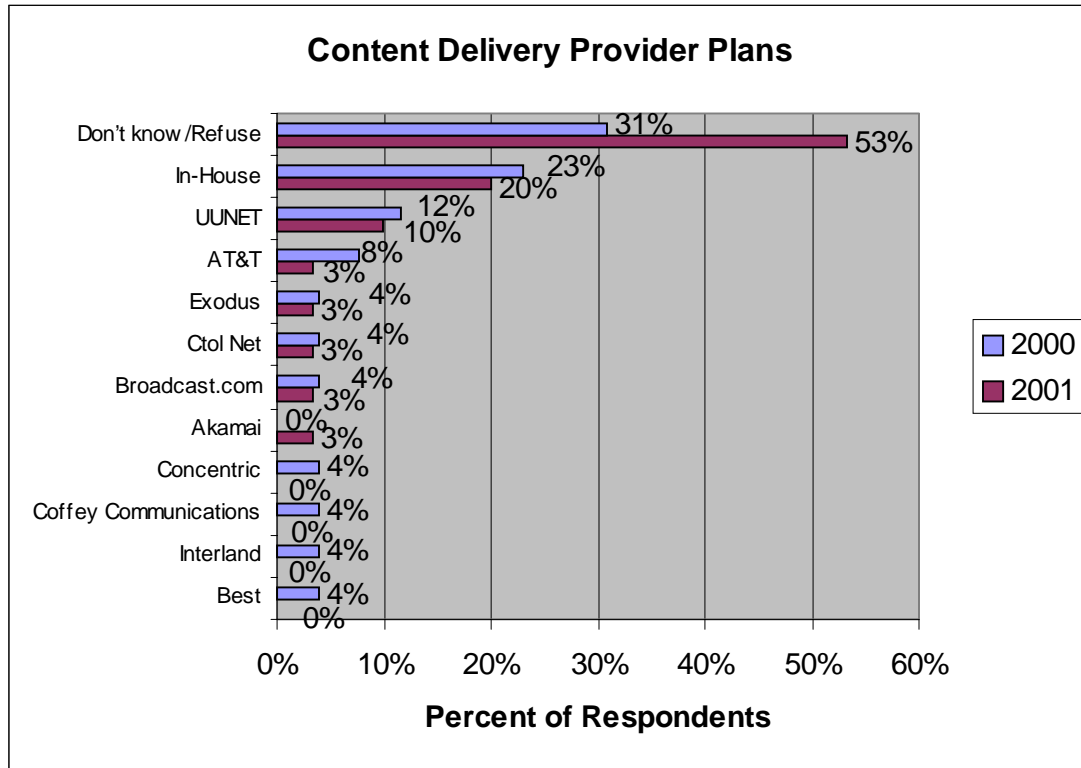
<i>Other Responses</i>
INTERNAL (5)
REGIONAL (2)
IN HOUSE (2)
CUSTOM (2)
INTERNAL ISP
LOCAL ISP

Content Delivery Provider Plans

In an open-ended question, we asked respondents to describe the service providers they use for content delivery services now and those they plan to use by July 2001. We defined content delivery services as a service or services that enable Web content providers (Web sites) the ability to distribute Web site content to end users in multiple locations simultaneously. The chart 5-2 below shows respondent plans for content delivery providers.

Content delivery services are in an early market period, where there are no clear marketshare winners. Respondents' description of content delivery providers ranged widely, with no one provider having more than three responses in 2000 and 2001. Study responses indicate that there is sufficient room in the content delivery market for providers who are examining content delivery service offerings.

Chart 5-2: Content Delivery Provider Plans (n=26, n=30) Q11-12

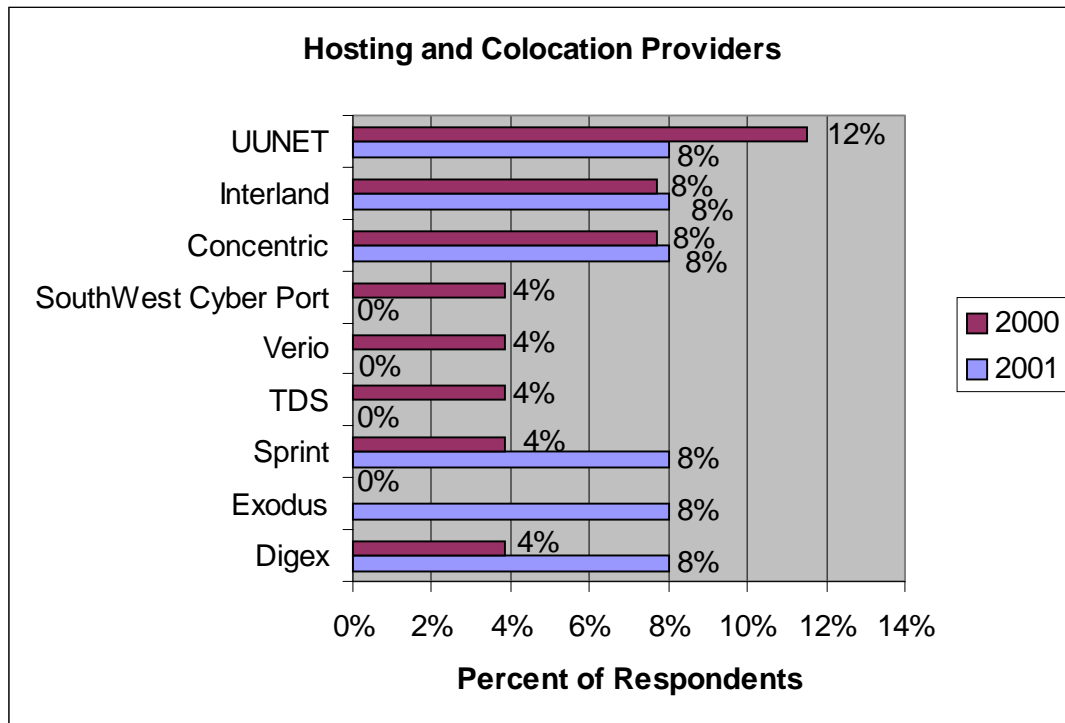


Current and Planned Hosting Providers

In an open-ended question, we asked respondents to describe to us the service providers they use for colocation and hosting now and those they plan to use by July 2001. Only respondents who indicated they used a hosting provider in question 6 were asked this question. The chart 5-3 below shows respondent current and future plans for colocation and hosting providers.

Respondents currently subscribe, and plan to subscribe, to a wide range of colocation and hosting providers, with no predominant provider. Based on the verbatim responses, some respondents are clearly not happy with their current service provider. We do note a significant change from the less known hosting providers to the well known hosting providers, such as UUNet and Exodus.

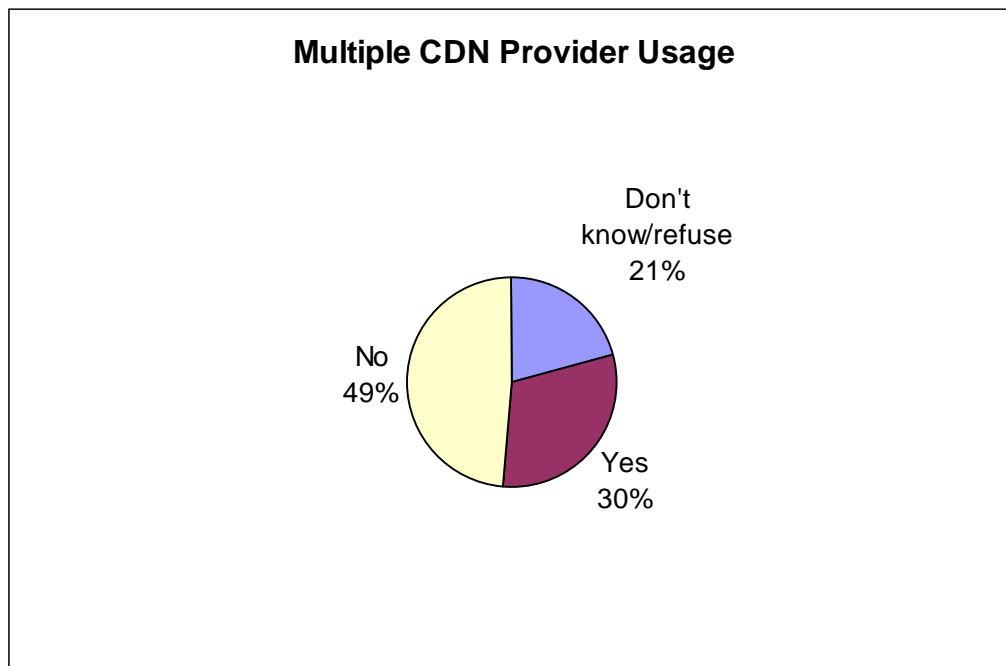
Chart 5-3: Current & Future Hosting Providers (n=22, n=20) Q14-15



Multiple CDN Providers

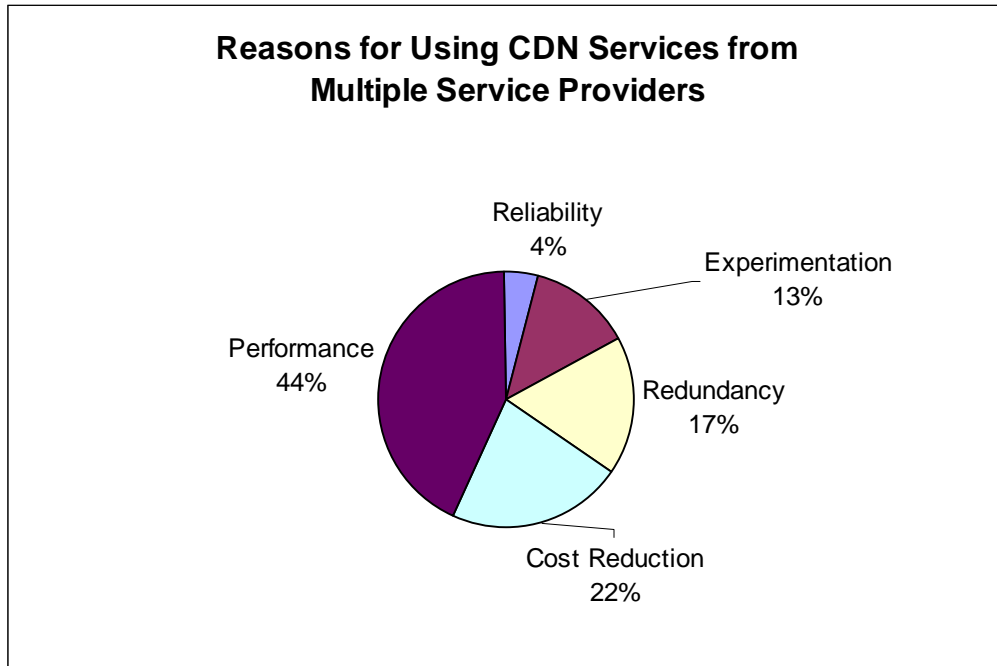
Respondents were asked whether they would consider using CDN services from multiple CDN service providers. Nearly half of our respondents indicated they would not. However, 30% indicated they would use multiple CDN providers. Twenty-one percent did not know or declined to answer the question.

Chart 5-4: Multiple CDN Provider Usage (n=100) Q17



Respondents who indicated they would consider using more than one CDN provider were asked why in a following open-ended question. We categorized responses into the following categories: Performance, Cost Reduction, and Redundancy. Performance was the dominant response with 44%, followed by cost reduction with 22% of the responses. Only 17% of those respondents considering the use of multiple CDN providers indicated redundancy.

Chart 5-5: Reasons for Multiple CDN Provider Usage (n=30) Q17a



Web Content

Content Types

New types of content are continually being developed to increase the effectiveness of online communication, e-commerce, and attracting visitors to a Web site. Streaming media continues to grow in popularity as an avenue to convey information to end users. Fundamentally, the surfer's experience includes how quickly all types of content, including streaming media, are delivered to their PCs. The Web surfer's experience can directly affect the bottom line of any online company. Content site managers strive to provide the best possible experience for all who visit their sites. That's why so many content providers are willing to pay for premium bandwidth and performance enhancement products and services.

We asked our respondents what types of content they have on their site now, and expect to have a year from now. Following are definitions of content used in our interviews:

- *Static Content*: content that does not change, such as a company logo
- *Dynamic Content*: dynamic content includes HTML pages built on the fly unique to a specific user, such as E*Trade account information
- *On-demand Streaming Media Content*: streaming media that is produced, then stored on Web site; for example, video on demand
- *Live Streaming Media Content*: streaming media that is captured at the source and transmitted to an audience with a minimal level of delay, such as a live Webcast of a concert
- *Secure Content*: content that is secured using technologies such as Secure Socket Layer (SSL)

Content Type Growth

In order to gain a better understanding of the growth of content types, respondents were asked to name current and future content types using the definitions listed above. dynamic content (87%), static content (85%), and secure content (72%) types make up the majority of respondent content types. There is no significant change in these three popular content types from this year to next year. Those Web sites that did not have static content on their site all had secure or dynamic content.

Web site owners continue to differentiate with content and are offering dynamic content that provides Web surfers with individualized content. Content delivery providers should continue to work towards serving dynamic

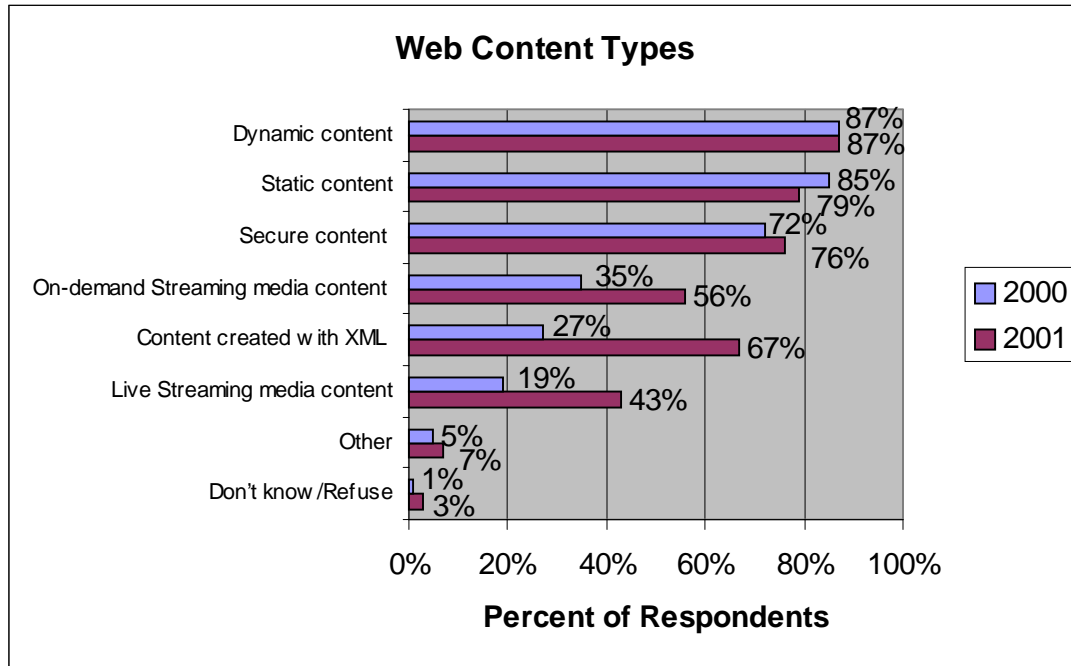
content from a network of CDN servers. The first CDN provider who can deliver dynamic content from the edge will have a significant market advantage.

The fastest growing content type is content created with Extensible Markup Language (XML) with 27% this year growing to 67% in 2001. XML was developed by the World Wide Web Consortium, and is a light version of SGML (Standard Generalized Markup Language) designed for Web content. XML uses definable tags, enabling flexible transmission and interpretation between applications. XML is increasingly being used to create dynamic content (individualized content unique to a user) as a Web site differentiation.

The popularity of streaming media on the Internet continues to grow, and could significantly affect current Internet infrastructure. The use of on-demand streaming media increases from 35% in 2000 to 56% in 2001. Live streaming media grows at an unexpected rate, from 19% in 2000 to 43% in 2001. These results are very similar to our May Rapid Business Intelligence (RBI) research study stating live streaming will grow from 23% in 2000 to 40% in 2001.

One widespread use of streaming could impact Internet performance globally. For a possible example, a mega hardware and home improvement store such as Home Depot might create a library of "How-to" streaming files on their Web site which users could view to assist in home improvements. A potential customer could download a file on how to replace a kitchen sink faucet. During the streamed video, advertisements for the tools and parts could be inserted into the stream, allowing the user to click through to the store to purchase the products. The cost of the streaming could be subsidized by advertisements, and sponsors would reach their target audience. In this model, demand could easily reach thousands of simultaneous users, all downloading multi-megabyte files from a central location. This example of capacity demand could cripple Internet performance. The demand for products and services which effectively deliver streaming media from the edge are well positioned to take advantage of this growing opportunity. The chart 6-1 below shows current and future plans for content types.

Chart 6-1: Web Content Types (n=100) Q18



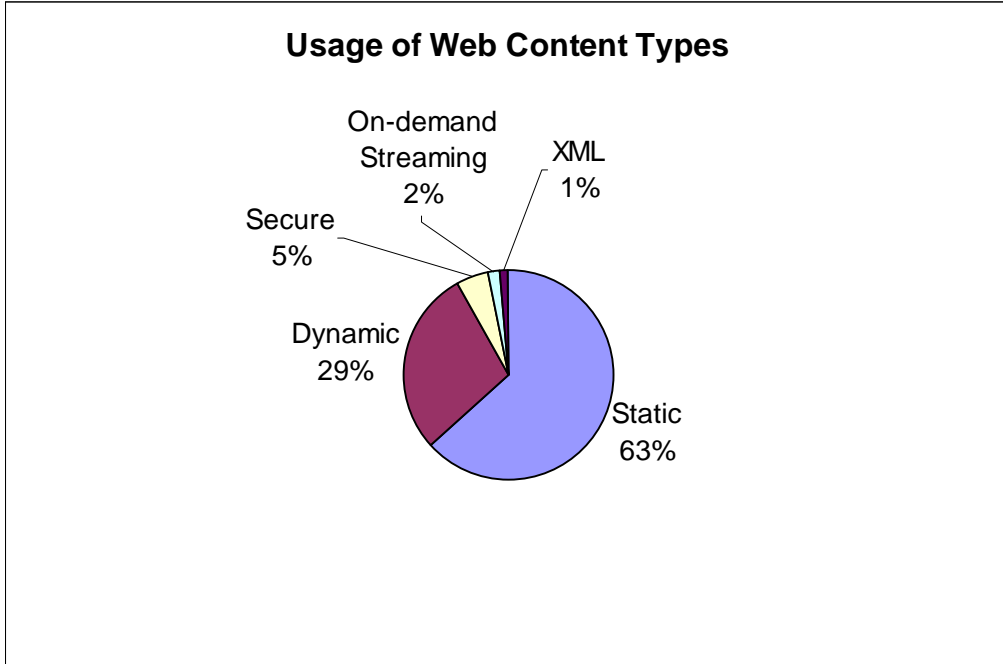
Web Site Content Usage

Respondents were asked what percent of their total Web site uses static, dynamic, on-demand streaming, secure, or XML-based content types. The average Web site is comprised of 63% static content, 29% dynamic content, 5% secure content, 2% on-demand streaming content, and 1% XML-based content. Chart 6-2 below shows the average makeup of a Web site. Please note that these averages are representative of the sample population, and not any single Web Site.

In question 22a, we asked respondents to state the total size of their Web site, including all types of content. Of the 78 respondents that answered the question, the average Web site is roughly 30 Gigabytes. Based on the average Web site makeup, our average Web site (of companies with 500 or more employees) would have the following:

- 18.9 Gigabytes of Static content
- 8.7 Gigabytes of Dynamic content
- 1.5 Gigabytes of Secure content
- 600 Megabytes of On-demand Streaming
- 300 Megabytes of XML-based content

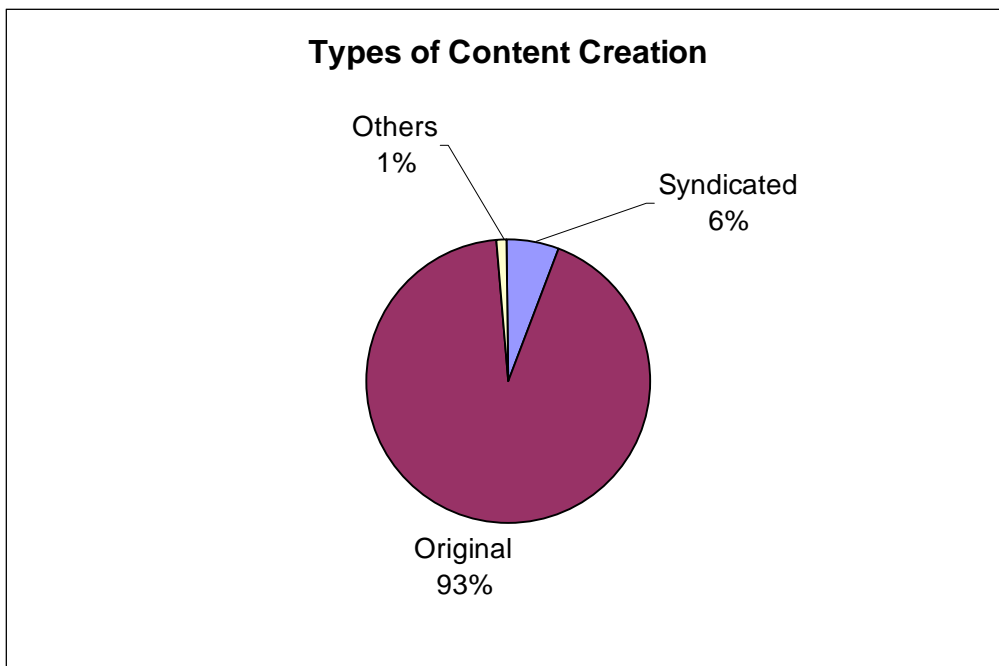
Chart 6-2: Usage of Web Content Types (n=100) Q19



Content Creation

In order to gain an understanding of how respondents create content for their Web site, we asked respondents to state what percentage of their Web site was syndicated, original or other. The vast majority of content created by our respondents is original (93%). On average, only 6% is syndicated content and 1% is other. Respondent sites that used syndicated content used a significant amount. Chart 6-3 below shows the percentage of content creation types.

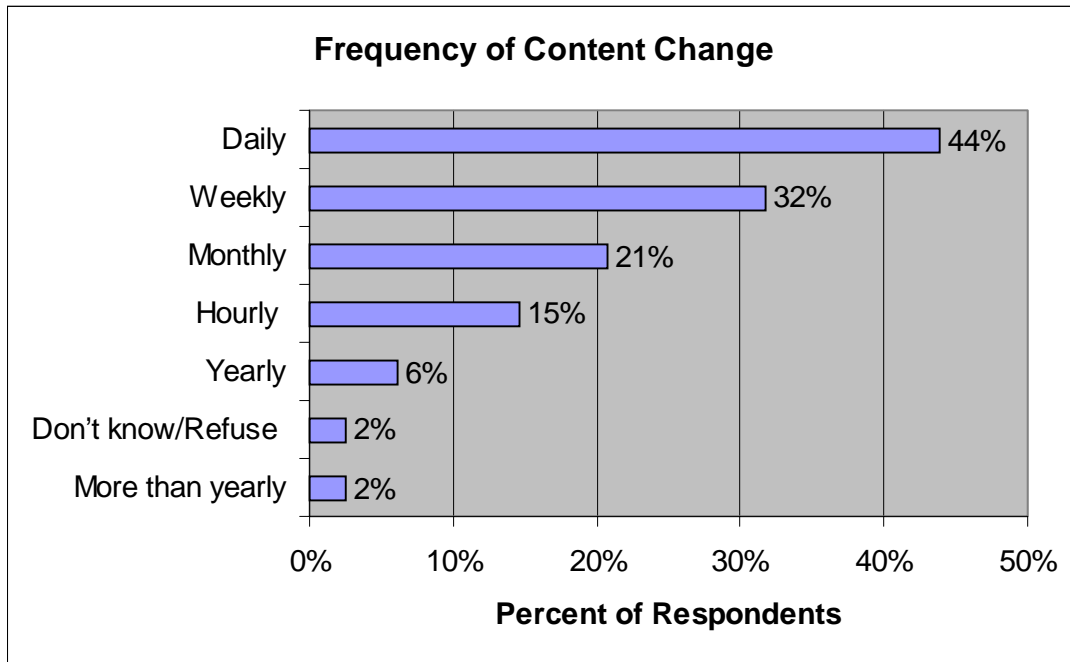
Chart 6-3: Types of Content Creation (n=100) Q21



Frequency of Content Changes

Static content can be segmented in many ways. In order to gain a better understanding of how frequently static content changes, we asked respondents to state how often they update their static content. Chart 6-4 below shows how frequently respondents change content.

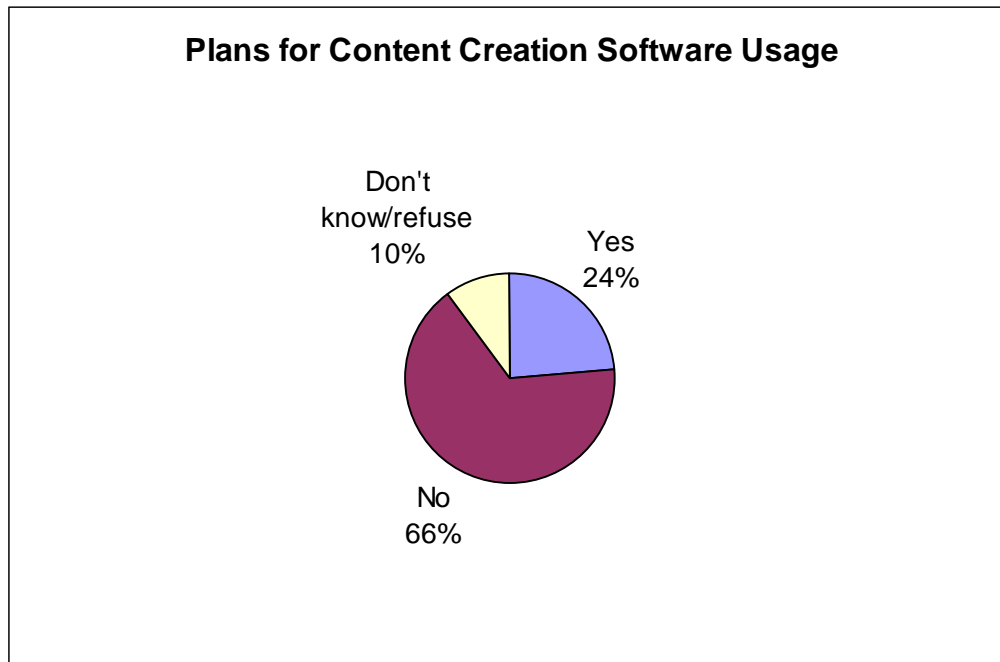
Chart 6-4: Frequency of Content Change (n=82) Q18a



Content Creation Software

The use of dynamic content is on the rise to fill the need to tailor content for each user. Content unique to each user is a differentiation that is having success in driving Web site traffic. Content creation software is used to create individualized content and of our respondents, 24% use content creation software. Chart 6-5 below shows content creation software usage.

Chart 6-5: Plans for Content Creation Software Usage (n=100) Q20



All respondents using or planning to use content creation software were read a list of content creation software vendors and asked to name the software they will use for 2000 and 2001. Allaire is the leader for 2000 with 25%, decreasing to 21% in 2001; however, Vignette significantly increases from 8% in 2000 to 38% in 2001. Product manufacturers seeking relationships with content creation software vendors should pursue relationships based on customer demands. Based on our findings, Vignette and Allaire should be at the forefront of content creation software partners. Chart 6-6 below shows software usage for respondents using or planning to use content creation software. Table 6-1 below shows all other content creation software responses for 2000 and 2001.

Chart 6-6: Content Creation Software Usage (n=24) Q20a

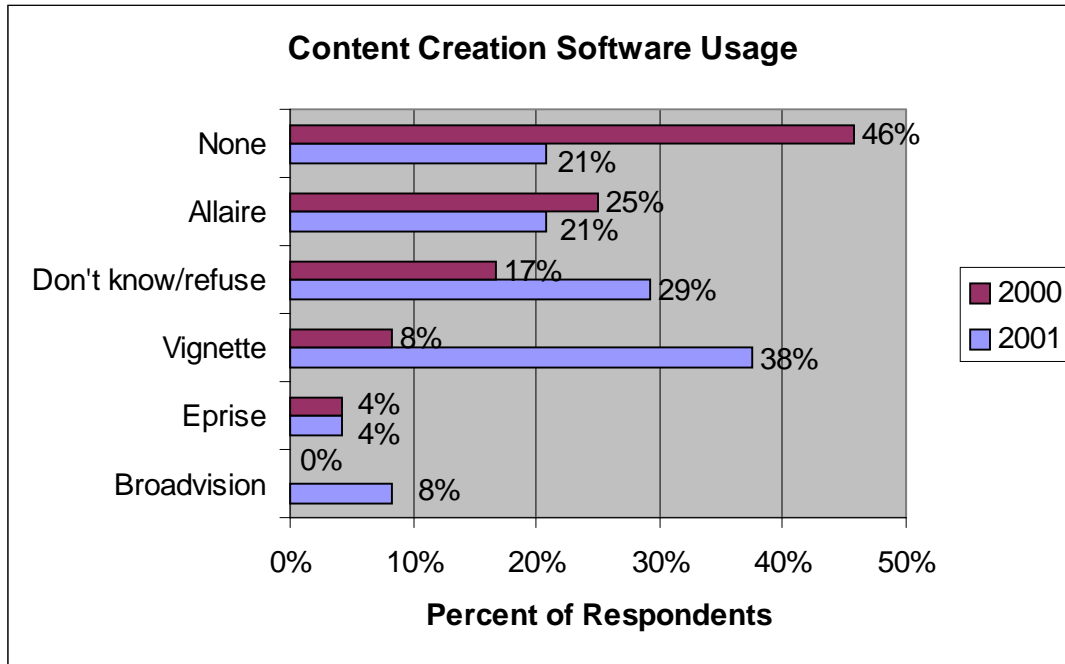


Table 6-1: Content Creation Software Used (n=24) Q20b

<i>2000 Content Creation Software Responses</i>	<i>2001 Content Creation Software Responses</i>
ARIBA	ADOBE
ATG	ATG
COLDFUSION (2)	CUSTOM
CUSTOM	DATA CHANNEL
DATA CHANNEL	DREAMWEAVER (3)
DREAMWEAVER	EXPEDIA
EBT	FRONT PAGE
ENGENDA	FRONTIER
FRONT PAGE	IBM
FRONTIER FROM USER LAND	IBM JAVA DEV ENVIRONMENT
INTERNAL	INTERNAL
INTERWOVEN	INTERWOVEN (2)
NETSCAPE COMPOSER	PROPRIETARY
ORACLE (BACK END DATA BASE)	SILVER STREAM
PROPRIETARY	VERITY
VERITY	
VISUAL INTERDEV	

In order to gain a better understanding of the types of applications that are used with content creation software, respondents were asked to name the software applications they use now and plan on using in 2001. Table 6-2 below shows content creation applications used with content creation software named in questions 20a and 20b. Responses for applications ranged widely, with no single application emerging as a leader.

Table 6-2: Content Creation Applications Used (n=19) Q20c

2000 Content Creation Application Responses	2001 Content Creation Application Responses
(8) DREAM WEAVER	(4) DREAMWEAVER
(4) FRONT PAGE	(2) JAVA SCRIPT
(3) ALLAIRE	ALLAIRE
(2) COLDFUSION	ASP
(2) JAVA SCRIPT	CGI
(2) PEARL	CRYSTAL
(2) VIGNETTE APPS	CUSTOM
CGI	FLASH
CONTENT CENTER	HOME SITE
CRYSTAL	MACRO MEDIA THAT INTEGRATES WITH COLDFUSION
CUSTOM	MS FRONT PAGE
DATA BASES	NOTEPAD
FIREWORKS	OPEN MARKET
FLASH	PEARL
FUSIONS	PHOTOSHOP
HOME SITE	STORY SERVER
MACROMEDIA	SYBASE DATABASES
OPEN MARKET	VIGNETTE APPS
PHOTOSHOP	XML
SYBASE DATABASES	
XML	

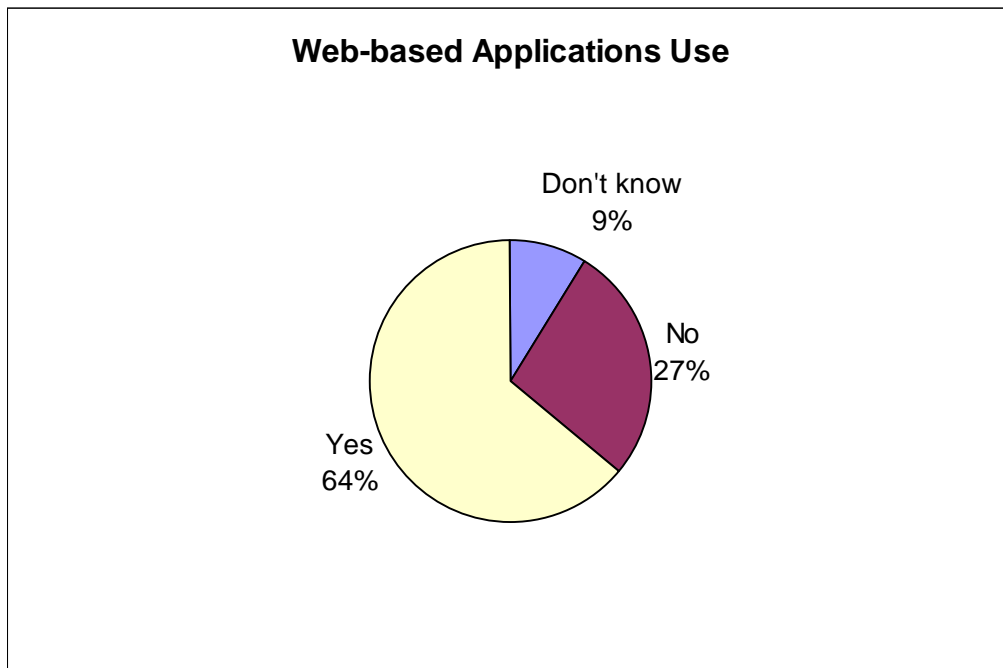
Web-based Applications

Application Use

A surprising number of our respondents (64%) plan to use Web-based applications for their Web site. Currently, delivering applications from a Web site requires the user to interact directly with the origin site, creating an environment that is difficult to scale with popularity. In order to scale with

success, Web-based applications must be distributed. However not every application is suited for distribution. Web-based applications require a high level of performance in order to provide a good end user experience. CDN service providers and product manufacturers should examine the opportunity for Web based application performance enhancement solutions. Chart 6-7 below depicts the use of Web-based applications.

Chart 6-7: Web-based Application Usage (n=100) Q23

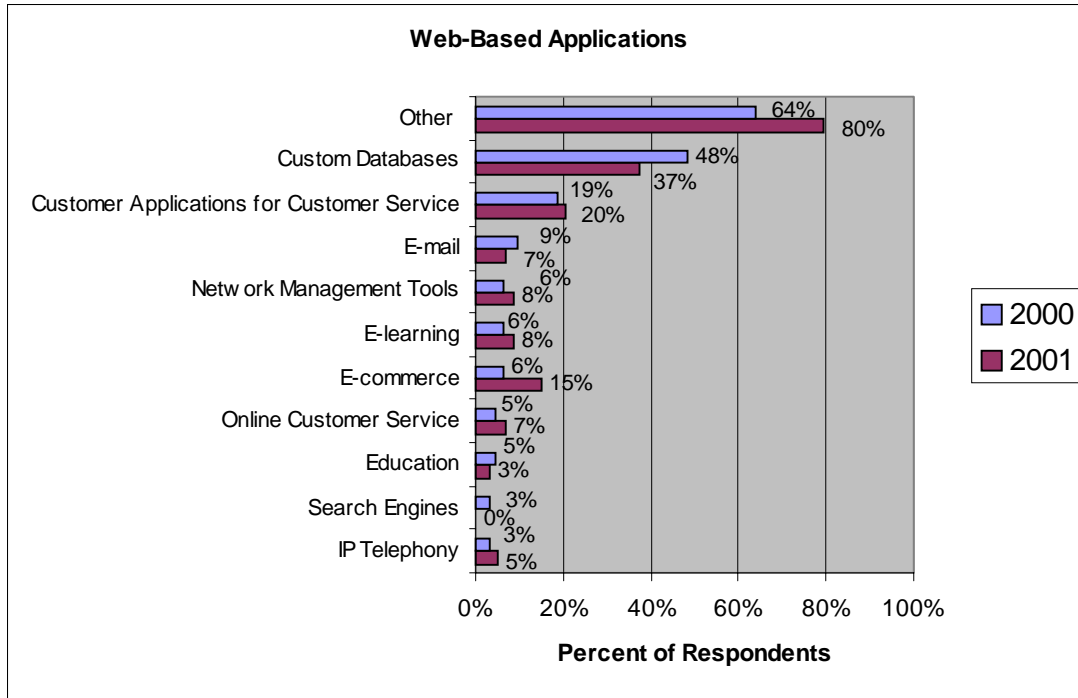


Current and Future Web-based Applications

Respondents were asked, in an open-ended question, what current Web-based applications they use and what they expect to use in the future. The most popular application, named by 48% of respondents was a custom Web-based database. Custom applications for customer service, named by 19% respondents, and e-mail applications, named by 9% of respondents, were the leading categories with multiple responses. The majority of the Web-based applications range widely, from sound applications to vertical applications including mortgage analysis tools. Aside from distributing databases, the applications named by our respondents require a large degree of customization in order to be distributed. The largest opportunity for product manufacturers and service providers resides in offering performance

enhancements for database applications. Chart 6-8 below depicts the types of Web-based applications.

Chart 6-8: Web-based Applications (n=64) Q23



Streaming Technology

Most providers offering content site hosting have been offering streaming capabilities to customers, but performance and scalability are two difficult hurdles to negotiate. The top 3 streaming technologies in use today are RealPlayer from Real Networks, Microsoft Media Player from Microsoft, and QuickTime from Apple.

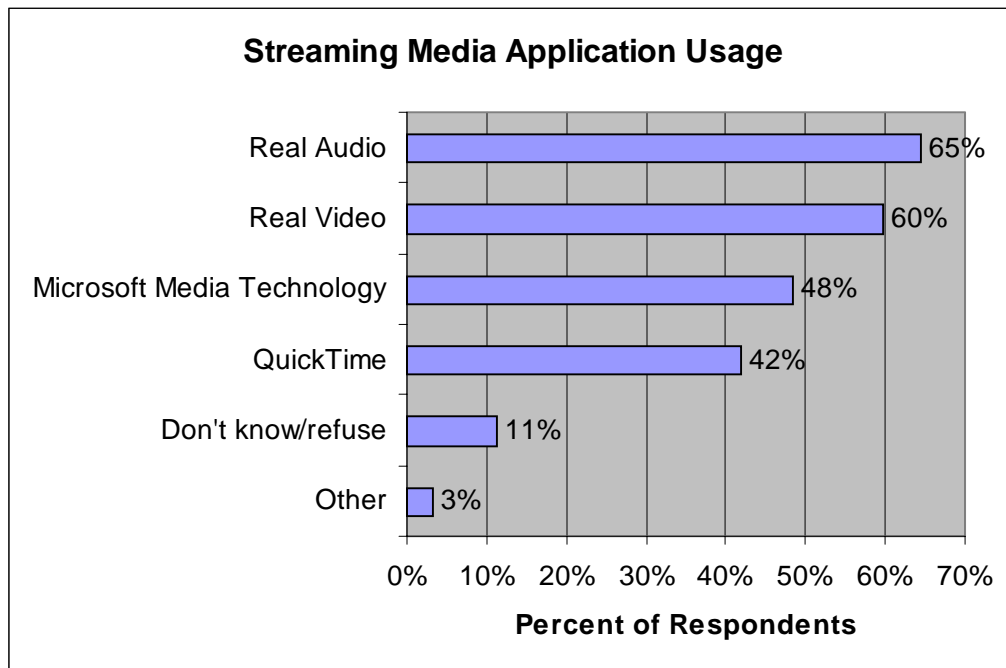
We define streaming media as audio or video that does not have to be downloaded before you play it back and includes two categories, live and on-demand. When streaming media is live, it is captured at the source and transmitted to an audience with a minimal level of delay. Acceptable delay, however, is a gray zone and is best defined by the end user. Streaming content that has been produced and is available for download is considered to be on-demand.

Much like any other type of content, streaming over the Internet is susceptible to haphazard performance conditions and can degrade with an increase in simultaneous users. The daily deployments of last-mile

technologies such as DSL and cable modems are providing Internet users with more useable bandwidth and enabling new content-rich applications such as streaming. Even with the current challenges, streaming media technology continues to become more main stream.

Respondents were asked to name the streaming technologies they use or plan to use. Real Networks is the dominant player with 65% of respondents using Real Audio and 60% using Real Video. Microsoft Media Technology follows with 48% and QuickTime with 42%. Chart 6-9 below shows streaming media application use.

Chart 6-9: Streaming Media Application Usage (n=62) Q24



Performance and Bandwidth

Current Performance Technologies

Content providers use a variety of technologies to increase performance, enhancing the end user's experience while browsing their Web site. We asked respondents to indicate which technologies, read from a rotated list, they use to increase performance for their site. Chart 7-1 below depicts respondents' use of technologies that increase performance.

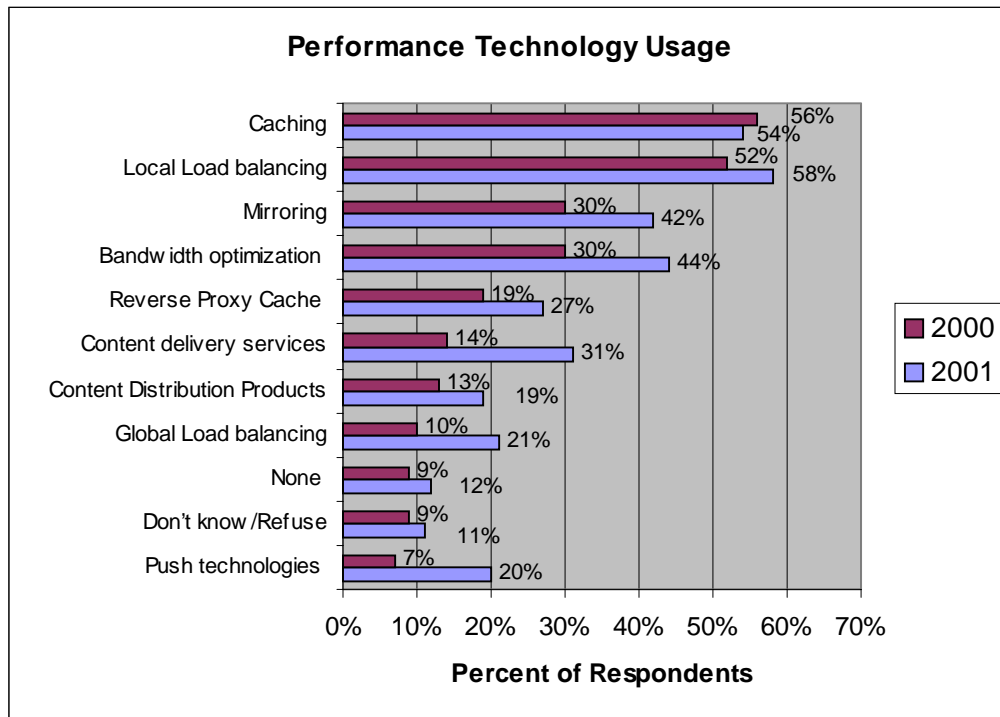
Caching is the most frequently used technology, as indicated by 56% of the respondents. Local load balancing products were used by 52% of the respondents in 2000, increasing to 58% in 2001. The use of mirroring, at 30%, increased to 42% in 2001. Bandwidth optimization products increased from 30% in 2000 to 44% in 2001.

Reverse proxy caching, a relatively new application of caching technology, is increasing in popularity from 19% in 2000 to 27% in 2001. We expect reverse proxy caching to increase significantly as the market becomes more aware of the benefits.

CDN services have the greatest increase of use by our respondents, growing from 14% in 2000 to 31% in 2001. Content delivery products and services continue to expand into the Internet market with market education and awareness. The decision to subscribe to CDN services or to build a private content delivery network involves considering both cost and control.

Another significant increase occurs with global load balancing solutions, which increases from 10% in 2000 to 21% in 2001. Over half of our respondents have more than one data center, and will likely use a global load balancing product or service. Those respondents that did 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 load balancing, as described by one of the respondents.

Chart 7-1: Performance Technology Usage (n=100) Q29



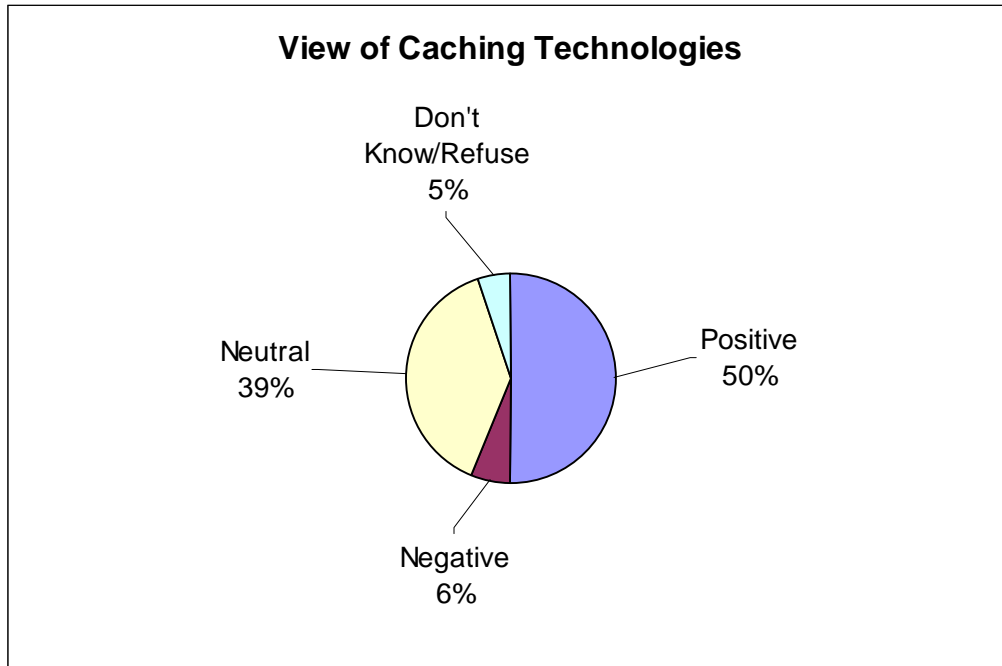
Role of Caching

To help determine how caching should be woven into content delivery product and service marketing messages, respondents were asked in an open-ended question for their view of the use of caching technologies.

Last year, responses were categorized as positive (52%), negative (26%) and neutral (22%). Caching was viewed positively versus negatively by last year’s study respondents in a 2-to-1 ratio. This year, respondents view caching in a much more positive light, 56% positive versus 6% negative, close to a 9-to-1 ratio. Chart 7-2 below shows respondents’ view of caching technology.

If caching messaging is introduced in content delivery service market messaging, companies should be aware that a small segment of the market views caching negatively. Service providers and product manufacturers should be careful when including caching in market messaging. The negative concerns regarding caching use described by last year’s respondents included data degradation, synchronization problems, problematic content updates, tracking banner advertisements, and difficulties with conducting diagnostics.

Chart 7-2: View of Caching Technologies (n=100) Q52



Caching continues to be a strategic technology used to increase Web site performance. In fact caching was the leading technology identified by respondents in this year's study as well as last year's study. In order to gain a better understanding of the caching products respondents are using to increase Web site performance, all respondents who indicated they use caching to increase Web site performance were asked to name the caching products they use. Of the 56 respondents asked, 33 did not know the name of the caching product or refused to give a response. The remaining 26 responses varied widely, with no visible product leader for companies with 500 or more employees. The lack of a clear leader in caching products in the enterprise Web site environment indicates a relatively open market. Table 7-1 below lists the verbatim responses for caching products used to increase Web site performance.

Table 7-1: Caching Product Usage (n=56) Q30

<i>Caching Product Usage</i>
(33) Don't Know
(5) MICROSOFT
(4) NETSCAPE
(2) PROXY SERVER
APACHE SQUID
BUILD IN IIS
CISCO BUILT IN
COLDFUSION CACHE
COMPAQ CACHING APPLIANCE
CUSTOM
FIREWALL (CACHING NETSCAPE)
IIS
IN SERVER
NET APPS
OPEN MARKET CONTENT SERVER
OPEN MARKET SATELLITE SERVER
ORDER MANAGER
SQUID
VIGNETTE

Global Load Balancing

Web site owners continue to expand their online presence with additional data centers. Earlier we discussed the fact that respondents averaged 2.36 data centers in 2000, increasing to 2.87 in 2001. Global load balancing products or services are required to balance traffic loads between data centers. When users type in a Web site address or Universal Resource Locator (URL), they rely on Domain Name System (DNS) servers to direct them through the Internet's haphazard maze of interconnected networks and connect them to a Web server. DNS is the service that maps IP addresses to their host names distributed throughout the Internet. Global load balancing solutions optimize the navigation process by using specific network and server metrics to direct users to the best performing data center and Web server for a particular Web site.

Users can be directed to servers in their own geographic region or away from a congested local network, effectively reducing response times and increasing the quality of the end user's experience. In addition, selected global load balancing solutions check the various elements that create dynamic content

to ensure the total data center site is operational before Web users are directed to any site.

Web site owners have many global load balancing solutions to choose from, each having distinct strengths and weaknesses. The two primary categories are product-based solutions—which are based on software applications, appliances, or switches—and service-based solutions, which are outsourced to a provider such as Akamai and Speedera.

Product-Based Solutions

Product-based global load balancing solutions are owned by a company and operated by its Web site professionals. There are three major categories:

- Software solutions are global load balancing applications designed to run on general-purpose operating systems (OS) and include software from product manufacturers such as Resonate.
- Appliances are network devices built specifically to perform a single function, global load balancing, and include products such as 3DNS from f5 Networks.
- Switches, which are network elements that “switch” traffic to destinations based on layer 4 (Transport layer) information, are continually evolving to encompass the scale of network layers and provide more intelligent switching decisions. Switch-based solutions include products such as WebOS that reside on the Alteon 180, and AceDirector switches from Alteon WebSystems.

Service-Based Solutions

Global load balancing services outsource all of the functions of a product-based solution, thus avoiding the heavy capital investment costs. Global load balancing services are offered by Akamai and Speedera. As with other outsourced services, Web site owners receive a number of benefits:

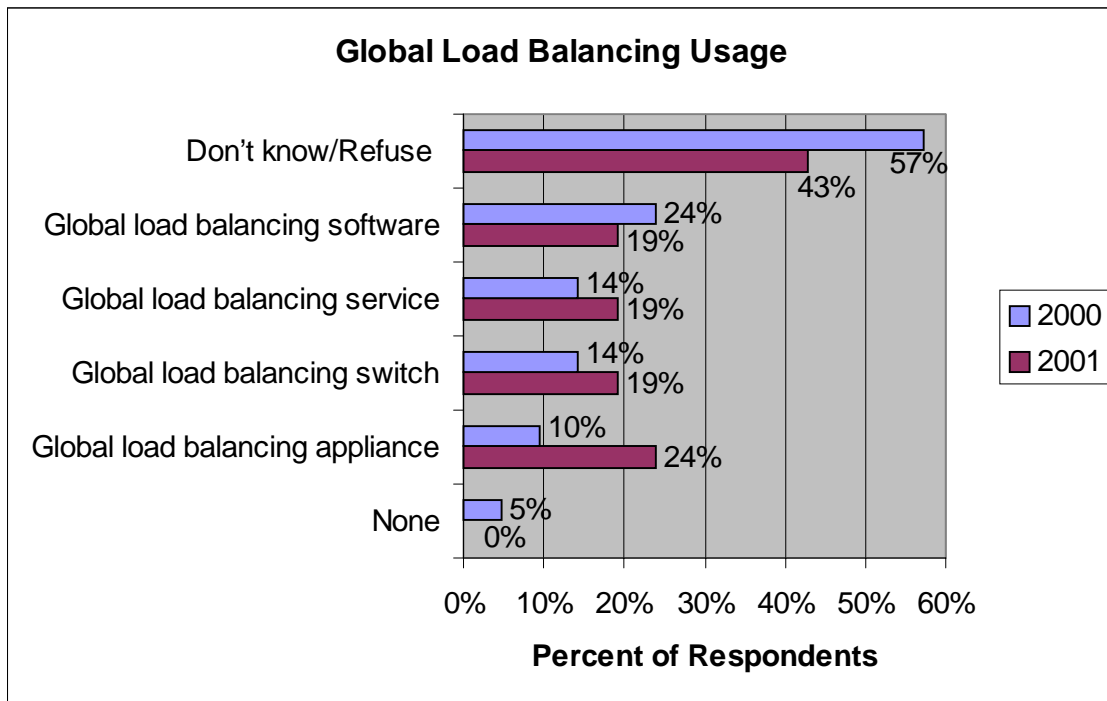
- Fewer high-level experts are required to maintain the solution, which is an advantage as expertise remains scarce due to the Internet’s rapid growth.
- Content professionals can focus on core expertise rather than the continual monitoring and management of global load balancing products.
- Services can be quickly provisioned and easily managed. Providers such as Speedera Networks offer “expertise on tap” so that any problems can be solved quickly without the need to retain many high-level IT professionals to manage the content site.

- The services are financially attractive, with no up-front capital expenditures and with reasonable recurring costs.
- Service level agreements can be negotiated to include compensation for violated agreements.

The 21 respondents that indicated they would use a global load balancing solution by July of 2001 were asked to name the current and future global load balancing product or service from a list. The most frequent response was “Don’t Know” for both 2000 (57%) and 2001 (43%). Global load balancing software decreases from 24% in 2000 to 19% in 2001, while global load balancing switches and services increase from 14% in 2000 to 19% in 2001. Global load balancing appliances increase from 10% in 2000 to 24% in 2001.

It is important to note that 53% of our respondents have more than one data center, but only 21% use global load balancing products or services. As we discussed earlier, some respondents indicated that they have data centers that host different data types and may not use global load balancing products or services.

Chart 7-3: Global Load Balancing Usage (n=21) Q31



Content Site Bandwidth

Content site metrics are historically difficult to gather, as many content professionals are reluctant to reveal average Megabits per second because of competitive threats.

Only 17 respondents gave us the monthly average Megabits per second. The average with all 17 respondents was 317 Mbps. Table 7-2 below depicts the mean for content site bandwidth.

Table 7-2: Content Site Bandwidth (n=17) Q33a

Monthly Bandwidth		
Mean	n=17	317 Mbps

The Cost of Bandwidth

Respondents were asked to approximate their cost for bandwidth per megabit per second per month. Only three responses were received (not unexpected, as the price of bandwidth is too competitive for content sites to reveal). The average of the three respondents was \$1,400 per Mbps per month. Insufficient responses, however, may make this figure unreliable. Costs will range widely because of respondent Web site connectivity differences. Some host internally and may include the total cost of a T1 line.

Page Views

Many online revenue models depend on the number of page views a Web site experiences. Page views are the number of times online users access a page of a particular Web site. We asked respondents what their average page views were. Sixty-three of our respondents have an average of 1,506,803 page views per month.

Table 7-3: Monthly Page Views (n=63) Q33b

Page Views		
Mean	n=63	1,506,803

Unique Visitors

Respondents were asked how many unique visitors their site receives per month. The fifty-seven respondents answering our question average 570,090 unique visitors per month.

Table 7-4: Monthly Unique Visitors (n=57) Q33c

Unique page Views		
Mean	n=57	570,090

Page Weight

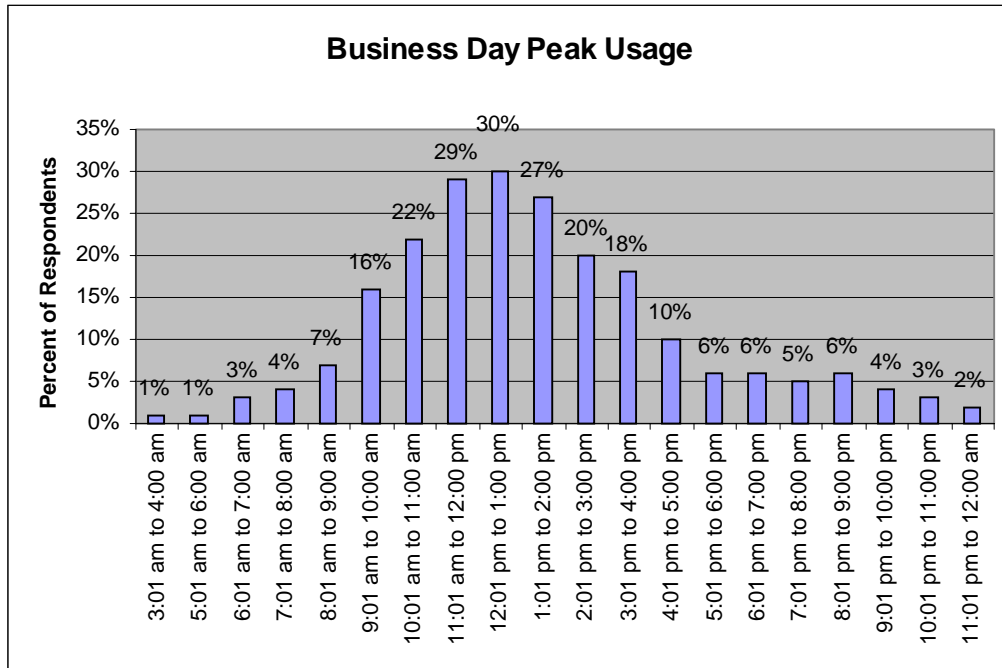
Respondents were asked for the average page weight in Kilobytes for their content sites. Of the 23 respondents that answered our question, responses had a mean of 33 Kilobytes per Web page. Costs will range widely because of respondent Web site connectivity difference. Some Web sites are hosted internally and may include the total cost of a T1 line.

Content Site Peak Usage

To gain an understanding of business day bandwidth utilization, we asked respondents for their peak usage times during the business day to the nearest hour, with business days defined as Monday through Friday. Chart 7-6 below shows content site business day peak usage.

Responses indicate that providers of content delivery services should plan for business day peak time capacity from the hours of 9 a.m. to 4 p.m.

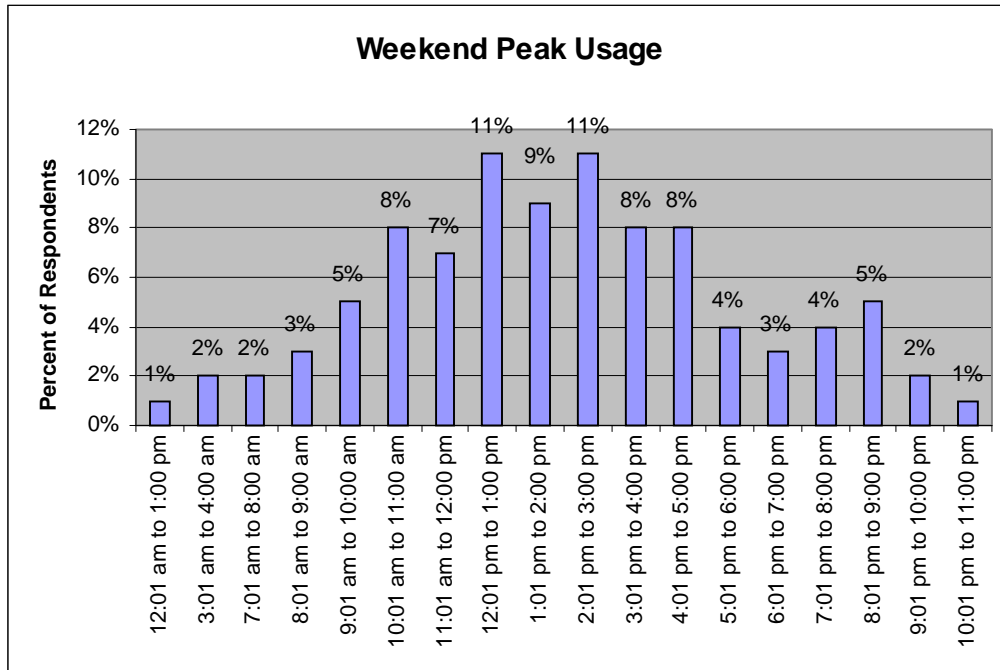
Chart 7-6: Business Day Peak Usage (n=100) Q36



To gain an understanding of weekend bandwidth utilization, we asked respondents for their peak usage times during the weekend to the nearest hour, with weekend days defined as Saturday and Sunday. Chart 7-7 below shows content site weekend peak usage.

Weekend peak usage times occur less frequently than do business day peak usage times. The duration of weekend peak usage time, however, is lower than that experienced on business days. Responses indicate that providers of content delivery services should plan for weekend peak time capacity from the hours of 10 a.m. to 5 p.m.

Chart 7-7: Weekend Peak Usage (n=100) Q37



Web Site Statistics

Gathering Web site usage information provides vital information for site development. Information collected from server logs provides insight into the growth of a Web site. In order to gain a better understanding of the types of statistics, we asked respondents to name the statistics they currently gather on their Web site. Topping the list of statistics was identifying the most frequently accessed content, named by 71% of respondents. The number of concurrent users (55%) and Web users' geographic location (54%) followed. The average round trip delay (44%) and Web user Bit rate (44%) tie in frequency. Product manufacturers and service providers of CDN solutions should include as many types of Web site 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 below, and prioritize product and service development based on customer requests. Chart 7-8 below shows the Web site statistics that respondents currently collect. Table 7-3 below shows all other responses to question 25a.

Chart 7-8: Web Site Statistics Collected (n=82) Q25a

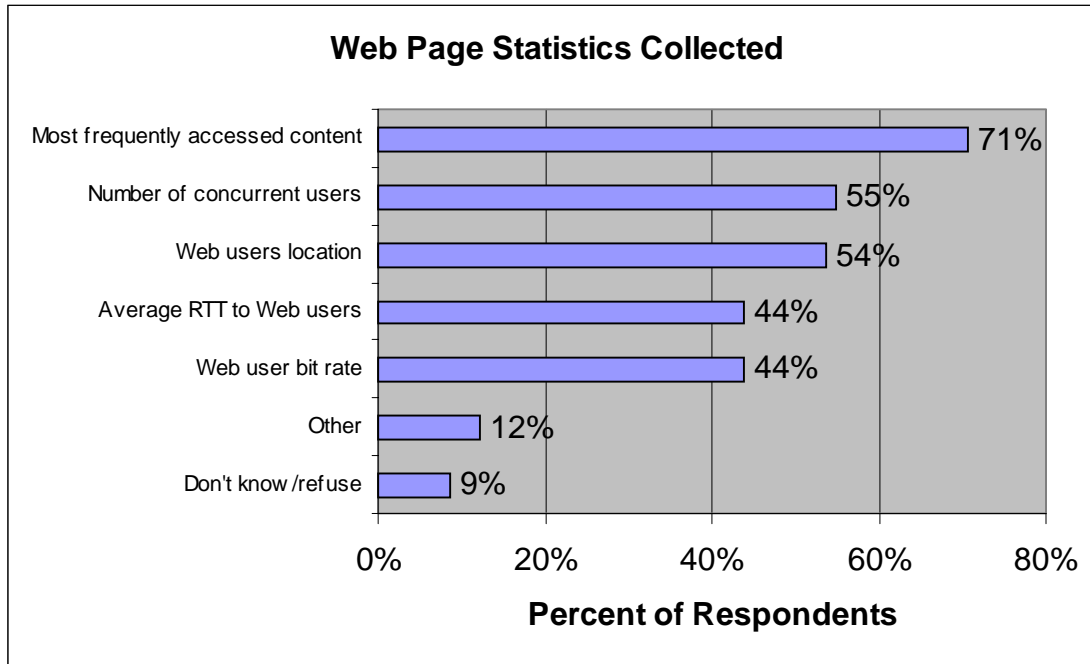


Table 7-5: Other Web Site Statistics Collected (n=23) Q25a

<i>Other Responses</i>
AREAS ACCESSED
BROWSER TYPE
CLIENT ERRORS
ENTRANCE AND EXIT POINTS
FILES ACCESSED
MISSED CONTENT ERRORS
MOST ACTIVE DOMAIN
MPEG DOWNLOAD
NUMBER OF HITS PER DAY
NUMBER OF PDF DOWNLOADS
PAGE VIEWS
DAILY, WEEKLY, AND MONTHLY AVERAGE USAGE
PATH THROUGH THE SITE
ROBOT AND SPIDER INFORMATION
SERVER ERRORS
STANDARD STATS PACKAGE-WEB TRENDS
TIME OF DAY
TYPE OF BROWSER PLATFORMS
UNIQUE CLIENTS
USER'S PATH THROUGH WEB SITE
WEB TRENDS
WHAT ISP THEY ARE USING
WHAT PLATFORM OR BROWSER IN USE

Respondents were asked to name the statistics they would like to gather and use on their Web site. Thirty-two percent of our respondents indicated there were no additional statistics they would like to gather and use on their Web site. Topping the list for desired Web site statistics are Web user Bit rate (22%), Web users geographic location (17%), and average round trip time to Web users (15%). Chart 7-9 below shows the Web site statistics respondents would like to use on their Web site. Table 7-4 below shows all other responses to question 25b.

There is a significant difference between those statistics respondents currently use, and those they would like to use. Roughly on third of respondents were satisfied with their current statistics. 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 7-9: Web Site Statistics Desired (n=81) Q25b

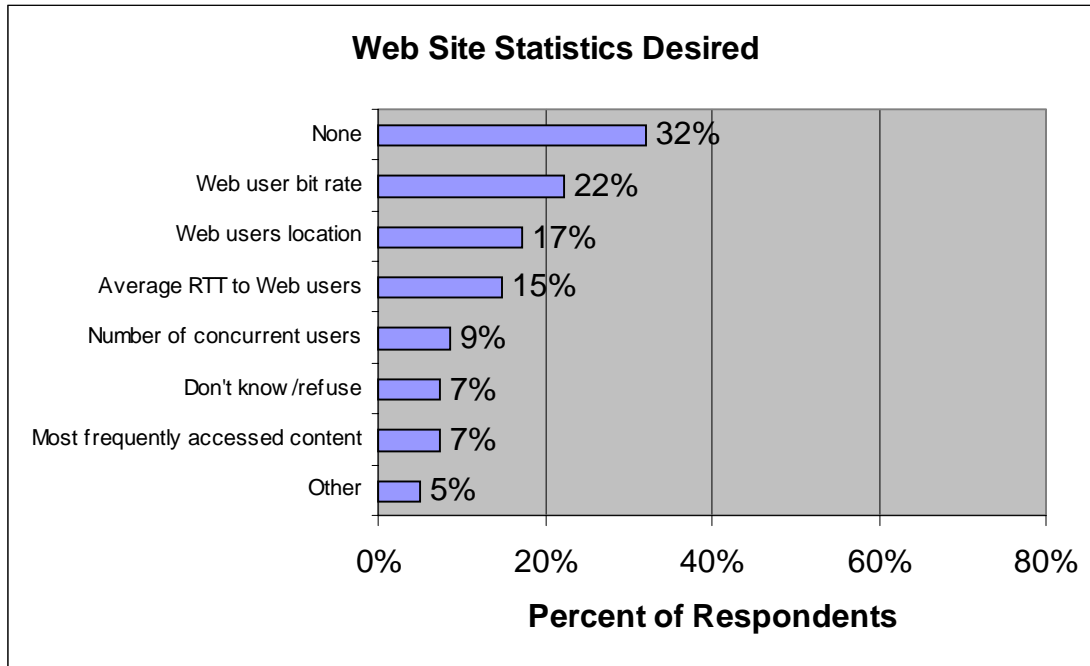


Table 7-6: Other Web Site Statistics Desired (n=6) Q25b

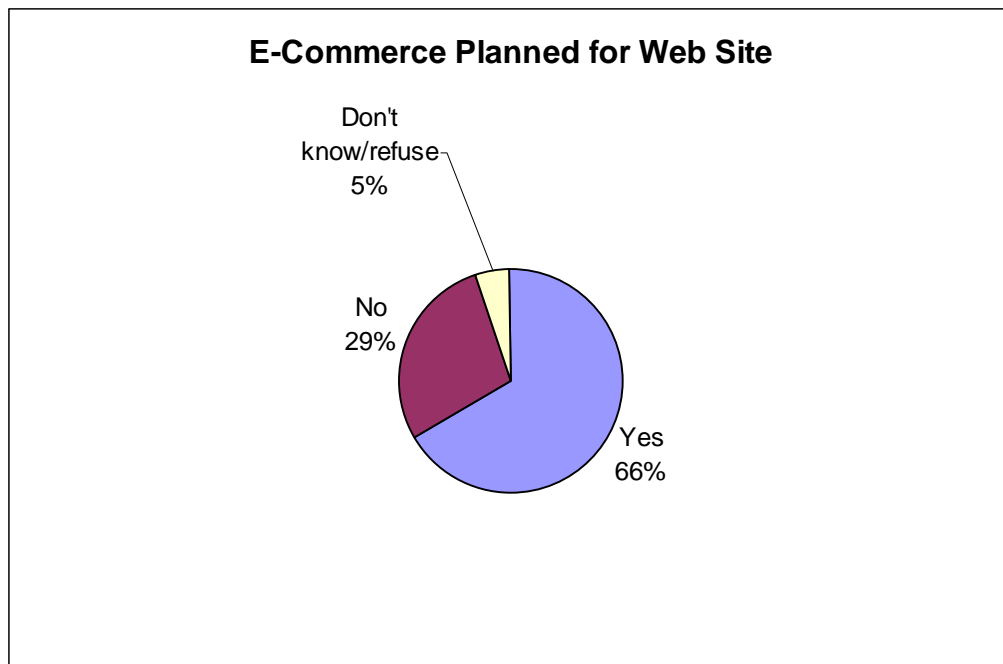
<i>Other Responses</i>
AT WHAT POINT STOP BUTTON OCCURS
BREAKDOWN OF NETWORK TIME
COMPLETE CLICK PASS
EASIER AND DIFFERENT WAYS TO LOOK AT DATA
LANGUAGES
PLATFORM

E-Commerce

The growth of commerce on the Internet is a testament to the application of innovative technology applied to traditional business practices. Forecasts for the amount of total dollars spent acquiring products and services online continue to increase, with just cause. E-commerce, initially driven by competition and now by success, is finding a permanent home with the traditional brick and mortar companies represented in our sample. The use of e-commerce will drive the need for better Web site performance.

Respondents were asked if they use or plan to use e-commerce on their Web site by July of 2001. Sixty-six percent of the respondents indicated they either currently use, or plan to use, e-commerce with their Web site to generate revenue. Twenty-nine percent had no plans and 5% did not know.

Chart 7-10: E-Commerce Usage (n=100) Q26



The 66 respondents currently using e-commerce or planning to use e-commerce on their Web site were asked to name the application they use in an open-ended question. Responses ranged widely from custom-built applications to off-the-shelf software. Table 7-5 below shows the verbatim responses for respondent's e-commerce applications.

Table 7-7: E-Commerce Applications (n=32) Q27

<i>E-Commerce Applications</i>
(12) CUSTOM
(2) COLDFUSION
CATALOG PRESENTATION
CYBERCASH
DATABASE TO MRO.COM
E-PAYMENT
LOTUS DOMINO
MICROSOFT SITE SERVER
MINI VEND
MS ACCESS BASED PRODUCTS
OPEN MARKET TRANSACTIONS
ORACLE BASED PRODUCTS
ORDER PROCESSING
OUTSOURCED
PROCESSING OF ORDERS
SAP
TRANSACTION DATA
WEB LOGIC COMMERCE SERVER
WEB METHODS B TO B SERVER
YAHOO

Planning Challenges

The Internet creates a difficult environment in which to predict demand. Companies online can easily fall prey to success, being inundated with Web site traffic that chokes performance. In order to gain a better understanding of the challenges facing Web site owners, we asked respondents in an open-ended question to name the top three challenges when planning for Web site growth. Chart 7-11 below shows the top Web site growth challenges categorized. The top two categories were Content Development (47%) and Anticipating Usage (34%). Responses indicate a lack of a consistent method for determining Web site growth. Service providers and product manufacturers of CDN solutions should include tools to assist customers with determining the growth of Web sites. Table 7-6 below lists all other responses that did not fit into categories defined by The HTRC Group.

Chart 7-11: Site Growth Planning Challenges (n=89) Q38

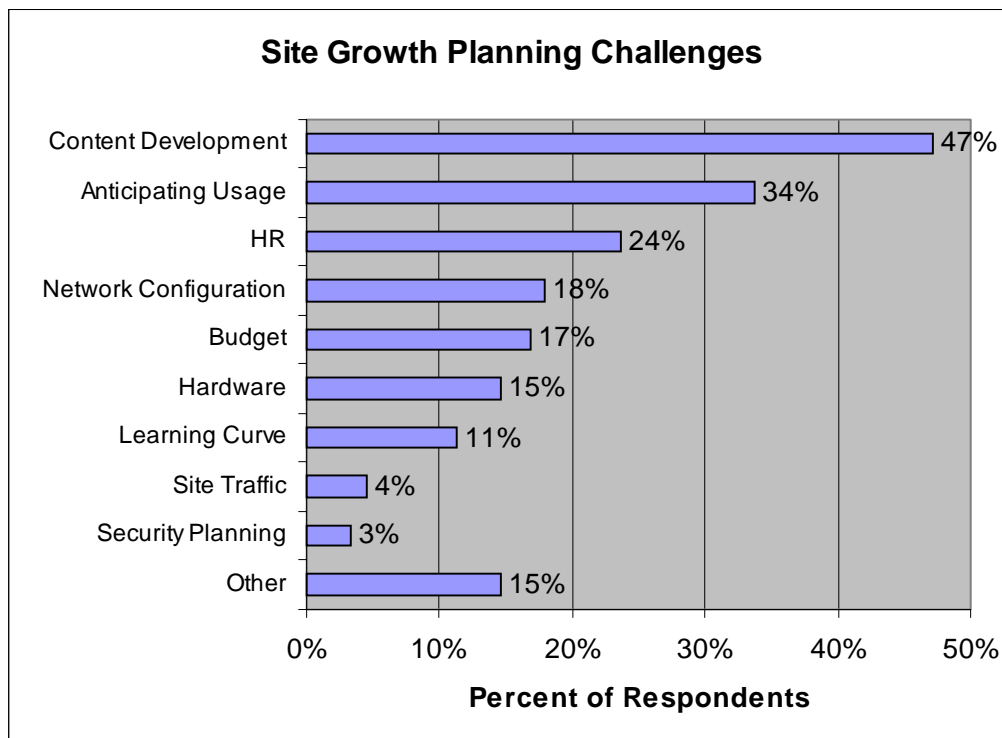
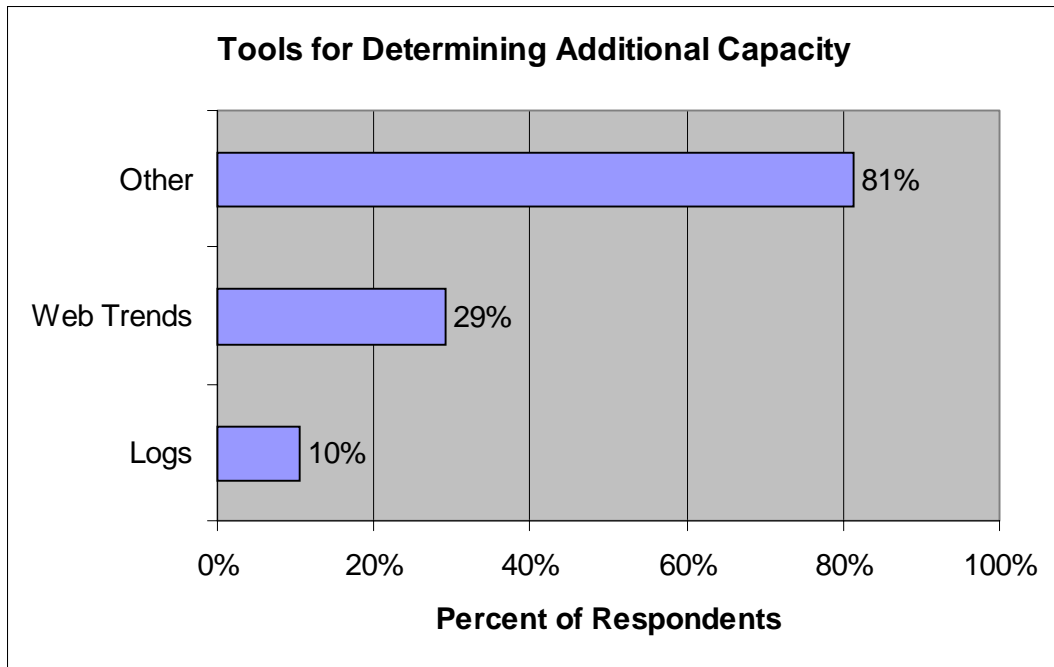


Chart 7-12: Tools for Determining Additional Capacity (n=48) Q39



Service Level Agreements

SLAs for Content Delivery Services

Service level agreements (SLAs) are a way for service providers to differentiate the quality of Internet access for enterprise and business customers. A list of SLAs in random order was presented to the respondents to rate the agreements when choosing a service provider for site connectivity. Respondents were asked to provide a rating on a scale of 1 to 7 (where 1 is “not important” and 7 is “critical”) on SLAs, such as availability, time to repair, latency, and end user experience. Chart 8-1 below shows the most desired SLAs, rated 5, 6, or 7 by respondents.

Availability (92%) and Time to Repair (89%) were rated critical by respondents. Respondents are very concerned with Internet access availability and the uptime and downtime associated with time to repair since these frequently affect a service provider’s online reputation.

Latency, measured from the content delivery server to end user SLAs, was rated critical by 71% of respondents. The time, or lag as it is commonly referred to, it takes for content to be delivered from the server to the requester greatly affects user experience. The more likely it is that the user will terminate the request. Importance of fresh and frequently updated content is reflected by Time to Content Refresh SLAs. Content professionals need assurances in the form of SLAs to guarantee the freshness of content, critical for frequently changing sites and those that tailor content for each user. Content refresh SLAs were rated critical by 69% of our total respondents.

End user experience based on content delivery provider validation (68%) and end user experience based on third party validation (54%) SLAs were rated critical by more than half of our respondents. There is a notable difference (14%) between end user experience based on the service provider and that based on a third party. Although third party validation can add considerable cost and may reduce profit margins, service providers should maintain the capability to validate the end user’s experience both internally and externally through a third party, thus offering different levels of end user experience validation in order to optimize margins.

Since content sites have varied performance requirements, service level agreements should be negotiable and, fundamentally, should guarantee faster, more reliable services and address availability and time to repair factors. Table 8-1 below shows other responses given for critical SLAs.

Chart 8-1: Desired SLAs (n=100) Q40

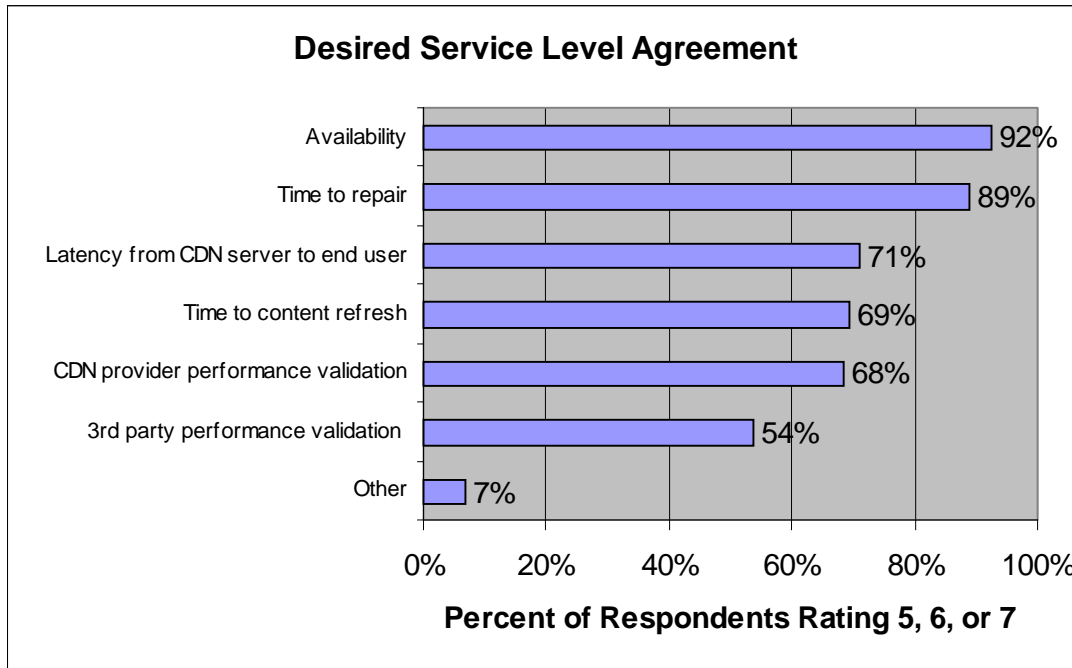


Table 8-1: Other Critical SLAs Responses (n=8) Q40

<i>Other Responses</i>
100% UP TIME
CUSTOMER SUPPORT
HIGHER BANDWIDTH ON HOSTED SERVER
LOCATION
PRICE
REASONABLE Overage RATES
SUPPORT STAFF AVAILABILITY
UP TO DATE

Expenditures

Site Expenditure Plans

In an open-ended question, we asked respondents to give us their approximate expenditures for content site development, site management, content delivery services and products, Internet bandwidth, hosting services, e-commerce, and hardware and software.

The average total content site expenditures decrease 24% from \$2,710,953 in 2000 to \$2,050,928 in 2001. Several categories of site expenditures increase from 2000 to 2001: site management increases 93% from \$162,916 to \$314,631, content delivery products increase 28% from \$249,590 to \$319,142, and hosting services increase 56% from \$55,363 to \$86,528. One category showed the most gain; e-commerce increases 181% from \$74,065 to \$208,250. This is a positive sign showing that more large businesses are investing in e-commerce activities, most likely joining the move to distribute products or services directly through their Web site.

Plans for content development took the biggest dip (58%) out of all of the categories declining in expenditures, decreasing significantly from \$1,683,000 to \$711,823. Next, bandwidth expenditures decrease 32% from \$64,162 to \$43,483. Based on industry market factors, the cost of Internet bandwidth is decreasing at around 10% annually. Some content sites' Internet bandwidth expenditures likely account for bandwidth reduction; site bandwidth demand, however, is growing 6.8% monthly. The increases in content delivery products and hosting services may account for some of the reduction in Internet bandwidth expenditures, but not enough keep pace with projected growth.

Expenditures on hardware and software decrease from 2000 to 2001. Forty-five percent of the total respondents plan to implement a content delivery solution in-house; although, in-house content delivery solution build-out plans are not reflected in hardware and software expenditures, where we show a decrease of 16% from \$133,416 to \$112,500.

Content sites will need to determine benefits and costs associated with in-house implementations or subscriptions to content delivery solutions. Study responses indicate content delivery technology investors currently want to build in-house solutions. This is supported in the content delivery service expenditures, which decline 12% from \$288,441 to \$254,571 in 2001. Both service providers and product manufacturers have an immense opportunity to influence customers through market education on outsourcing content delivery versus in-house implementation. Chart 9-1 below shows the areas of expenditure in which each company spent or plans to spend for 2000 and 2001.

Table 9-1: Expenditures Q42a and Q43a

Expenditures		2000		2001
Content development	(n=45)	\$1,683,000	(n=34)	\$711,823
Site Management	(n=48)	\$162,916	(n=38)	\$314,631
Content delivery services	(n=43)	\$288,441	(n=36)	\$254,571
Content delivery products	(n=44)	\$249,590	(n=35)	\$319,142
Internet Bandwidth connection	(n=37)	\$64,162	(n=30)	\$43,483
Hosting Services	(n=47)	\$55,363	(n=39)	\$86,528
E-commerce	(n=46)	\$74,065	(n=32)	\$208,250
All other hardware and software	(n=22)	\$133,416	(n=3)	\$112,500
Totals:		\$2,710,953		\$2,050,928

Web Site Downtime

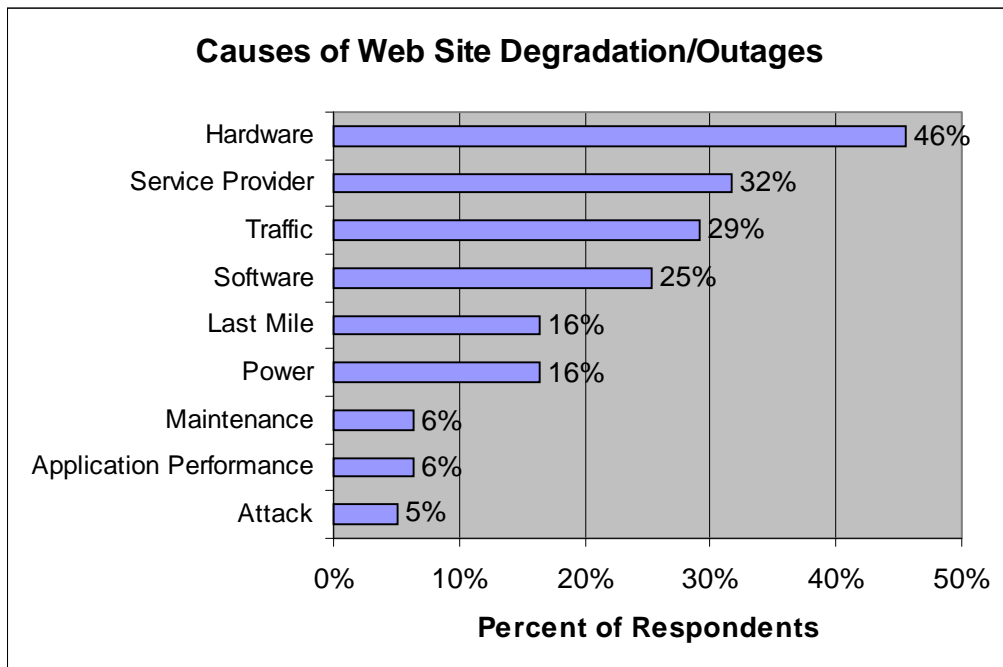
As it has become important for many businesses to generate Web site revenue, it has become equally important to be concerned with the factors such as service degradation and downtime that can affect revenue and increase expenses. Some businesses rely entirely on their Web sites as a source of revenue while others use their sites as a marketing tool.

Causes of Web Site Downtime

In an open-ended question, we asked our respondents about the top three causes for Web site degradations and/or outages. We then took the responses and categorized them. Of 79 respondents, the top causes were hardware (46%), service provider (32%), and excessive traffic (29%).

On the radar screen, one out of four respondents (25%) noted software as one of the top causes, while last mile and power causes were 16% of the responses. Chart 10-1 below lists the top causes of Web site degradation/outages.

Chart 10-1: Causes of Web Site Degradation/Outages (n=79) Q32



Liability Concerns

On a scale of 1 to 7, respondents were asked to rate their company's concerns over liability lawsuits due to Web site outages. We took responses that rated 5, 6, and 7 from 95 respondents; 31% of large businesses expressed concerns over liability lawsuits.

Site Revenue Generation

Only five out of 100 respondents answered our question on how much annual revenue was generated from their company's Web site. This, of course, shows that the results are not an accurate portrayal of respondents. Probably respondents thought this information was too confidential. An accurate assessment of this data is unlikely due to the small sample size.

In Table 10-1 below, the average annual revenue generated was \$17,440,000.

Table 10-1: Content Site Revenue (n=5) Q41

Annual Revenue Generated		
Mean	n=5	\$17,440,000

Lost Site Revenue

Content sites generate revenue in three ways: products purchased from the Web site, advertisement from banner and placement ads, and online subscriptions. Respondents were asked to approximate how much revenue their company would lose per hour if their site were not operational. These figures don't represent the majority of respondents since most businesses also felt that this was a confidential topic and responses were few. Due to the inadequate sample size, a precise assessment of this data is doubtful. Chart 10-2 below shows the lost revenue dollars per hour for each of the three types of revenue generated.

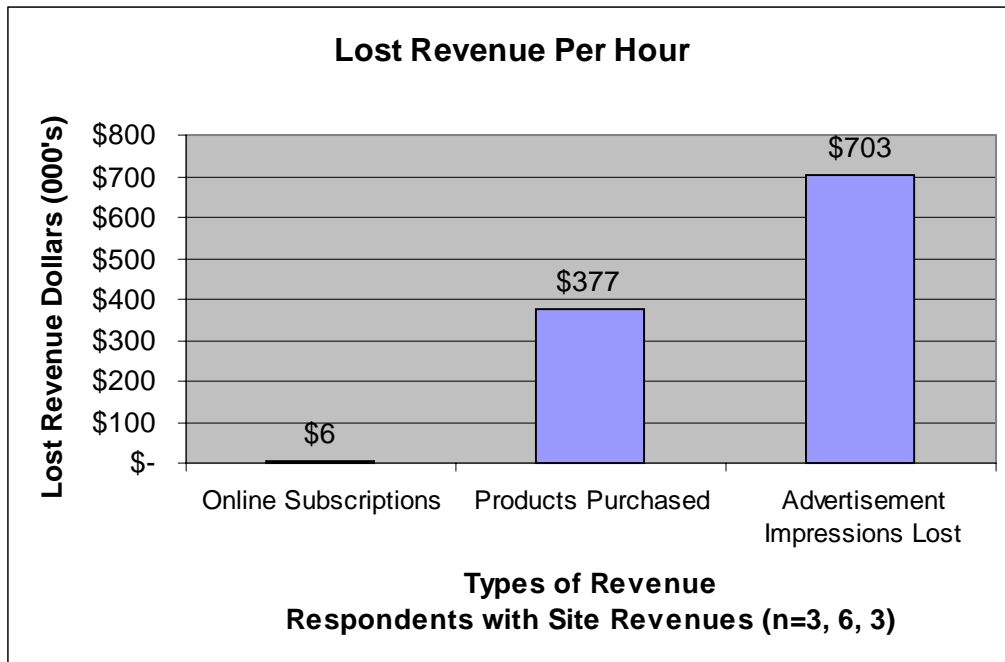
Content sites which generate revenue through advertisement use a business model similar to that of the effective television advertisement model. Banner ads are big business to those sites that carry a large number of page views. For respondent sites that generate revenue through advertisements, an hour of downtime costs \$702,666 in lost revenue.

E-commerce has provided an avenue for product manufacturers to increase efficiency through a direct product distribution channel with their online presence. Respondent sites which generate revenue through online product purchases lose an average of \$377,283 for each hour their site is down.

Online content subscriptions offered by respondents ranged from newsletter to news. Respondent sites that generated revenue from online subscriptions lose \$5,750 on average for every hour of site downtime.

Both product manufacturers and service providers should position solution redundancy and resiliency through the cost of downtime points. Product manufacturers have the burden of proving the resiliency of products to their customers. Product testing that includes redundancy and resiliency, done by reputable publications such as Network Magazine, are a cost-effective way to market products. Service providers should create technical marketing documents that educate customers on how network architecture and content delivery technology differentiate through resiliency and redundancy.

Chart 10-2: Hourly Lost Revenue (n=6) Q44



Market Messaging

CDN Provider Positioning

CDN Provider Features

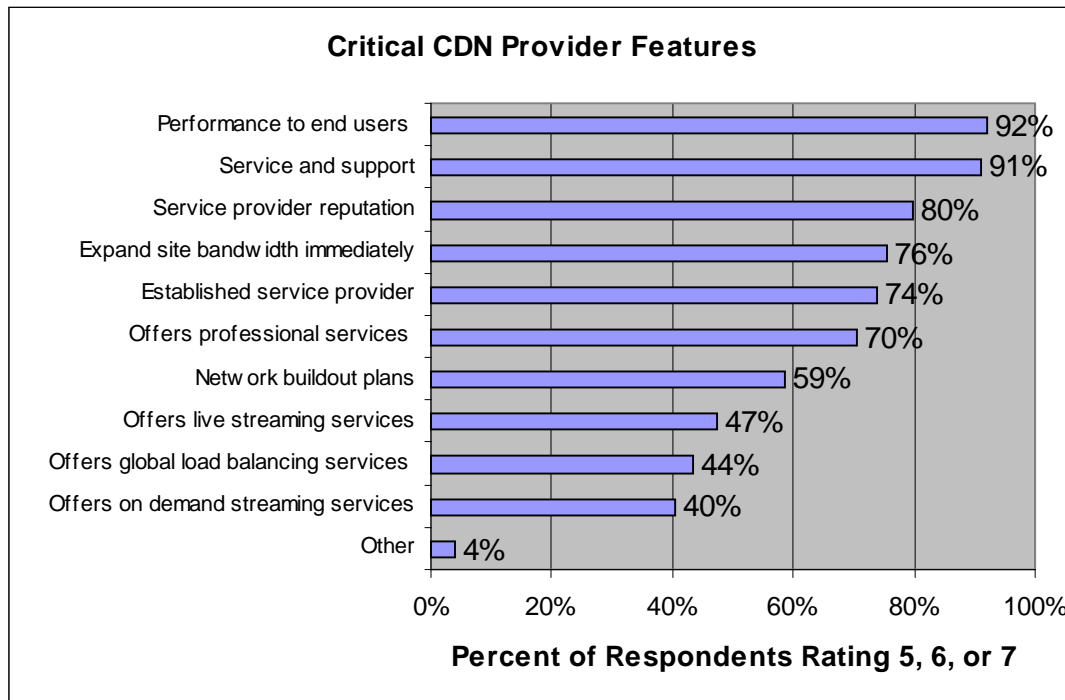
Differentiating CDN services is difficult in a competitive market. CDN providers have started to offer content delivery services in a variety of flavors, based on levels of performance, service level agreements and service provider features. On a scale of 1 to 7, where 1 is “not important” and 7 is “critical,” we asked respondents to rate the features in choosing a content delivery service provider. Chart 11-1 below shows the most desired CDN provider features, those rated 5, 6, or 7 by respondents.

Performance to end users is a fundamental differentiation and was rated critical by 92% of the study respondents. Service providers should seek credible third-party publications for industry performance testing. Marketing material should explain in detail how performance is increased through network architecture and technology education.

Service and support has been, and will likely continue to be one of the fundamental criteria for judging a product manufacturer and a service provider. The end user experience will make or break any service, especially with services that include new technology. With service and support rated critical by 91% of the study respondents, service providers should make significant efforts to develop an excellent reputation for service and support as early as possible.

Technology professionals like to openly discuss the latest and greatest products, services, and technologies in online forums, trade shows, and list servers. Eighty percent of respondents rated a service provider’s reputation as critical when choosing a service provider for connectivity. Service providers should include high profile programs promoting constant customer interaction to maintain customer relationships. Service providers should partner with a company or develop a good public relations group to maintain good press and analyst relations.

Chart 11-1: Critical CDN Provider Features (n=100) Q46



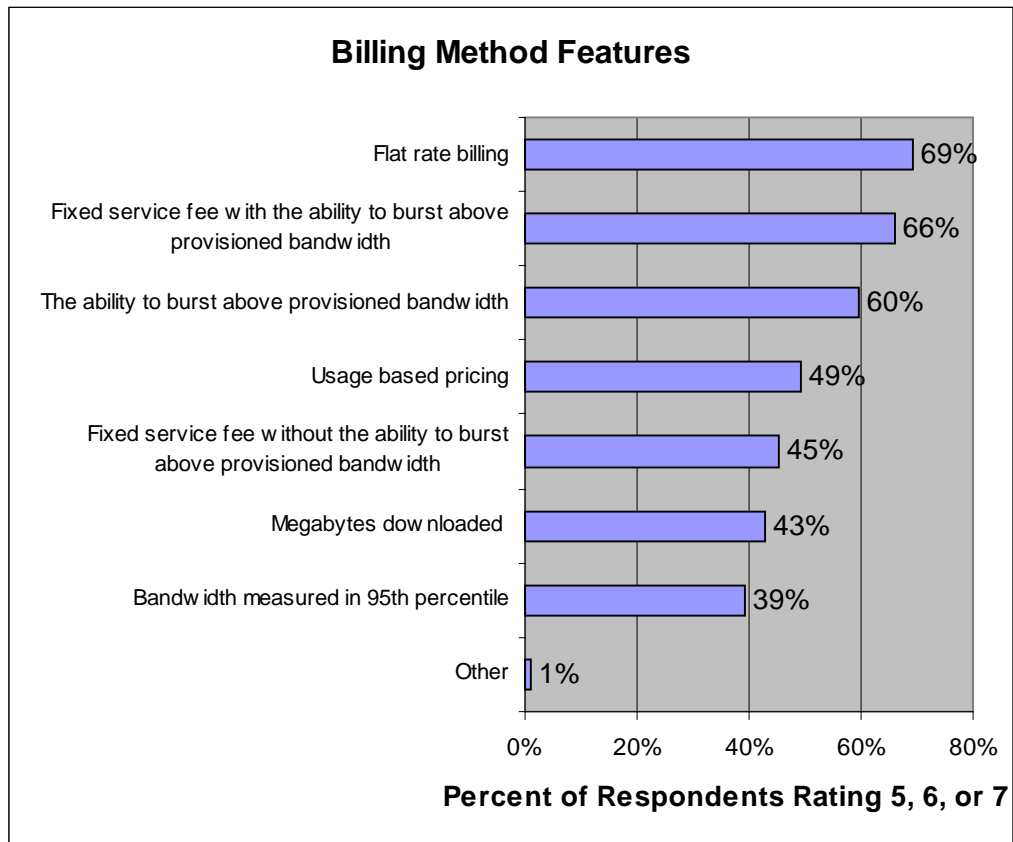
Billing Methods

In the same discussion about service provider features, we looked at methods of billing for content delivery services. On a scale of 1 to 7, where 1 is “not important” and 7 is “critical,” study respondents were asked to rate the importance of methods of billing for content delivery services. Chart 11-2 below shows the desired billing method features, those rated 5, 6, or 7 by respondents.

Flat rate billing (69%) and fixed service fee with the ability to burst above provisioned bandwidth (66%) were rated most important by our respondents. Service providers should seek to offer billing plans that offer convenient, flat-rate billing along with a fixed service fee if the content site desires to burst above their allocated bandwidth. Forty-nine percent of respondents said that they were interested in usage-based pricing; this shows that content sites desire accessible, straightforward billing plans to easily determine their cost of usage.

Sixty percent of the respondents said they desired to have the ability to burst above the provisioned bandwidth, while 45% would rather have a fixed service fee without the ability to burst. Others responded that they would like to see billing plans for megabytes downloaded (43%) and bandwidth measured in the 95th percentile billing to the minute (39%).

Chart 11-2: Billing Method Features (n=100) Q47



Marketing Resources

In order to gain a better understanding of the best sources content professionals 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 important.” Chart 11-3 below shows the different sources for learning and how they rated among the 100 respondents. In Table 11-1 below, other responses for sources for learning are listed.

Of the top sources for information, trade magazines (80%) and vendor Web sites (73%) were rated as critical sources. These two sources should be prioritized by both product manufacturers and service providers as an important medium for marketing to customers. Manufacturers and providers should strive to be included in columns and articles of significant trade publications along with maintaining good relationships with industry writers who cover hosting services and new technology. Vendor Web sites should market product and service educational material on their site.

Independent white papers were rated very useful by 59% of the respondents, slightly higher than online magazines (58%) and trade show conference sessions (52%). Product manufacturers and service providers should seek to have their product and service information included in independent white papers and online magazines.

Chart 11-3: Sources For Learning (n=100) Q48

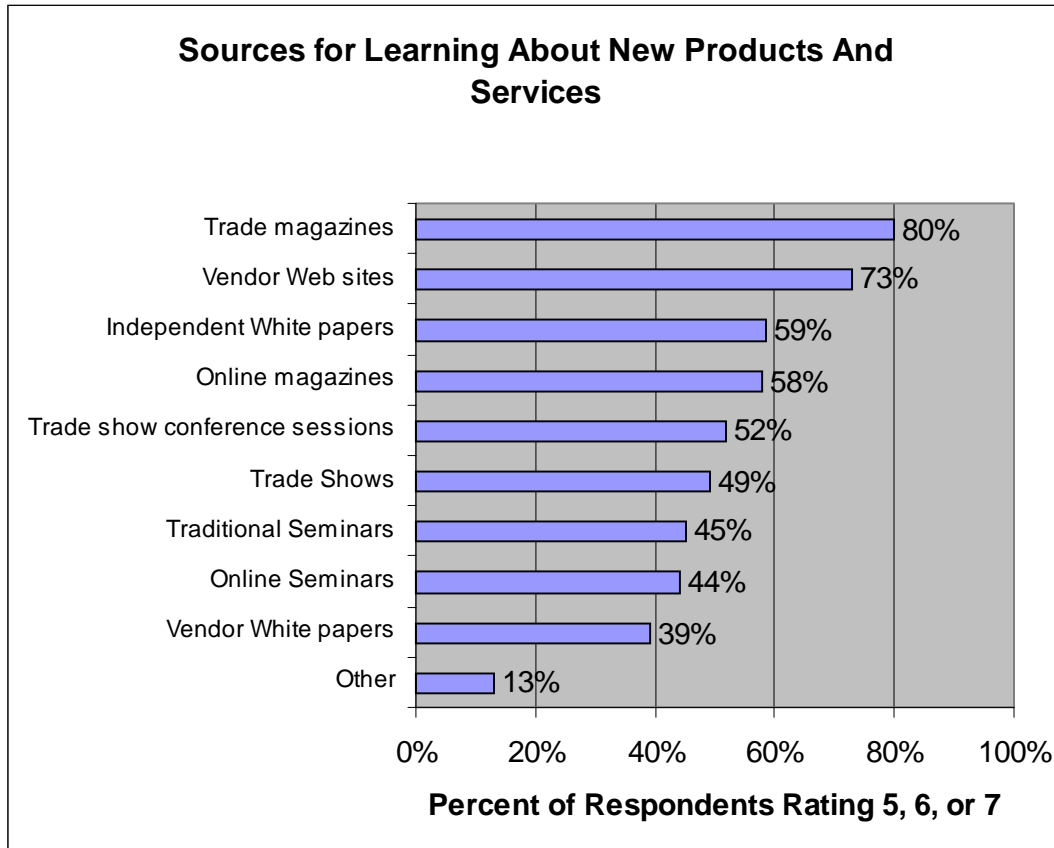


Table 11-1: Other Sources For Learning (n=12) Q48

<i>Other Responses</i>
E-MAIL
GET INFORMATION FROM A 3RD PARTY ON INTERNET
INDEPENDENT WEBSITES
NEWS GROUPS
PEERS
RADIO
RECOMMENDATIONS FROM OTHER PEOPLE IN THE INDUSTRY
TRADE ASSOCIATIONS
USER
VENDOR PRESENTATIONS
WE DO OUR OWN RESEARCH
WORD OF MOUTH

Top Publications

Content professionals read many publications; this creates a challenge when determining which publications to advertise in. In an open-ended question, we asked respondents for the top three publications which were influential in their purchase of products and services. Chart 11-4 below shows the most influential publications. Table 11-2 below shows the additional responses on publications.

The list of publications varied widely. Forty-six percent of the study respondents rated Internet World as the most influential publication. The list used for names was from an aggregated list of 20 publications. However, some publications collect more Web site professional titles than others. We believe this to be the case for Internet World, and may account for its frequent response. The significant publications with which product manufacturers and service providers should maintain close relationships also include Internet Week (18%), Web Technologies (16%), eWeek (15%), Info World (15%), Information Week (12%), Interactive Week (11%), and PC Magazine (9%).

Chart 11-4: Most Influential Publications (n=100) Q49

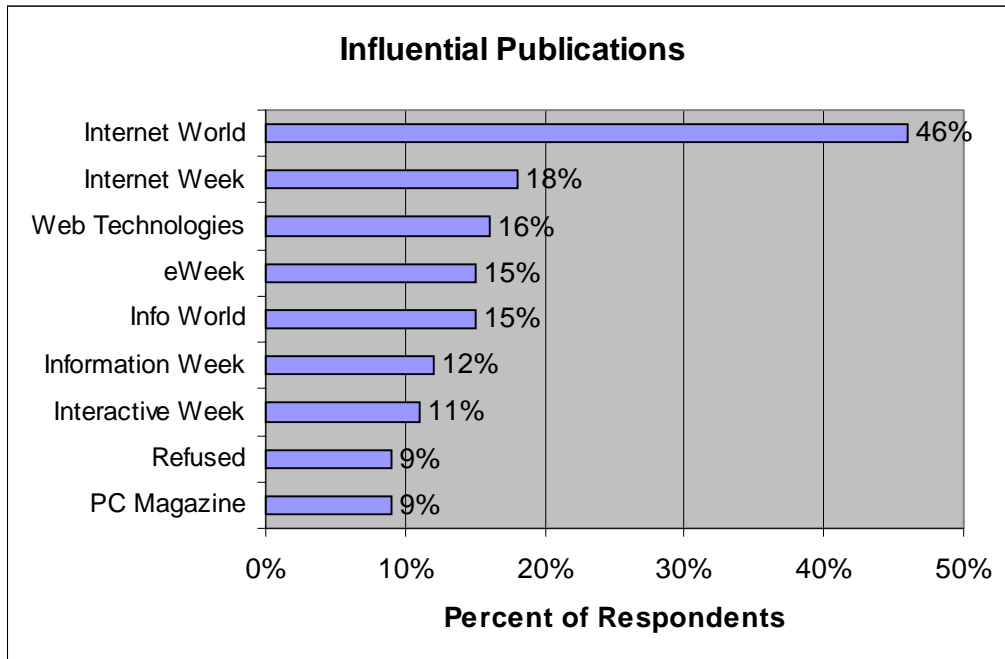


Table 11-2: Other Influential Publications (n=100) Q49

Other Responses	
ADOBE MAGAZINE	MAC WORLD
BOARD WATCH	MCP MAGAZINE
BUSINESS 2.0	MICROSOFT NEWSLETTER
CNET	NETWORK COMPUTING
COLDFUSION DEV JOURNAL	NETWORK MAGAZINE
COMMUNICATIONS OF THE ACM	PC WEEK
COMPUTER SCENE	PRICE SUPPORT
COMPUTER WORLD	SECURITY
CONSUMER REPORTS	SERVER/WORK STATION EXPERT
CREATE	SEYBOLD INTERNET REPORT
E BUSINESS	SYLLABUS MAGAZINE
EAI JOURNAL	SYSTEMS ADMIN
ENTERPRISE LINUX	TELEMEDICINE TODAY
FIND SVP	UPSIDE
FORESTER RESEARCH	VAR BUSINESS
GARTNER RESEARCH	WALL STREET JOURNAL
GOVERNMENT COMPUTER NEWS	WASHINGTON TECHNOLOGY
INC	WEB DEV
INDUSTRY STANDARD	WEB SOURCES
INFORMATION SECURITY	WEB WORLD
INFRO AGE	WHITE PAPER
INTERACTIVITY	WINDOWS 2000
JAVA DEVELOPERS JOURNAL	WIRED
LUNIX WORLD	ZDNET
MAC ADDICT	

The Decision Maker

To better understand who are the final decision makers, we asked respondents, in an open-ended question, to identify the individual(s), by title, in their companies who make the decision to choose content delivery products or services. Chart 11-5 below shows the breakdown of the categorized responses for company decision makers. Table 11-3 shows the other decision maker responses.

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.

Forty-three percent had varied responses when asked to identify the person(s) responsible for making the final decision on content delivery products or services. This made it difficult to classify them into definitive categories. The majority of the study respondents identify the chief information officer (CIO) (20%), director of information systems (19%), and Webmaster (15%) as the final decision makers.

Chart 11-5: Final Decision Makers (n=100) Q53

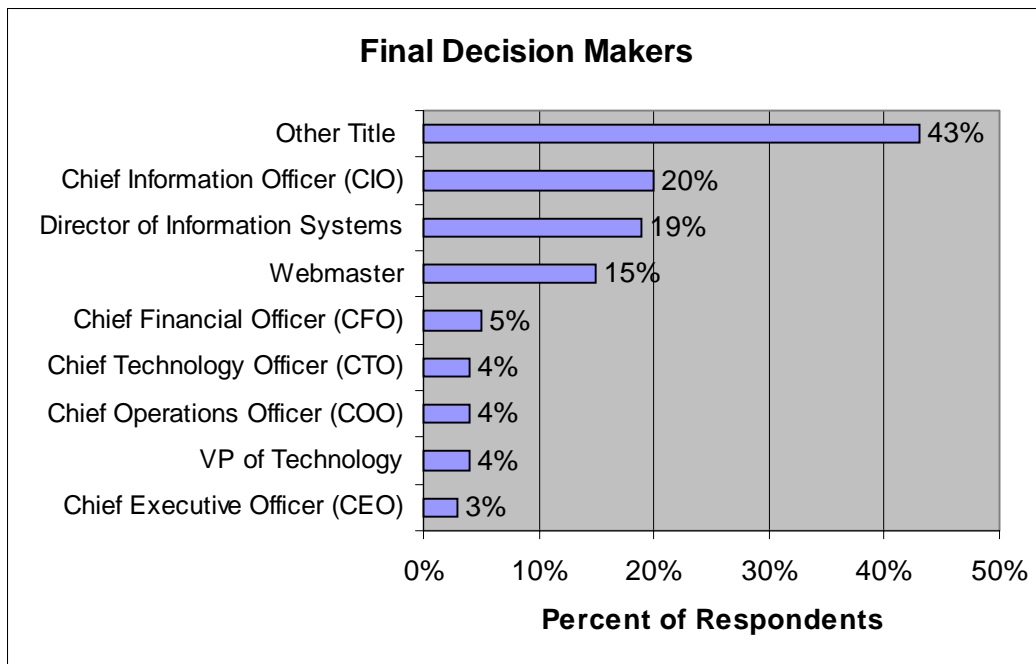


Table 11-3: Other Company Decision Makers (n=25) Q53

<i>Other Responses</i>	
(3) COMMITTEE	INTERNATIONAL TREASURER
(3) MARKETING DIRECTOR	IRMO DIRECTOR
(3) PRODUCT MANAGER	LIBRARY DIRECTOR
APPLICATIONS DEVELOPMENT MANAGER	MULTI-MEDIA SERVICES DIRECTOR
ASSISTANT TO THE DEAN	NETWORK ADMINISTRATOR
BUDGETING BOARD	PLANT MANAGER
COMPUTER CENTER DIRECTOR	PORTAL LEADERSHIP TEAM
WEB DEVELOPMENT COORDINATOR	PROVOST
CORPORATE WEB ANALYST	PUBLISHER
DEPUTY CHIEF OF STAFF	SENIOR DIRECTOR, E-BUSINESS
DIRECTOR OF ADVERTISING	SENIOR INTERNET ADMINISTRATOR
DIRECTOR OF COMPUTING	SYSTEM ANALYST
DIRECTOR OF E-BUSINESS	VICE PRESIDENT
DIRECTOR OF MARKETING SERVICES	VICE PRESIDENT INTERNET DEVELOPMENT
DIRECTOR OF RESEARCH	VICE PRESIDENT OF E-COMMERCE
E-COMMERCE CENTER MANAGER	VICE PRESIDENT OF IS
E-COMMERCE MANAGER	VICE PRESIDENT OF MARKETING
GENERAL MANAGER	VICE PRESIDENT OF OPERATIONS
GROUP TECH	WEB PROGRAM MANAGER

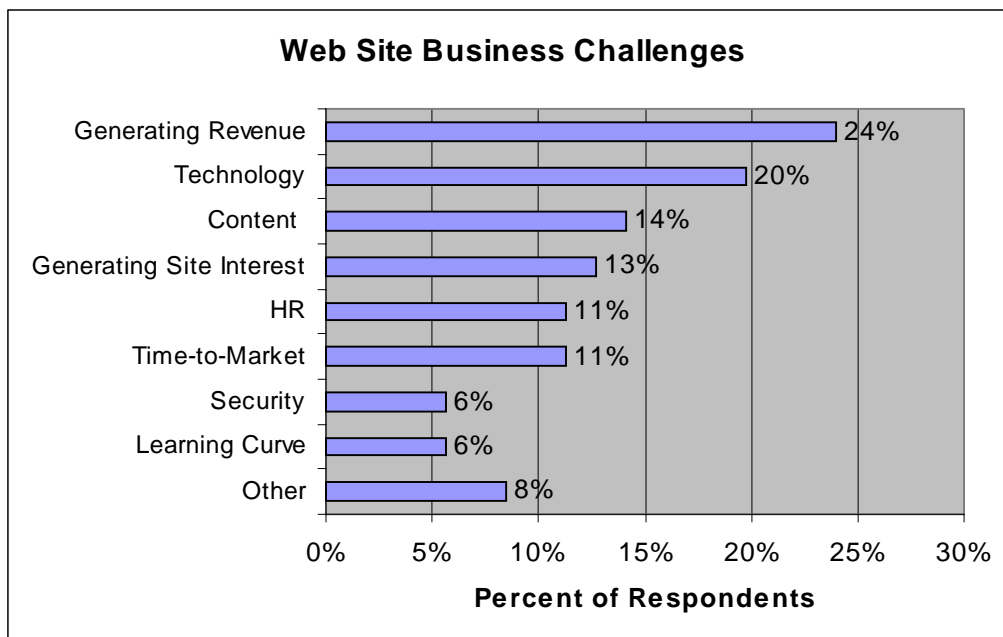
Challenges

Business Challenges

In order to gain a better understanding of the business challenges content professionals currently face, we asked respondents in an open-ended question about their largest Web site business challenges. We categorized the verbatim responses as follows: generating revenue, technology, content, generating site interest, HR, time-to-market, security, learning curve, and other. Chart 12-1 below shows a percentage breakdown by category of Web site business challenges. Please see the verbatim responses in the data summary.

The top business challenge, described by 24% of the study respondents, was generating revenue. Technology was described by 20% as a challenge. Product manufacturers and service providers have a diverse selection of products and services; many content sites struggle with getting these products and services to work as intended for their specific Web site purpose. Content (14%), generating site interest (13%), HR (11%), and time-to-market (11%) are also mentioned as business challenges. See chart below to view the other business challenge categories.

Chart 12-1: Business Challenges (n=71) Q55

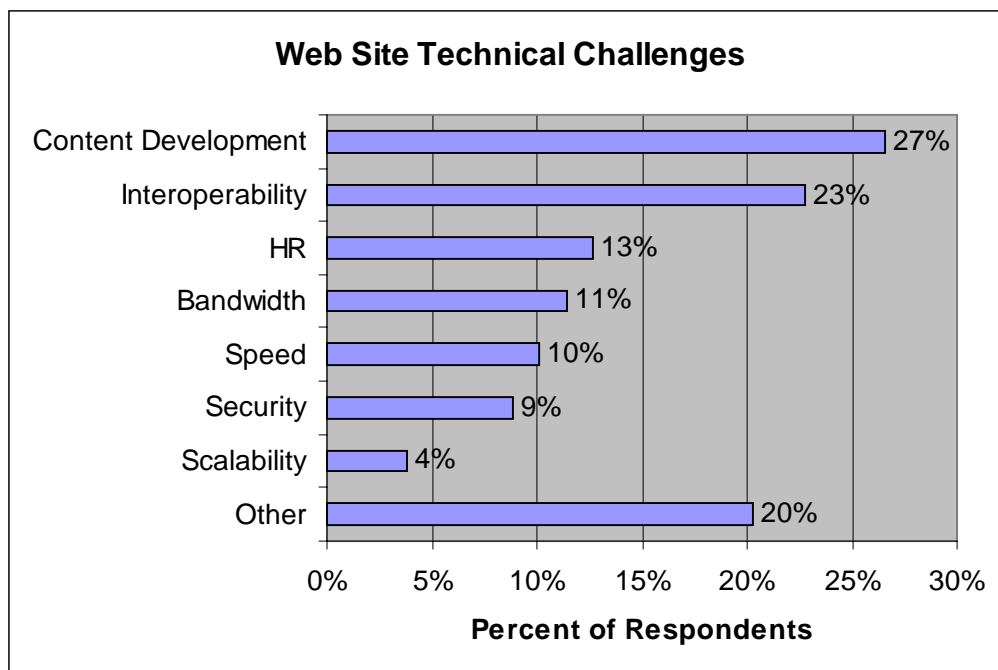


Technical Challenges

To gain a better understanding of the content site technical challenges, we asked content professionals, in an open-ended question, for their largest Web site technical challenges. We categorized the verbatim responses as follows: content development, interoperability, HR, bandwidth, speed, security, scalability, and other. Chart 12-2 below shows the percentage breakdown by category of the respondents' Web site technical challenges.

Content development, as described by 27% of respondents, was the largest technical challenge. Developing specialized content for the Internet will be increasingly challenging as Web sites compete for content to display on their sites. Interoperability was described as a challenge by 23% of the study respondents, while HR was described by 13% of the respondents.

Chart 12-2: Technical Challenges (n=79) Q54



Content Delivery Solutions

There are three approaches to delivering content delivery services in the market today: facilities-based, multi-network, and hybrid.

Facilities-based content delivery providers own and operate the network used to deliver content delivery services and can directly resolve network problems if they occur. In order to deliver content delivery services on a facilities-based network, the service provider's network should span a large geographic area to distribute content to end users. Facilities-based content delivery providers, which own data centers, can provide a single source for most or all Internet services and can bundle services such as colocation, access and content delivery services.

Multi-network content delivery providers place content delivery servers in as many facilities-based service providers' networks as possible, targeting those with many Internet access users. These content delivery servers comprise a network of many interconnected servers across multiple ISP backbones. The content delivery servers deployed in multiple facilities-based service providers' networks make up the multi-network content delivery provider's service network. Multi-network content delivery providers negotiate agreements with facilities-based service providers to strategically place content delivery servers around the world. Deploying content delivery servers in many individual networks adds resiliency to the multi-network content delivery provider's overall service network. When a content delivery server is placed in a facilities-based service provider's network and that network experiences service degradation or outages, the rest of the multi-network content delivery provider's content delivery servers automatically deliver more content to compensate for the outage. Hosting agreements between facilities-based providers and multi-network content delivery providers will change over time. The challenge to multi-network content delivery providers is to maintain many content delivery servers in facilities-based service provider's networks.

Hybrid CDN providers maintain a combination of a facilities-based and a multi-network approach to provide CDN services.

The following are submissions from providers of content delivery solutions:

Content Delivery Service Solutions

Digital Island, Inc.

Digital Island's Global e-Business Delivery Network enables the fast, reliable, and relevant Web experiences your customers demand. Whether your business must deliver secure data transmissions, streaming media, frequent updates, or mission-critical applications, Digital Island's integrated

services securely deliver your content to the customer, providing a guaranteed, fast, and relevant customer experience, every time. Digital Island provides tangible solutions to the challenges of global e-Business, delivering three key benefits to our customers:

- A faster and more reliable end-user experience, enhancing brand loyalty, sales, and customer satisfaction.
- Greater geographic reach with the ability to transparently serve multiple regions with more relevant content.
- Lower total cost of conducting global e-Business.

Target Markets for Content Delivery Services

All content publishers. While our focus is on publishers with large traffic volumes or large international users, our solution benefits anyone who wants superior performance from their Web site.

Target Markets for Streaming Media Services

As with HTTP content, anyone who uses streaming media to enhance the viewers' experience on their Website can benefit from our solution. We have major customers in many different sectors, notably Finance, Music, and Entertainment.

iBEAM Broadcasting Corporation.

iBEAM Broadcasting's network delivers streaming audio and video over the Internet. Our infrastructure helps us deliver content for a wide variety of companies who use streaming media to enhance their business. iBEAM's network architecture resembles that of traditional broadcasting systems. Cable and broadcast television is distributed by satellite to a network of cable head-ends located in local areas. iBEAM^(TM) uses satellites to broadcast streaming media to our "Internet Head Ends" located at Internet Access Providers' locations. The iBEAM Network^(TM) combines the fidelity, scalability, and efficiency of traditional broadcast with the interactive power of the Internet.

Features

The iBEAM Network consists of three main components:

Edge Network: Our MaxCaster^(TM) media serving systems in Access Provider points-of-presence (POPs) around the world serve content as close to the end

user as possible. Serving content from the "edge" of the Internet lets us bypass many of the problems that occur when content is served far from the end user.

Broadcast Platform: iBEAM's proprietary Broadcast Platform coordinates our extensive network of servers. Proprietary iBEAM software determines the best place to serve content to the end user and provides real-time reporting on streaming broadcasts. Our Network Operations Center (NOC) uses this platform to continuously maintain and monitor our Edge Network.

Satellite: iBEAM communicates with their MaxCaster servers by satellite. This lets enables them to transmit information from a single source to multiple recipients simultaneously and more economically.

Fiber Optics: We also use fiber optic communications to add redundancy to our network and to link different components of our Internet broadcast network.

The unique design of the iBEAM Network offers the following benefits:

High-Fidelity Streams: The iBEAM Network delivers broadcast-quality audio and video streams directly to the edge of the Internet to be served at a point close to the end user. Our network eliminates the problems that occur when data is lost as it travels across the Internet.

Reliability: iBEAM ensures that users can connect to any stream we broadcast, and we make sure the transmission is not dropped during the middle of a program

Massive Scale: The iBEAM Network can serve more than 500,000 simultaneous streams, and we will serve millions of streams in the future. This ensures access to the largest events and prime-time caliber Webcasts.

Lower Cost: The iBEAM solution significantly cuts the cost of delivering streaming media because we bypass expensive Internet bandwidth. This increases Content Providers' profits and allows them to explore new uses of streaming media that were not economically viable in the past.

Target Markets for Content Delivery Services

iBEAM is focused on steaming media (audio and video) services and delivery.

Target Markets for Streaming Media Services

Entertainment (music, indie films, events), news and information services, enterprise (Fortune 500), advertisers, college and university campuses, and ISPs.

Mirror Image Internet, Inc.

Mirror Image Internet, Inc. ("Mirror Image") offers global content distribution services that address the "world wide wait" problem on the Internet by improving Internet download speed, quality of delivery and scalability through its patent-pending architecture for content distribution.

Mirror Image instaDeliverySM Internet acceleration services deliver Internet content with speed and consistency, regardless of demand volume. Its production platform is the Content Access PointTM ("CAP") infrastructure. The CAP architecture clusters large, scaleable systems, locating them at key traffic convergence points in the Internet, leveraging Mirror Image technology and that of Cisco Systems, Hewlett-Packard, Sun Microsystems and other industry-leading vendors to deliver content performance, reliability and scalability. CAPs store and deliver content directly into major Internet user basins, bypassing Internet congestion and reducing speed-of-light latency.

Mirror Image installs CAPs at key Internet locations worldwide, in proximity to user populations. From such locations, the CAPs serve content directly to Internet users and are able to connect to thousands of ISP and corporate networks. Content providers, enterprises and ISPs that use the Mirror Image instaDeliverySM services improve Web performance, eliminating redundant data transfers and reducing their network investments. Once completed, Mirror Image believes that the CAP infrastructure should be able to serve a majority of user requests for Web content worldwide.

By overlaying the specialized CAP infrastructure on top of the Internet, Mirror Image is in fact adding mainframe-like power, manageability, security, scalability and efficiency, to the distribution of Web content. The Mirror Image CAP production infrastructure improves Internet performance with high-output, high-performance, large-scale clusters of systems, reflecting the capacity and scale of the Internet itself. Because of the individual scale and performance of the CAPs, Mirror Image does not need to deploy thousands of systems to serve Internet content to users worldwide. The CAP design can scale over time to adjust to Internet supply and demand growth. This enables Mirror Image to offer content providers the benefits of a unified architecture, serving their needs worldwide with high efficiency.

Target Markets for Content Delivery Services

Mirror Image serves the needs of Internet business participants such as content providers, enterprises and Internet service providers. Services offered in 2000 include instaContentSM (global content delivery), instaStreamSM (audio and video stream delivery), and instaSpeedSM (managed Internet caching services). InstaContentSM is a content distribution service that

provides an infrastructure to extend Web sites to global scale, dynamically distribute content, accelerate delivery of site content to users and reduce content providers' need for additional Web site production capacity to accommodate traffic surges. The origin Web server is relieved from the task of serving all these requests, and only has to serve requests for dynamically generated content, which generally represent the smaller part of most sites' total content load. Leveraging the large scale of the global CAP infrastructure, instaContent can take on even very large scale Web site content distribution projects.

Target Markets for Streaming Media Services

InstaStreamSM is designed to enable content providers to deliver high-quality streaming media over the Internet. Content providers benefit from delivering higher quality audio and video to their audience, while also relieving congestion at their origin sites and containing their server deployment costs. The CAP infrastructure stores and serves audio and video media in close proximity to end users, delivering superior-quality streams with consistency. Mirror Image offers a set of tools and services to content providers, to manage their CAP libraries and to obtain service statistics. The CAP System can also serve audio and video at low speeds, with similar benefits to content providers.

SolidSpeed Networks, Inc.

SolidSpeed Networks, Inc. is an Internet performance company dedicated to making small-to-medium business Web sites more responsive. We use a proprietary combination of intelligent routing and network optimization to provide affordable acceleration of Web content delivery. Content delivered by our network bypasses the congestion and other problems that often slow down or make Web sites unavailable. A more responsive site can dramatically increase visitor retention and site profitability.

Target Markets for Content Delivery Services

The small and medium businesses (SMB) market, those who currently pay \$500 to \$2,000 per month for hosting.

Target Markets for Streaming Media Services

The SMB's are currently interested in just on-demand streaming.

Speedera Networks, Inc.

The Speedera Universal Delivery Network consists of hundreds of servers deployed at the edge of the Internet, at multiple points of presence on multiple networks all around the world. The Speedera software solution consists of several components that are deployed across this wide area network of servers creating a universal solution for content routing and high availability delivery of all types of content including static, dynamic and streaming media. By installing probes and caching content close to end users, the performance (download speeds) and availability of Web sites are substantially improved.

Speedera servers are typically deployed at POPs connected to different networks, and support the key elements of the Universal Delivery Network architecture, including global traffic management software; high-performance content delivery software like Web servers, Web caches, FTP and streaming media servers; as well as network and service probes for monitoring the entire system.

Speedera offers multiple services running on this Universal Delivery Network. Speedera's services are delivered to customers as fully outsourced services with monthly subscription charges. The system typically requires no software or hardware to be installed at a customer's site. A Web interface is available for customer access to comprehensive monitoring information, including network status as well as extensive real-time and historical statistics on a per customer basis.

The Speedera Universal Delivery Network (UDN) offers the following services:

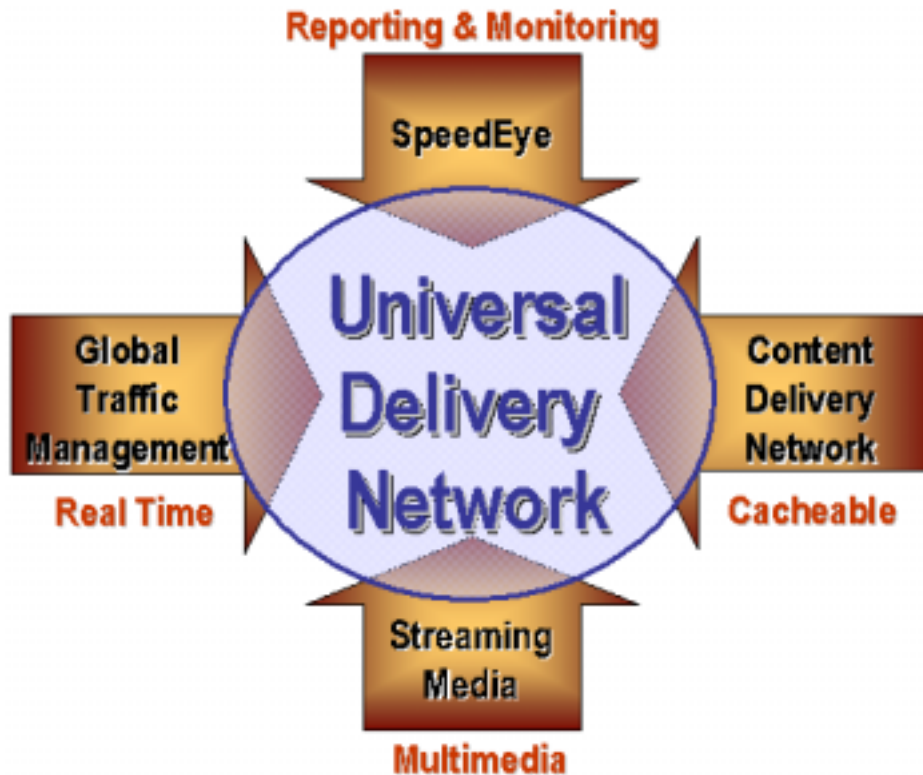
Speedera Global Traffic Management (GTM): This service routes traffic between multiple mirrored customer Web sites, for load balancing and failover, using criteria such as packet loss, network latency, local server load, persistence and other metrics.

Speedera Content Delivery Network (CDN): This service caches content at multiple servers and delivers content from edge servers located closest to the user.

Speedera Streaming: This service is used to deliver high-performance on-demand and live streams from the Speedera network.

Speedera SpeedEye: Customers use this tool to monitor their Web site and view real-time and historical usage patterns, performance, availability and other data.

Figure: Speedera UDN delivers static, dynamic and streaming media



Target Markets for Content Delivery Services

Speedera is focused on very efficient delivery of Web content and applications for Web Content Providers, E-Businesses, Streaming Media Providers, and Enterprises. We partner with a variety of service providers to deliver the Speedera UDN™ service, including Internet Service Providers, Web Hosting Companies, Colocation facilities, Carriers and other kinds of service providers, and Streaming value-added service providers.

Target Markets for Streaming Media Services

Target markets for streaming media services include Webcasting companies, training departments, entertainment production groups, Web content companies, and media production groups.

Content Delivery Product Solutions

Cisco Systems, Inc.

Cisco Systems is the worldwide leader in networking for the Internet. Cisco's networking solutions connect people, computing devices and computer networks, allowing people to access or transfer information without regard to differences in time, place or type of computer system.

Cisco provides end-to-end networking solutions that customers use to build a unified information infrastructure of their own, or to connect to someone else's network. An end-to-end networking solution is one that provides a common architecture that delivers consistent network services to all users. The broader the range of network services, the more capabilities a network can provide to users connected to it.

Cisco's offers the industry's broadest range of hardware products used to form information networks or give people access to those networks; Cisco IOS® software, which provides network services and enables networked applications; expertise in network design and implementation; and technical support and professional services to maintain and optimize network operations. Cisco is unique in its ability to provide all these elements, either by itself or together with partners.

Cisco serves customers in three target markets:

- **Enterprises** - Large organization with complex networking needs, usually 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.
- **Small/Medium Business** - Companies with a need for data networks of their own, as well as connection to the Internet and/or to business partners.

Target Markets for Content Delivery Services

Service provider community to enterprise and Internet customers, and enterprise customer markets.

Target Markets for Streaming Media Services

Service provider community to enterprise and Internet customers, Broadband access networks (early adopters), and enterprise customer market.

Fast Forward, Inc. (Inktomi)

Fast Forward Networks offers a software-based Internet broadcasting infrastructure solution for service providers and content distributors called a media distribution network or MDN. MDNs are based on a broadcast overlay architecture and are overlays to existing service provider networks that are optimized for the delivery of streaming media. They are highly scalable and reliable and deliver unprecedented management and control. Using our solution, providers will have the capability to broadcast thousands of channels to millions of viewers simultaneously. And most importantly, build a profitable Internet broadcasting business.

Fast Forward Networks offers a comprehensive suite of products that enables service providers to generate revenue from Internet broadcasting. Easily integrated with existing technologies, Fast Forward Networks' broadcast overlay architecture solves difficult streaming media acquisition, distribution and management problems, to enable service providers to build a reliable and scalable Internet broadcast business. The product suite consists of the following products:

- MediaBridge™: Internet broadcasting nodes that intelligently distribute streams throughout the media distribution network
- MediaBridge ServerLink™: format specific modules (WMT, G2, QuickTime) that integrate closely with streaming media servers at the edge of the network
- Broadcast Manager™: a suite of network monitoring and management tools that enable service providers and content distributors to control, view, and monitor broadcasts at the stream level

The Fast Forward Networks platform provides all of the management and distribution pieces necessary to build a profitable Internet broadcast business: broadcast level scalability and reliability, monetization and management of streams, control of user experience and the ability to do content peering. Unlike current approaches to Internet broadcast, the Fast Forward Networks architecture lets service providers and content distributors broadcast thousands of events to millions of viewers simultaneously.

The FastForward Networks platform is the only solution that combines broadcast distribution and control to deliver all of the infrastructure pieces necessary to build a broadcast service, including broadcast level scalability and reliability, monetization and management of streams, control of user experience and the ability to do content peering.

Target Markets for Content Delivery Services

FastForward Networks markets its products to content distributors, service providers and enterprise customers.

Inktomi Corporation

Inktomi's complete solution for CDNs consists of the Traffic Server network cache platform and Content Delivery Suite (CDS) for proactive content distribution and management.

Traffic Server: Inktomi Traffic Server is a scalable, reliable, software based network cache, which is the most proven and widely deployed cache on the market today. Its open API layer enables plug-in applications and services, making it the leading cache platform for enabling value-added service revenue. Traffic Server's streaming plug-in, Media-IXT, is the only streaming media cache to enable on-demand and live streaming of RTSP, WMT and soon Quicktime, protocols from a single cache server. Traffic Server's scalable clustering technology has been proven at the world's largest service providers, including AOL, which routes over 5 billion Web requests per day through Traffic Server.

Content Delivery Suite: Content Delivery Suite consists of two components.

Content Distributor – The Content Distributor reliably and securely replicates and synchronizes the delivery of content across multiple network servers and caches, combining effective content distribution and mirroring with redundancy and fault tolerance.

Using an agent/manager architecture and a proprietary communications protocol, Inktomi Content Distributor provides content updates to Web servers and caches over any TCP/IP-based network, and works securely through firewalls. Administrators centrally configure, schedule and monitor jobs, set policies for distribution and perform one-step rollbacks from a Java-based console. A command line interface enables seamless integration with content creation tools.

Content Manager – The Manager integrates management and monitoring capabilities ensuring that distributed content and applications are highly available, and meet service level and performance requirements.

Using the Inktomi Content Manager, administrators can define groupings of URLs that comprise a business function and monitor their status and performance as a group. In addition, performance requirements or customer service levels can be monitored through administrator-defined thresholds. The Manager delivers customized alerts to the Content Manager console, via email or pager. Drill-down capabilities help identify the sources of performance problems. A wizard-driven engine allows emulation and periodic

testing of user sessions, guaranteeing that content and applications are functioning correctly

Inktomi's Network Products platform is the only solution to integrate a scalable, software-based network cache with a proactive content distribution and management solution. This provides benefits such as integrated distribution and management of cacheable and non-cacheable Web content, streaming media content pre-load, and distributed cache updating. Inktomi's products are unique in providing the scale and remote capabilities needed in highly distributed CDN environments. As a result of this, Inktomi's solution is used by 90% of the content delivery networks announced to date.

Target Markets for Content Delivery Services

Inktomi is a technology provider, rather than a service provider. Our primary target market is the CDN market itself, along with major Internet service providers. Our secondary market is the enterprise, where we target companies that are building their own content distribution solutions in an Intranet or Extranet environment.

Target Markets for Streaming Media Services

Inktomi's streaming media product, Media IXT, is targeted at CDNs and the enterprise.

Forecasts

Web sites are a strategic advantage in today's markets, and most businesses are increasingly dependent on an online presence. The 2000 Content Delivery Service Study forecasts cover products and services that enhance Web site performance including content delivery services, content delivery products, streaming services, and global load balancing services. Following are significant market factors influencing our forecasts:

Market Factors

- Content traffic demand for bandwidth increases roughly 6.8 percent per month.
- Cost is the largest barrier to subscribe to CDN services
- The price of CDN services will decrease over time, driving adoption rates up.
- CDN technology will expand to distribute more content types, including dynamic content.
- Internet expertise does not scale with demand; sites will outsource more IT functions.
- New Internet access technology will drive more sophisticated high-bandwidth content.
- Most content sites will evaluate the least expensive solution that yields the highest acceptable performing solution.
- Broadband Internet access drives increased bandwidth demand.
- The number of new Web sites will increase at a slower rate in 2001 and 2003 as Internet infrastructure continues to develop around the world.

Content Delivery Service Forecast

About the forecast

The 2000 Content Delivery Service Study Forecast includes dollars spent by Web sites for CDN services and in-house product implementations. This forecast does not include streaming content. This forecast also does not include service provider expenditures for content delivery products.

Methodology

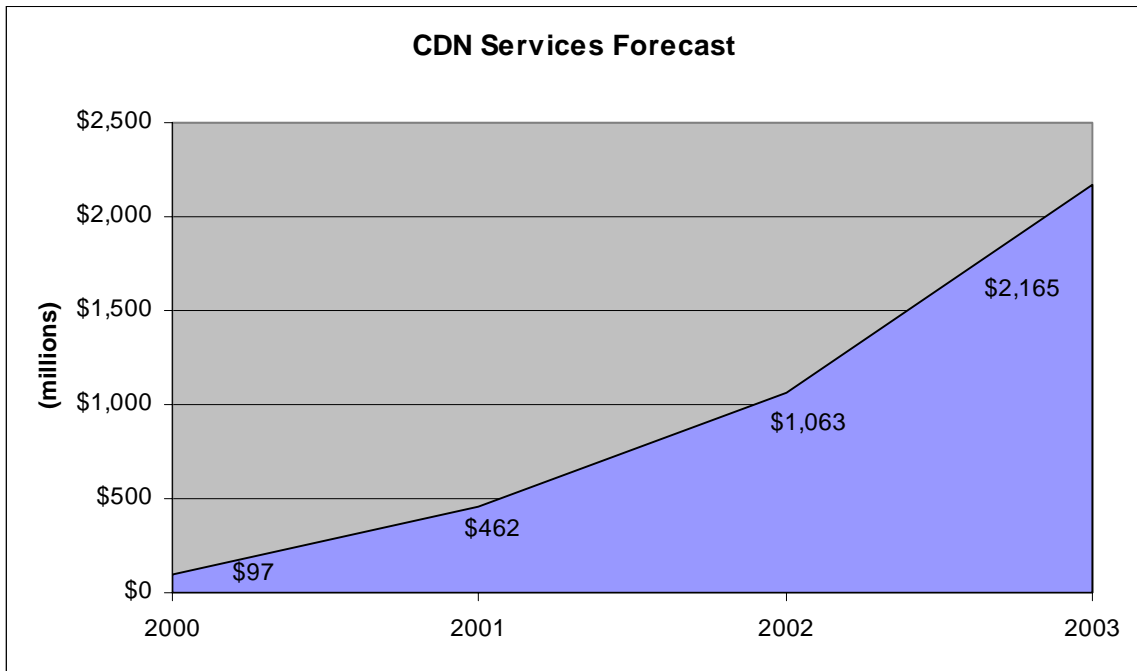
The 2000 Content Delivery Service Study Forecasts examine the opportunity for service providers offering CDN services. This forecast is comprised of primary and secondary information sources. To understand the total population of Web sites, we considered public information on the total number of Web site domain name registrations from January 1996 through 2000. A very small percentage of the total Web sites use a significant amount of bandwidth. We also took into account the growing number of businesses with an online presence. Location has been critical to a successful retail business, and businesses with an online presence will view Web site performance just as important. Adoption rates for CDN services were heavily influenced by current and future respondent plans for CDN subscriptions.

We used extrapolation techniques and market factors to estimate the market population size and growth for CDN services. Using demand-side information gathered in this study, as well as supply-side sources, we projected the opportunity for content delivery products and services. The largest factors influencing forecast growth are the increasing number of business Web sites and the demand for performance differentiation.

Content Delivery Services Forecast

Service providers that offer CDN services are presented with a significant opportunity. Web sites will spend \$97 million in subscriptions to CDN services in 2000, increasing to \$2.2 billion in 2003. Content delivery services include services that intelligently distribute content globally on a network through strategically placed servers, which store and deliver content close to end users. The chart 13-1 below depicts the revenue opportunity for service providers that offer CDN services.

Chart 13-1: Content Delivery Services Forecast



Content Delivery Products Forecast

About the forecast

The 2000 Content Delivery Service Study Forecast for products include dollars spent by service providers as well as Web sites for CDN products. Service providers will continue to build out CDN networks in pursuit of the significant opportunity outlined in the previous CDN services forecast. Study respondents indicated plans to build out an in-house CDN solution. Dollars spent by Web sites planning an in-house CDN solution are included in this forecast. This forecast does not include dollars spent on CDN or streaming services.

Methodology

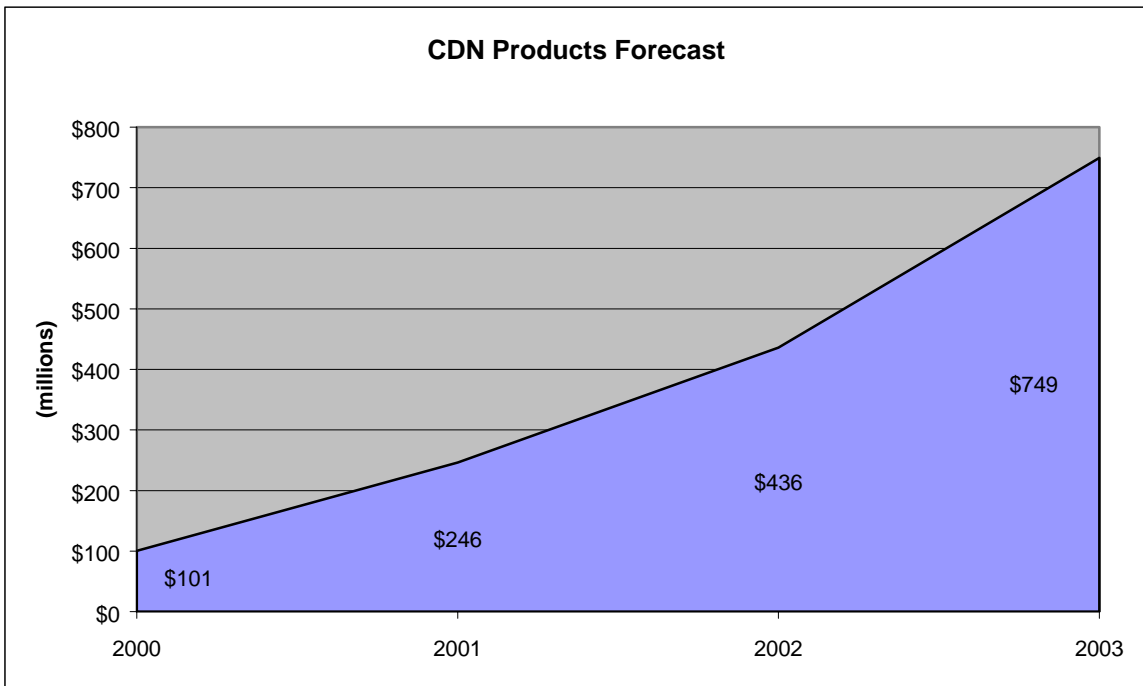
The 2000 Content Delivery Products Forecast examines the opportunity for product manufacturers offering CDN solutions. This forecast is comprised of primary and secondary information sources. The number of emerging CDN providers is increasing as facilities based and multi-network CDN providers enter the market.

We used extrapolation techniques and market factors to estimate the market population size and growth for CDN service providers. Using demand-side information gathered in this study, as well as supply-side sources, we projected the opportunity for CDN product manufacturers.

Content Delivery Products Forecast

Product manufacturers that offer CDN products are presented with a growing opportunity. Service providers and Web site owners will spend \$101 million on CDN products in 2000, increasing to \$749 million in 2003. The chart 13-2 below depicts the revenue opportunity for product manufacturers that offer CDN solutions.

Chart 13-2: Content Delivery Products Forecast



Streaming Services Forecast

About the forecast

The 2000 Content Delivery Service Study Forecast for streaming services includes dollars spent by Web sites for on-demand and live streaming services. This forecast does not include static or dynamic content distributed by CDN providers.

Methodology

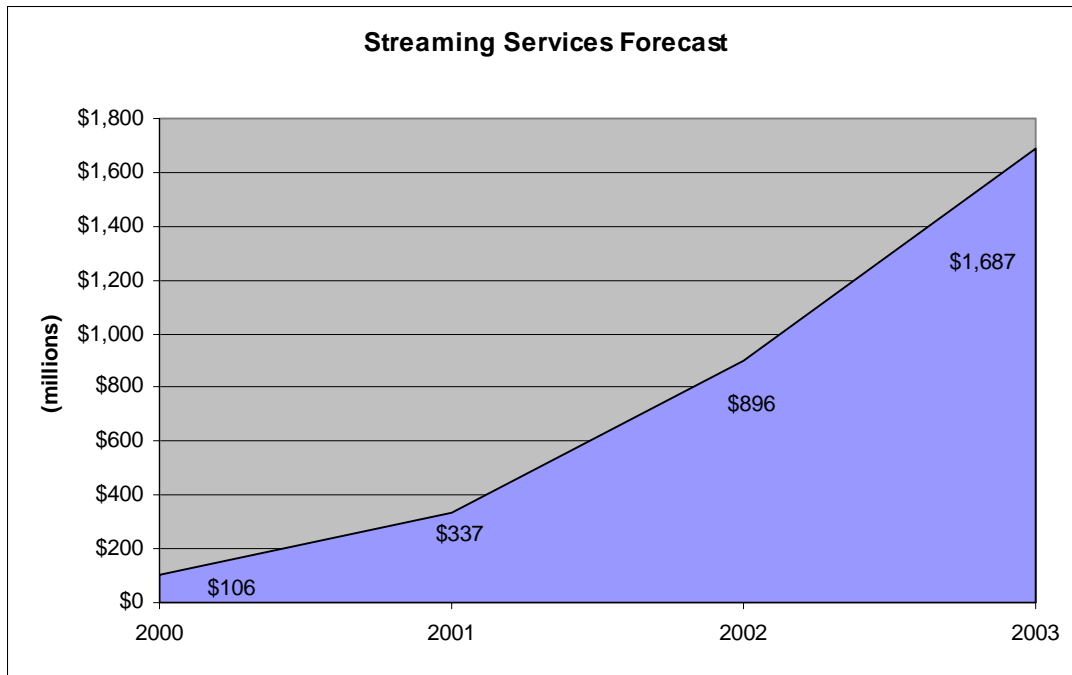
This forecast is comprised of primary and secondary information sources. Adoption rates for CDN services were heavily influenced by current and future respondent plans for streaming subscriptions live and on-demand.

We used extrapolation techniques and market factors to estimate the market population size and growth for CDN services. Using demand-side information gathered in this study, as well as supply-side sources, we projected the opportunity for live and on-demand streaming services. The largest factors influencing forecast growth are the increasing number of study respondents planning to use streaming media.

Streaming Service Forecast

Service providers that offer streaming services are presented with a significant opportunity. Web sites will spend \$106 million in performance streaming services in 2000, increasing to \$1.7 billion in 2003. The chart 13-3 below depicts the revenue opportunity for service providers that offer live and on-demand streaming services.

Chart 13-3: Streaming Services Forecast



Global Load Balancing Services Forecast

About the forecast

The 2000 Content Delivery Service Study forecast for global load balancing services includes dollars spent by Web sites for global load balancing services. Global load balancing services are complementary to CDN services. The number of CDN service providers offering global load balancing services will increase over time. Service providers will continue to build out networks that incorporate complementary services, providing an avenue for further market differentiation. Dollars spent by Web sites on global load balancing services are included in this forecast. This forecast does not include dollars spent on local or global load balancing products, CDN or streaming services.

Methodology

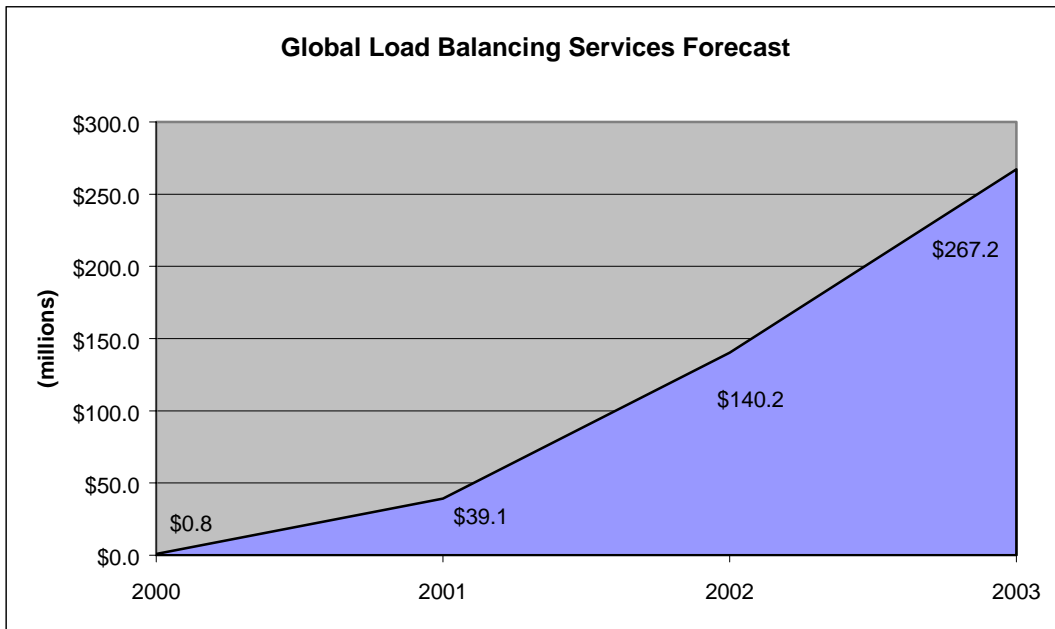
Today, roughly half of the large companies in the U.S. have more than one data center housing a complicated array of redundant Web servers and network performance enhancement devices. A key component of this ever-growing Web site network architecture is global load balancing technology, which directs users of a specific Web site to the optimal global data center and to the optimal server within that center. Subscribing to global load balancing services holds significant advantages in maintaining performance and uptime for growing Web sites.

We used extrapolation techniques and market factors to estimate the market population size and growth for global load balancing services. Using demand-side information gathered in this study, as well as supply-side sources, we projected the opportunity for global load balancing services. The largest factors influencing forecast growth are the increasing number of data centers maintained by study respondents.

Global Load Balancing Services Forecast

Service providers that offer global load balancing services have an optimistic outlook for revenue growth through an increasing opportunity. Web site owners will spend \$800 thousand on global load balancing services in 2000, increasing to \$267 million in 2003. The chart 13-4 below depicts the revenue opportunity for service providers that offer global load balancing services.

Chart 13-4: Global Load Balancing Services Forecast



Appendix A

The 2000 Content Delivery Service Study Questionnaire

1. Do you have detailed knowledge of your content site, including network plans, 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 company?

Number of employees: _____ (If less than 500, terminate)

Refused: _____ (Go to Q.2a)

Don't Know/Refuse: _____ (Go to Q.2a)

[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)

3. 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)

4. Approximately how many of the following types of content site employees do you have now (July 2000)? How many will you have by July of 2001? (Fill in appropriate field)

[Range 0-99999. Enter 99998 for Refused. Enter 99999 for DK]

<u>Employee Types</u>	<u>July 2000</u>	<u>July 2001</u>
1.Creative Web Designers	_____	_____
2.Network Engineers	_____	_____
3.NOC staff	_____	_____
4.Technical Web Operators	_____	_____
5.Content Distribution Specialists	_____	_____
6.All other content site employees	_____	_____

[If 2000 and 2001 = zero, DK, or refused for all categories, terminate]

5a. What is your company's line of business? (Check all that apply)

- 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 _____ None of the above/Refused [DO NOT READ]
- 22 _____ Don't know [DO NOT READ]

10. Which of the following ways do you currently plan to use content delivery products or services? Plan to by July of 2001? (*Read list*)

<u>Service</u>	<u>July 2000</u>	<u>July 2001</u>
1. Multi-network content delivery service provider (e.g. Akamai or Adero)	_____	_____
2. Facilities-based content delivery service provider (e.g. Concentric Networks)	_____	_____
3. Hybrid Facilities-based and Multi-network based content delivery service provider (e.g. Digital Island)	_____	_____
4. Build your own content delivery network	_____	_____
5. Do not use content delivery services	_____	_____
6. Other [Do not read]	_____	_____
7. Don't know/Refuse [Do not read]	_____	_____

(If Q10-2001=5, Ask Q10a)

10a. Why don't you plan to use content delivery services? (Open ended)

1. Don't know
2. Specify: _____

(goto Q14)

(If Q10-2000=4, Ask Q10b)

10b. What content delivery products do you use or plan to use for your site or service? (Open ended)

1. Don't know
2. Specify: _____

[Ask Q11 only if Q10-now=1,2,3,6]

11. What service provider(s) do you use for content delivery services now? [*Multiple responses, Do not read*]

19. Epic Realm
20. Akamai
21. IBEAM
22. Mirror Image
23. Edgix
24. Digital Island
25. Enron
26. Williams
27. Intel
28. AboveNet
29. Frontier GlobalCenter
30. Adero
31. Concentric
32. Exodus
33. Speedera
34. InterNap
35. Other: _____
36. Don't know

[Ask Q12 only if Q10-2001=1,2,3, 6]

12. What service provider(s) do you plan to use for content delivery services by July of 2001? [*Multiple responses, Do not read*]

37. Epic Realm
38. Akamai
39. IBEAM
40. Mirror Image
41. Edgix
42. Digital Island
43. Enron
44. Williams
45. Intel
46. AboveNet
47. Frontier GlobalCenter
48. Adero
49. Concentric
50. Exodus
51. Speedera
52. InterNap
53. Other: _____
54. Don't know

13. Why do you use or plan to use content delivery services? (Open ended)
1. Don't know/Refuse
 2. Specify:_____

[If Q6=2,3,4, ask Q14]

14. What service provider(s) do you currently use for colocation or hosting your site? (Open ended)
1. Don't know/Refuse
 2. Specify:_____

15. What service provider(s), if any, do you plan to use for colocation or hosting your site in July of 2001? (Open ended)
1. Don't know/Refuse
 2. Plan to host internally
 3. Specify:_____

16. Which of the following service provider types would you prefer content delivery services from? (Check all that apply) (Read list -- Rotate)

- _____ 1. _____ Hosting provider
- _____ 2. _____ Content delivery specialist
- _____ 3. _____ National facilities based ISP
- _____ 4. _____ International ISP
- _____ 5. _____ Are there any other service provider types: _____
- _____ 6. _____ None [Do not read]
- _____ 7. _____ Don't know/Refuse [Do not read]

17. Would you consider using CDN (Content Delivery Network) services from multiple CDN service providers? (Open ended)

- _____ 1. _____ Yes (If yes, ask 17a)
- _____ 2. _____ No

- 17a. Why would you use CDN services from multiple CDN service providers? (Open ended)

1. Don't know/Refuse
2. Specify:_____

Content Section

18. Which of the following types of content does your company use on the Web site now? By July of 2001? (*Read list, probe for others*)

<u>Service</u>	<u>July 2000</u>	<u>July 2001</u>
1. Static content (does not change, e.g. company logo)	_____	_____
2. Dynamic content (Dynamic content includes HTML pages built on the fly unique to a specific user)	_____	_____
3. On-demand Streaming media content (Streaming media that is produced, then stored on Web site)	_____	_____
4. Live Streaming media content (Streaming media that is captured at the source and transmitted to an audience with a minimal level of delay)	_____	_____
5. Secure content (content that is secured using technologies such as SSL)	_____	_____
6. Content created with XML	_____	_____
7. Are there any others (Specify)	_____	_____
8. Don't know/Refuse [Do not read]	_____	_____

If Q18=1 in 2000 than ask Q18a)

18a. Of all your static content, how often do you update your content? (Check all that apply)

- _____ 1. _____ Hourly
- _____ 2. _____ Daily
- _____ 3. _____ Weekly
- _____ 4. _____ Monthly
- _____ 5. _____ Yearly
- _____ 6. _____ More than yearly
- _____ 7. _____ Don't know/Refuse [*Do not read*]

19. What percent of your total Web site uses the following types of content now? (*Read list, Answers must total 100%, probe for others*)

<u>Service</u>	<u>Percentage</u>
1. Static content (does not change, e.g. company logo)	_____ %
2. Dynamic content (Dynamic content includes HTML pages built on the fly unique to a specific user)	_____ %
3. On-demand Streaming media content (Streaming media that is produced, then stored on Web site)	_____ %
4. Secure content (content that is secured using technologies such as SSL)	_____ %
5. Content created with XML	_____ %
6. Bring in responses from Q18	_____ %
	Total <u>100%</u>
7. Don't know/Refuse [Do not read]	_____

20. Do you use or plan to use content creation software such as Vignette, on your Web site by July 2001? (Content creation software creates dynamic content: HTML files built on the fly unique to a specific user)

1. Yes: _____ (Go to Q 20a)
2. No: _____ (Go to Q 21)
3. Don't know/Refuse [Do not read]

20a Which of the following types of content creation software does your company use on the Web site now? By July of 2001? (*Read list, probe for others*)

<u>Service</u>	<u>July 2000</u>	<u>July 2001</u>
1. Vignette	_____	_____
2. Broadvision	_____	_____
3. Allaire	_____	_____
4. Eprise	_____	_____
5. Don't know/Refuse [Do not read]	_____	_____
6. None [Do not read]	_____	_____

20b. Is there any other content creation software you use now? By July 2001?

1. Yes, specify _____
2. No

(If 20a=6 and 20b=2 then skip to Q21)

20c. Of the content creation software you use, what content creation software applications do you use now? By July 2001?(Open ended)

1. Don't know/Refused
2. Specify: _____

21. When creating content for your site what percent is... (*Read list, Answers must total 100%, probe for others*)

<u>Service</u>	<u>Percentage</u>
1. Syndicated	_____ %
2. Original	_____ %
3. Other	_____ %
4. Any others	_____ %
Total	<u>100%</u>

22a. What is the total size of your content site, in Gigabytes, including all types of content: _____ Gigs (Fill in numbers)

Be sure to record Gigabytes, NOT Megabytes or Kilobytes.

[Range 1-99,999,999 -- Enter 99999998 for refused. Enter 99999999 for DK]

22b. Of all the content on your content site, what percent is cacheable content: _____% (Fill in percentage) (Cacheable content includes all static content that is not marked as non cacheable)

[Range 1-100. Enter 999 for DK]

23. What Web based applications does your company offer through your Web site in 2000? What applications by July 2001? (Open ended. Record all that apply) (examples of Web based applications include IP Telephony, databases, custom built)

2000

1. Don't know
2. None
3. Specify: _____

2001

1. Don't know
2. None
3. Specify: _____

(If Q18=3,4 2000 or 2001 ask Q24)

24. Which of the following applications do you use or plan to use for live or on-demand streaming media? (Check all that apply) (Read list -- Rotate)

- _____ 1. _____ Real Audio
- _____ 2. _____ Real Video
- _____ 3. _____ Microsoft Media Technology
- _____ 4. _____ Quick Time
- _____ 5. _____ Are there any other applications: _____
- _____ 6. _____ None [Do not read]
- _____ 7. _____ Don't know/Refuse [Do not read]

25a. Which of the following statistics do you CURRENTLY gather and use on your Web site? (Check all that apply) (Read list -- Rotate)

- _____ 1. _____ Number of concurrent users
- _____ 2. _____ Bit rate at which Web users are accessing your site
- _____ 3. _____ Content most frequently accessed
- _____ 4. _____ Web users geographic location
- _____ 5. _____ Average round trip time (RTT) to Web users
- _____ 6. _____ Are there any other statistics: _____
- _____ 7. _____ None [Do not read]
- _____ 8. _____ Don't know/Refuse [Do not read]

25b. Which of the following statistics WOULD YOU LIKE TO gather and use on your Web site? (Check all that apply) (Read list -- Rotate, show only answers not mentioned in Q25a)

- _____ 1. _____ Number of concurrent users
- _____ 2. _____ Bit rate at which Web users are accessing your site
- _____ 3. _____ Content most frequently accessed
- _____ 4. _____ Web users geographic location
- _____ 5. _____ Average round trip time (RTT) to Web users
- _____ 6. _____ Are there any other statistics: _____
- _____ 7. _____ None [Do not read]
- _____ 8. _____ Don't know/Refused [Do not read]

Ecommerce Section

26. Do you use or plan to use ecommerce on your Web site by July 2001?

- 1. Yes: _____ (Go to Q 27)
- 2. No: _____ (Go to Q 29)
- 3. Don't Know/Refuse: _____ (Go to Q 29)

27. What applications do you use or plan to use for ecommerce? (Ecommerce includes presentations of product catalogs and the ability to accept an/or process transactions via the Internet) (Open ended. Record all that apply)

- 1. Don't know/Refuse
- 2. None
- 3. Specify: _____

28a. What is the average number of ecommerce transactions per month: _____ Ecommerce transactions

[Range 1-999,999,999.0 -- Enter 9,999,999,998 for refused. Enter 9,999,999,999 for DK]

28b. What is the average value in US dollars per transaction: \$ _____

Page views refers to the number of visitors that view a content site Web page
[Range 1-99,999,999 -- Enter 99999998 for refused. Enter 99999999 for DK]

28c. What is the total capacity of number of Web site ecommerce transactions per second: _____ Ecommerce transactions per second

[Range 1.0-999,999,999 -- Enter 9,999,999,998 for refused. Enter 9,999,999,999 for DK]

Bandwidth and Performance Section

29. Which of the following technologies does your company currently use to increase performance to the site now? Which technologies by 2001? (Check all that apply)
(Read list)

Service	July 2000	July 2001
1. Local Load balancing	_____	_____
2. Global Load balancing	_____	_____
3. Bandwidth optimization and traffic shaping products (e.g. Xedia)	_____	_____
4. Reverse Proxy Cache (A reverse proxy cache sits in front of a Web site and serves frequently accessed objects to user, freeing up Web server capacity)	_____	_____
5. Caching	_____	_____
6. Mirroring	_____	_____
7. Content delivery services	_____	_____
8. Push technologies (e.g. Marimba, Tibco)	_____	_____
9. Content Distribution Products (e.g. Inktomi, Microsoft replication mgr.)	_____	_____
10. Any other technologies Specify: _____	_____	_____
11. Don't know/Refuse [Do not read]	_____	_____
12. None [Do not read]	_____	_____

Ask only if Q29=4, otherwise skip to 31)

30. What caching products do you use to increase content site performance? (record all that apply)

1. *Don't know*
2. *Specify:* _____

31. Which of the following global load balancing solutions does your company use for the Web site now? By July of 2001? (Global load balancing solutions optimize the navigation process by using specific network and server metrics to direct users to the best performing data center and Web server for a particular Web site.) (*Read list, probe for others*)

<u>Solution</u>	<u>July 2000</u>	<u>July 2001</u>
1. Global load balancing software (e.g. Resonate)	_____	_____
2. Global load balancing switch (e.g. Alteon WebSystems)	_____	_____
3. Global load balancing appliance (e.g. f5 Networks)	_____	_____
4. Global load balancing service (e.g. Speedera or Akamai)	_____	_____
5. Don't know/Refuse [Do not read]	_____	_____
6. None [Do not read]	_____	_____

32. What are the top three causes for Web site degradations and/or outages? (Open ended. Record all that apply)

1. *Don't know/Refuse*
2. *Specify:* _____

33. Next, I'd like to read you a list of traffic demands for your site. After I read each one, please tell me what the monthly averages is for each of the following on your site? First... (Fill in numbers)

33a. Monthly average of Bandwidth, as measured in Megabits per second: _____Mbps

[Range 1.0-9999 -- Enter 9998 for refused. Enter 9999 for DK]

33b. How many page views per month: _____

Page views refers to the number of visitors that view a content site Web page

[Range 1-99,999,999 -- Enter 99999998 for refused. Enter 99999999 for DK]

33c. How many unique visitors per month: _____

[Range 1-99,999,999 -- Enter 99999998 for refused. Enter 99999999 for DK]

33d. What is the monthly average page weight in Kilobytes: _____KB

Page weight refers to the size a content site Web page.

Be sure to record Kilobytes, NOT Megabytes.

[Range 1-99,999 -- Enter 99998 for refused. Enter 99999 for DK]

34a. What is the average monthly peak traffic demand for your site as measured in Megabits per second: _____ Mbps (Fill in number)

[Range 1.0-9999 -- Enter 9998 for refused. Enter 9999 for DK]

34b. How many page views during peak times per month: _____

Page views refers to the number of visitors that view a content site Web page

[Range 1-99,999,999 -- Enter 99999998 for refused. Enter 99999999 for DK]

35. By what percentage does your bandwidth-demand for your content site grow per month? (Fill in percentage)

Bandwidth percent growth: _____%

[Range 0-999 -- Enter 998 for refused. Enter 999 for DK]

36. What are your peak usage times during the business week to the nearest hour? (Do not read list. Record all that apply)

37. What are your peak usage times during the weekend to the nearest hour? (Do not read list. Record all that apply)

[For example, if Resp. replies between 8:00 am to 10:00 am, and between 4:00 pm and 7:00 pm, record all answers included within the specified time frame, i.e. 9,10,17,18,19)

1. 12:01 am to 1:00 am
2. 1:01 am to 2:00 am
3. 2:01 am to 3:00 am
4. 3:01 am to 4:00 am
5. 4:01 am to 5:00 am
6. 5:01 am to 6:00 am
7. 6:01 am to 7:00 am
8. 7:01 am to 8:00 am
9. 8:01 am to 9:00 am
10. 9:01 am to 10:00 am
11. 10:01 am to 11:00 am
12. 11:01 am to 12:00 pm
13. 12:01 pm to 1:00 pm
14. 1:01 pm to 2:00 pm
15. 2:01 pm to 3:00 pm
16. 3:01 pm to 4:00 pm
17. 4:01 pm to 5:00 pm
18. 5:01 pm to 6:00 pm
19. 6:01 pm to 7:00 pm
20. 7:01 pm to 8:00 pm
21. 8:01 pm to 9:00 pm
22. 9:01 pm to 10:00 pm
23. 10:01 pm to 11:00 pm
24. 11:01 pm to 12:00 am
25. Don't know

Capacity Planning Section

38. What are the top three challenges when planning for site growth for your content site?
(Open ended. Record all that apply)

1. *Don't know/Refuse*
2. *Specify:* _____

39. What tools do you use to determine when your site needs additional capacity? (Open ended. Record all that apply)

1. *Don't know/Refuse*
2. *Specify:* _____

SLAs

40. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the following service level agreements for content delivery services when choosing a service provider for site connectivity? (Fill in rating)

Rotate 1-6--Enter 8 for DK or refused

- _____ 1. _____ Latency measured from content delivery server to end user
- _____ 2. _____ Availability
- _____ 3. _____ Time to repair
- _____ 4. _____ End user experience based on 3rd party validation (e.g. Keynote)
- _____ 5. _____ End user experience based on content delivery provider validation
- _____ 6. _____ Time to content refresh: the time it takes to replicate content throughout the network of content delivery servers
7. _____ Are there any other SLAs that are important for content delivery services when choosing a service provider for site connectivity?
[Specify other agreement and score]

Revenue and Expenditures Section

41. Approximately what is the annual revenue generated from your site? (Fill in revenue)

Annual revenue from site: \$ _____

[Range 0-9,999,999,999 -- Enter 9,999,999,998 for refused. Enter 9,999,999,999 for DK]

42a. How much has your company spent, or plan to spend, on the following expenditure areas for 2000? (Fill in expenditures)

Expenditures _____ 2000 _____

[Range 0-9,999,999,999 -- Enter 9,999,999,998 for refused. Enter 9,999,999,999 for DK]

1. Content development \$ _____

2. Site Management (Webmasters, Network Engineering) \$ _____

3. Content delivery *services* \$ _____

4. Content delivery *products* \$ _____

5. Internet Bandwidth connection for in house hosting \$ _____

6. Hosting Services \$ _____

7. Ecommerce services/applications \$ _____

8. All other Hardware and software \$ _____

42b-other. How much has your company spent, or plan to spend, for all other expenditure areas for your Web site?

[Record type and amount if other expenditure areas]

Expenditures _____ 2000 _____

Other: _____ \$ _____

43a. How much does your company 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. Content development \$ _____
- 3. Site Management (Webmasters, Network Engineering) \$ _____
- 3. Content delivery *services* \$ _____
- 4. Content delivery *products* \$ _____
- 5. Internet Bandwidth connection for in house hosting \$ _____
- 6. Hosting Services \$ _____
- 7. Ecommerce services/applications \$ _____
- 8. All other Hardware and software \$ _____

43b-other. How much does your company plan to spend, for all other expenditure areas for your Web site in 2001?

[Record type and amount if other expenditure areas]

Expenditures 2001

Other: _____ \$ _____

44. Of the following sources of site revenue, approximately how much would your company lose per hour if your site were not operational for the following revenue areas: (Fill in numbers)

Expenditures Lost Revenue

[Range 0-99,999,999 -- Enter 99,999,998 for refused. Enter 99,999,999 for DK]

- 1. Advertisement impressions lost \$ _____
- 2. Products purchased \$ _____
- 3. Online subscriptions \$ _____
- 4. Are there any others: _____ \$ _____

45. Approximately what is your cost for bandwidth per megabit per second for your content site Internet connectivity? (Fill in cost)

[Range 1-9,999 -- Enter 9,998 for refused. Enter 9,999 for DK]

Bandwidth cost per Mbps: \$ _____

Provider Attributes Section

46. 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 a content delivery service provider? (Fill in rating)

Rotate answers 1-10--Enter 8 for DK or refuse

- _____ 1. _____ Ability to expand site bandwidth capacity immediately
- _____ 2. _____ Service provider reputation
- _____ 3. _____ Service and support
- _____ 4. _____ Established service provider (e.g. AT&T, UUNet, PSINet)
- _____ 5. _____ Service providers network buildout plans
- _____ 6. _____ Offers on demand streaming services
- _____ 7. _____ Offers live streaming services
- _____ 8. _____ Performance to end users
- _____ 9. _____ Offers global load balancing services
- _____ 10. _____ Offers professional services
- _____ 11. _____ Are there any other features that are important when choosing a content delivery service provider? *[Specify other feature and score]*

47. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following methods to pay for content delivery services? (Fill in rating)

Rotate answers 1-7--Enter 8 for DK or refuse

- _____ 1. _____ Megabytes downloaded
- _____ 2. _____ Fixed service fee with the ability to burst above provisioned bandwidth
- _____ 3. _____ Bandwidth measured in 95th percentile billing to the minute
- _____ 4. _____ Usage based pricing
- _____ 5. _____ The ability to burst above provisioned bandwidth
- _____ 6. _____ Flat rate billing
- _____ 7. _____ Fixed service fee with without the ability to burst above provisioned bandwidth
- _____ 8. _____ Are there any other billing methods that are important when choosing a content delivery service provider? [*Specify other feature and score*]

48. 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 1-9--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. _____ Are there any other sources that are important for learning about new products and services? [*Specify other source and score*]

49. What are the top 3 publications that are influential in your purchase of products and services? (Open ended)

1. Don't know/Refuse
2. Specify: _____
3. Internet Week
4. Information Week
5. Interactive Week
6. Internet World
7. PC Week
8. Info World
9. Network World
10. PC Magazine

Challenges Section

50. On a scale of 1 to 7, where 1 is not concerned and 7 is extremely concerned, please rate how concerned your company is regarding liability lawsuits when Web site outages occur? (Fill in rating)

Enter 8 for DK/Refuse

1. _____ Web site outage liability concerns

51. What are the top 3 barriers for subscribing to content delivery services? (Open ended)

1. Don't know/Refuse
2. Specify: _____

52. What is your view of the use of caching technologies? (Read list. Rotate answers 1-3. Check only one)

- _____ 1. _____ Positive
- _____ 2. _____ Negative
- _____ 3. _____ Neutral
- _____ 4. _____ Don't Know/Refuse

53. What is the title of the person or persons responsible for making the final decision on content delivery products or services? (Record all that apply)

- 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. Webmaster
- 9. Other, Specify Title: _____
- 10. Don't know/Refuse [*Do not read*]

54. What are your largest Website technical challenges your company faces? (Open ended)

- 1. Don't know/Refuse
- 2. Specify: _____

55. What are your largest Website business challenges your company faces? (Open ended)

- 1. Don't know/Refuse
- 2. Specify: _____

Thank you for participating in the HTRC Groups content delivery service study. We will email you a PDF version of the executive summary for your participation as soon as it is available in September.

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

Q.1 Do you have detailed knowledge of your content site, including network plans, bandwidth, management, performance, and challenges?

n=100	# Resp
Yes	100
No	0

Q.2 Approximately how many employees are in your entire company?

n=99

		Percent	Category
Mean	25489.70		
Median	3000.00	20%	< 1000
Mode	500	62%	1,000 to 10,000
Std Deviation	84877.57	18%	10,001 to 600,000

Q.3 Of the following categories of decision makers, which would best describe your position when purchasing products or services?

n=100

	# Resp	Percent
Primary Decision maker	21	21%
Secondary Decision maker	58	58%
Ancillary Decision maker	21	21%

Q.4 Approximately how many of the following types of content site employees do you have now (July 2000)? How many will you have by July of 2001?

2000	2001	
7.5	9.3	Web designers
10.6	11.3	Network Engineers
5.3	6.2	NOC Staff
4.1	4.8	Technical Web Operators
4.2	7.0	Content Distribution Specialists
20.8	32.2	All other content site employees

	YR 2000	Mean	Median	Mode	Std Dev
n=99	Web designers	7.48	2.00	1	17.43
n=90	Network Engineers	10.58	3.00	3	42.43
n=75	NOC Staff	5.25	0.00	0	13.84
n=90	Technical Web Operators	4.09	2.00	1	7.24
n=95	Content Distribution Specialists	4.23	1.00	0	12.95
n=98	All other content site employees	20.86	1.50	0	100.47
	Mean Number of Content Employees for 2000	52.49			
	YR 2001	Mean	Median	Mode	Std Dev
n=89	Web designers	9.31	3.00	1	17.81
n=83	Network Engineers	11.27	3.00	3	44.06
n=70	NOC Staff	6.23	0.00	0	17.26
n=80	Technical Web Operators	4.78	2.00	1	8.99
n=83	Content Distribution Specialists	7.01	2.00	0	18.53
n=87	All other content site employees	32.20	2.00	0	122.53
	Mean Number of Content Employees for 2001	70.80			

Q.5a What is your company's line of business?
n=100

# Resp	Percent	
1	1%	Management of Companies and Enterprises
2	2%	Telecommunications
2	2%	Agriculture, Forestry, Fishing and Hunting
2	2%	Wholesale Trade
3	3%	Transportation and Warehousing
4	4%	Arts, Entertainment, and Recreation
4	4%	Utilities
5	5%	Finance and Insurance
9	9%	Health Care and Social Assistance
10	10%	Professional, Scientific, and Technical Services
11	11%	Manufacturing
15	15%	Information
16	16%	Public Administration
16	16%	Educational Services

Q.5b How do you classify your Web site or service?
n=100

# Resp	Percent	
1	1%	Automotive
1	1%	Entertainment
1	1%	None of the above/Refused
2	2%	Research
2	2%	Pubic Services
4	4%	Portal
6	6%	Health Care
6	6%	Financial
6	6%	News
8	8%	Educational
12	12%	E-commerce
21	21%	Technology
30	30%	Company Information

Q.6 Which of the following best describes the hosting strategy for your content site or service?
n=100

# Resp	Percent	
4	4%	Colocation: your server(s) are hosted in service provider's network
11	11%	Hybrid colocation: host servers both in ISP's network and your own network
16	16%	Hosted: entire site is hosted on service provider's server
69	69%	Self-hosted: host server(s) in your own network

Q.7a Within how many total data centers is your site currently hosted, including internally hosted data? By July of 2001?

2000 **2001**
2.36 2.87 Data Centers

n=94	YR 2000	Mean	Median	Mode	Std Dev
	# of Data Centers	2.36	2.00	1	2.15

n=89	YR 2001	Mean	Median	Mode	Std Dev
	# of Data Centers	2.87	2.00	1	3.83

Q.7b How many total Web servers do you use for your Web site now? By July of 2001?

2000 **2001**
6.11 8.02 Number of Web servers

n=94	YR 2000	Mean	Median	Mode	Std Dev
	# of Web Servers	6.11	3.00	2	11.28

n=87	YR 2001	Mean	Median	Mode	Std Dev
	# of Web Servers	8.02	4.00	2	13.23

Q.8 How many different service providers do you host your site with, including internally hosted data? By July of 2001?

2000 **2001**
1.28 1.39 Number of service providers

n=97	YR 2000	Mean	Median	Mode	Std Dev
	Number of Service Providers	1.28	1.00	1	1.48

n=94	YR 2001	Mean	Median	Mode	Std Dev
	Number of Service Providers	1.39	1.00	1	1.71

Q.8a Which of the following reasons do you host with multiple data centers?

n=24

# Resp	Percent	
1	4%	Other
1	4%	Don't know/Refuse
2	8%	None
5	21%	Cost savings
5	21%	Geographic proximity
13	54%	Redundancy

Q.9 What service providers come to mind when you think about content delivery services?

n=100

# Resp	Percent	
1	1%	Media One
1	1%	MCI
1	1%	Best
1	1%	USWest
1	1%	SkyCache (Cidera)
1	1%	BBN Net Planner
1	1%	Bell South
1	1%	Inktomi
2	2%	Mindspring
2	2%	CompuServe
2	2%	AT&T
2	2%	Intel
2	2%	Concentric
2	2%	Exodus
2	2%	Oracle
3	3%	UUNET
3	3%	Vignette
4	4%	AOL
4	4%	Earthlink
4	4%	Akamai
66	66%	Don't know/Refuse

Q.10 Which of the following ways do you currently plan to use content delivery products or services? Plan to by July of 2001?

n=100

2000		2001		
# Resp	Percent	# Resp	Percent	
11	11%	11	11%	Multi-network content delivery service provider
10	10%	12	12%	Facilities-based content delivery service provider
18	18%	18	18%	Hybrid Facilities and Multi-network-based CDN
42	42%	45	45%	Build your own content delivery network
25	25%	14	14%	Do not use content delivery services
5	5%	10	10%	Don't know/Refuse

Q.10a Why don't you plan to use content delivery services? (Open ended)
n=14

# Resp	Percent	
2	14%	Don't know
12	86%	Specify:

**(7) No
Need**

NO NEED TO AT THIS POINT, MAYBE IN 2 TO 3 YEARS
WE DON'T SEE THE BENEFIT
THERE IS NO PLACE WHERE IT CAN BE CURRENTLY USED
WE HAVE NO NEED
WE HAVE NO NEED FOR IT
BEING AN EDUCATIONAL SITE IT'S NOT AN AREA WE'RE MOVING INTO
YET
I'M NOT SURE WE HAVE A NEED FOR THAT

(5) Other

IT'S TOO EXPENSIVE FOR THE RESULTS WE GET
WE ONLY HAVE DYNAMIC AND SELF HOSTED
E-COMMERCE NOT GEARED
WE HANDLE EVERYTHING IN HOUSE
IT DOESN'T PROVIDE CONTENT

Q.10b What content delivery products do you use or plan to use for your site or service?

n=42

# Resp	Percent		# Resp	Percent	
			4	14%	Adobe
			6	21%	Custom
13	31%	Don't know	9	31%	Microsoft
29	69%	Specify	17	59%	Other

Q.11 What service provider(s) do you use for content delivery services now?

n=26

# Resp	Percent	
1	4%	Best
1	4%	Broadcast.com
1	4%	Coffey Communications
1	4%	Ctol Net
1	4%	Interland
1	4%	Concentric
1	4%	Exodus
2	8%	AT&T
3	12%	UUNET
6	23%	In-House
8	31%	Don't know/Refuse

Q.12 What service provider(s) do you plan to use for content delivery services by July of 2001?

n=30

# Resp	Percent	
1	3%	AT&T
1	3%	Akamai
1	3%	Broadcast.com
1	3%	Ctol Net
6	20%	In-House
3	10%	UUNET
1	3%	Exodus
16	53%	Don't know/Refuse

Q.13 Why do you use or plan to use content delivery services? (Open ended)

n=36

# Resp	Percent		# Resp	Percent	
			2	8%	Other
11	31%	Don't know	3	12%	Cost
25	69%	Specify:	20	80%	Better Performance

Q.14 What service provider(s) do you currently use for colocation or hosting your site? (Open ended)

n=22

# Resp	Percent	
1	4%	Ameritech
1	4%	AT&T
1	4%	Data Return
1	4%	Dialtone
1	4%	Digex
1	4%	Digital Island
1	4%	GTE
1	4%	Intermedia
1	4%	Level3
1	4%	Meredeth
1	4%	Qwest
1	4%	Sprint
1	4%	TDS
1	4%	Verio
1	4%	SouthWest Cyber Port
2	8%	Concentric
2	8%	Interland
3	12%	UUNET

Q.15 What service provider(s), if any, do you plan to use for colocation or hosting your site in July of 2001? (Open ended)

n=20

# Resp	Percent	
1	4%	AT&T
2	8%	Concentric
1	4%	Dialtone
1	4%	Digital Island
2	8%	Digex
2	8%	Exodus
2	8%	Interland
1	4%	Level3
1	4%	RackSpace.com
1	4%	Qwest
2	8%	Sprint
1	4%	TDS
2	8%	UUNET
1	4%	Verio

Q.16 Which of the following service provider types would you prefer content delivery services from?

n=100

# Resp	Percent	
19	19%	Hosting provider
19	19%	Content delivery specialist
18	18%	National facilities based ISP
15	15%	International ISP
13	13%	Are there any other service provider types:
19	19%	None
5	5%	Don't know/Refuse

Other:

REGIONAL	INTERNAL
ORACLE	LOCAL ISP
INTERNAL	CUSTOM
INTERNAL	INTERNAL ISP
IN HOUSE	INTERNAL
CUSTOM	INTERNAL

Q.17 Would you consider using CDN (Content Delivery Network) services from multiple CDN service providers? (Open ended)
n=100

# Resp	Percent	
30	30%	Yes (if yes, ask 17a)
49	49%	No
21	21%	Don't know/refuse

Q.17a Why would you use CDN services from multiple CDN service providers?
(Open ended)
n=30

# Resp	Percent	
7	23%	Don't know/refused
23	77%	Specify

n=23

# Resp	Percent	
2	9%	Reliability
3	13%	Experimentation
4	17%	Redundancy
5	22%	Cost Reduction
10	43%	Performance

Q.18 Which of the following types of content does your company use on the Web site now?
By July of 2001?

n=100

2000		2001		
# Resp	Percent	# Resp	Percent	
1	1%	3	3%	Don't know/Refuse
5	5%	7	7%	Other
19	19%	43	43%	Live Streaming media content
27	27%	67	67%	Content created with XML
35	35%	56	56%	On-demand Streaming media content
72	72%	76	76%	Secure content
85	85%	79	79%	Static content
87	87%	87	87%	Dynamic content

Other:

ASP	PDF
ASP	WAP
COLDFUSION	WAP CONTENT
COLDFUSION	WAP CONTENT
ORACLE BASED	WIRELESS
PDF	WIRELESS

Q.18a Of all your static content, how often do you update your static content? (Check all that apply)
n=82

# Resp	Percent	
2	2%	More than yearly
2	2%	Don't know/Refuse
5	6%	Yearly
12	15%	Hourly
17	21%	Monthly
26	32%	Weekly
36	44%	Daily

Q.19 What percent of your total Web site uses the following types of content now?
n=100

Percent	
63%	Static
29%	Dynamic
2%	On-demand Streaming
5%	Secure
1%	XML

Static content	Mean	Median	Mode	Std Dev
	63.03%	75.00	80	31.76
Dynamic content	28.68%	20.00	20	29.28
On-demand Streaming media content	1.55%	0.00	0	2.74
Secure content	5.49%	0.00	0	12.58
Content created with XML	1.25%	0.00	0	4.19

Q.20 Do you use or plan to use content creation software such as Vignette, on your Web site by July 2001?

n=100

# Resp	Percent	
24	24%	Yes
66	66%	No
10	10%	Don't know/refuse

Q.20a Which of the following types of content creation software does your company use on the Web site now? By July of 2001?

n=24

2000		2001		
# Resp	Percent	# Resp	Percent	
0	0%	2	8%	Broadvision
1	4%	1	4%	Eprise
2	8%	9	38%	Vignette
4	17%	7	29%	Don't know/refuse
6	25%	5	21%	Allaire
11	46%	5	21%	None

Q.20b Is there any other content creation software you use now? By July 2001?

n=24

2000		
# Resp	Percent	
15	63%	Yes, specify_____
9	38%	No

Responses:

ARIBA	FRONT PAGE
ATG	FRONTIER FROM USER LAND
COLDFUSION	INTERNAL
COLDFUSION	INTERWOVEN
CUSTOM	NETSCAPE COMPOSER
DATA CHANNEL	ORACLE (BACK END DATA BASE)
DREAMWEAVER	PROPRIETARY
EBT	VERITY
ENGENDA	VISUAL INTERDEV

2001

# Resp	Percent	
15	63%	Yes, specify_____
5	21%	No
4	17%	Don't know/refused

Responses:

ADOBE	FRONTIER
ATG	IBM
CUSTOM	IBM JAVA DEV ENVIRONMENT
DATA CHANNEL	INTERNAL
DREAMWEAVER	INTERWOVEN
DREAMWEAVER	INTERWOVEN
DREAMWEAVER	PROPRIETARY
EXPEDIA	SILVER STREAM
FRONT PAGE	VERITY

Q.20c Of the content creation software you use, what content creation software applications do you use now? By July 2001?(Open ended)

n=19

2000

# Resp	Percent	
1	5%	Don't know/refused
18	95%	Specify:_____

(8) DREAM WEAVER	DATA BASES
(4) FRONT PAGE	FIREWORKS
(3) ALLAIRE	FLASH
(2) COLDFUSION	FUSIONS
(2) JAVA SCRIPT	HOME SITE
(2) PEARL	MACROMEDIA
(2) VIGNETTE APPS	OPEN MARKET
CGI	PHOTOSHOP
CONTENT CENTER	SYBASE
	DATABASES
CRYSTAL	XML
CUSTOM	

2001

# Resp	Percent	
5	26%	Don't know/refused
14	74%	Specify:_____

- (4) DREAMWEAVER MS FRONT PAGE
- (2) JAVA SCRIPT NOTEPAD
- ALLAIRE OPEN MARKET
- ASP PEARL
- CGI PHOTOSHOP
- CRYSTAL STORY SERVER
- CUSTOM SYBASE DATABASES
- FLASH VIGNETTE APPS
- HOME SITE XML
- MACRO MEDIA THAT INTEGRATES WITH COLDFUSION

Q.21 When creating content for your site what percent is...

n=100

Percent

6%	Syndicated
93%	Original
1%	Others

Syndicated

Mean	Median	Mode	Std Dev
6.15%	0.00	0	19.01

Original

Mean	Median	Mode	Std Dev
92.85%	100.00	100	19.06

Any Others

Mean	Median	Mode	Std Dev
1.00%	0.00	0	2.64

Q.22a What is the total size of your content site, in Gigabytes, including all types of content:

n=78

	Mean	Median	Mode	Std Dev
Gigabytes	30.28	4.00	1	88.85

Q.22b Of all the content on your content site, what percent is cacheable content:

n=77

	Mean	Median	Mode	Std Dev
Cacheable	58.0%	65.00	80	33.7

Q.23 What Web based applications does your company offer through your Web site in 2000?
What applications by July 2001?

n=100

2000		
# Resp	Percent	
9	9%	Don't know
27	27%	None
64	64%	Specify:_____

n=64

2000		
# Resp	Percent	
2	3%	IP TELEPHONY
2	3%	SEARCH ENGINES
3	5%	EDUCATION
3	5%	ON-LINE CUSTOMER SERVICE
4	6%	E-COMMERCE
4	6%	E-LEARNING
4	6%	NETWORK MANAGEMENT TOOLS
6	9%	E-MAIL
12	19%	CUSTOM APPLICATIONS FOR CUSTOMER SERVICE
31	48%	CUSTOM DATABASES
41	64%	Other

n=100

YR 2001		
# Resp	Percent	
21	21%	Don't know
20	20%	None
59	59%	Specify:_____

n=59

2001		
# Resp	Percent	
3	5%	IP TELEPHONY
2	3%	EDUCATION
4	7%	ON-LINE CUSTOMER SERVICE
9	15%	E-COMMERCE
5	8%	E-LEARNING
5	8%	NETWORK MANAGEMENT TOOLS
4	7%	E-MAIL
12	20%	CUSTOM APPLICATIONS FOR CUSTOMER SERVICE
22	37%	CUSTOM DATABASES
47	80%	Other

Q.24 Which of the following applications do you use or plan to use for live or on-demand streaming media?
n=62

2000		
# Resp	Percent	
2	3%	Other
7	11%	Don't know/refuse
26	42%	Quicktime
30	48%	Microsoft Media Technology
37	60%	Real Video
40	65%	Real Audio

Others:
FLASH
STREAMING MPEG

Q.25a Which of the following statistics do you CURRENTLY gather and use on your Web site?
n=82

# Resp	Percent	
7	9%	Don't know/refuse
10	12%	Are there any other statistics?
36	44%	Bit rate at which Web users are accessing your site
36	44%	Average round trip time (RTT) to Web users
44	54%	Web users geographical location
45	55%	Number of concurrent users
58	71%	Content most frequently accessed

Other:

AREAS ACCESSED	PATH THROUGH THE SITE
BROWSER TYPE	ROBOT AND SPIDER INFORMATION
CLIENT ERRORS	SERVER ERRORS
ENTRANCE AND EXIT POINTS	STANDARD STATS PACKAGE-
FILES ACCESSED	WEB TRENDS
MISSED CONTENT ERRORS	TIME OF DAY
MOST ACTIVE DOMAIN	TYPE OF BROWSER
MPEG DOWNLOAD	PLATFORMS
NUMBER OF HITS PER DAY	UNIQUE CLIENTS
NUMBER OF PDF DOWNLOADS	USERS PATH THROUGH WEB SITE
PAGE VIEWS	WEB TRENDS
DAILY, WEEKLY, AND MONTHLY AVERAGE USAGE	WHAT ISP THEY ARE USING
	WHAT PLATFORM OR BROWSER IN USE

Q.25b Which of the following statistics WOULD YOU LIKE TO gather and use on your Web site?

n=81

# Resp	Percent	
4	5%	Are there any other statistics?
6	7%	Content most frequently accessed
6	7%	Don't know/refuse
7	9%	Number of concurrent users
12	15%	Average round trip time (RTT) to Web users
14	17%	Web users geographical location
18	22%	Bit rate at which Web users are accessing your site
26	32%	None

Other:

AT WHAT POINT STOP BUTTON OCCURS
 BREAKDOWN OF NETWORK TIME
 COMPLETE CLICK PASS
 EASIER AND DIFFERENT WAYS TO LOOK AT DATA
 LANGUAGES
 PLATFORM

Q.26 Do you use or plan to use e-commerce on your Web site by July 2001?

n=100

# Resp	Percent	
66	66%	Yes
29	29%	No
5	5%	Don't know/refuse

Q.27 What applications do you use or plan to use for e-commerce?

n=66

# Resp	Percent	
26	39%	Don't know/refuse
1	2%	None
39	59%	Specify

n=39

(12) CUSTOM	OPEN MARKET TRANSACTIONS
(2) COLD FUSION	ORACLE BASED PRODUCTS
CATALOG PRESENTATION	ORDER PROCESSING
COLLABORATIVE SERVICES	OUTSOURCED
COURSE REGISTRATION	PAYING PARKING TICKETS ON-LINE
CYBERCASH	PROCESSING OF ORDERS
DATABASE TO MRO.COM	PURCHASE OF LICENSES AND CERTIFICATES
ELECTRONIC BILL PAYMENT	SAP
ENERGY CONSUMPTION	SECURITIES
E-PAYMENT	SELL INSURANCE
FILING PERMITS ON-LINE	SELL MERCHANDISE
INCOME TAX FILING	SELLING SERVICES
LOTUS DOMINO	SEPARATE BILL PAYING PROGRAM
MICROSOFT SITE SERVER	SUPPLIER TO SUPPLIER TRANSACTIONS
MINI VEND	TRANSACTION DATA
MOTOR VEHICLE REGISTRATION	WEB LOGIC COMMERCE SERVER
MS ACCESS BASED PRODUCTS	WEB METHODS B TO B SERVER
ON-LINE ORDERING	YAHOO

Q.28a What is the average number of e-commerce transactions per month:

n=19

E-commerce transactions			
Mean	Median	Mode	Std Dev
7426.3	2500.00	1000	14632

Q.28b What is the average value in US dollars per transaction:

n=10

Dollar per transaction			
Mean	Median	Mode	Std Dev
2231.3	100.00	100	6250.5

Q.28c What is the total capacity of Web site e-commerce transactions per second:

n=7

E-commerce transactions per second

Mean	Median	Mode	Std Dev
21763	200	4	39134

Q.29 Which of the following technologies does your company currently use to increase performance to the site now? Which technologies by 2001?

n=100

2000		2001		
# Resp	Percent	# Resp	Percent	
7	7%	20	20%	Push technologies
9	9%	11	11%	Don't know/Refuse
9	9%	12	12%	None
10	10%	21	21%	Global Load balancing
13	13%	19	19%	Content Distribution Products
14	14%	31	31%	Content delivery services
19	19%	27	27%	Reverse Proxy Cache
30	30%	44	44%	Bandwidth optimization
30	30%	42	42%	Mirroring
52	52%	58	58%	Local Load balancing
56	56%	54	54%	Caching

Q.30 What caching products do you use to increase content site performance?

n=56

# Resp	Percent	
33	59%	Don't know
23	41%	Specify:

(5) MICROSOFT	IN SERVER
(4) NETSCAPE	NET APPS
APACHE SQUID	OPEN MARKET CONTENT SERVER
BUILD IN IIS	OPEN MARKET SATELLITE SERVER
CISCO BUILT IN	ORDER MANAGER
COLDFUSION CACHE	PROXY SERVER
COMPAQ CACHING APPLIANCE	PROXY SERVER
CUSTOM	SQUID
FIREWALL (CACHING NETSCAPE)	VIGNETTE
IIS	

Q.31 Which of the following global load balancing solutions does your company use for the Web site now? By July of 2001?

n=21

2000		2001		
# Resp	Percent	# Resp	Percent	
1	5%	0	0%	None
2	10%	5	24%	Global load balancing appliance
3	14%	4	19%	Global load balancing switch
3	14%	4	19%	Global load balancing service
5	24%	4	19%	Global load balancing software
12	57%	9	43%	Don't know/Refuse

Q.32 What are the top three causes for Web site degradations and/or outages?

n=79

# Resp	Percent	
36	46%	Hardware
25	32%	Service Provider
23	29%	Traffic
20	25%	Software
13	16%	Power
13	16%	Last Mile
5	6%	Application Performance
5	6%	Maintenance
4	5%	Attack

Q.33 Next, I'd like to read you a list of traffic demands for your site. After I read each one, please tell me what the monthly averages is for each of the following on your site?

Q.33a Monthly average of Bandwidth, as measured in Megabits per second:

n=17

Mean	Median	Mode	Std Dev
317	7	1	961.1

Q.33b What is the average page views per month:

n=63

Mean	Median	Mode	Std Dev
1,506,803	120,000	100,000	3831412

Q.33c What is the average unique visitors per month:

n=57

Mean	Median	Mode	Std Dev
570,090	15,400	6,000	3E+06

Q.33d What is the monthly average page weight in Kilobytes:

n=23

Mean	Median	Mode	Std Dev
33	30	30	24.56

Q.34a What is the average monthly peak traffic demand for your site as measured in Megabits per second:

n=15

Mean	Median	Mode	Std Dev
755	15	1	1979

Q.34b What is the average page views during peak times per month:

n=29

Mean	Median	Mode	Std Dev
1,078,500	10,000	2,000	4472559

Q.35 By what percentage does your bandwidth-demand for your content site grow per month?

n=79

Mean	Median	Mode	Std Dev
6.8%	5	0	9.04

Q.36 What are your peak usage times during the business week to the nearest hour?

n=100

	Frequency	Percent
3:01 am to 4:00 am	1	1%
5:01 am to 6:00 am	1	1%
6:01 am to 7:00 am	3	3%
7:01 am to 8:00 am	4	4%
8:01 am to 9:00 am	7	7%
9:01 am to 10:00 am	16	16%
10:01 am to 11:00 am	22	22%
11:01 am to 12:00 pm	29	29%
12:01 pm to 1:00 pm	30	30%
1:01 pm to 2:00 pm	27	27%
2:01 pm to 3:00 pm	20	20%
3:01 pm to 4:00 pm	18	18%
4:01 pm to 5:00 pm	10	10%
5:01 pm to 6:00 pm	6	6%
6:01 pm to 7:00 pm	6	6%
7:01 pm to 8:00 pm	5	5%
8:01 pm to 9:00 pm	6	6%
9:01 pm to 10:00 pm	4	4%
10:01 pm to 11:00 pm	3	3%
11:01 pm to 12:00 am	2	2%
Don't Know	20	20%

Q.37 What are your peak usage times during the weekend to the nearest hour?

n=100

	Frequency	Percent
12:01 am to 1:00 pm	1	1%
3:01 am to 4:00 am	2	2%
7:01 am to 8:00 am	2	2%
8:01 am to 9:00 am	3	3%
9:01 am to 10:00 am	5	5%
10:01 am to 11:00 am	8	8%
11:01 am to 12:00 pm	7	7%
12:01 pm to 1:00 pm	11	11%
1:01 pm to 2:00 pm	9	9%
2:01 pm to 3:00 pm	11	11%
3:01 pm to 4:00 pm	8	8%
4:01 pm to 5:00 pm	8	8%
5:01 pm to 6:00 pm	4	4%
6:01 pm to 7:00 pm	3	3%
7:01 pm to 8:00 pm	4	4%
8:01 pm to 9:00 pm	5	5%
9:01 pm to 10:00 pm	2	2%
10:01 pm to 11:00 pm	1	1%
Don't Know	60	60%

Q.38 What are the top three challenges when planning for site growth for your content site?
N=89

# Resp	Percent	
13	15%	Other
3	3%	Security Planning
4	4%	Site Traffic
10	11%	Learning Curve
13	15%	Hardware
15	17%	Budget
16	18%	Network Configuration
21	24%	HR
30	34%	Anticipating Usage
42	47%	Content Development

Q.39 What tools do you use to determine when your site needs additional capacity?
N=48

# Resp	Percent	
5	10%	Logs
14	29%	Web Trends
39	81%	Other

Q.40 On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the following service level agreements for content delivery services when choosing a service provider for site connectivity?
N=100

# of Resp	Percent	Rating 5, 6, 7
7	7%	Other
42	54%	End user experience based on 3rd party validation
56	68%	End user experience based on content delivery provider validation
59	69%	Time to content refresh
61	71%	Latency measured from content delivery server to end user
81	89%	Time to repair
85	92%	Availability

Other:
100% UP TIME
CUSTOMER SUPPORT
HIGHER BANDWIDTH ON HOSTED SERVER
LOCATION
PRICE
REASONABLE OVERAGE RATES
SUPPORT STAFF AVAILABILITY
UP TO DATE

Q.41 Approximately what is the annual revenue generated from your site?

n=5

Mean	\$17,440,000
Median	\$10,000,000
Mode	\$200,000
Std. Dev.	24537074

Q.42a How much has your company spent, or plan to spend, on the following expenditure areas for 2000?

Q.43a How much does your company plan to spend on the following expenditure areas for 2001?

	# of Resp	2000	# of Resp	2001
Content development	45	\$1,683,000	34	\$711,823
Site Management	48	\$162,916	38	\$314,631
Content delivery services	43	\$288,441	36	\$254,571
Content delivery products	44	\$249,590	35	\$319,142
Internet Bandwidth connection	37	\$64,162	30	\$43,483
Hosting Services	47	\$55,363	39	\$86,528
Ecommerce	46	\$74,065	32	\$208,250
All other hardware and software	22	\$133,416	3	\$112,500
	Total	\$2,710,953	Total	\$2,050,928

Q.44 Of the following sources of site revenue, approximately how much would your company lose per hour if your site were not operational for the following revenue areas:

Advertisement Impressions Lost

n=3

Mean	Median	Mode
\$702,666	\$100,000	\$8,000

Products Purchased

n=6

Mean	Median	Mode
\$377,283	\$30,000	\$700

Online Subscriptions

n=3

Mean	Median	Mode
\$5,750	\$2,000	\$250

Q.45 Approximately what is your cost for bandwidth per megabit per second for your content site Internet connectivity?

Cost of Bandwidth		n=3
Mean	Median	Mode
\$1,400	\$1,500	\$1,000

Q.46 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 a content delivery service provider?

n=100

# Resp	Percent Rating 5, 6, 7	
4	4%	Other
36	40%	Offers on demand streaming services
37	44%	Offers global load balancing services
42	47%	Offers live streaming services
47	59%	Service providers network buildout plans
62	70%	Offers professional services
65	74%	Established service provider (e.g. AT&T, UUNet, PSINet)
68	76%	Ability to expand site bandwidth capacity immediately
71	80%	Service provider reputation
81	91%	Service and support
81	92%	Performance to end users

Q.47 On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following methods to pay for content delivery services?

n=100

# Resp	Percent Rating 5, 6, 7	
1	1%	Other
26	39%	Bandwidth measured in 95th percentile billing to the minute
30	43%	Megabytes downloaded
30	45%	Fixed service fee without the ability to burst above provisioned bandwidth
36	49%	Usage based pricing
40	60%	Ability to burst above provisioned bandwidth
45	66%	Fixed service fee with the ability to burst above provisioned bandwidth
52	69%	Flat rate billing

Other:

FIXED BILLING WITH THE ABILITY TO BURST

Q.48 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

# Resp	Percent Rating 5, 6, 7	
13	13%	Other
39	39%	Vendor White papers
44	44%	Online Seminars
45	45%	Traditional Seminars
49	49%	Trade Shows
52	52%	Trade show conference sessions
58	58%	Online magazines
58	59%	Independent White papers
73	73%	Vendor Web sites
80	80%	Trade magazines

Other:

E-MAIL

GET INFORMATION FROM A 3RD PARTY ON INTERNET

INDEPENDENT WEBSITES

NEWS GROUPS

PEERS

RADIO

RECOMMENDATIONS FROM OTHER PEOPLE IN THE INDUSTRY

TRADE ASSOCIATIONS

USER

VENDOR PRESENTATIONS

WE DO OUR OWN RESEARCH

WORD OF MOUTH

Q.49 What are the top 3 publications that are influential in your purchase of products and services?

n=100

# Resp	Percent	
46	46%	Internet World
18	18%	Internet Week
16	16%	Web Technologies
15	15%	Info World
15	15%	eWeek
12	12%	Information Week
11	11%	Interactive Week
9	9%	PC Magazine
9	9%	Refused
7	7%	PC Week
5	5%	Computer World
4	4%	Network Magazine
3	3%	CNET
3	3%	Gartner Research
2	2%	Business 2.0
2	2%	Government Computer News
2	2%	Industry Standard
2	2%	Network Computing
2	2%	Wall Street Journal
2	2%	Wired

Other Responses:

ADOBE MAGAZINE	MAC WORLD
BOARD WATCH	MCP MAGAZINE
COLDFUSION DEV JOURNAL	MICROSOFT NEWSLETTER
COMMUNICATIONS OF THE ACM	PRICE SUPPORT
COMPUTER SCENE	SECURITY
CONSUMER REPORTS	SERVER/WORK STATION EXPERT
CREATE	SEYBOLD INTERNET REPORT
E BUSINESS	SYLLABUS MAGAZINE
EAI JOURNAL	SYSTEMS ADMIN
ENTERPRISE LINUX	TELEMEDICINE TODAY
FIND SVP	UPSIDE
FORESTER RESEARCH	VAR BUSINESS
INC	WASHINGTON TECHNOLOGY
INFORMATION SECURITY	WEB DEV
INFRO AGE	WEB SOURCES
INTERACTIVITY	WEB WORLD
JAVA DEVELOPERS JOURNAL	WHITE PAPER
LINUX WORLD	WINDOWS 2000
MAC ADDICT	ZDNET

Q.50 On a scale of 1 to 7, where 1 is not concerned and 7 is extremely concerned, please rate how concerned your company is regarding liability lawsuits when Web site outages occur?

n=95

# Resp	Percent	Rating 5, 6, 7
29	31%	Web site outage liability concerns

Q.51 What are the top 3 barriers for subscribing to content delivery services? (Open ended)

n=44

# Resp	Percent	Barrier
4	9%	Awareness
5	11%	Security
6	14%	Credibility
7	16%	No Need
10	23%	Technology
28	64%	Cost

Q.52 What is your view of the use of caching technologies?

n=100

# Resp	Percent	View
50	50%	Positive
6	6%	Negative
39	39%	Neutral
5	5%	Don't Know/Refuse

Q.53 What is the title of the person or persons responsible for making the final decision on content delivery products or services?

n=100

# Resp	Percent	Title
3	3%	Chief Executive Officer (CEO)
4	4%	VP of Technology
4	4%	Chief Operations Officer (COO)
4	4%	Chief Technology Officer (CTO)
5	5%	Chief Financial Officer (CFO)
15	15%	Webmaster
19	19%	Director of Information Systems
20	20%	Chief Information Officer (CIO)
43	43%	Other Title

Other Titles:

(3) COMMITTEE	INTERNATIONAL TREASURER
(3) MARKETING DIRECTOR	IRMO DIRECTOR
(3) PRODUCT MANAGER	LIBRARY DIRECTOR
APPLICATIONS DEVELOPMENT MGR	MULTI-MEDIA SERVICES DIRECTOR
ASSISTANT TO THE DEAN	NETWORK ADMINISTRATOR
BUDGETING BOARD	PLANT MANAGER
COMPUTER CENTER DIRECTOR	PORTAL LEADERSHIP TEAM
WEB DEVELOPMENT COORDINATOR	PROVOST
CORPORATE WEB ANALYST	PUBLISHER
DEPUTY CHIEF OF STAFF	SENIOR DIRECTOR OF E-BUSINESS
DIRECTOR OF ADVERTISING	SENIOR INTERNET ADMINISTRATOR
DIRECTOR OF COMPUTING	SYSTEM ANALYST
DIRECTOR OF E-BUSINESS	VICE PRESIDENT
DIRECTOR OF MARKETING SERVICES	VICE PRESIDENT INTERNET DEVELOPMENT
DIRECTOR OF RESEARCH	VICE PRESIDENT OF E-COMMERCE
E-COMMERCE CENTER MANAGER	VICE PRESIDENT OF IS
E-COMMERCE MANAGER	VICE PRESIDENT OF MARKETING
GENERAL MANAGER	VICE PRESIDENT OF OPERATIONS
GROUP TECH	WEB PROGRAM MANAGER

Q.54 What are your largest Web site technical challenges your company faces? (Open ended)
n=79

# Resp	Percent	
3	4%	Scalability
7	9%	Security
8	10%	Speed
9	11%	Bandwidth
10	13%	HR
18	23%	Interoperability
21	27%	Content Development
16	20%	Other

Q.55 What are your largest Web site business challenges your company faces?
(Open ended)
n=71

# Resp	Percent	
4	6%	Learning Curve
4	6%	Security
8	11%	Time-to-Market
8	11%	HR
9	13%	Generating Site Interest
10	14%	Content
14	20%	Technology
17	24%	Generating Revenue
6	8%	Other

Appendix C

Verbatim Responses

13. Why do you use or plan to use content delivery services?

(2) Other

FOR CUSTOMER SERVICE
BETTER CONTROL

(3) Cost

FLEXIBILITY AND PRICING
SAVE TIME AND MONEY
COST EFFECTIVE

(20) Better Performance

BETTER SITE USER EXPERIENCE
BANDWIDTH
BANDWIDTH EFFICIENCY
BETTER ACCESS SPEEDS
FASTER CONTENT
GOOD WITH VIDEO
HIGH QUALITY
CAN'T DO IT INTERNALLY
SPEED
TO ENHANCE OUR EXISTING CONTENT
MAKE OUR WEB SITE FASTER
TO GET INFO TO END USERS AS QUICKLY AS POSSIBLE
TO MAKE CONTENT AVAILABLE TO PEOPLE IN REMOTE AREAS
VIDEO AND AUDIO STREAMING
WE ARE PLANNING TO DELIVER A LOT OF INFORMATION ON-LINE
FASTER SERVICE
SPEED TO END USERS
MAKING SURE WE DON'T HAVE SLOW CONTENT
TO PROVIDE OUR END CUSTOMERS WITH BETTER EXPERIENCE
DISTRIBUTE CONTENT TO REMOTE LOCATIONS

17a. Why would you use CDN services from multiple CDN service providers?
(Open ended)

(1) Reliability

WE WOULD BE LOOKING FOR IMPROVED RELIABILITY

(3) Experimentation

TO SEE WHAT IT WOULD IMPROVE PERFORMANCE
FOR REACHING DIFFERENT GEOGRAPHICALLY DISPERSED USERS
THE DIFFERENT AUDIENCES WE HAVE

(4) Redundancy

REDUNDANCY
REDUNDANCY
A GOOD VARIETY OF SOURCES
IF IT GIVES US SOME ALTERNATIVES THEN IT MIGHT BE WORTH IT

(5) Cost Reduction

COST
COST
COST EFFICIENCY
REDUCE COSTS
FOR COST EFFECTIVENESS

(10) Performance

FOR SPECIFIC CONTENT
GET CONTENT AS CLOSE TO END PEOPLE AS POSSIBLE TO MAXIMIZE
RESPONSE TIME
IF WE HAD BANDWIDTH NEEDS WE COULDN'T SERVICE INTERNALLY
PERFORMANCE
PERFORMANCE
IT MAY BE THE BEST WAY TO DELIVER INFORMATION TO USERS
THE USERS WOULD BE HAPPIER, THE FASTER THE BETTER
TO DELIVER FAST CONTENT
TO GET INFORMATION OUT AS FAST AS POSSIBLE TO AS MANY
LOCATIONS AS POSSIBLE
WE MAY END UP WITH A MORE WIDE SPREAD ACCESS TO CONTENT

32. Causes for Web site outages and degradations

Attack

ATTACH ONE SERVICE
ATTACK
HACKERS
SECURITY ATTACKS

Maintenance

MAINTENANCE
MAINTENANCE
MAINTENANCE ACTIVITIES

UPDATING OUR BACKUP SYSTEMS
SYSTEMS UPGRADE

Application Performance

DATABASE QUERIES
DATABASE SERVER
DATABASE SIZE
E-MAIL
INTERNAL SEARCH ENGINE OVERLOAD

Last Mile

CABLE CUT
FAILURE OF TELECOMMUNICATION LINES
LINE HICCUPS
NETWORK CONNECTIVITY LOSS
NETWORK CONNECTIVITY
NOT HAVING LOCAL ACCESS
OUR LOCAL NETWORKS
PHONE LINE PROBLEMS
PIPELINE
PROVIDER LOSS OF CONNECTIVITY
PROVIDER OUTAGES
T-1 LINE GOING DOWN
TELEPHONE COMPANY PROBLEMS

Power

ELECTRICAL FAILURE
LOSS OF ELECTRICITY
POWER
POWER
POWER FAILURE
POWER FAILURE
POWER FAILURE
POWER GLITCHES
POWER OUTAGE
POWER OUTAGES
POWER RELIABILITY
SITE POWER LOSES
POWER

Software

APPLICATION FAILURE
BAD DESIGN
COLDFUSION
DYNAMIC PROCESS
EFFICIENCY OF THE SCRIPTS

IIS
ISSUES WITH SOME OF OUR SOFTWARE PROGRAMS
LOCAL DIRECTOR
MICRO OPERATING SYSTEM FAILURES
OPERATING SYSTEM
POOR PROGRAMMING
PROGRAMMING CODES
SERVER O S FAILURE
SOFTWARE ERRORS
SOFTWARE FAILURE
SOFTWARE FAILURE
INCORRECTLY CONFIGURED SOFTWARE
PROBLEMS WITH FIREWALL OR PROXY SERVER
HUMAN ERROR
HUMAN ERROR

Traffic

TRAFFIC OVERLOADS
BACK HOES ON THE INTERNET
BANDWIDTH
BANDWIDTH
BANDWIDTH
BANDWIDTH
BANDWIDTH
BANDWIDTH PROBLEMS
BANDWIDTH BOTTLENECK
DEMAND
HIGH TRAFFIC
NETWORK
NETWORK
NETWORK BANDWIDTH
NETWORK CONGESTION
NOT ENOUGH BANDWIDTH
NUMBER OF USERS
TOO LITTLE AVAILABLE BANDWIDTH
TOO MUCH TRAFFIC
TRAFFIC
TRAFFIC
TRAFFIC LOAD
USER LOAD

Service Provider

ASP FAILURES
BACKBONE
CARRIER
CONNECTIVITY RELIABILITY

CONTENT DEVELOPERS
ISP SERVICE DEGRADATION
DNS
DOWNSTREAM NETWORK FAILURE
UPSTREAM ISP PERFORMANCE
ISP
ISP DOWNTIME
ISP TROUBLE
LOCAL NETWORK OUTAGES AFFECTING USERS
NETWORK FAILURE
NETWORK GOING DOWN
NETWORK OUTAGES
NETWORK TRAFFIC
OUR ISP
POINT OF PRESENCE
POOR INFRA-STRUCTURE
PROBLEMS ON THE NETWORK
PROVIDER FAILURES
ROUTING ANOMALIES
UP STREAM NETWORK FAILURE
UPSTREAM SERVICE

Hardware

EQUIPMENT
EQUIPMENT
EQUIPMENT FAILURE WITH THE SERVICE PROVIDER
HARDWARE (SERVER) PROBLEMS
HARDWARE AND SOFTWARE PROBLEMS
HARDWARE FAILURE
HARDWARE FAILURE
HARDWARE FAILURE
HARDWARE FAILURE
HARDWARE FAILURE
HARDWARE FAILURE
HARDWARE FAILURE
HARDWARE FAILURE
HARDWARE MAINTENANCE
HARDWARE PROBLEM
HARDWARE PROBLEM
INTERNAL SERVER ERRORS
LOCAL SERVER RESOURCES
MEMORY LEAKS
OUR SERVER
OVER LOADING OUR SERVERS
OVER LOADING THE SERVER
OVERLOADING SERVERS
POOR HARDWARE

POOR SERVER PERFORMANCE
PROCESSOR STRENGTH
SERVER AVAILABILITY
SERVER CAPACITY
SERVER DOWN
SERVER ERRORS
SERVER FAILURE
SERVER FREEZING
SERVER OUTAGES
SERVER OVERLOAD
SERVER PERFORMANCE
SERVER PROBLEMS
WEB SERVER FAILURE

38 What are the top three challenges when planning for site growth for your content site?

N=89

(3) Security Planning

SECURITY
SECURITY
SECURITY

(4) Site Traffic

DRIVING MORE PEOPLE TO THE SITE
DRIVE USERS FROM OTHER AREAS
PROMOTION OF THE SITE
GETTING ALL OF OUR SUBSIDIARIES TO MIGRATE TO OUR PRIMARY SITE

(10) Learning Curve

KEEPING UP WITH TECHNOLOGY
FINDING SOLUTIONS THAT INSURE THAT ACCURATE DATA IS PLACED ON THE WEB
ID APPROPRIATE TECHNOLOGIES
KEEPING IT CURRENT
KEEPING IT TIMELY
NEW TECHNOLOGY
TECHNOLOGY CURVE
STAYING UP TO DATE WITH THE LATEST TECHNOLOGIES
LEARNING NEW WEB TECHNOLOGY
TRAINING ENGINEERS

(13) Hardware

DISC SPACE
EXPANDING CONTENT
HARD DRIVE SPACE
HARDWARE ALLOCATION
HARDWARE PLANNING
HARDWARE REQUIREMENTS
HAVING INFRASTRUCTURE IN PLACE TO HANDLE THE TRAFFIC
MAKING SURE THEY HAVE ENOUGH SERVER SPACE
DISC SPACE
STORAGE SPACE FOR SERVERS
SERVER STABILITY
SPACE
SPACE

(15) Budget

APPROVAL
BUDGET MONEY FOR ADDITIONAL HARDWARE
CONVINCING MANAGEMENT THERE IS A PROBLEM
COST
ECONOMICS
COST
FUNDING
FUNDING
GET DEPARTMENTS TO BUY IN TO THE NEW IDEAS
MONEY
MONEY
PURCHASING HARDWARE
PURCHASING HARDWARE
RESOURCES
RESOURCES

(16) Network Configuration

CONFIGURING HARDWARE
EASE OF UPDATE
FINDING A PRODUCT THAT IS CROSS FORM COMPATIBLE
CONFIGURING SOFTWARE
GETTING A DATABASE INVOLVED
IMPLEMENTATION
INFRASTRUCTURE IN LINE
INTEGRATING UNIQUE NETWORKS
INTEGRATION WITH HEADQUARTERS WEBSITE
INTEGRATION, NOT OUT STEPPING USER CAPABILITIES
MAINTAINING COMPATIBILITY WITH END USER
MAKING SURE WE HAVE ENOUGH PHYSICAL CAPACITY (NETWORK,
DISC SPACE)
REDUNDANCY

REDUNDANCY
REDUNDANCY
RELIABILITY

(21) HR

FINDING QUALIFIED HELP FOR SERVER FARM
FINDING RIGHT PEOPLE
FINDING PEOPLE
GETTING ENGINEERING TO DEVELOP SERVICES
GETTING EVERYBODY WE NEED
GETTING NON-TECH PEOPLE BEHIND WHAT'S GOING
GETTING PEOPLE TO ACTUALLY PRODUCE ON A GLOBAL LEVEL
HOW TO STAFF IT
HUMAN RES
HUMAN RESOURCES
MAN POWER
MORE PROGRAMMERS
PEOPLE
PERSONNEL
PROJECT MANAGEMENT
STAFF
STAFFING
STAFFING
SUPPORT STAFF
TECH SUPPORT
TRYING TO FIND PEOPLE

(30) Anticipating Usage

ANTICIPATING USAGE
AUDIENCE SHARE
AVAILABILITY
BANDWIDTH
BANDWIDTH
BANDWIDTH
BANDWIDTH
BANDWIDTH CONSERVATION
BANDWIDTH PLANNING
BANDWIDTH
BANDWIDTH
DOWNLOAD TIME
EVALUATING CURRENT GROWTH
DETERMINING THE REQUIRED BANDWIDTH
HIGH AVAILABILITY
HOW PERFORMANCE IS IMPACTED
IMPROVING THE BANDWIDTH
MINIMIZE OUTAGES

NETWORK SPEED
NOT ENOUGH BANDWIDTH
PREPARING INFRA-ARCHITECTURE
PROJECTING THE HIGHEST VOLUME AT THE HIGHEST PEAK
BANDWIDTH
SCALE ABILITY
SCALE ABILITY
SPEED
SPEED
SPEED
TRYING TO GUESS HOW MANY PEOPLE WE CAN SUPPORT
VOLUME FORECASTING

(42) Content Development

APPEARANCE
ASTHETIC APPEAL
CODING
CONTENT
CONTENT
CONTENT
CONTENT ACCURACY
CONTENT CREATION
CONTENT INTEGRATION
CONTENT MANAGEMENT
CONTENT MANAGEMENT
CONTENT MANAGEMENT SYSTEM
CONVERT TO PRESENTABLE FORM
COORDINATING
COORDINATING CONTENT AUTHORS
COORDINATION
CREATION OF NEW AND UNIQUE CONTENT
DEVELOPMENT OF THE DYNAMIC LAYOUT
DEVELOPMENT OF THE SITE STRUCTURE/CONTENT
DEVELOPMENT RESOURCES
FIGURING OUT WHAT INFORMATION THE PEOPLE WANT
DYNAMIC CONTENT
FINDING A WAY TO UPDATE CONTENT WITHOUT HAVING TO INVOLVE
GATHERING GOOD LOCAL CONTENT
GETTING CONTENT
GETTING CONTENT AVAILABLE
GETTING EMPLOYEES TO CONTRIBUTE TO CONTENT
JUST GETTING CONTENT PEOPLE TO TELL ME WHAT THEY WANT
KEEPING THE CONTENT UP TO DATE
KNOWING WHAT CONTENT TO PROVIDE
LAYOUT
MANAGING VENDOR RELATIONSHIPS WITH VARIOUS CONTENT

SOURCES
NEW SOURCES OF CONTENT
PDF GENERATION AND TURNAROUND
PERSONALIZATION
PRODUCTION PROCESS
DEVELOPING CONTENT
THE DEVELOPERS
TIME TO UPDATE
TO BE ABLE TO UPGRADE CONTENT
TRACKING CONTENT PROVIDERS
DEVELOPING NEW CONTENT SOURCES

51. What are the top 3 barriers for subscribing to content delivery services?
(Open ended)

n=44

(4) Awareness

KNOWING WHAT THEY ARE
KNOWING WHICH ONES THAT ARE AVAILABLE
KNOWING WHO OFFERS THEM
KNOWING WHO OFFERS THE SERVICE

(5) Security

DATA SECURITY
SECURITY
SECURITY ISSUES
SECURITY ISSUES
SECURITY ISSUES

(6) Credibility

CREDIBILITY
NOT SURE IF WE TRUST THEM TO WORK
TRUST FACTOR
TRUSTED BRAND OR CO
NOT SURE OF PERFORMANCE
NOT RELIABLE

(7) No Need

NO INTEREST
NO NEED
MATCHING OUR NEEDS
RELEVANCE
WE DON'T NEED IT
DEVELOP IT IN HOUSE
NO NEED

(10) Technology

CONFUSING TECHNOLOGY
DIFFICULTY INTERFACING
DIFFICULTY OF IMPLEMENTING ON GLOBAL SCALE
IMPLEMENTING SOLUTION
IMPLEMENTATION
INTERACTION WITH BACK END DATABASES
TECH BARRIERS
VERY NEW TECH
NEW TECH
NEW TECHNOLOGY

(28) Cost

COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST OF SERVICE AND DEVELOPMENT
COST TO THE USER
EFFECTIVE PRICING
MONEY
MONEY TIME
PRICE
PRICE
PRICE
PRICE
PRICE
PRICE
PRICE

54. What are your largest website technical challenges your company faces?
(Open ended)

n=79

(3) Scalability

BUILDING A SCALABLE AND ADAPTABLE CORE ENGINE STRUCTURE
RELIABILITY
RELIABLE DELIVERY

(7) Security

DEVELOPING FOR SECURE ACTIVITY ON THE PUBLIC INTERNET
SECURITY
SECURITY
SECURITY
SECURITY
SECURITY
SECURITY

(8) Speed

BUILDING THE APPLICATIONS FAST ENOUGH
CONTENT DELIVERY FROM CLIENTS
SPEED
SPEED OF DEPLOYMENT
GIVE USER THE IMPRESSION THAT THE WEB SITE IS RUNNING FAST
PERFORMANCE TUNING (DATABASE)
SERVER CAPACITY
TO INCREASE APPLICATION SPEED

(9) Bandwidth

BANDWIDTH
BANDWIDTH
BANDWIDTH
BANDWIDTH
BANDWIDTH
HEAVY USAGE
LOW USAGE
NETWORK BANDWIDTH
NETWORK BANDWIDTH

(10) HR

FINDING AND RETAINING QUALIFIED STAFF
FINDING DEVELOPERS
HAVING ENOUGH TECHNICAL STAFF
PERSONNEL

PROGRAMMING RESOURCES
EFFICIENCY OF LABOR
STAFF
STAFFING
STAFFING
UNTRAINED ENGINEERS

(18) Interoperability

BACK END STRATEGY
BACKWARDS COMPATIBILITY
CONNECTION TO LEGACY SYSTEMS
CROSS PLATFORM INTEGRATION
E-COMMERCE
E-COMMERCE
E-COMMERCE DELIVERY
EXECUTING SCRIPTS
IMPLEMENT BACK-END SYSTEMS
INFRASTRUCTURE
INTEGRATING WEB TECHNOLOGY WITH LEGACY PRINTING SYSTEMS
INTEGRATION FROM SITE TO SITE
INTEGRATION OF HUNDREDS OF DIVISIONAL WEB SITES
QUICKNESS OF IMPLEMENTATION
MULTIPLE WEB SITES TO COMBINE
MERGING DATABASES
SYSTEMS INTEGRATION
TO INTEGRATE OUR WEB ENVIRONMENT WITH OUR INTERNAL
SYSTEMS

(21) Content Development

ACCURACY OF INFORMATION
BAD LINKS
CHANGE MANAGEMENT
CONTENT MAINTENANCE
DEALING WITH DYNAMIC CONTENT
FIND PRESENTABLE FORM
GETTING EVERYBODY TO LOOK THE SAME
GETTING OUR MESSAGE OUT
KEEPING CONTENT UP TO DATE
KEEPING INFORMATION CURRENT
KEEPING IT CURRENT
KEEPING IT WORKING 24 HOURS A DAY 7 DAYS A WEEK
CONTENT ORGANIZATION
PROVIDING CONTENT IN THE BEST MANNER
PROVIDING FOR ALL THE VARIOUS BROWSERS
PUBLISHING
PUBLISHING

STREAMING AUDIO
STREAMING VIDEO
STREAMING VIDEO
OBTAINING CONTENT

55. What are your largest website business challenges your company faces?
n=71

(4) Learning Curve

KEEPING UP WITH STANDARDS
KEEPING UP WITH TECHNOLOGY
STAYING CURRENT
TO KEEP UP WITH TECHNOLOGY

(4) Security

SECURITY
SECURITY
SECURE CONTENT DELIVERY
DEVELOPING INTERACTIVITY WHILE MAINTAINING PRIVACY

(8) Time-to-Market

CORPORATE INERTIA
DEFINING MISSION STATEMENT
HAVING THE BEST PRODUCT FAST
SPEED BY WHICH INFORMATION IS AVAILABLE
TIME TO MARKET
BUSINESS PROCESS CHANGE
PROCESS AND ORGANIZATIONAL CHANGES

(8) HR

PERSONNEL
PERSONNEL OFF LOADING INTENSIVE DEMAND SERVICES
MAN POWER
LABOR INTENSITY
QUALIFIED STAFFING
STAFFING
TRAINING
TRAINING

(9) Generating Site Interest

ADOPTION BY CUSTOMER
CUSTOMER TRAFFIC
END USER ACCEPTANCE
GETTING CUSTOMERS
GETTING VIEWERS
PROMOTION OF THE SITE

PUBLIC AWARENESS
STAYING POPULAR
MARKETING SITE

(10) Content

CREATING A PRODUCT THAT WILL BE CONSIDERED TO BE WORTH THE MONEY
CONTENT GENERATION
CONTENT INTEGRATION
DATA ORIGINATION
DEVELOPMENT
KEEPING CONTENT FRESH
KEEPING CURRENT CONTENT
KEEPING IT CURRENT
TAKING PAPER DATA AND GETTING IT ON THE SITE ELECTRONICALLY
CONTENT DEVELOPMENT

(14) Technology

IMMATURE TECHNOLOGY
IMPLEMENT BACK-END SYSTEMS TO FRONT INFRASTRUCTURE
INTEGRATION
INTEGRATION ON THE BACK END
MAKING SURE WE GET ALL THE FUNCTIONALITY THAT WE NEED
MANAGING 60 SITES FROM ONE LOCATION
MOVING TO E-COMMERCE
SYSTEMS INTEGRATION
THE DEVELOPMENT OF ELECTRONIC FILING SPEED
VERIFYING TRANSACTIONS
INTERFACE SAP
DETERMINING A TECHNOLOGY THAT WILL BE HERE FOR YEARS TO COME

(17) Generating Revenue

GENERATING REVENUE
ADDING E-COMMERCE
DEVELOPING NEW BUSINESS
E-COMMERCE
E-COMMERCE
E-COMMERCE
E-COMMERCE
E-COMMERCE
E-COMMERCE INFRASTRUCTURE
E-COMMERCE ISSUE
IMPLEMENTING E-BUSINESS

INTEGRATING E-COMMERCE AND B TO B ACTIVITIES
MAKING MONEY
MARKETING E-COMMERCE SERVICES
REVENUE GENERATIONS
REVENUE PRODUCED BY THE SITE
TRYING TO MAKE A PROFIT

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