

# **The 1999 Content Delivery Service Study**

**November 1999**

The HTRC Group  
P.O. Box 2087  
San Andreas, CA 95249  
[www.htrcgroup.com](http://www.htrcgroup.com)

*About The HTRC Group*

The High-Tech Resource Consulting Group focuses on service provider networking, providing consulting, custom market research, and market research studies to service providers and product manufacturers.

## Table of Contents

<i>Table of Contents</i> _____	<i>iii</i>
<i>Table of Charts, Figures, and Tables</i> _____	<i>vi</i>
<i>Executive Summary</i> _____	<i>1</i>
<b>The 1999 Content Delivery Service Study</b> _____	<b>1</b>
<b>Plans for Content Delivery Services</b> _____	<b>1</b>
<b>The Opportunity</b> _____	<b>3</b>
<b>Barriers for Content Delivery Services</b> _____	<b>5</b>
<b>Page Views</b> _____	<b>6</b>
<b>SLAs for Content Delivery Services</b> _____	<b>7</b>
<b>Lost Site Revenue</b> _____	<b>8</b>
<b>Provider Positioning</b> _____	<b>9</b>
<b>Marketing Channels</b> _____	<b>10</b>
<b>Business Challenges</b> _____	<b>10</b>
<b>Technical Challenges</b> _____	<b>10</b>
<b>Company Sizes</b> _____	<b>11</b>
<b>Content Site Types</b> _____	<b>11</b>
<b>Site Revenue</b> _____	<b>11</b>
<i>The 1999 Content Delivery Service Study</i> _____	<i>13</i>
<i>Market Background</i> _____	<i>15</i>
<i>Study Methodology</i> _____	<i>17</i>
<i>Demographics</i> _____	<i>19</i>
<b>Company Sizes</b> _____	<b>19</b>
<b>Content Site Employee Types</b> _____	<b>19</b>
<b>Content Site Types</b> _____	<b>20</b>
<b>Site Revenue</b> _____	<b>21</b>
<i>Site Connectivity</i> _____	<i>23</i>
<b>Content Site Configurations</b> _____	<b>23</b>
<i>Content Delivery Services</i> _____	<i>25</i>
<b>Plans for Content Delivery Services</b> _____	<b>25</b>
Content Delivery Service Architectures _____	25
<i>Why Content Sites Would Choose Content Delivery Providers</i> _____	<i>27</i>
<i>Benefits and Barriers</i> _____	<i>31</i>
<b>Barriers for Content Delivery Services</b> _____	<b>31</b>

<b>Why Content Delivery Services?</b>	<b>33</b>
Why Content Delivery Services	33
Why Not Content Delivery Services	33
The Role of Caching	34
<b><i>Current And Future Plans For Service Providers</i></b>	<b>37</b>
Content Delivery Provider Plans	37
Current and Planned Hosting Providers	38
<b><i>Bandwidth and Performance</i></b>	<b>41</b>
Current Performance Technologies	41
Content Site Bandwidth	42
The Cost of Bandwidth	42
Page Views and Page Weight	42
Page Weight	43
Unique Visitors	43
Content Site Peak Usage	44
Bandwidth	44
Peak Bandwidth	45
Time of Day	45
The Growth of Content Site Bandwidth	47
<b><i>Service Level Agreements</i></b>	<b>49</b>
SLAs for Content Delivery Services	49
<b><i>Expenditures</i></b>	<b>51</b>
Site Expenditure Plans	51
<b><i>The Cost of Content Site Downtime</i></b>	<b>53</b>
Site Revenue Generation	53
Lost Site Revenue	53
<b><i>Market Messaging</i></b>	<b>55</b>
Provider Positioning	55
Marketing Channels	56
Top Publications	57
The Decision Maker	58
<b><i>Challenges</i></b>	<b>61</b>
Business Challenges	61
Technical Challenges	62
<b><i>Content Delivery Solutions</i></b>	<b>65</b>
Content Delivery Service Solutions	65
Akamai	65

Mirror Image Internet, Inc.	66
Adero	66
Exodus	68
<b>Content Delivery Product Solutions</b>	<b>68</b>
F5	68
InfoLibria	69
Inktomi/Webspective	69
Novell	70
<b><i>Content Delivery Services Forecast</i></b>	<b>73</b>
<b>About the forecast</b>	<b>73</b>
<b>Methodology</b>	<b>73</b>
<b>Market Factors</b>	<b>74</b>
<b>Forecast</b>	<b>74</b>
Content Delivery Services	74
Content Delivery Equipment	75
<b><i>Recommendations</i></b>	<b>77</b>
<b><i>Appendix A</i></b>	<b>79</b>
<b>Business Model Details</b>	<b>79</b>
<b><i>Appendix B</i></b>	<b>83</b>
<b>The 1999 Content Delivery Service Study Questionnaire</b>	<b>83</b>
<b>Screening Section</b>	<b>83</b>
<b>Content Delivery Service Section</b>	<b>84</b>
<b>Bandwidth and Performance Section</b>	<b>87</b>
<b>SLAs</b>	<b>90</b>
<b>Expenditures Section</b>	<b>90</b>
<b>Challenges Section</b>	<b>94</b>
<b><i>Appendix C</i></b>	<b>97</b>
<b>Data Summary</b>	<b>97</b>

## Table of Charts, Figures, and Tables

<i>Chart 2-2: Content Delivery Technology Investment Plans (N=100) Q6</i>	2
<i>Chart 10-1: Content Delivery Service Forecast</i>	4
<i>Chart 10-2: Content Site Content Delivery Product Opportunity</i>	5
<i>Chart 3-1: Content Delivery Service Barriers (N=51) Q27</i>	6
<i>Chart 5-1: Monthly Page Views (N=68) Q14b</i>	7
<i>Chart 6-1: Critical SLAs (N=100) Q19</i>	8
<i>Chart 7-1: Hourly Lost Revenue Q22</i>	9
<i>Chart 1-1: Organizational Sizes (N=100) Q2</i>	19
<i>Chart 1-2: Content Site Employee Types (N=100) Q3</i>	20
<i>Chart 1-3: Content Site Types (N=100) Q4</i>	21
<i>Table 1-1: Content Site Type Other Responses</i>	21
<i>Table 1-2: Content Site Revenue Q20</i>	22
<i>Chart 2-1: Content Site Connectivity (N=100)</i>	23
<i>Chart 2-2: Content Delivery Technology Investment Plans (N=100) Q6</i>	25
<i>Chart 2-3: Content Delivery Solution Plans Q6 (n=100)</i>	26
<i>Chart 3-1: Content Delivery Service Barriers (N=51) Q27</i>	32
<i>Chart 3-2: Benefits of Content Delivery Solutions (N=54) Q10</i>	33
<i>Chart 3-3: No Plans For Content Delivery Solutions (N=29) Q7</i>	34
<i>Chart 3-4: View of Caching (N=63) Q28</i>	35
<i>Chart 4-1: Content Delivery Provider Plans (N=46) Q8</i>	38
<i>Chart 4-2: Current &amp; Future Hosting Providers (N=64, N=63) Q11-12</i>	39
<i>Chart 5-1: Performance Technologies (N=100) Q13</i>	41
<i>Table 5-1: Content Site Bandwidth Q14a</i>	42
<i>Chart 5-1: Monthly Page Views (N=68) Q14b</i>	43
<i>Chart 5-2: Monthly Unique Page Views (N=64) Q14c</i>	44
<i>Chart 5-3: Peak Time Page Views (N=38) Q15b</i>	45
<i>Chart 5-4: Business Day Peak Usage (N=100) Q17</i>	46
<i>Chart 5-5: Weekend Peak Usage (N=100) Q18</i>	47
<i>Table 5-2: Site Bandwidth Growth Percentage Q16</i>	47
<i>Chart 6-1: Critical SLAs (N=100) Q19</i>	50
<i>Table 6-1: Expenditures Q20</i>	52
<i>Chart 7-1: Hourly Lost Revenue Q22</i>	54
<i>Chart 8-1: Critical Service Provider Features (N=100) Q24</i>	56
<i>Chart 8-2: Sources For Learning (N=100) Q25</i>	57
<i>Chart 8-3: Most Influential Publications (N=79) Q26</i>	58
<i>Chart 8-4: Company Decision Makers (N=96) Q29</i>	59
<i>Chart 9-1: Business Challenges (N=63) Q31</i>	62
<i>Chart 9-2: Technical Challenges (N=86) Q30</i>	63
<i>Figure 9-1: Inktomi</i>	70
<i>Chart 10-1: Content Delivery Service Forecast</i>	75
<i>Chart 10-2: Content Site Content Delivery Product Opportunity</i>	76

## **Executive Summary**

### ***The 1999 Content Delivery Service Study***

The 1999 Content Distribution Services study examines an emerging service market focused on providing Internet content sites with new performance enhancements utilizing content delivery technology. In the study, we examine demographics, plans for content delivery service use, content site connectivity, current and future service plans, bandwidth utilization, desired service level agreements, technologies used to enhance performance, expenditures, the cost of content downtime, and challenges. 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.

To gain a thorough understanding of the opportunity for content delivery products and services, we interviewed 100 Webmasters and Content Managers selected at random from a list of content professionals.

Content delivery products and services fundamentally improve Web 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.)

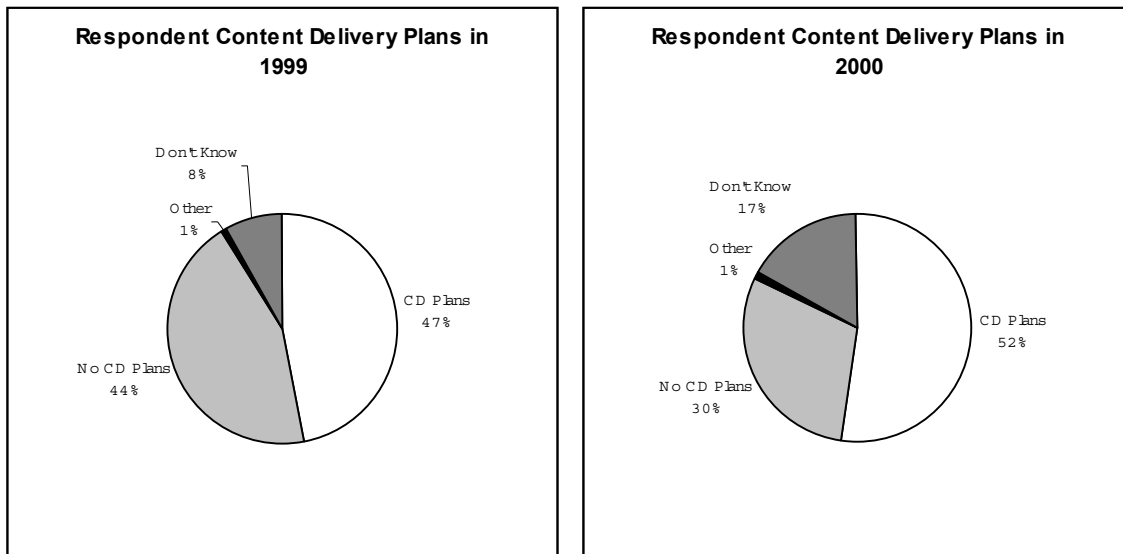
The introduction of content delivery products and services has been well received in the industry and merger, acquisition, and IPO activity attest to their importance. The merger of Digital Island and Sandpiper, a multi-network content delivery provider, was viewed favorably by the financial community, with Digital Island's stock value significantly more than doubling the day the merger was announced. Content delivery service provider Akamai Technologies' recent IPO increased over seven times in value in the first day.

### ***Plans for Content Delivery Services***

The survey indicated a higher than expected response for plans to invest in content delivery technology, which grows from 47% in 1999 to 52% in 2000. (A lower percentage had been anticipated, as content delivery solutions are relatively new.) Plans to invest in content delivery technology included plans for in-house and service subscriptions to content delivery solutions.

The significant change from 1999 to 2000 is in "Don't Know" responses, increasing from 8% to 17%, and supporting the indication of a new market. These respondents have not yet decided how they will address content delivery technology.

**Chart 2-2: Content Delivery Technology Investment Plans (N=100) Q6**



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 or facilities-based provider of content delivery services.

The largest number of respondents plan to build their own private content delivery network. These respondents that have in-house buildout plans increase from 40% in 1999 to 45% in 2000. There is no growth for multi-network and facilities-based providers of content delivery services from 1999 to 2000, which remains steady at 8%.

There are five primary reasons why content sites would choose content delivery providers:

- 1) The importance of maintaining an online Internet presence will only increase as time progresses, and service degradation and outages can be costly to the content site provider in terms of both revenue and reputation.
- 2) Content sites bandwidth demand is growing at an average of 8.4% per month and the study survey indicates a planned average increase in the number of total content site employees of only 12% over the next year.
- 3) Expenditures on hardware and software decrease significantly from \$42,898 in 1999 to \$30,563 in 2000. In-house content delivery solution build-out plans are not reflected in planned hardware and software expenditures over the next year.



- 4) Speed is an important differentiation among content providers. Since Internet users are likely to shun a slow-performing content site in favor of a faster competitor, speed can impact on the financial health of a content provider, especially those dependent on e-commerce as a source of revenue.
- 5) Cost

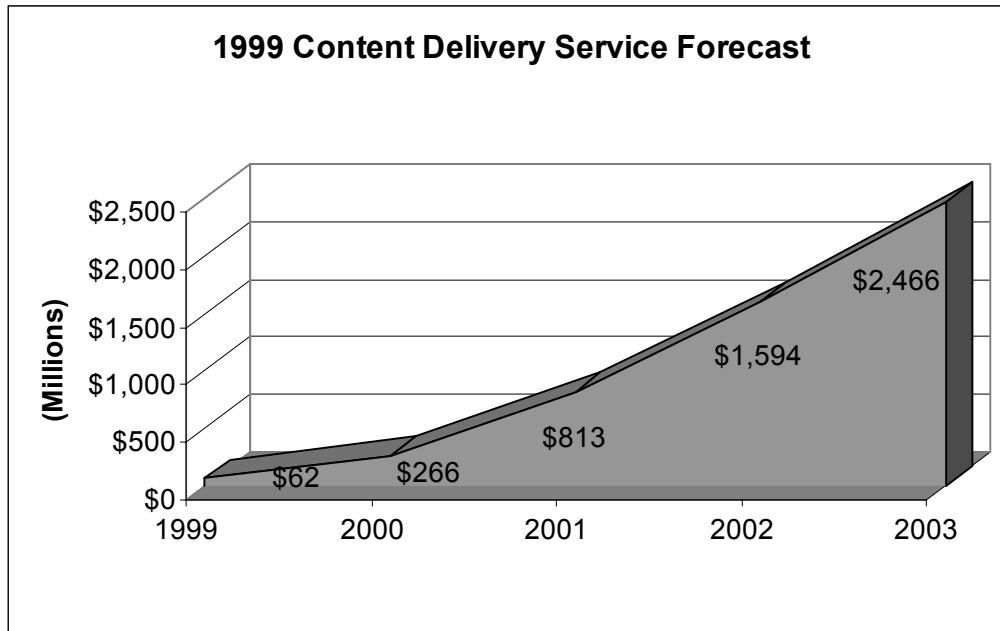
### ***The Opportunity***

The 1999 Content Delivery Service Study forecasts include dollars spent by content sites for content delivery services and in-house product implementations. This forecast does not include service provider expenditures for content delivery products.

Content sites differentiate in two fundamental ways, the actual content on their site (content development) and the end user's web browsing experience (performance). By 2003 there is a combined \$2.6 billion dollar market for service providers and product manufacturers that provide content delivery solutions assisting content sites with increasing performance and content development.

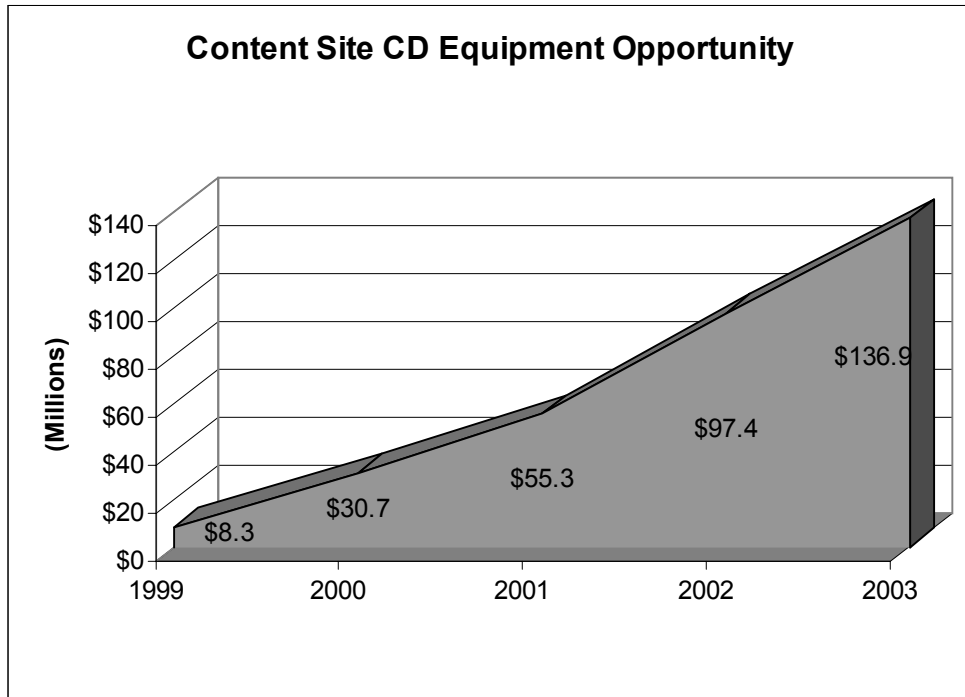
Service providers that offer content delivery services are presented with a significant opportunity. Content Sites will spend 62 million hardware and software in 1999, increasing to 2.47 billion in 2003. Content delivery services include services that intelligently distribute content globally on a network through strategically placed servers, which store content close to end users. The chart 10-1 below depicts the revenue opportunity for service providers that offer content delivery services.

**Chart 10-1: Content Delivery Service Forecast**



Content sites that elect to deploy their own content delivery solution present a good opportunity for product manufacturers. Content Sites will spend 8.3 million hardware and software in 1999, increasing to 136.9 million in 2003. Hardware includes the servers and appliances used in an in-house content delivery solution. Software includes the content delivery software only. The chart 10-2 below depicts the revenue opportunity for product manufacturers selling to organizations other than service providers.

**Chart 10-2: Content Site Content Delivery Product Opportunity**



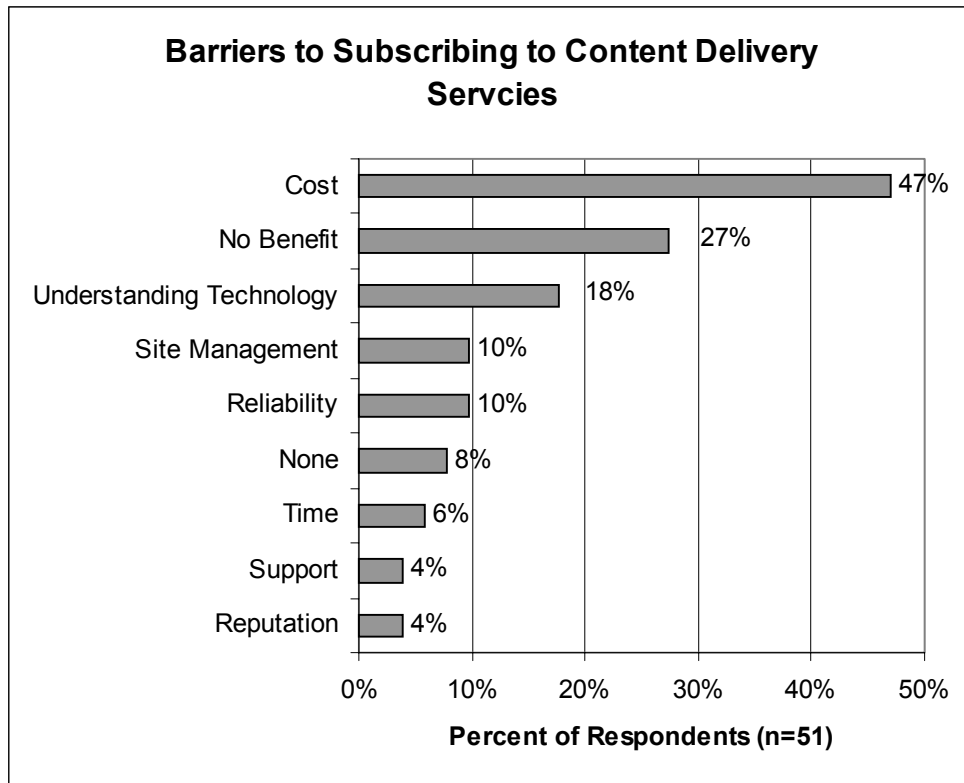
The content delivery market is just beginning to emerge. Product manufacturers are developing second generation products aimed at enabling service providers and enterprise customers to deploy in-house content delivery solutions.

Content delivery service providers are currently assigning considerable resources to acquire customers early in the market. Providers of content delivery services will continue to develop and differentiate their service offerings through technology advancements and network architectures.

### ***Barriers for Content Delivery Services***

Respondents were asked in an open-ended question to describe their top three barriers for subscribing to content delivery services. We categorized responses based on individual answers. As shown in chart 3-1 below, the strongest is Cost, followed by No Benefit, and Understanding Technology. Since the current buyer thinking of 47% 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 similar to the ones above.

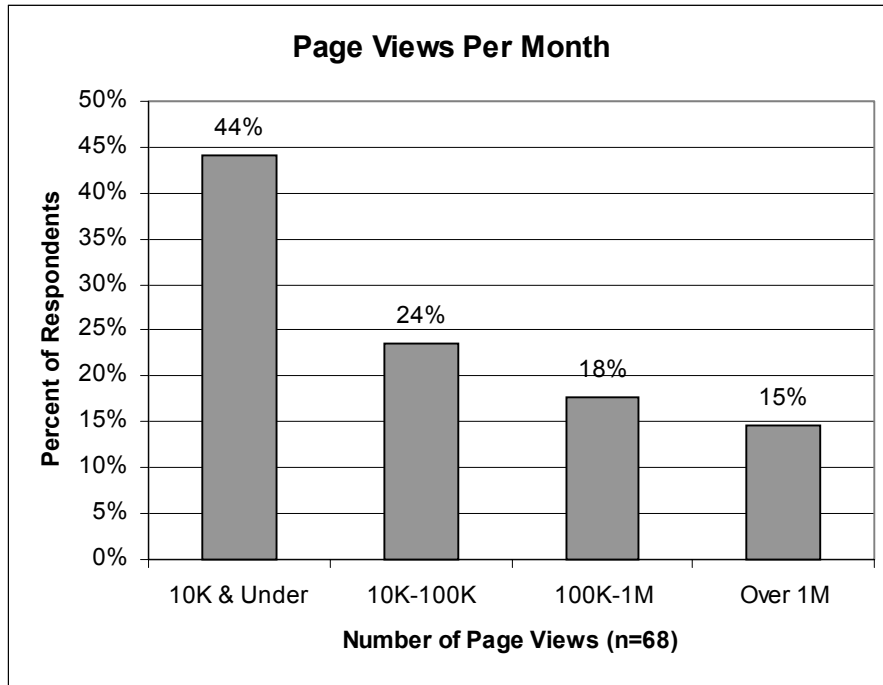
**Chart 3-1: Content Delivery Service Barriers (N=51) Q27**



**Page Views**

Respondents were asked to approximate number of page views per month. Unlike the response to our questions regarding Megabits per second and the cost of bandwidth, 68 of the study participants provided data. The mean of the 68 responses is 56,064.8 page views per month with a range of 5 thousand to 10 million. To gain a better understanding of respondents, chart 5-1 below shows a breakdown of respondent page views per month. Forty-four percent of respondents had 10 thousand or less page views per month. Respondents with more bandwidth utilization included 24% indicating 10-100 thousand monthly page views, 18% with 100 thousand to 1 million monthly page views, and 15% with over 1 million monthly page views.

**Chart 5-1: Monthly Page Views (N=68) Q14b**

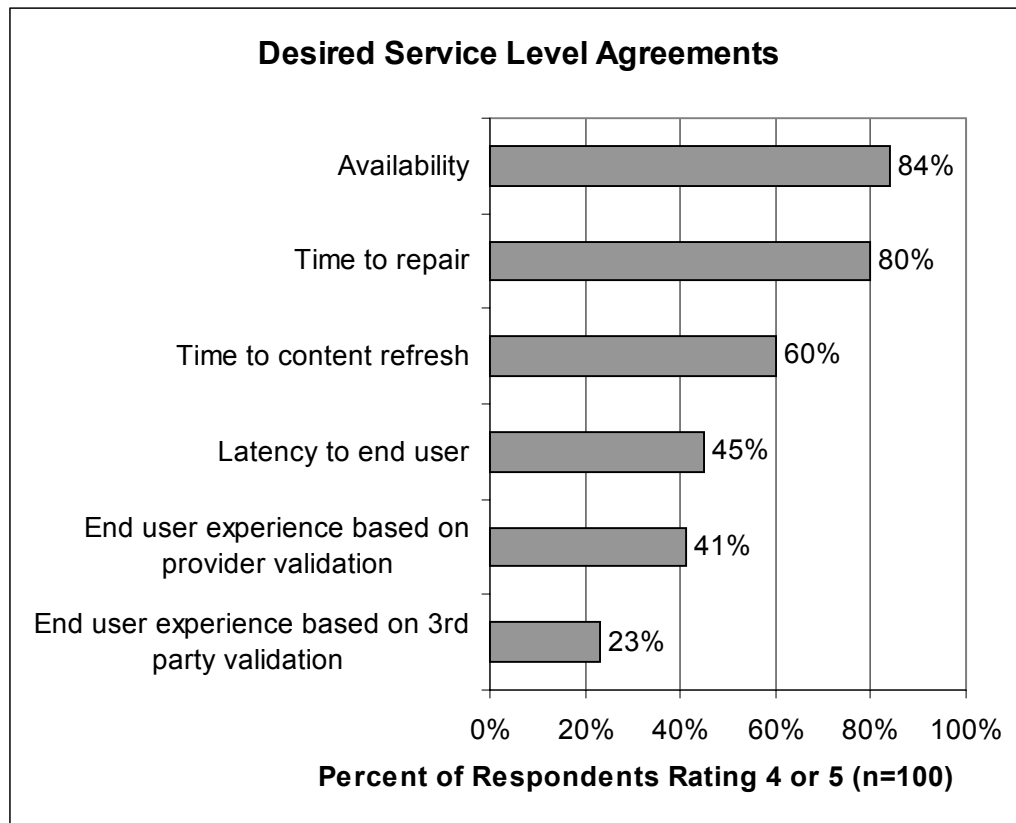


***SLAs for Content Delivery Services***

Service level agreements (SLAs), which offer a way for service providers to differentiate the quality of Internet access, are more widely available to enterprise customers now than in the past. A list of SLAs in random order was presented to the respondents to rate for content delivery services when choosing a service provider. On a scale of 1 to 5, 1 is not important and 5 is critical. Chart 6-1 below shows the most desired SLAs, rated 4 or 5 by respondents.

Availability, rated critical by 84% of respondents, and Time to Repair, rated critical by 80%, reflect basic network operational SLAs. Respondents are concerned with the uptime and downtime to repair factors, those that frequently impact an online reputation.

**Chart 6-1: Critical SLAs (N=100) Q19**



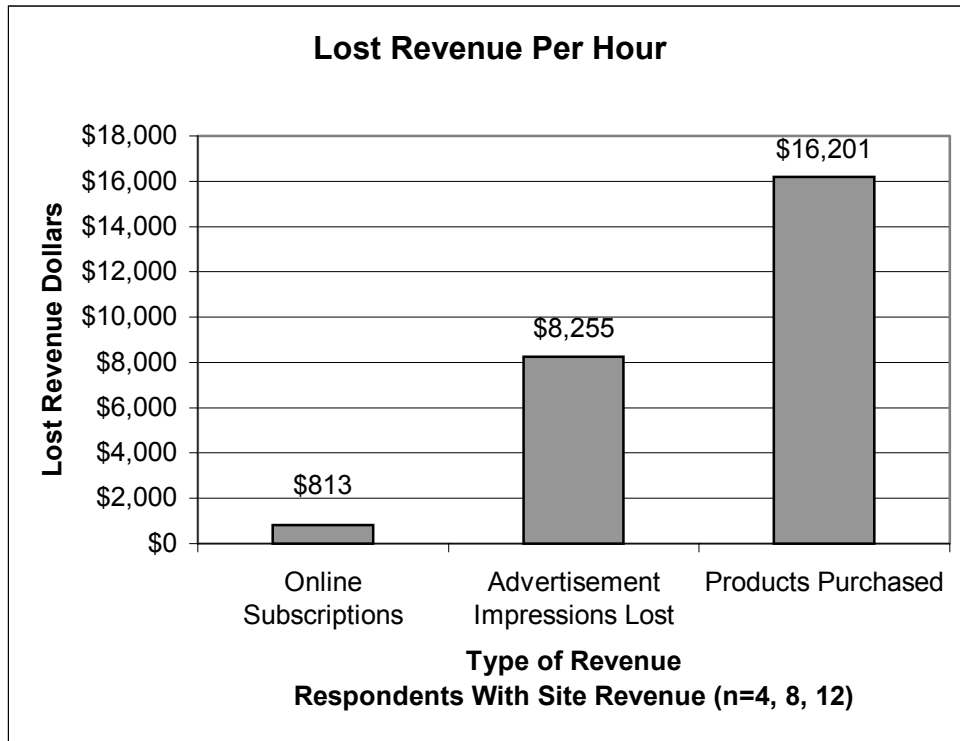
### **Lost Site Revenue**

Content sites generate revenue in three ways: 1) products purchased, 2) advertisement, and 3) online subscriptions. Respondents were asked to approximate how much their company would lose per hour if their site were not operational. Chart 7-1 below shows lost revenue per hour if a site outage occurs for advertisement impressions, products purchased, and online subscriptions.

E-commerce has provided an avenue for product manufacturers to increase efficiencies through a direct product distribution channel with their online presence. Respondents' sites that generate revenue through online product purchases lose an average of \$16,201 for each hour their site is down.

Content sites that generate revenue through advertisement use a business model similar to that of the tried and truly effective television advertisement model. Banner ads are big business to those sites that carry a large number of page views. For study respondent sites that generate revenue through advertisements, one hour of site downtime costs \$8,255 in lost revenue.

**Chart 7-1: Hourly Lost Revenue Q22**



**Provider Positioning**

The Web hosting services are difficult to differentiate in a competitive market. Service providers following the next evolution of hosting services will offer or begin to offer content delivery services in a variety of flavors, based on levels of performance, SLAs and service provider features. Service and support has been, and will likely continue to be one of the fundamental criteria by which a customer judges a provider. With service and support rated critical by 85% of the study respondents, service providers should make significant efforts to develop an excellent reputation for service and support as early as possible.

Performance to end users is a fundamental differentiation and was rated critical by 82% of the study respondents. Service providers should seek credible third- party publications for industry performance testing. Marketing collateral should explain in detail how performance is increased through network architecture and technology education.

The significant publications with which service providers and product manufacturers should maintain close relationships include Internet Week,

Information Week (12%), Interactive Week (11%), Internet World (11%), and PC Week (10%).

### ***Marketing Channels***

Vendor Web sites were rated a critical source for learning about new products and services by 64% of the study respondents. Both product manufacturers and service providers should prioritize their Web site as an important medium for marketing to customers. Vendor Web sites should market though educational material on their site.

The content delivery market is just beginning, and will continue to gather momentum though media coverage in trade publications. Sixty-three percent of the respondents rated Trade Magazines a very useful source for learning about new products and services. Service providers and product manufacturers should strive to be included in columns and articles that are published in the significant trade publications. Vendors should strive to maintain good relationships with industry writers that cover hosting services and new technology.

### ***Business Challenges***

The top business challenge, described by 33% of the study respondents, was content development. Service providers and product manufacturers should continue to develop tools that help content professionals develop and distribute content. As time progresses, the importance of content delivery solution management tools will increase in importance and become a more critical part of solution differentiation.

Generating site traffic was described as a challenge by 29% of respondents. These content professionals were seeking ways to increase the number of “Eyeballs” (end users) that browse their content site. Product manufacturers and service providers should investigate programs to help content sites develop additional traffic.

### ***Technical Challenges***

Performance, as described by 26% of the study respondents, was the largest technical challenge. Maintaining content site performance is a huge pain point for content site professionals. Technical sales material should include detailed explanations of how a content delivery solution significantly increases performance.

Managing content was described as a challenge by 21% of the study respondents. New types of content are continually being developed and content professionals are tasked with making new content types work. Product manufacturers and service providers should develop content delivery



solutions that include easy to use management tools that can manage and adapt to a variety of content types.

Security was described as a challenge by 15% of the study respondents. Content delivery solutions should address security by supporting the variety of secure content types, as well as demonstrating secure products or services.

### ***Company Sizes***

Survey response revealed a wide range of company sizes, with employees ranging in number from 1 to 150,000, and with a mean of 4,240. The largest number of respondents, at 50%, were small organizations, those with 100 employees or less. Medium-sized organizations with 101 to 1000 employees constituted 30% of the respondents, followed by large organizations, those with over 1000 employees. The study sample is representative of the stratified frequency of small, medium and large organizations with a presence on the Internet.

### ***Content Site Types***

Respondent content site types ranged from technology to business-to-business sites. Oftentimes technology companies are at the forefront of early adopters of new technology, continually seeking ways to increase the overall company effectiveness. Technology sites at 30% were the most frequent content site type in the study sample, followed by e-commerce at 22%, and News at 10%.

### ***Site Revenue***

When asked for the annual revenue generated from their site, 48 respondents refused or could not answer the question and 33 indicated that their content sites did not generate revenue. Some of respondents with content sites that do not generate revenue were education and government content sites and likely do not generate revenue. The data below is therefore drawn from the 19 participants who provided an actual dollar figure in response to the question.

For respondents that generate revenue, responses ranged from \$5000 to \$1,000,000,000 annually, with an average of \$70,415,789 annually. By trimming the largest three responses from the sample, the trimmed mean of those with revenue is \$1,431,250 annually.



## **The 1999 Content Delivery Service Study**

The 1999 Content Distribution Services study examines an emerging service market focused on providing Internet content sites with new performance enhancements utilizing content delivery technology. In the study, we examine demographics, plans for content delivery service use, content site connectivity, current and future service plans, bandwidth utilization, desired service level agreements, technologies used to enhance performance, expenditures, the cost of content downtime, and challenges. 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.

Content providers make up a rapidly changing market that is difficult to segment. In this study, we examine content sites respondents by type, bandwidth usage, and page views.

Content delivery products and services fundamentally improve Web 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.



## **Market Background**

The introduction of content delivery products and services has been well received in the industry and merger, acquisition, and IPO activity attest to their importance. The merger of Digital Island and Sandpiper, a multi-network content delivery provider, was viewed favorably by the financial community, with Digital Island's stock value significantly more than doubling the day the merger was announced. Content delivery service provider Akamai Technologies' recent IPO increased over seven times in value in the first day.

The Internet is growing at incredible speeds. There seems no end in sight for the on-line population currently estimated at 171 million users worldwide and representing about 3% of the world's population. There are over 5.5 million Web sites on the Internet today, most of which are small personal Web pages bundled with an Internet dial-up account. New technologies, such as cable modems and Digital Subscriber Line (DSL), increase Internet access speeds, feeding the demand for more sophisticated bandwidth-intensive interactive content. Bandwidth demand for popular content sites continues to grow, creating ongoing performance challenges.

Content sites differentiate in two fundamental ways, the actual content on their site (content development) and the end user's web browsing experience (performance). By 2003 there is a combined \$2.6 billion dollar market for service providers and product manufacturers that provide content delivery solutions assisting content sites with increasing performance and content development.

The content delivery market is just beginning to emerge. Product manufacturers are developing second generation products aimed at enabling service providers and enterprise customers to deploy in-house content delivery solutions.

Content delivery service providers are currently assigning considerable resources to acquire customers early in the market. Providers of content delivery services will continue to develop and differentiate their service offerings through technology advancements and network architectures.



## Study Methodology

To gain a thorough understanding of the opportunity for content delivery products and services, we interviewed 100 Webmasters and Content Managers selected at random from content professionals who subscribe to Internet Week or LAN Times. An initial determination of a prospective respondent's decision-making role was based on his/her position title. Determination of a respondent's knowledge of the content site, (including network plans, bandwidth, management, performance, and challenges) was based on the first interview question. Selection was further refined by actual contact: interviews 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, were terminated. Not all survey participants answered all questions, the "n" is indicated on each chart.

Interviewers, trained by the HTRC Group, conducted 20-minute telephone interviews using The 1999 Content Delivery Services Study Questionnaire located in the appendix. Greg Howard, Principal Analyst of the HTRC Group, developed the study questionnaire based on interviews with content delivery service providers and product manufacturers.

Respondents were offered a copy of the executive summary 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. Respondents were asked all questions with the exception of question 7. Only respondents that did not plan to use content delivery products or services, as indicated by their answers to question 6, were asked question 7.

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



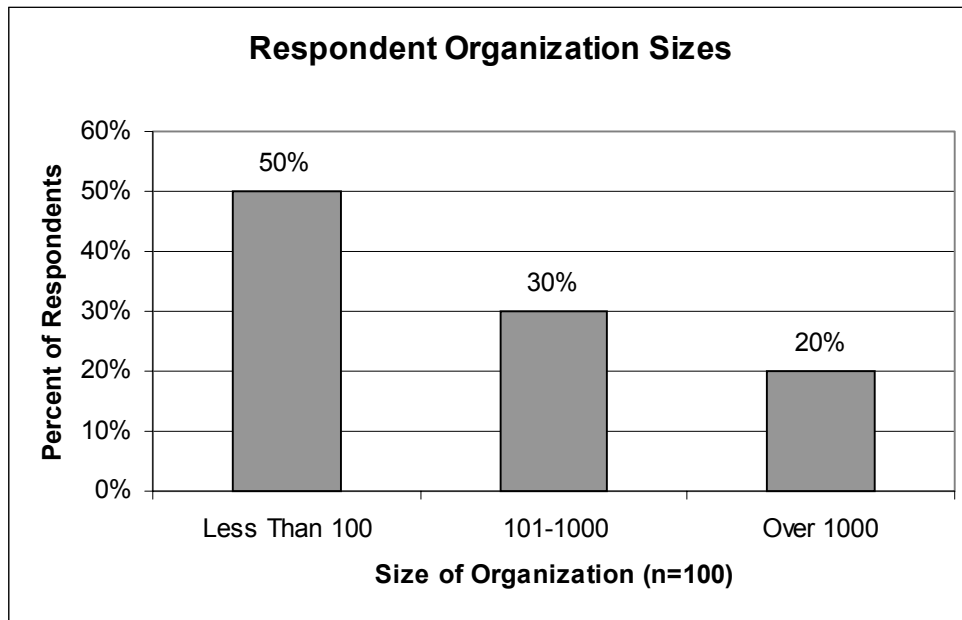


## Demographics

### ***Company Sizes***

Survey response revealed a wide range of company sizes, with employees ranging in number from 1 to 150,000, and with a mean of 4,240. The largest number of respondents, at 50%, were small organizations, those with 100 employees or less. Medium-sized organizations with 101 to 1000 employees constituted 30% of the respondents, followed by large organizations, those with over 1000 employees. The study sample is representative of the stratified frequency of small, medium and large organizations with a presence on the Internet. (See Chart 1-1)

**Chart 1-1: Organizational Sizes (N=100) Q2**

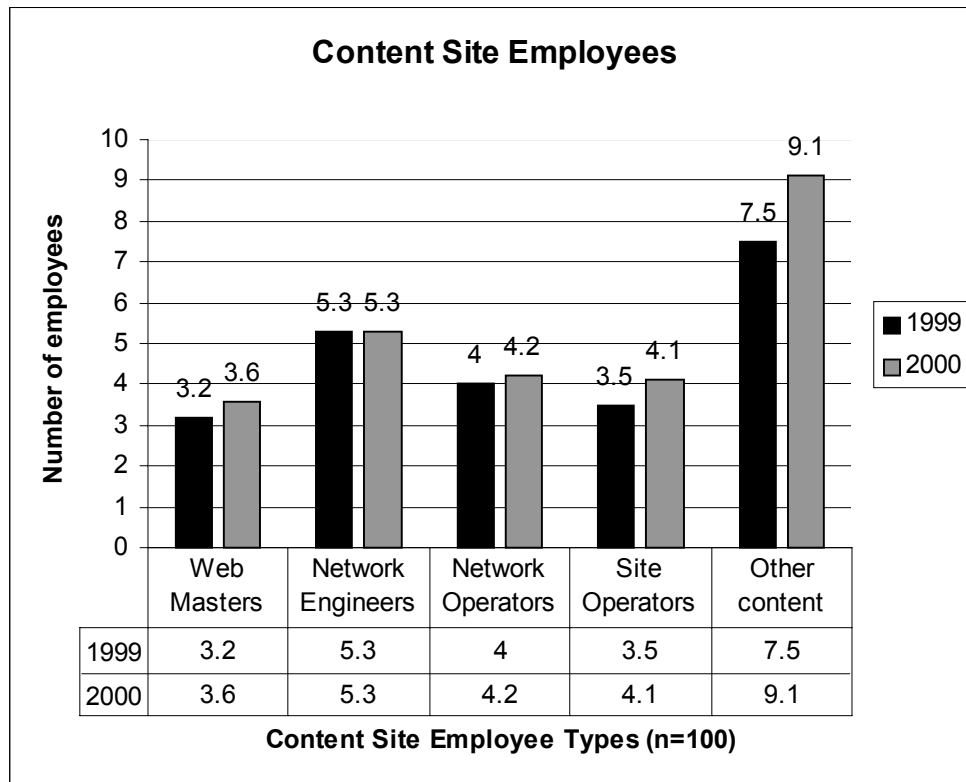


### ***Content Site Employee Types***

Content site employees are those whose job function involves working with their companies' Web sites. The response to the study survey indicates that the average overall number of content site professionals will likely increase from 23.2 per company in 1999 to 26.3 during 2000. Chart 1-2 below depicts the anticipated increase in Webmasters, Network Engineers, Network Operators, Site Operators, and other content site employees.

Based on metrics gathered from respondents later in the study, content site traffic is increasing at an average of 8.4% a month and it is apparent that there will not be enough professionals to keep up with content site growth. With the current scarcity of content 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 services in a way that extends the capacity and efficiency of existing content site employees rather than replacing them.

**Chart 1-2: Content Site Employee Types (N=100) Q3**

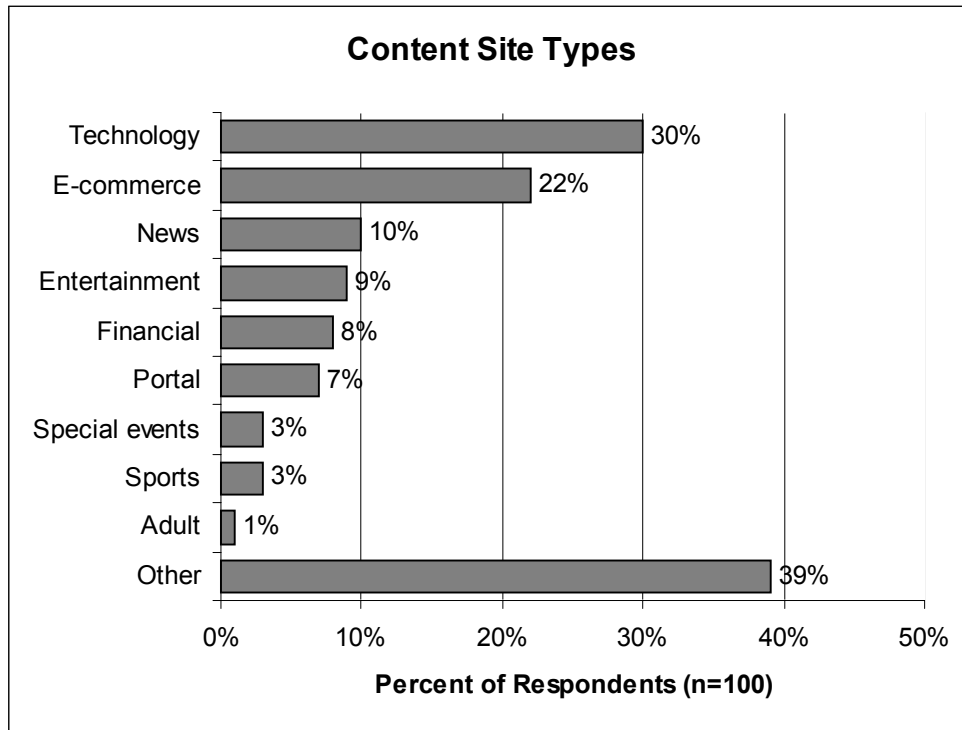


**Content Site Types**

Respondent content site types ranged from technology to business-to-business sites. Oftentimes technology companies are at the forefront of early adopters of new technology, continually seeking ways to increase the overall company effectiveness.

Technology sites at 30% were the most frequent content site type in the study sample, followed by e-commerce at 22%, and News at 10%. Chart 1-3 below shows respondent content site types. Responses not listed in the question were categorized as “Other” and are listed in table 1-1 below.

**Chart 1-3: Content Site Types (N=100) Q4**



**Table 1-1: Content Site Type Other Responses**

<i>Other Responses</i>	
Company Marketing	9
Educational	8
Online Publishing	6
Government	4
Manufacturing	4
Affinity Community	4
Market Research	1
Business to Business	1

**Site Revenue**

Performance, one of the two ways in which content sites differentiate, can be tied directly to the bottom line of a content site that generates revenue.

Content sites that generate revenue were predominantly those of medium-sized and large companies.

When asked for the annual revenue generated from their site, 48 respondents refused or could not answer the question and 33 indicated that their content sites did not generate revenue. Some of respondents with content sites that do not generate revenue were education and government content sites and likely do not generate revenue. The data below is therefore drawn from the 19 participants who provided an actual dollar figure in response to the question.

For respondents that generate revenue, responses ranged from \$5000 to \$1,000,000,000 annually, with an average of \$70,415,789 annually. By trimming the largest three responses from the sample, the trimmed mean of those with revenue is \$1,431,250 annually.

**Table 1-2: Content Site Revenue Q20**

<b>Content Site Revenue</b>	
Mean (N=19)	\$70,415,789
Trimmed Mean (N=16)	\$1,431,250

## Site Connectivity

### ***Content Site Configurations***

The most prevalent content site Internet configurations, utilized by 43% of the study respondents, were externally hosted content sites, that is, those sites entirely hosted on a service provider's network. Externally hosted sites are mostly small and medium-sized companies that do not have adequate resources, desire or expertise to maintain Web servers.

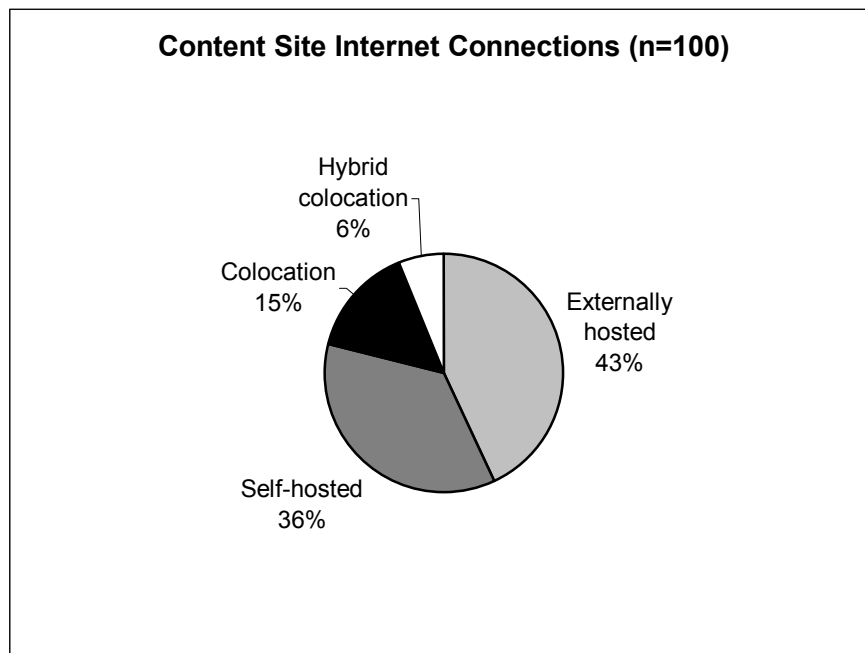
Self-hosted content sites are hosted on server(s) in the respondent's own network, with the respondents themselves maintaining the servers and Internet connection. Self-hosted content site configurations are employed by 36% of the study respondents.

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 15% of the study respondents.

Very few of the study respondents used a hybrid approach to hosting their content site. Six percent of respondents host servers in both the service provider's network and their own networks.

Chart 2-1 below shows respondent content site Internet connection types.

**Chart 2-1: Content Site Connectivity (N=100)**





## Content Delivery Services

### *Plans for Content Delivery Services*

#### Content Delivery Service Architectures

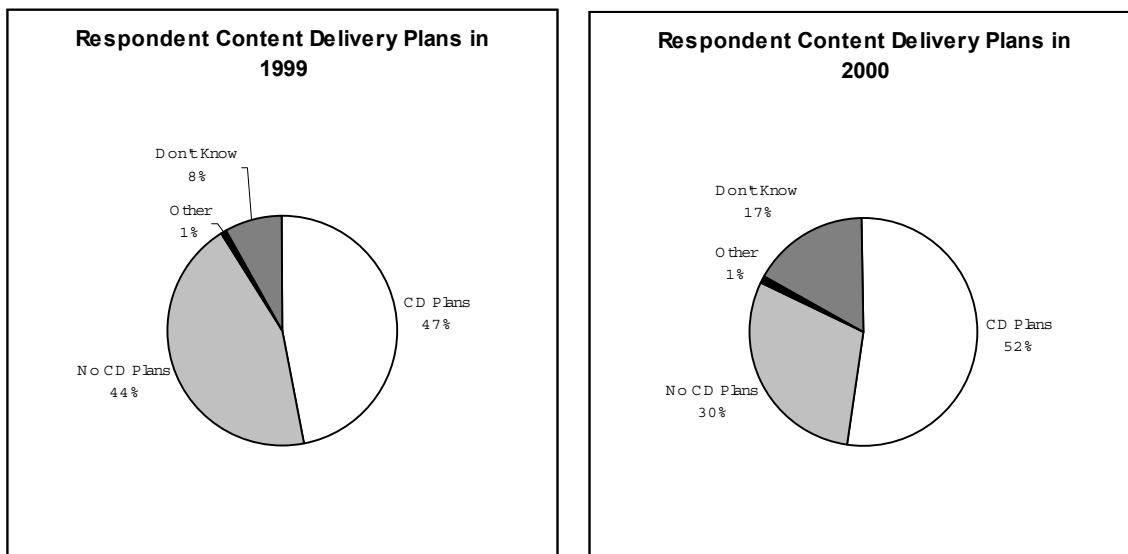
The survey indicated a higher than expected response for plans to invest in content delivery technology, which grows from 47% in 1999 to 52% in 2000. (A lower percentage had been anticipated, as content delivery solutions are relatively new.) Plans to invest in content delivery technology included plans for in-house and service subscriptions to content delivery solutions.

The significant change from 1999 to 2000 is in “Don’t Know” responses, increasing from 8% to 17%, and supporting the indication of a new market. These respondents have not yet decided how they will address content delivery technology.

Respondents that had no plans to implement a content delivery solution decreased from 44% in 1999 to 30% in 2000. These respondents may be taking a “wait-and-see” attitude towards new technology that has not been proven in the market, and/or awaiting the turn of the century and the subsiding of Y2K fears.

The one “Other” response was “Re-brand and contract,” indicating plans to resell content delivery services. The charts below reflect respondent content delivery plans for 1999 and 2000.

**Chart 2-2: Content Delivery Technology Investment Plans (N=100) Q6**

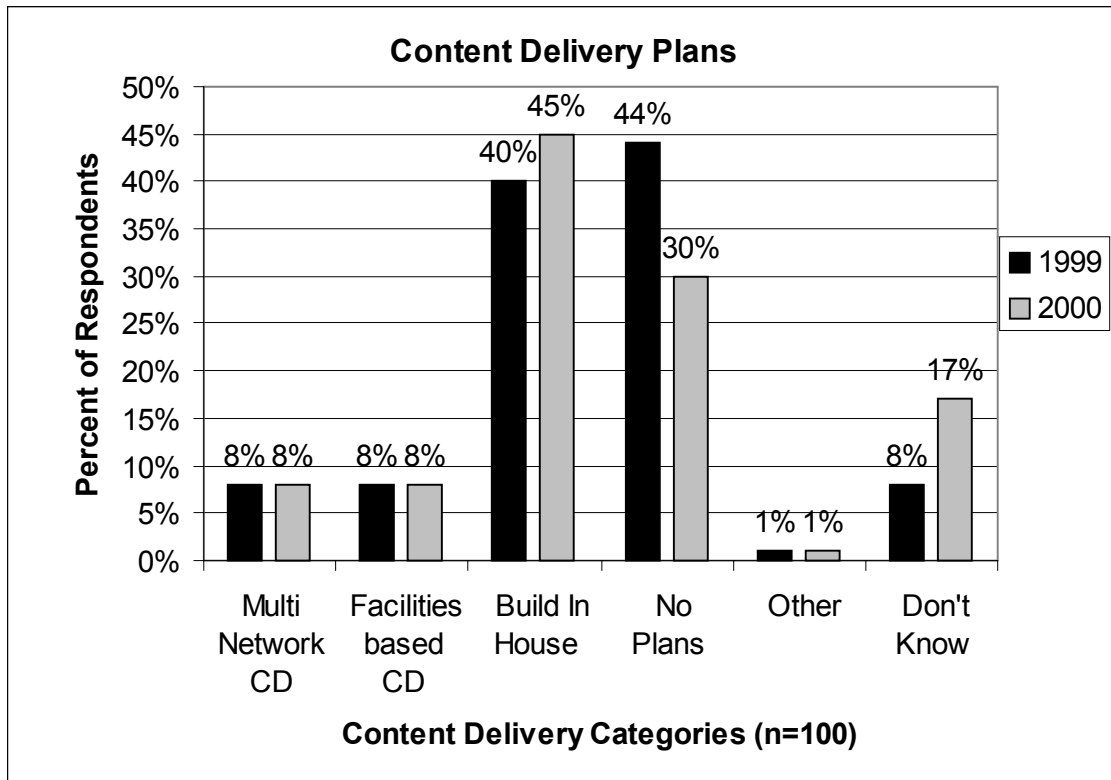


A content site can use content delivery technology in either of two ways: building out their own content delivery solution, or outsourcing the delivery of content to a multi-network or facilities-based provider of content delivery services.

The largest number of respondents plan to build their own private content delivery network. These respondents that have in-house buildout plans increase from 40% in 1999 to 45% in 2000. There is no growth for multi-network and facilities-based providers of content delivery services from 1999 to 2000, which remains steady at 8%. Chart 2-3 below depicts respondent's plans for content delivery solutions.

Respondent plans to outsource content delivery services to multi-network and facilities-based content delivery providers show no growth. However, we believe that when content site managers examine resources and planned growth, more will choose content delivery services. Please refer to the following section for the five primary reasons why content sites would choose content delivery services.

**Chart 2-3: Content Delivery Solution Plans Q6 (n=100)**





## Why Content Sites Would Choose Content Delivery Providers

There are five primary reasons why content sites would choose content delivery providers:

- 4) The importance of maintaining an online Internet presence will only increase as time progresses, and service degradation and outages can be costly to the content site provider in terms of both revenue and reputation.
- 5) Content sites bandwidth demand is growing at an average of 8.4% per month and the study survey indicates a planned average increase in the number of total content site employees of only 12% over the next year.
- 6) Expenditures on hardware and software decrease significantly from \$42,898 in 1999 to \$30,563 in 2000. In-house content delivery solution build-out plans are not reflected in planned hardware and software expenditures over the next year.
- 4) Speed is an important differentiation among content providers. Since Internet users are likely to shun a slow-performing content site in favor of a faster competitor, speed can impact on the financial health of a content provider, especially those dependent on e-commerce as a source of revenue.

### 6) Cost

In conjunction with this survey, we examined the costs for in-house hosting, hosting with a provider, and subscribing to content delivery services. The financial cost models subsequently developed revealed that the actual costs of using content delivery services can be lower than in-house hosting (without a content delivery solution) or hosting with a provider (without a content delivery solution). The benefits in performance, however, are much greater. For special short-term events, content delivery services provide the most cost-effective solution because the content site provider doesn't need to purchase additional equipment or hire extra personnel to deliver bandwidth requested. Respondents indicated that, on average, they do not plan to increase the number of content professionals nor hardware and software expenditures significantly, and many will likely not scale with growth. When content site managers examine the costs associated with a content delivery solution, many will likely choose to outsource the delivery of content.

The assumptions used in the creation of these models were the result of feedback from service providers, public pricing information and content delivery providers, and extrapolations based on industry trends. The models are intended to be used as a guideline only. Actual costs will vary. The details of the financial cost models are located in the appendix.

We chose a Tier 1 content site—those with greater than 20 Mbps monthly bandwidth usage—because they represent the early adopters of content

delivery services. For the purpose of this study we will examine a Tier 1 content site that utilizes 45 Mbps in the first quarter, increasing to 90 Mbps in the fourth quarter. Tier 2, 3, and 4 content sites may also benefit from content delivery services; however, assumptions and results will vary. Individual Tier 5 content delivery site subscriptions—personal Web pages—do not make economical sense. However, large providers that host many Tier 5 sites may subscribe to content delivery services in order to increase performance and reliability.

### *In-House Hosting Model*

In our Tier 1 cost model, the content site is operated and supported in-house by the content site provider. The content provider owns and manages connections to the Internet, provisioning additional wide area network (WAN) connections to increase capacity, network operations and support. The model identifies capital investments including T3 installations, Web servers, routers, and cost of labor. Recurring costs include bandwidth over a one-year period.

- Content sites generally need to increase bandwidth capacity in tandem with traffic demand. In our cost model, we started with 45 Mbps in Q1, 60 Mbps in Q2, 75 Mbps in Q3, and 90 Mbps in Q4. The largest recurring cost is bandwidth.
- Our assumptions include five full-time employees, each averaging \$68,000 annually, to ensure Web servers, routers, and switches are working properly and maintain server performance. Labor costs do not include hiring costs.
- We added two additional network engineers at month 6 to handle the additional capacity.
- Over a one-year period, equipment costs were \$448,000, bandwidth costs were \$905,000 and labor costs were \$442,000.
- The total cumulative costs for an in-house Tier 1 content site over the one-year period are \$1,795,000.

### *Hosting Provider Model*

In the Tier 1 hosting cost model, the content site is hosted with a service provider. The content provider owns and manages the Web servers located at the data center. The model identifies capital investments including Web servers, load balancer, and cost of labor. Recurring costs include bandwidth over a one-year period.

- Content sites generally need to increase bandwidth capacity in tandem with traffic demand. In our cost model, we started with 45

Mbps in Q1, 60 Mbps in Q2, 75 Mbps in Q3, and 90 Mbps in Q4. The largest recurring cost is bandwidth.

- Our assumptions include four full-time employees, each averaging \$68,000 annually, to ensure Web servers, routers, and switches are working properly and maintain server performance. We then added two more network engineers at month 6 to handle the additional capacity. Labor costs do not include hiring costs.
- Over the one-year period, equipment costs were \$368,000, bandwidth costs were \$675,000 and labor costs were \$351,000.
- The total cumulative costs for a hosted Tier 1 content site over the one-year period are \$1,394,000.

### Content Delivery Services Model

In the Tier 1 content delivery services cost model, the content site is hosted with a service provider. The content provider still owns and manages the web server located at the data center. The model identifies labor costs and capital investments, including Web servers. Note that there are no additional labor costs added in month 6 because the content delivery provider handles any additional labor needed to cover increases in bandwidth and Web server capacity. Recurring costs include bandwidth over a one-year period.

- Content sites generally increase bandwidth capacity in tandem with traffic demand. In this cost model, the content site starts with 45 Mbps in Q1 and requires an additional 15 Mbps for each subsequent quarter. The largest recurring cost is bandwidth.
- Our assumptions include three full-time employees, each averaging \$68,000 annually, to maintain Web server performance. Because the content delivery provider handles increases in bandwidth and Web server capacity, the content provider does not need to hire another employee at month 6 to alleviate excess workload.
- Over the one-year period, equipment costs were \$48,000, bandwidth costs were \$982,000, and labor costs were \$204,000.
- The total cumulative costs for a content delivery subscriber Tier 1 content site over the one-year period are \$1,234,000.

### Summary of Investments and Returns

- The biggest differences in performance between the three cost models are in terms of speed, reliability, and scalability, and the ability to boost bandwidth and server capacity for special heavy-traffic online events.

- The content delivery service solution, with the content delivery provider distributing content closer to end-users for \$1,233,500 annually, provides content providers with the highest performance.
- The hosting provider solution, costing \$1,393,800 annually, offers the second-highest performance.
- The in-house hosting cost model, costing \$1,686,000 annually, is the lowest performing of the three scenarios.
- The largest saving in the content delivery service model comes from a reduction in equipment and labor. The actual costs of the three models - in-house hosting, hosting provider, and content delivery services - will vary.

## **Benefits and Barriers**

### **Content Site Content Delivery Benefits**

Content delivery solutions help content sites differentiate in performance to enhance the end user's experience while browsing the content site. The difference between content sites that decide to deploy their own content delivery solution and those that outsource distribution to a provider of content delivery services will be in cost and control. In the financial models we discussed above, costs can vary widely depending on bandwidth and resources.

A provider's use of many content delivery servers to distribute content can add resiliency to the content site. Content site objects are distributed throughout the content delivery provider's service network logically, based on traffic demand and network conditions for optimal performance. The principal benefits of subscribing to content delivery services are an increase in speed, reliability, and scalability, and in the content provider's ability to hold special traffic-boosting events.

Subscribing to or developing an in-house content delivery solution adds reliability - that is, the ability of a site to perform consistently - by delivering content from multiple redundant locations, and increases scalability in three areas: bandwidth, network equipment and personnel. Increasing bandwidth capacity with a content delivery provider requires few resources from a content site provider, because the delivery provider, rather than content site personnel, delivers and maintains bandwidth. Because delivery providers can increase capacity as needed, site providers can cost-effectively ensure continued high performance during special high-traffic events and peak loads.

### **Barriers for Content Delivery Services**

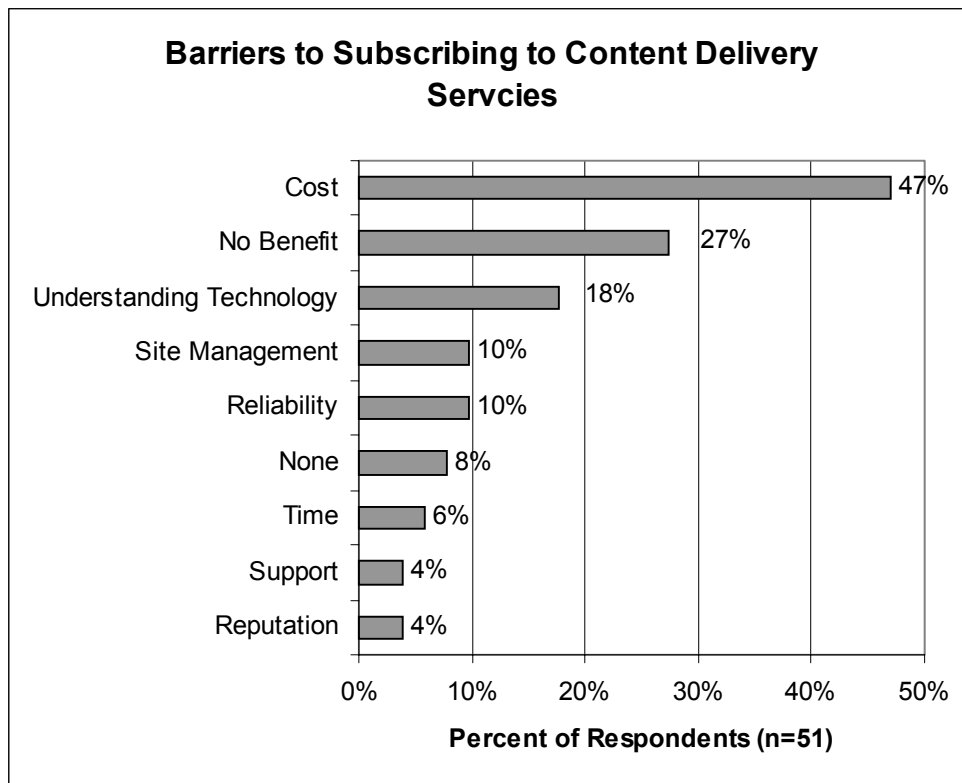
Respondents were asked in an open-ended question to describe their top three barriers for subscribing to content delivery services. We categorized responses based on individual answers. As shown in chart 3-1 below, the strongest is Cost, followed by No Benefit, and Understanding Technology. Since the current buyer thinking of 47% 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 similar to the ones above.

The second largest barrier, described by 27% of the study respondents, was that they saw no benefit to content delivery services. Some of the study respondents from education and government may not have an interest in

performance, and therefore see no benefit to subscribing to content delivery services. However, those respondents that do have an interest in content site performance differentiation and saw no benefit likely do not understand how content delivery technology works.

The ability of prospects to understand new technology is pivotal to content delivery service providers' acquisition of new customers. Eighteen percent of the study respondents described their lack of understanding of the technology. Content delivery technology is new, and can present a challenge to potential customers. Providers of content delivery technology should create documents that target readers at different levels of technical expertise, which may include the business- focused buyers, those new to content delivery technology, and technically advanced buyers.

**Chart 3-1: Content Delivery Service Barriers (N=51) Q27**



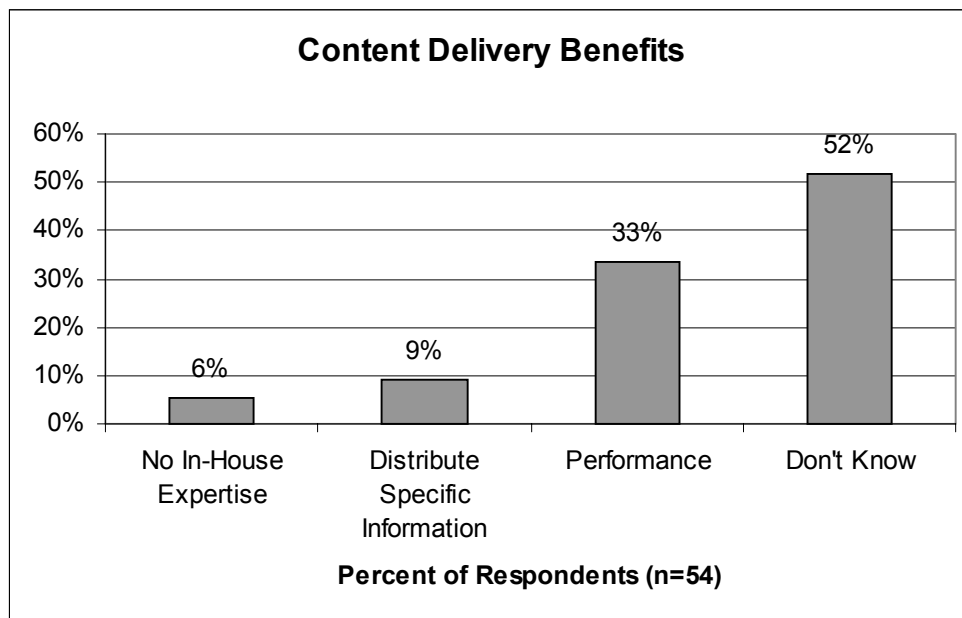
## Why Content Delivery Services?

### Why Content Delivery Services

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, distribute specific information, no in-house expertise, and don't know. The chart 3-2 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 33% of our responses from an N of 54, included a range of benefits such as efficiency, consistency and providing better delivery for customers. The most frequent response to why respondents use or plan to use content delivery services was "Don't know." Of the total respondents, 52% did not know why they plan to use content delivery services, likely because they do not yet have a full understanding of how content delivery services work.

**Chart 3-2: Benefits of Content Delivery Solutions (N=54) Q10**



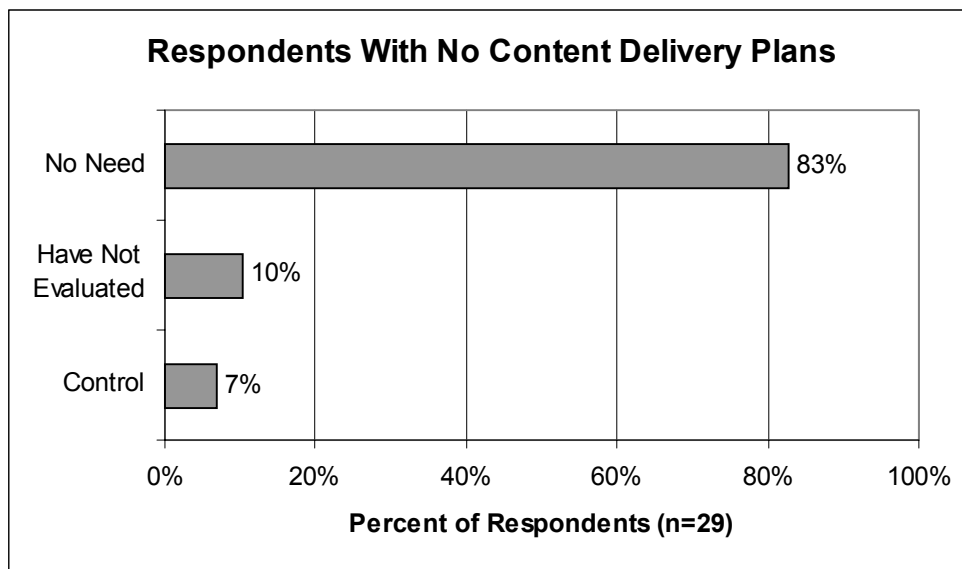
### Why Not Content Delivery Services

Respondents that have no plans for content delivery services were asked in an open-ended question why they do not plan to use these services. Based on responses, we categorized descriptions as follows: no need, have not evaluated, and control. The chart 3-3 below shows categorized respondent

descriptions of reasons for content delivery services. Please see the verbatim responses in the data summary for details.

The most frequently response was that the respondent saw no need for content delivery services. Some of these respondents represented education and government sites, whose, site performance does not impact the bottom line, and may therefore explain a lack of interest in performance gains. Only 10% of our respondents with no content delivery service plans indicated that that they have not evaluated the technology. Seven percent of respondents to this question indicated they did not want to lose control of their content site.

**Chart 3-3: No Plans For Content Delivery Solutions (N=29) Q7**



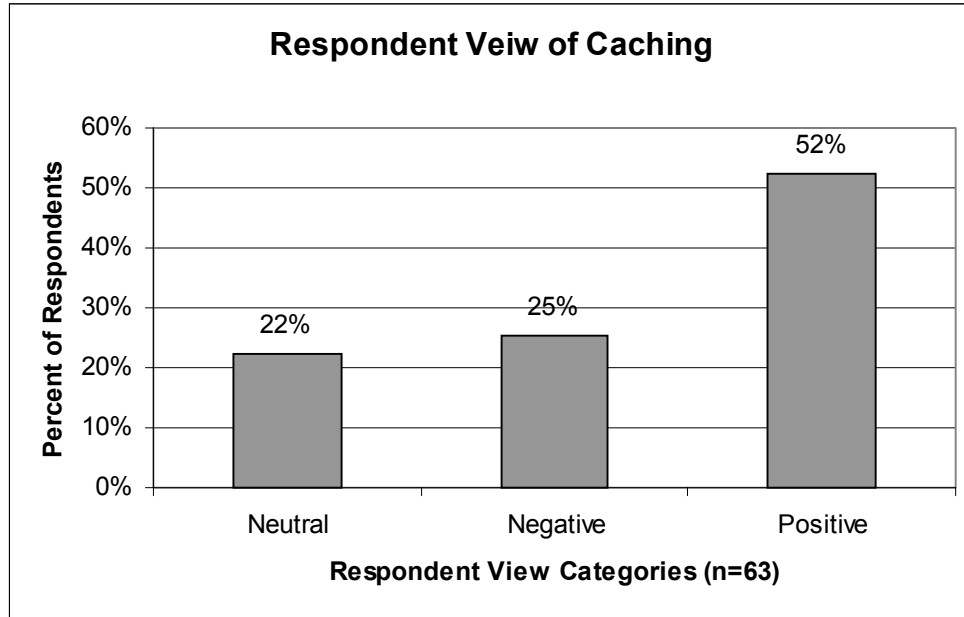
### The Role of Caching

To help determine how caching should be woven into content delivery marketing messages, respondents were asked in an open-ended question for their view of the use of caching technologies. Responses were categorized as positive, negative or neutral, and are reflected in chart 3-4 below. Please see the verbatim answers in the data summary for detailed responses.

Caching is viewed positively versus negatively by the study respondents in a 2-to-1 ratio. However, if caching messaging is introduced in content delivery service market messaging, companies should address the perceived problems that caching itself introduces. The negative concerns regarding caching use described by the study respondents included data degradation, synchronization problems, problematic content updates, tracking banner advertisements, and difficulties with conducting diagnostics.



**Chart 3-4: View of Caching (N=63) Q28**





## **Current And Future Plans For Service Providers**

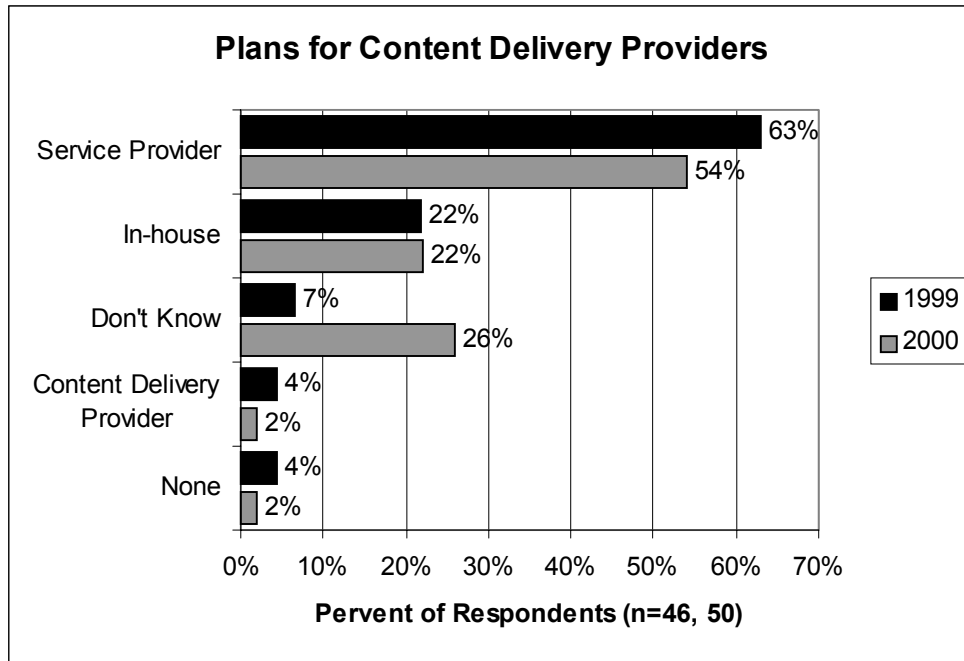
### ***Content Delivery Provider Plans***

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 September 2000. We defined content delivery services as a service or services that enable Web content providers the ability to distribute Web site content in multiple locations simultaneously. Based on responses, we categorized respondent descriptions as follows: ISP, in-house, don't know, and content delivery provider. The chart 4-1 below shows respondent plans for content delivery providers. Please see the verbatim responses in the data summary for details.

Of the 29 service providers listed by the 46 respondents to this question, none have announced content delivery services. These respondents are likely planning to use their existing provider for content delivery services. Ten respondents plan to use in-house means for a content delivery solution, and will also likely use their existing service provider. Only two respondents named content delivery providers, IBEAM and Frontier Global Center (now Global Crossing).

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 two responses in 1999 and 2000. Study responses indicate that there is sufficient room in the content delivery market for providers that are examining content delivery service offerings.

**Chart 4-1: Content Delivery Provider Plans (N=46) Q8**

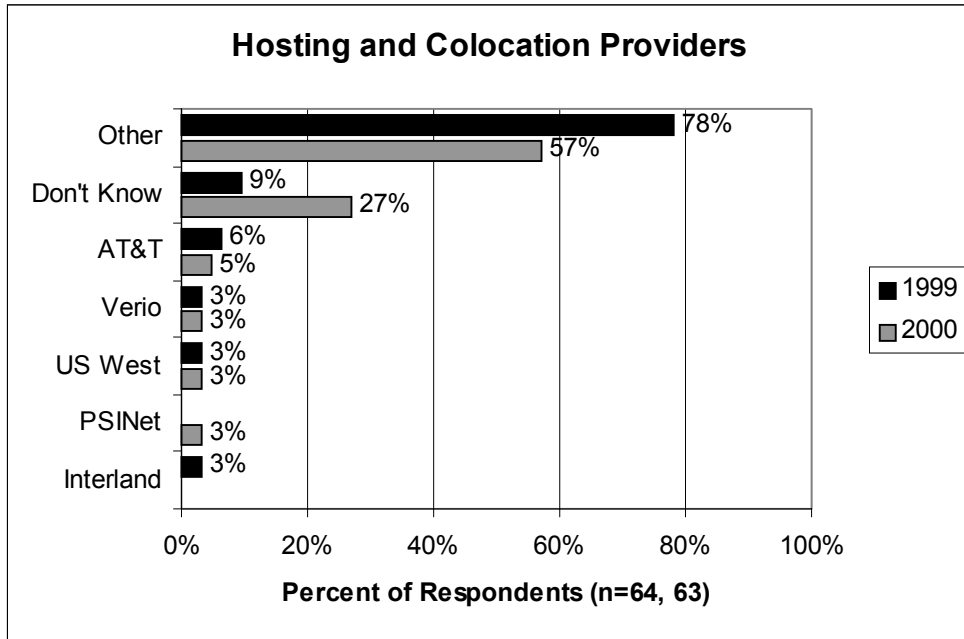


**Current and Planned Hosting Providers**

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 September 2000. The chart 4-2 below shows respondent current and future plans for colocation and hosting providers. Please see the verbatim responses in the data summary for details.

Respondents currently subscribe, and plan to subscribe to a wide range of colocation and hosting providers, with no predominant provider. The most significant change in responses from 1999 to 2000 is in the “Don’t Know” category. Based on the verbatim responses, some respondents are clearly not happy with their current service provider. The “Other” responses include single providers ranging from the well known to the lesser known.

**Chart 4-2: Current & Future Hosting Providers (N=64, N=63) Q11-12**





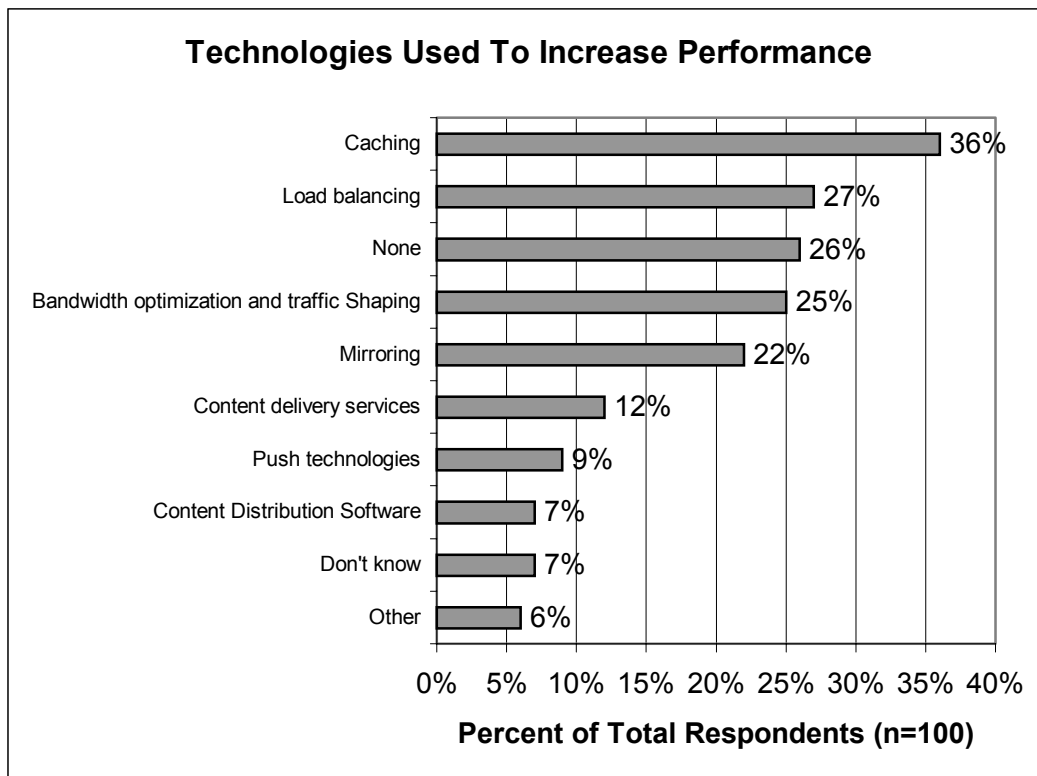
## Bandwidth and Performance

### *Current Performance Technologies*

Content providers use a variety of technologies to increase performance, enhancing the end user's experience 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 5-1 below depicts respondents' use of technologies which increase performance.

Caching is the most frequently used technology, as indicated by 36% of the respondents. Load balancing products were used by 27% of the respondents, followed by 25% that use bandwidth optimization and traffic shaping products. Twenty-six percent of the respondents do not use any products to increase performance. One of the six "Other" responses was "Handled by ISP," providing an indication that some respondents may depend on their service providers for maintaining performance. Mirroring Technology was used by 22% of our respondents, followed by 12% that use Content Delivery services. Surprisingly, only 7% of our respondents use content distribution software, considering the large percentage that plan to implement an in-house content delivery solution.

**Chart 5-1: Performance Technologies (N=100) Q13**



### **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 19 respondents, predominantly Tier 1 sites (those in excess of 20 Mbps per month) gave us the monthly average Megabits per second. One respondent's answer was so high, that it dramatically affected mean. The average with all 19 respondents was 453.7 Mbps per month. Trimming the outlier, and examining the 18 responses, the trimmed mean was 179.9 Mbps. Table 5-1 below depicts mean and trimmed mean for content site bandwidth.

**Table 5-1: Content Site Bandwidth Q14a**

Mean	(N=19)	453.7 Mbps
Trimmed Mean	(N=18)	179.9 Mbps

### **The Cost of Bandwidth**

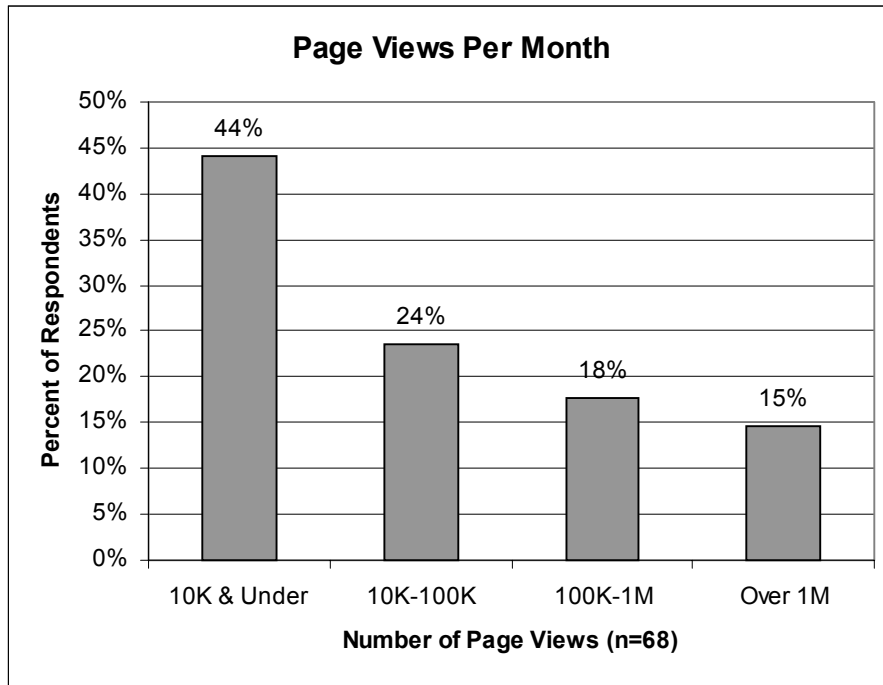
Respondents were asked to approximate their cost for bandwidth per megabit per second per month. Only two responses were received (not unexpected, as the price of bandwidth is too competitive for content sites to reveal). The average of the two respondents was \$984 per Mbps per month. Insufficient responses, however, deny this figure any significance.

### **Page Views and Page Weight**

Respondents were asked to approximate number of page views per month. Unlike the response to our questions regarding Megabits per second and the cost of bandwidth, 68 of the study participants provided data. The mean of the 68 responses is 56,064.8 page views per month with a range of 5 thousand to 10 million. To gain a better understanding of respondents, chart 5-1 below shows a breakdown of respondent page views per month. Forty-four percent of respondents had 10 thousand or less page views per month. Respondents with more bandwidth utilization included 24% indicating 10-100 thousand monthly page views, 18% with 100 thousand to 1 million monthly page views, and 15% with over 1 million monthly page views.



**Chart 5-1: Monthly Page Views (N=68) Q14b**



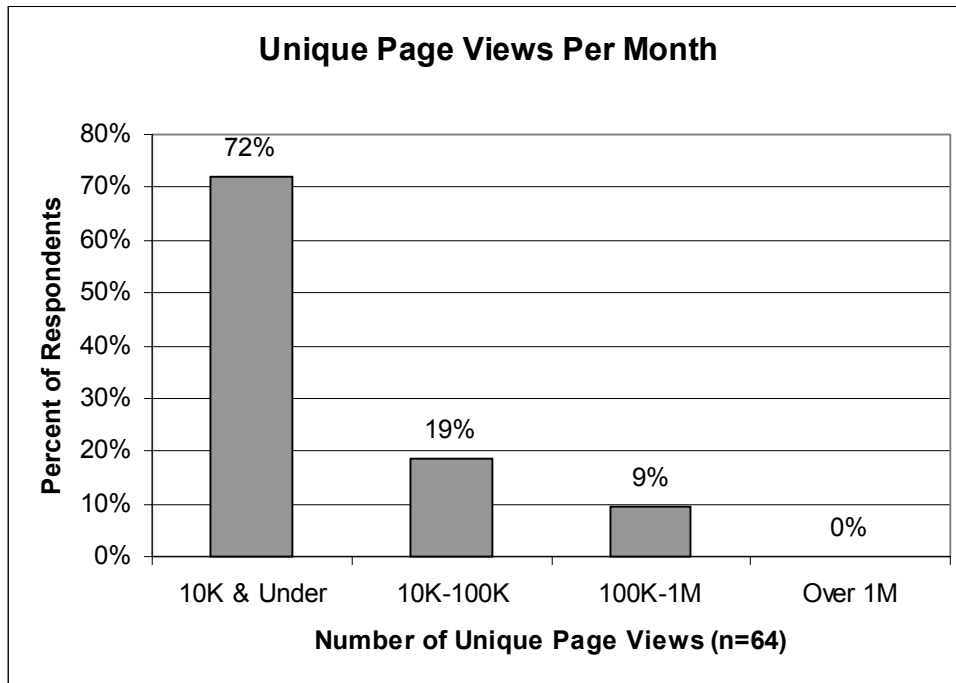
### ***Page Weight***

Respondents were asked for the average page weight in Kilobytes for their content sites. After trimming outlier responses, 27 responses had a trimmed mean of 105.5 Kilobytes per web page.

### ***Unique Visitors***

As unique visitors are a good measure of the growth of a content site, respondents were asked for the number of unique visitors they had per month. The mean of the 64 respondents for unique visitors is 39,491 page views per month with a range of 1 to 675,000. The chart 5-2 below shows the breakdown of unique page views.

**Chart 5-2: Monthly Unique Page Views (N=64) Q14c**



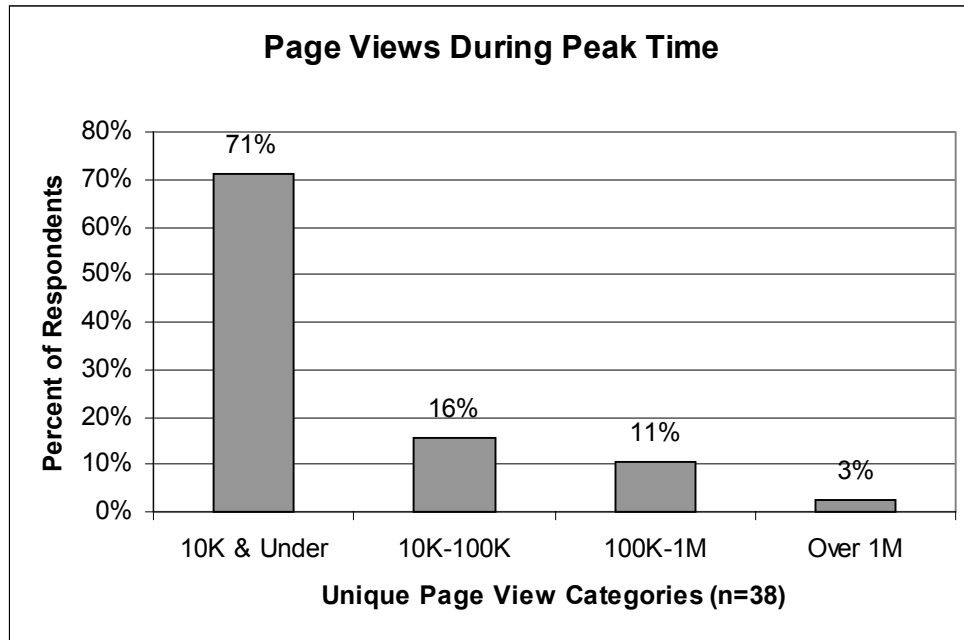
### ***Content Site Peak Usage***

#### **Bandwidth**

Respondents were asked to approximate number of page views per month during peak usage. The mean of the 38 respondents is 89,418.5 page views per month with a range of 1693 to 2 million. Chart 5-3 below shows a breakdown of respondent page views per month during peak usage and gives us a better understanding of our study participants.

A comparison of the monthly average and peak page view indicates a 37% increase during peak utilization. However, only 38 respondents answered the peak page view question, compared to the 68 respondents answering the monthly average page view question.

**Chart 5-3: Peak Time Page Views (N=38) Q15b**



### Peak Bandwidth

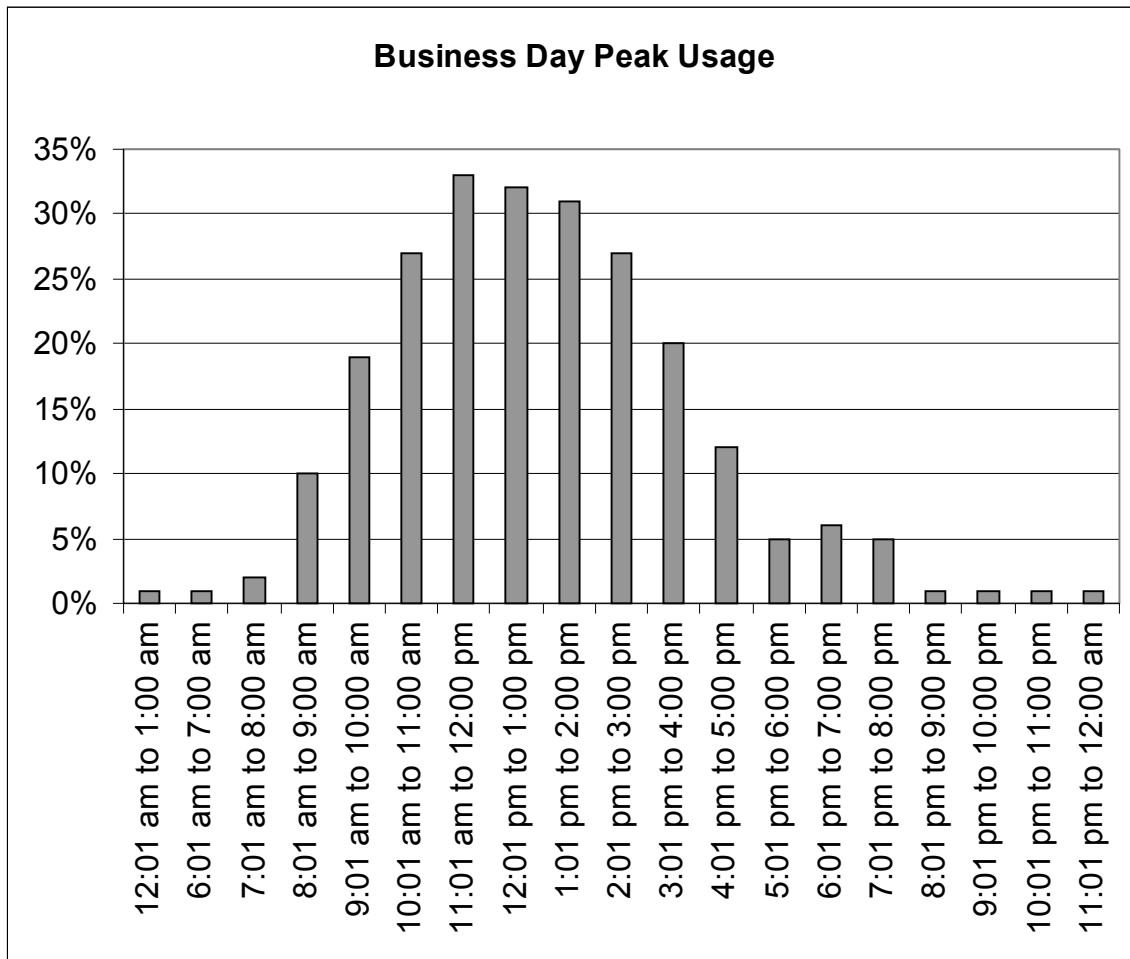
An overwhelming number of respondents chose not to reveal content site peak bandwidth usage. The majority of content professionals indicated they felt that Megabits per second usage information was too sensitive to reveal. Only ten respondents gave us the monthly peak bandwidth usage average in Megabits per second for their site and the mean of these figures is not significant. A better indicator of bandwidth utilization can be found in the number of page views above.

### Time of Day

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 5-4 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 10 a.m. to 2 p.m.

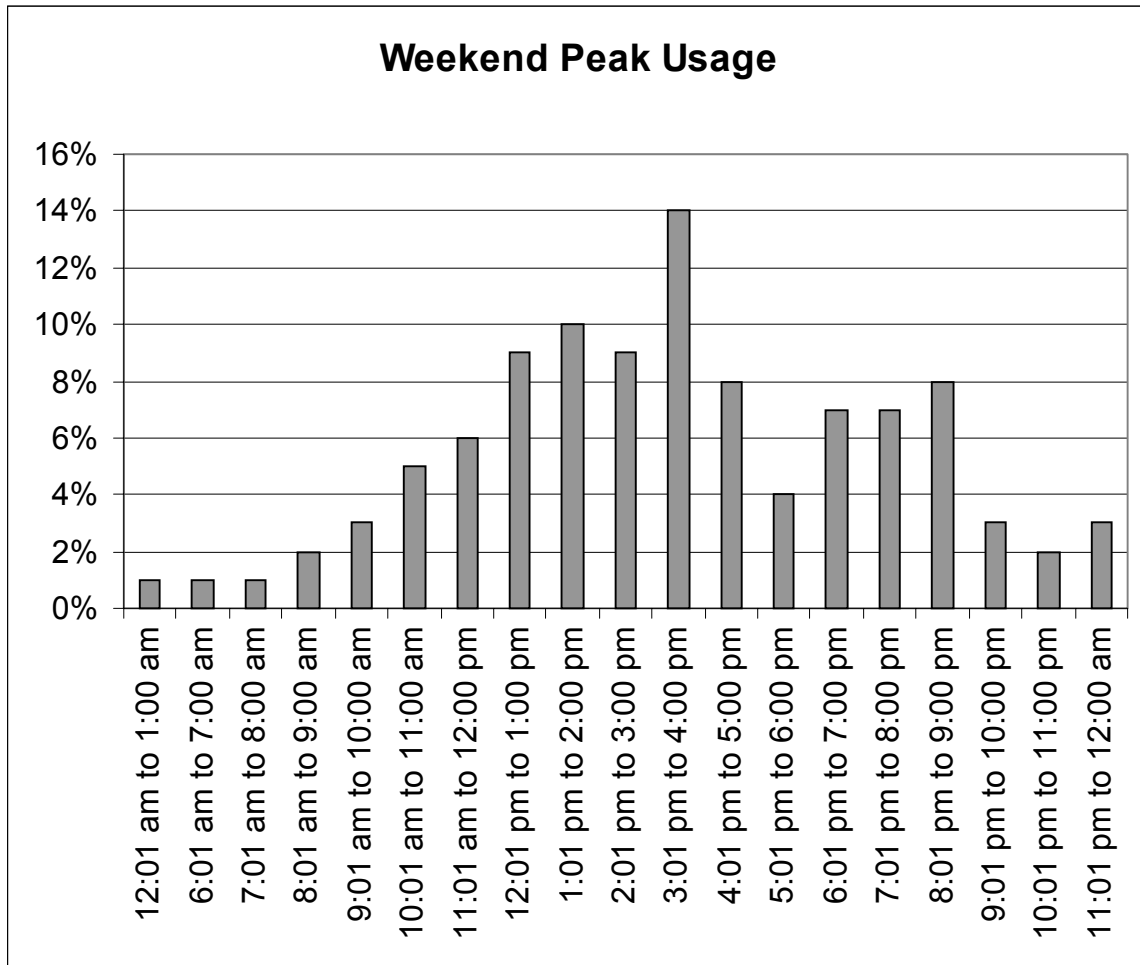
**Chart 5-4: Business Day Peak Usage (N=100) Q17**



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 5-5 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 longer 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 8 p.m.

**Chart 5-5: Weekend Peak Usage (N=100) Q18**



***The Growth of Content Site Bandwidth***

Content site growth affects network operations and build-out plans. Respondents were asked by what percentage bandwidth-demand for their content site grows per month. Of the 44 responses that ranged from 1% to 48%, the mean monthly bandwidth growth was 8.4%. Table 5-2 below depicts the average monthly content site bandwidth growth percentage.

**Table 5-2: Site Bandwidth Growth Percentage Q16**

Bandwidth percent growth	(N=44)
Mean:	8.4%



## **Service Level Agreements**

### ***SLAs for Content Delivery Services***

Service level agreements (SLAs), which offer a way for service providers to differentiate the quality of Internet access, are more widely available to enterprise customers now than in the past. A list of SLAs in random order was presented to the respondents to rate for content delivery services when choosing a service provider. On a scale of 1 to 5, 1 is not important and 5 is critical. Chart 6-1 below shows the most desired SLAs, rated 4 or 5 by respondents.

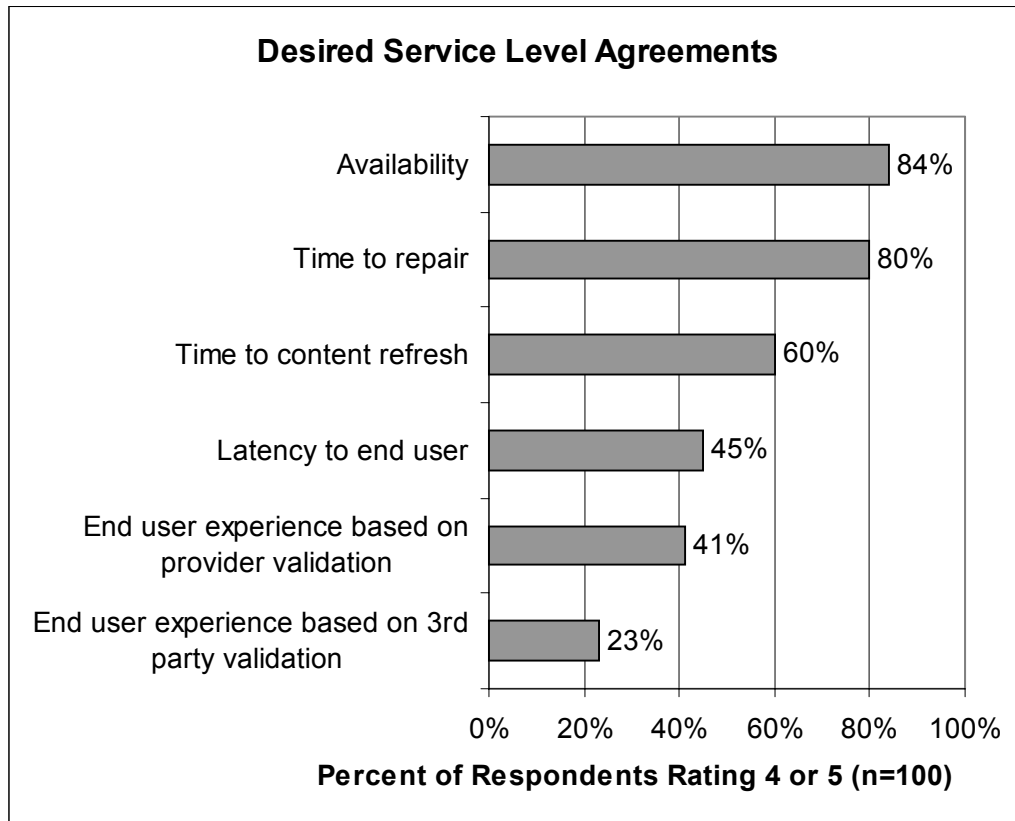
Availability, rated critical by 84% of respondents, and Time to Repair, rated critical by 80%, reflect basic network operational SLAs. Respondents are concerned with the uptime and downtime to repair factors, those that frequently impact an online reputation.

Content refresh SLAs were rated critical by 60% of our total respondents, indicating the importance of fresh and frequently changing content. As we discussed earlier in this study, content sites differentiate by 1) performance and 2) content development. Content professionals need assurances in the form of SLAs to guarantee the freshness of content, critical for frequently changing sites, and especially those that tailor content for each user. Content freshness is a key differentiation among the top news sites, and can be directly tied to a site's bottom line.

Latency to end user (45%), end user experience based on content delivery provider validation (41%), and end user experience based on third-party validation (23%) (e.g. Keynote) SLAs were rated critical by less than half of our respondents. There is a notable 18% difference between end user experience validation based on the service provider and that based on a third party. Including third-party validation to a SLA can add considerable cost, and may reduce profit margins. However, some of the Tier 1 respondents rated third-party validation a critical SLA. Service providers should maintain the capability to validate the end user's experience both internally and through a third party, thus offering levels of end user experience validation in order to optimize margins.

Most content delivery providers currently offer their customers SLAs such as performance measured and validated by third parties. Since content sites have varied performance requirements, SLAs should be negotiable and, fundamentally, should guarantee faster, more reliable services and specifically address availability and time to repair factors.

**Chart 6-1: Critical SLAs (N=100) Q19**





## 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, Internet bandwidth, outsourcing services, and hardware and software.

The average total content site expenditures increase only 3% from \$215,711 in 1998 to \$222,887 in 1999. The total expenditures for 2000 decreases from 1999; the number of respondents that answered the year 2000 questions, however, also decreases. Only two categories of expenditures increase from 1999 to 2000: content delivery services and outsourcing services, which increase 9.5% from \$25,775 to \$28,494, and 31% from \$13,149 to \$18,920, respectively.

Plans for bandwidth expenditures stay relatively constant, slightly decreasing between 22 and 20 thousand over a three-year period. 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 8.4% monthly. The increases in content delivery services and outsourcing 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 significantly from 1999 to 2000. 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.

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. Both service providers and product manufacturers have an immense opportunity to influence customers through market education.

**Table 6-1: Expenditures Q20**

<b>Expenditures</b>	<b>1998</b>		<b>1999</b>		<b>2000</b>	
Content development	(n=58)	\$64,509	(n=55)	\$73,170	(n=44)	\$55,264
Site Management	(n=54)	\$42,022	(n=56)	\$46,082	(n=46)	\$31,363
Content delivery services	(n=48)	\$25,849	(n=50)	\$25,775	(n=38)	\$28,494
Internet Bandwidth	(n=47)	\$22,262	(n=45)	\$21,813	(n=36)	\$20,088
Outsourcing Services	(n=61)	\$16,541	(n=56)	\$13,149	(n=48)	\$18,920
All Hardware and software	(n=61)	\$44,528	(n=60)	\$42,898	(n=49)	\$30,563
Totals		\$215,711		\$222,887		\$184,692

## **The Cost of Content Site Downtime**

### ***Site Revenue Generation***

Content sites are an increasingly critical part of revenue generation for most businesses today. The importance of an online presence varies from business to business, some relying entirely on their content site as a source of revenue while others use their site as a marketing tool.

Maximizing profitability is a fundamental business practice. Based on expenditure responses in the previous sections, the average site that generates \$1.4 million annually will have average annual expenditures of \$222,887. The content site costs do not include any costs associated with production or shipping, nor do they include general and administrative costs. Based on averages for sites that generate revenue, the costs of ongoing content development and maintaining the content site is roughly 16% of site revenue.

The importance of content site uptime is clear: service degradations and downtime can cost revenue and reputation.

### ***Lost Site Revenue***

Content sites generate revenue in three ways: 1) products purchased, 2) advertisement, and 3) online subscriptions. Respondents were asked to approximate how much their company would lose per hour if their site were not operational. Chart 7-1 below shows lost revenue per hour if a site outage occurs for advertisement impressions, products purchased, and online subscriptions.

E-commerce has provided an avenue for product manufacturers to increase efficiencies through a direct product distribution channel with their online presence. Respondents' sites that generate revenue through online product purchases lose an average of \$16,201 for each hour their site is down.

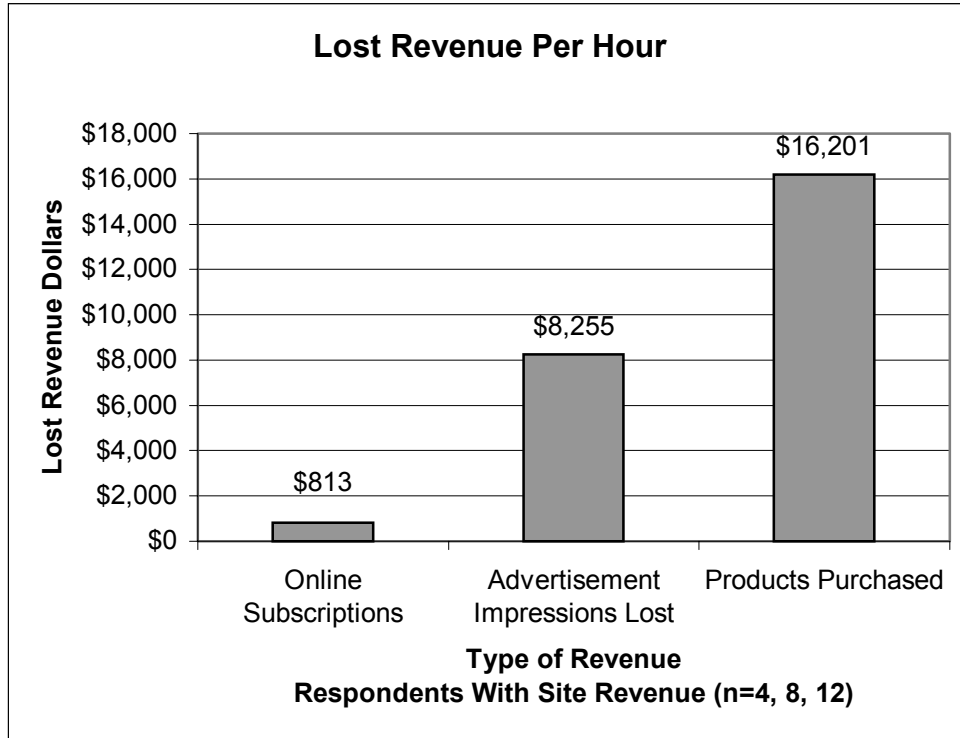
Content sites that generate revenue through advertisement use a business model similar to that of the tried and truly effective television advertisement model. Banner ads are big business to those sites that carry a large number of page views. For study respondent sites that generate revenue through advertisements, one hour of site downtime costs \$8,255 in lost revenue.

Online content subscriptions offered by study respondents ranged from adult to news. Respondent sites that generated revenue from online subscriptions lose \$813 on average for every hour their site is down.

Both product manufacturers and service providers should position solution redundancy and resiliency through the cost of downtime pain 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 Data Communications, 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 differentiates through resiliency and redundancy.

**Chart 7-1: Hourly Lost Revenue Q22**



## **Market Messaging**

### ***Provider Positioning***

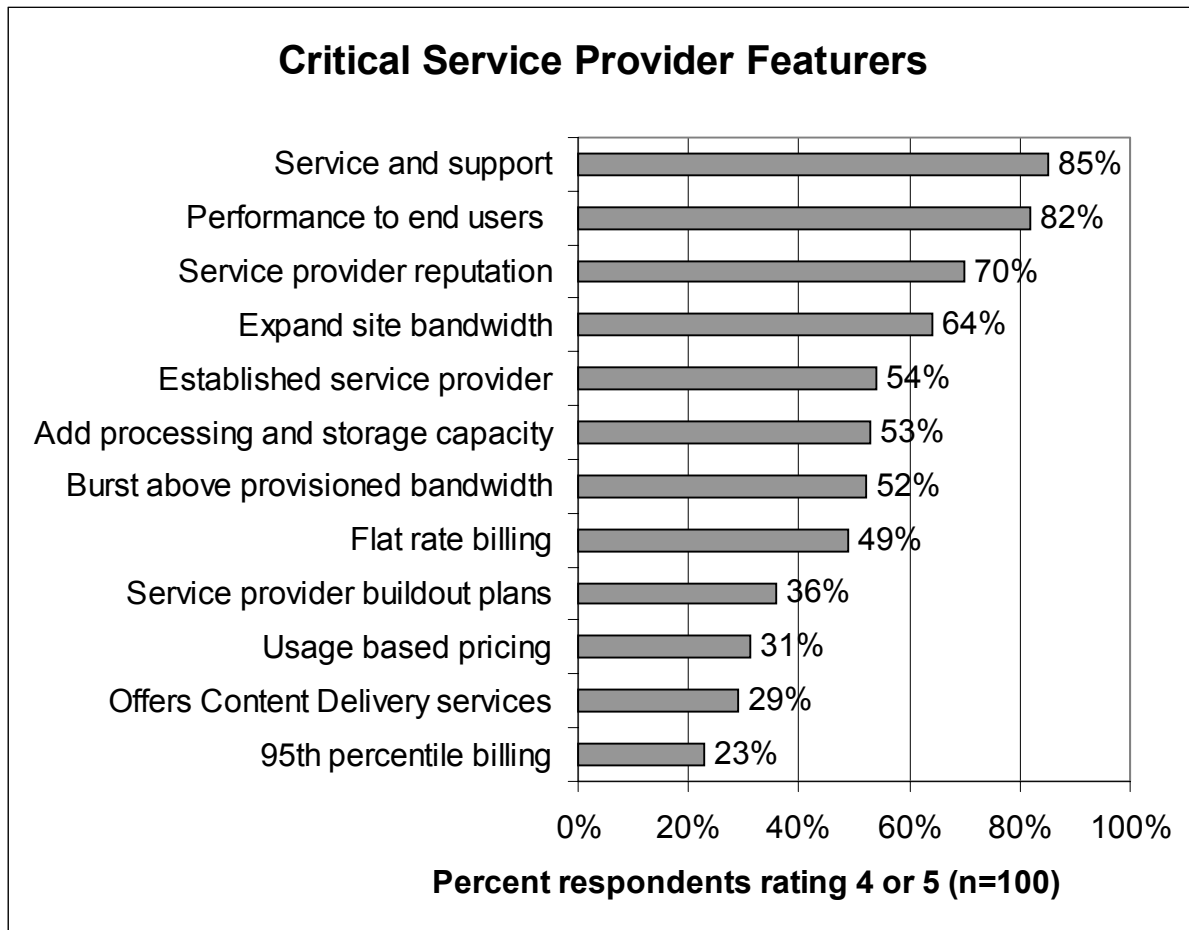
The Web hosting services are difficult to differentiate in a competitive market. Service providers following the next evolution of hosting services will offer or begin to offer content delivery services in a variety of flavors, based on levels of performance, SLAs and service provider features. Features used in choosing a service provider for connectivity were listed in random order, and respondents were asked to rate them on a scale of 1 to 5, where 1 is not important and 5 is critical. Chart 8-1 below shows the most desired service provider features, those rated 4 or 5 by respondents.

Service and support has been, and will likely continue to be one of the fundamental criteria by which a customer judges a provider. The end user experience will make or break any service, especially with services that include new technology. Oftentimes service and support is overlooked as fundamental differentiation on which corporate positioning is based. With service and support rated critical by 85% of the study respondents, service providers should make significant efforts to develop an excellent reputation for service and support as early as possible.

Performance to end users is a fundamental differentiation and was rated critical by 82% of the study respondents. Service providers should seek credible third- party publications for industry performance testing. Marketing collateral should explain in detail how performance is increased through network architecture and technology education.

Technology professionals operate in pockets of tightly-knit communities where the latest and greatest products, services, and technologies are openly discussed in online forums, trade shows, and list servers. Seventy percent of the study respondents rated a service provider's reputation as critical when choosing a service provider for connectivity. Service providers should incorporate high profile programs promoting constant customer interaction to maintain good customer relationships. Service providers should also invest in partnering with a company or developing a good public relations group in order to maintain good press and analyst relations.

**Chart 8-1: Critical Service Provider Features (N=100) Q24**



### **Marketing Channels**

Disseminating market messaging to target markets is costly. 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 sources for learning on a scale of 1 to 5, where 1 is not important and 5 is critical. Chart 8-2 below shows those sources for learning about new technology, which were rated 4 or 5 by respondents.

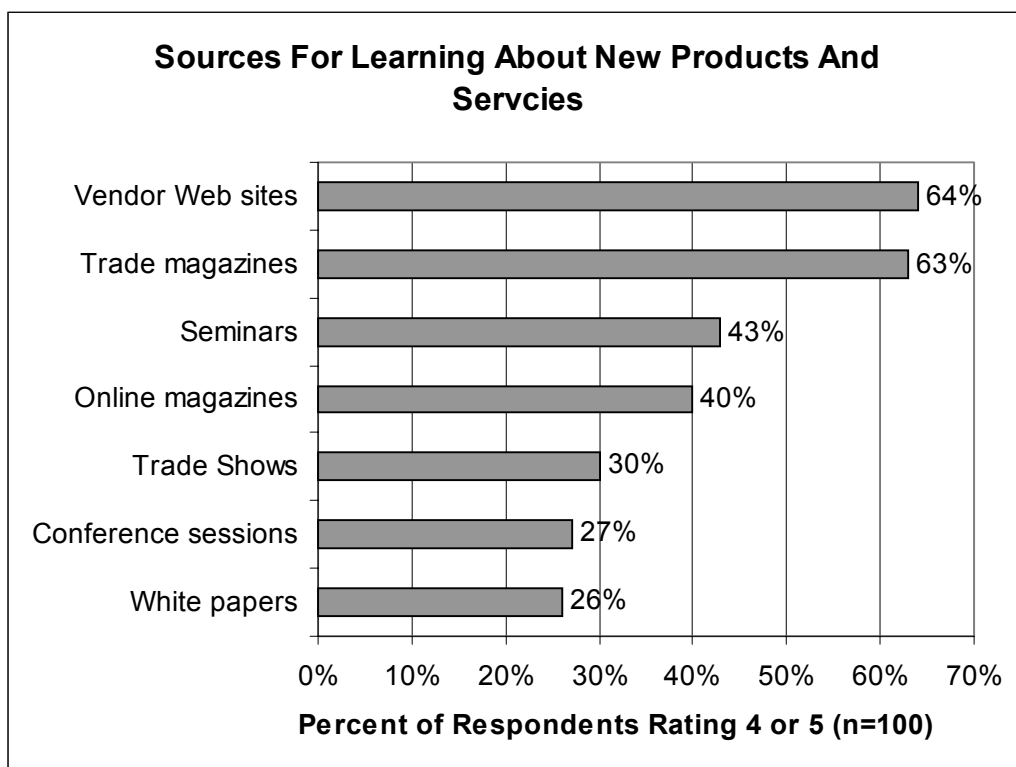
Vendor Web sites were rated a critical source for learning about new products and services by 64% of the study respondents. Both product manufacturers and service providers should prioritize their Web site as an important medium for marketing to customers. Vendor Web sites should market though educational material on their site.

The content delivery market is just beginning, and will continue to gather momentum though media coverage in trade publications. Sixty-three percent

of the respondents rated Trade Magazines a very useful source for learning about new products and services. Service providers and product manufacturers should strive to be included in columns and articles that are published in the significant trade publications. Vendors should strive to maintain good relationships with industry writers that cover hosting services and new technology.

Seminars were rated very useful by 43% of the respondents, slightly higher than Trade Shows (30%) and Conference sessions (27%). Product manufacturers and service providers should investigate seminar opportunities with potential customers.

**Chart 8-2: Sources For Learning (N=100) Q25**

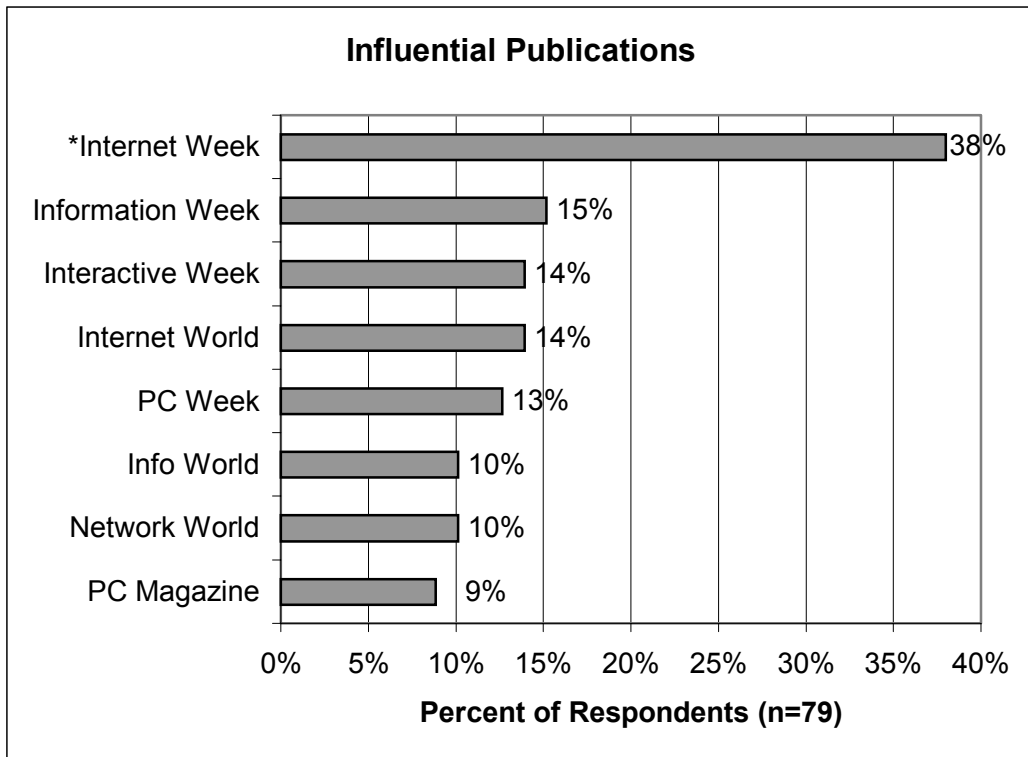


### ***Top Publications***

Content professionals read many publications, creating the challenge of determining in which publications it is important to advertise. We asked respondents, in an open ended question, for the top three publications that are influential in their purchases of products and services. The list of publications varied widely, with some publications, however, more significant than others.

The significant publications with which service providers and product manufacturers should maintain close relationships include Internet Week, Information Week (12%), Interactive Week (11%), Internet World (11%), and PC Week (10%). The list used to randomly select Webmasters and Content Managers for this study comprised content professionals who subscribe to Internet Week or LAN Times. The 30% response identifying Internet Week may, therefore, be atypical. Please see the data summary for details on the verbatim responses.

**Chart 8-3: Most Influential Publications (N=79) Q26**



***The Decision Maker***

To better understand who the final decision makers are, we asked respondents to identify, by department or title, the individual(s) in their companies who make the decision to choose a service provider. Chart 8-4 below shows the breakdown of categorized responses. Please see the data summary for details on the verbatim responses.

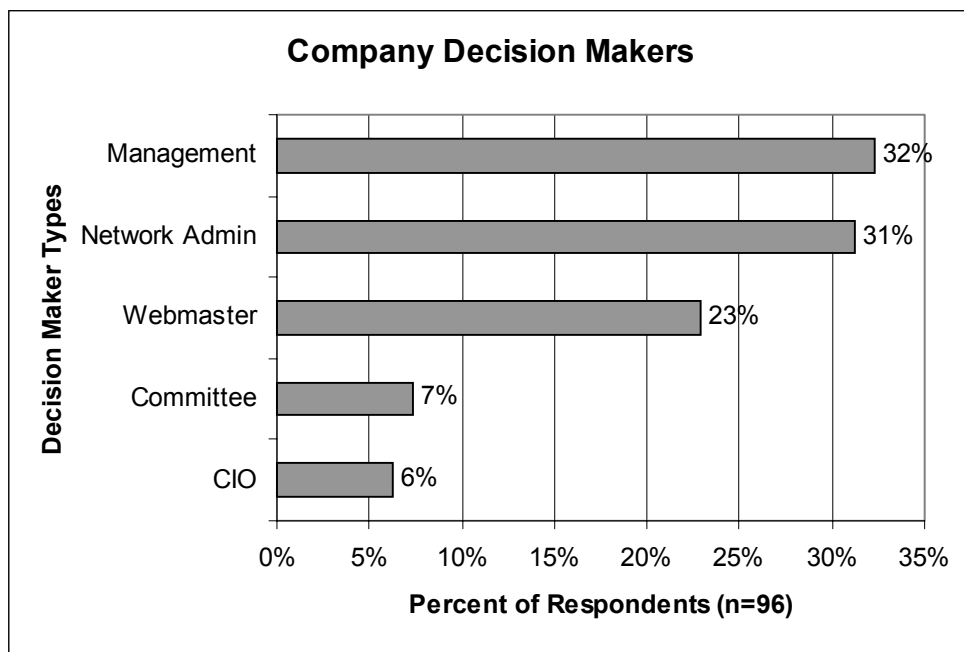
Service providers and product manufacturers must sell to both technical buyers and business buyers. Technical buyers are the IS professionals that fit into the Network Admin category. Sales attempts and marketing collateral



targeting technical buyers should include detailed technology information positioning the resiliency and redundancy of products and services.

The business buyers are those in the Management category, and include titles such as Presidents, Vice Presidents and Managers. The business buyer is more concerned with how new products and services will increase the bottom line. Sales and marketing collateral should address this through case studies and business-oriented white papers and business models.

**Chart 8-4: Company Decision Makers (N=96) Q29**





## Challenges

### ***Business Challenges***

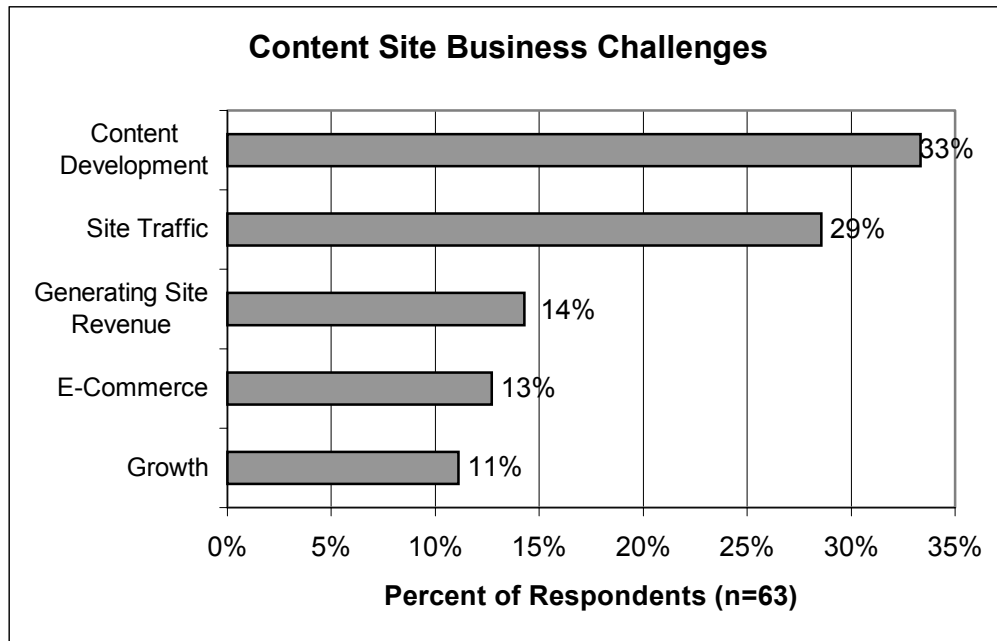
In order to gain a better understanding of the business challenges content professionals currently face, we asked study respondents in an open-ended question for the largest business challenges for their Website. We categorized the verbatim responses into: content development, generating site traffic, generating site revenue, e-commerce, and growth. Chart 9-1 below shows a percentage breakdown by category of respondents' Website business challenges. Please see the verbatim responses in the data summary.

The top business challenge, described by 33% of the study respondents, was content development. Service providers and product manufacturers should continue to develop tools that help content professionals develop and distribute content. As time progresses, the importance of content delivery solution management tools will increase in importance and become a more critical part of solution differentiation.

Generating site traffic was described as a challenge by 29% of respondents. These content professionals were seeking ways to increase the number of "Eyeballs" (end users) that browse their content site. Product manufacturers and service providers should investigate programs to help content sites develop additional traffic.

Generating site revenue (14%), e-commerce (13%), and growth (11%) are also mentioned as business challenges.

**Chart 9-1: Business Challenges (N=63) Q31**



### **Technical Challenges**

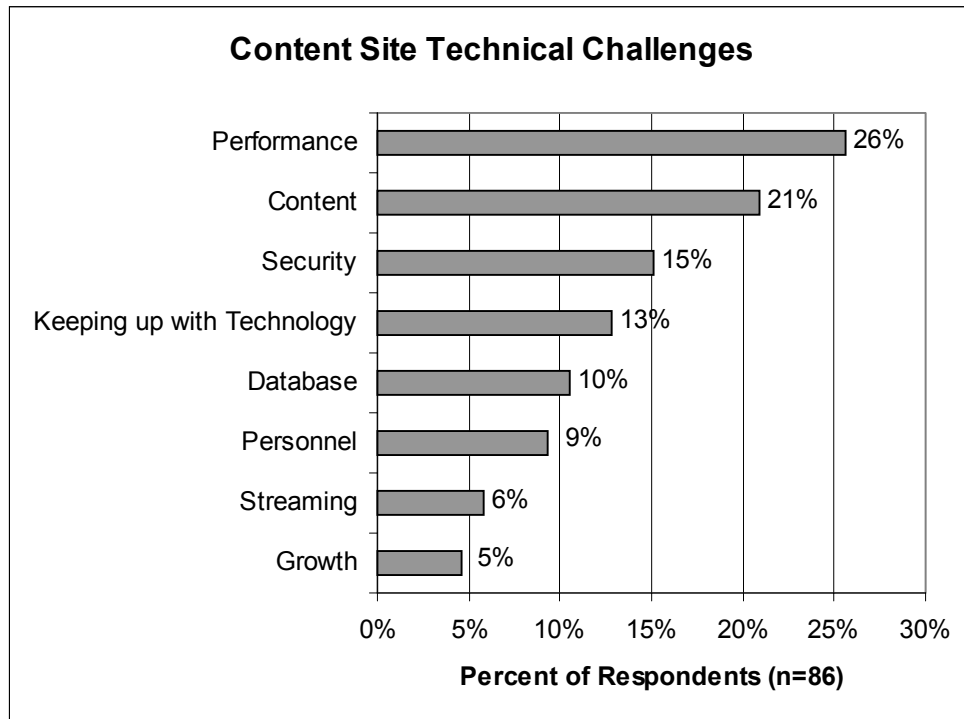
To gain a better understanding of the content site technical challenges, we asked content professionals, in an open-ended question, for their largest technical Website challenges. We categorized the verbatim responses as follows: performance, managing content, security keeping up with technology, databases, personnel, streaming and growth. Chart 9-2 below shows the percentage breakdown by category of respondents' Website technical challenges. Please see the verbatim responses in the data summary.

Performance, as described by 26% of the study respondents, was the largest technical challenge. Maintaining content site performance is a huge pain point for content site professionals. Technical sales material should include detailed explanations of how a content delivery solution significantly increases performance.

Managing content was described as a challenge by 21% of the study respondents. New types of content are continually being developed and content professionals are tasked with making new content types work. Product manufacturers and service providers should develop content delivery solutions that include easy to use management tools that can manage and adapt to a variety of content types.

Security was described as a challenge by 15% of the study respondents. Content delivery solutions should address security by supporting the variety of secure content types, as well as demonstrating secure products or services.

**Chart 9-2: Technical Challenges (N=86) Q30**





## **Content Delivery Solutions**

### ***Content Delivery Service Solutions***

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

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 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 provider's 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 service overall 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.

### **Akamai**

Akamai provides a guaranteed global delivery service for Internet content that improves web site speed and reliability and protects against Web site crashes due to demand overloads. Our FreeFlow service, which we market to large businesses and businesses with an Internet focus, delivers our customers' Web content through a worldwide server network by locating the content geographically closer to their users. Using software that is based on our proprietary algorithms, we monitor Internet traffic patterns and deliver our customers' content by the most efficient route available.

Our service is easy to implement and does not require our customers or their Web site visitors to make any hardware or software modifications. In addition, our customers are able to provide their Web site visitors with a richer experience, due to our ability to deliver advertising banners, icons, graphics, video & audio streaming, and software downloads from our network. Our customers, who operate many highly trafficked Web sites, include Apple Computer, CNN Interactive, Discovery Channel Online, Infoseek, The Motley Fool, and Yahoo!

#### Mirror Image Internet, Inc.

Mirror Image Internet, Inc. eliminates the "world wide wait" by providing content delivery network services that speed Internet traffic and improve quality of service for Internet Content Providers, Service Providers and Corporations. By deploying an open standards network of highly scalable Content Access Points™ (CAPs) at key Internet exchange locations around the world, Mirror Image adds a new, high-speed infrastructure layer on top of the Internet. This global network intelligently stores content closer to the end user and powers Mirror Image's family of **instaDelivery**<sup>SM</sup> Internet Services. The Mirror Image suite of **instaDelivery** Internet Services include content distribution, streaming media, and caching services that enable customers to deliver maximum speed performance to their end users without making costly infrastructure investments.

Mirror Image Internet is deploying the world's largest and most powerful content distribution network. By uniquely servicing both access providers and content providers through the same global content distribution network, Mirror Image ensures maximum performance worldwide. In addition, Mirror Image provides the fast delivery of 75% of customers' Internet traffic to millions of end users worldwide – at rates up to ten times faster than traditional traffic flow.

Target markets include:

Internet Content Providers, Service Providers and Corporations.

#### Adero

Five key elements distinguish Adero from other vendors in the content distribution space:

1. Global Emphasis
2. Non-Invasive Deployment
3. Flexible Pricing Options
4. Technology Extensions (Upgrade path to support commerce and other distributed applications)



## 5. Content Localization

*Global Emphasis.* Internet performance degradation has two main sources: 1) “flood” events, where hundreds of thousands of users simultaneously seek to access the same information; and, 2) long latency, high loss, poorly peered network connections. Peak load events are characteristic of a handful of USA-based Web sites (players with whom you don’t want to share your network). Long latency and high loss connections are characteristic of the global Internet (and will be for some time).

The solution to the flood problem is enormous spare capacity. As with other vendors, AderoWorld provides spare capacity to its customers (hundreds of Mbps of super connectivity in the United States on 6 backbone networks). The solution to the second problem is to keep the audience from traversing high latency connections to the extent possible. What distinguishes AderoWorld is that its architecture is designed to keep the audience at the distributed node for *all* cacheable content, including html. This means that the audience in Australia, for example, is not required to connect with an origin server in say, Wisconsin, for each and every html page. This provides an enormous performance enhancement and advantage over certain competitors.

*Non-Invasive Deployment.* AderoWorld activation is a 10 minute process. More importantly, Adero requires no changes to your ongoing publishing and updating processes. AderoWorld requires no post-processing scripts or APIs to write to each time Web content is changed. Adero offers three levels of content control: user activated passive cache; regularly scheduled cache pre-population; and virtual mirroring (directory written to disk).

*Flexible Pricing.* AderoWorld is sold on a bandwidth basis OR on a pageview basis, depending on customer preference and business model. Both options are billed monthly and are available worldwide or on a per-region basis.

*Technology Extensions.* As described in question 4, Adero is built on an enterprise caliber processing platform. Adero will use this platform to extend support for distributed applications, such as content publishing and color matching, and electronic commerce applications, such as distributed Encryption, Point of Sale, and Certificate Validation.

*Content Localization.* Adero has developed a proprietary data network mapping and traffic management solution that continually updates operational maps of the Internet and provides best routing information to Adero’s network of Global Traffic Managers. This information can be used by customers in determining geographic targeting and providing localization of content.

## Exodus

Exodus Communications™ ReadyCache™ Content Distribution Service provides customers an efficient way to deliver content quickly to more end-users with a less costly investment in server infrastructure. The ReadyCache Service complements Exodus™ industry-leading network architecture and managed services such as monitoring, usage reporting, intelligent routing and log collation. ReadyCache moves content closer to the end-user by intelligently replicating frequently accessed data at geographically dispersed cache locations on the Exodus network. This provides both peak load handling capability and delivery enhancements because traffic to the requestor makes more use of the Exodus Network. In addition, the ReadyCache Service takes advantage of the Exodus high-speed backbone network to move data from the origin server to the cache server providing a direct connection between servers instead of going through the Internet to refresh the cache. Exodus' ReadyCache Service is implemented using clusters built on Inktomi Traffic Server caching technology deployed at Exodus Internet Data Centers (IDCs) located on the West Coast, Central, East Coast, and Europe. Along with the Exodus ReadyCache Service, Exodus provides daily and month-to-date bandwidth Reports including daily bandwidth reports of all cached traffic. Such reports can be securely accessed from the customer's browser. Exodus can provide surge-protection, better response time, and a scalable service on their network.

Exodus provides a direct path for content retrieval from the origin servers to the caching servers whenever content is not found in the cache. A key aspect is that the request and response from a cache server to the origin servers always uses the high-speed Exodus backbone, ensuring faster retrieval of requested information.

Target markets include

- Companies with large and small Web presence
- Customers that have Web sites with large amounts of cacheable content including; graphics, text, software or graphic downloads
- Exodus customers and non Exodus customers

### ***Content Delivery Product Solutions***

F5

F5's products fit into content delivery solutions in 3 ways.

First, BIG/ip & 3DNS can be "built into the plumbing" to help a content delivery service guarantee the availability of its service.

Second, BIG/ip, 3DNS & global/SITE can be used by the customer who is subscribing to a content delivery service to guarantee the availability of the head end site that feeds the content delivery service content. This is very important as all e-commerce transactions must still occur at the head end and must therefore be highly available and scaleable.

Third, global/SITE can be utilized by a customer to maintain synchronized copies of content at multiple sites if the customer wants to perform their own distributed content delivery. Of course, BIG/ip and 3DNS can be used to augment the salability and availability of this "self hosted" approach.

## InfoLibria

InfoLibria is an Internet infrastructure company that is dedicated to dramatically improving Internet functionality and performance. The key to superior Internet performance is content management and delivery—getting high-quality Web objects and streams to end users in an efficient and expedient manner. InfoLibria puts this capability into the hands of the Internet service providers, enabling these companies to gain an edge in a highly competitive market.

InfoLibria has developed a complete line of content-management and delivery systems that meet the needs of service providers of any size. InfoLibria's Content Commander™ enables service providers to direct Web objects and streams throughout their networks by positioning content at InfoLibria's streaming media product, MediaMall™ and caching appliance, DynaCache™. MediaMall and DynaCache reside at points of presence near the edge of the network, enabling content to be served quickly and efficiently to end users.

An InfoLibria system that utilizes Avid Technology's broadcast storage capabilities is the Industry's most powerful multimedia streaming system, capable of serving an unparalleled 1,600 unique, one-megabyte multimedia streams at once.

InfoLibria's content-management and delivery systems enable a wide range of new value-added services for service providers, including:

- Pay-per-view video
- TV-quality video and stereo-quality audio
- Surge protection
- Customized file sizing
- Pay-per-access (software downloads, etc)

## Inktomi/Webspective

Inktomi's Content Delivery Suite is the only complete content delivery infrastructure enabling service providers and enterprises to reliably move

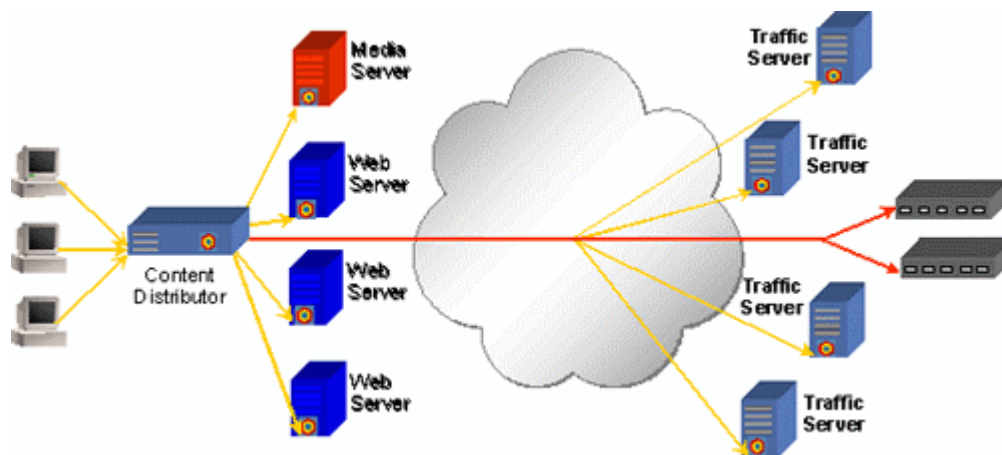
content and applications closer to end-users, thus reducing network latency, optimizing bandwidth and improving content performance and quality.

The Content Delivery Suite Includes:

**Content Distributor:** The Content Distributor is an intelligent, highly scalable system for distributing web content to servers and caches over a LAN or WAN. Using an agent/manager architecture and a proprietary communications protocol, Inktomi enables content updates over any TCP/IP-based network, and unlike other content distribution mechanisms, works securely through firewalls. In addition, the Content Distributor interfaces with leading load balancers to update them regarding content availability across the network.

**Content Manager:** Inktomi's Content Manager is based on the same agent/manager architecture used for Content Distributor. Agents located at the distributed servers and caches capture log files and other system statistics, either through a Inktomi ISAPI/NSAPI server plug-in or via log file injection, and send them to a centralized relational database in real-time. With this data, the Content Manager can monitor and manage SLA's and other performance thresholds. The Content Manager also allows the administrator to configure, start-up, shut-down and take other actions on the distributed web applications, servers and caches in the system.

**Figure 9-1: Inktomi**



## Novell

Novell Internet Caching System (ICS) is the award-winning caching appliance that significantly reduces customer wait times, handles your ever-increasing traffic, and makes content delivery more affordable. Along with reducing costly bandwidth usage, Novell ICS has the ability to deliver content at ten to one hundred times the speed and with fifty times the connectivity of a web server. As an appliance, Novell ICS operates in any

Unix, Cisco, NT, or NetWare environment. These benefits, among others, enable content publishers, ISPs and enterprises to increase customer satisfaction, attract new customers and drive new revenue opportunities. Novell is partnered and inter-operates with various content distribution/management service providers such as Akamai, Edgix, Mirror Image and SkyCache. Novell ICS was specifically built as a platform for these and other services, and is the only product capable of offering in-the-flow Internet services due to its directory integration and significant performance headroom. Novell ICS's directory integration\* lays the foundation for user-specific ad injection, content transformation, and other content-delivery services that take advantage of knowing your customers in order to meet their specific needs. Novell also delivers streaming media\* and the unique ability to time shift live video\*. Novell ICS is available through OEM partners including Compaq, Dell, IBM, Legend, Microbits, NEC, OCD, Pionex, Quantex, and others.

- Novell ICS is currently available, the starred functionality will be available Q1 2000



## Content Delivery Services Forecast

### ***About the forecast***

The 1999 Content Delivery Service Study forecasts include dollars spent by content sites for content delivery services and in-house product implementations. This forecast does not include service provider expenditures for content delivery products.

### ***Methodology***

The 1999 Content Delivery Service Study forecasts examine the opportunity for service providers offering content delivery services and product manufacturers selling to content sites (not service providers). 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 to March 1999. A very small percentage of the total Web sites use a significant amount of bandwidth.

In order to simplify content site market segmentation for our forecast, we segmented content providers into the following groups:

- Tier 1 sites: organizational Web sites with average peak bandwidth usage exceeding 20 Mbps.
- Tier 2 sites: organizational Web sites with average peak bandwidth usage ranging from 10 Mbps to 19.9 Mbps.
- Tier 3 sites: organizational Web sites with average peak bandwidth usage ranging from 2 Mbps to 9.9 Mbps.
- Tier 4 sites: organizational Web sites with average peak bandwidth usage less than 2 Mbps.
- Tier 5 sites: personal Web pages.

Tier 1 content sites—such as Amazon.com, CNN.com, MSNBC.com, and Yahoo.com—represent the largest sites in the Internet with average peak bandwidth usage greater than 20Mbps. Tier 2, 3, and 4 content sites include a broad mix of organizations. Tier 5 content sites are personal Web sites and represent the largest number of sites in the Internet. Individual Tier 5 sites are generally included with a dial-up Internet access account, and will not subscribe to CDN services. Internet Service Providers (ISPs) that host many Tier 5 sites, however, are good CDN candidates.

We used extrapolation techniques and market factors to estimate the market population size and growth for Tier 1 through Tier 5 segments. The majority

of Web sites are Tier 5 sites, and do not represent an opportunity for content delivery products and services. Tier 4 sites present very little opportunity for content delivery products and services, but there are many small Web-based businesses that rely entirely on a high-performing Internet presence. Tier 1 sites are the most frequently visited in the Internet and continually seek to increase performance. Tier 1 sites represent the largest opportunity for content delivery products and services.

Using information gathered in this study, as well as supply-side sources, we projected opportunity for content delivery products and services. The largest factors influencing forecast growth are the increasing number of content sites and demand for bandwidth.

### ***Market Factors***

- Content traffic demand for bandwidth increases roughly 8.4 percent per month.
- There are roughly 5.5 million Web sites and growing, most of which are small personal pages.
- 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 choose the least expensive high performing content delivery 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.

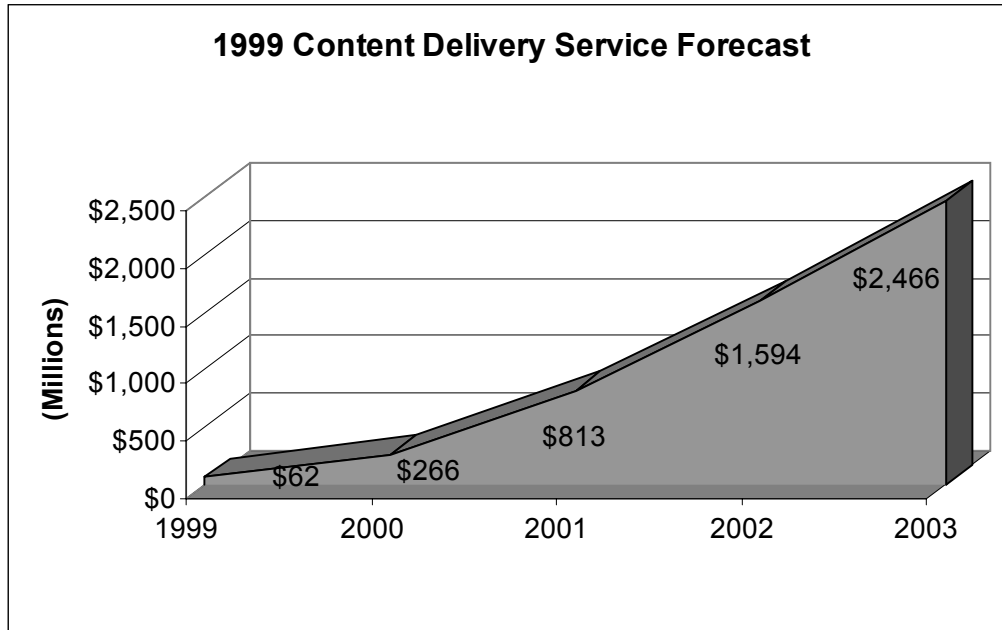
### ***Forecast***

#### **Content Delivery Services**

Service providers that offer content delivery services are presented with a significant opportunity. Content Sites will spend 62 million hardware and software in 1999, increasing to 2.47 billion in 2003. Content delivery services include services that intelligently distribute content globally on a network through strategically placed servers, which store content close to end users. The chart 10-1 below depicts the revenue opportunity for service providers that offer content delivery services.



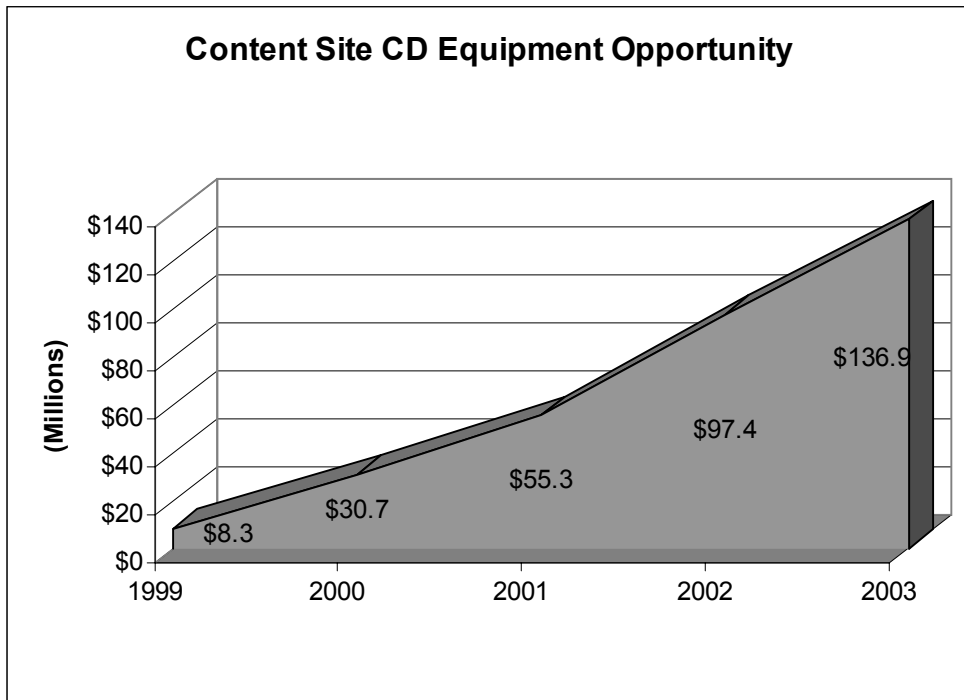
**Chart 10-1: Content Delivery Service Forecast**



### Content Delivery Equipment

Content sites that elect to deploy their own content delivery solution present a good opportunity for product manufacturers. Content Sites will spend 8.3 million hardware and software in 1999, increasing to 136.9 million in 2003. Hardware includes the servers and appliances used in an in-house content delivery solution. Software includes the content delivery software only. The chart 10-2 below depicts the revenue opportunity for product manufacturers selling to organizations other than service providers.

**Chart 10-2: Content Site Content Delivery Product Opportunity**



## Recommendations

- ◆ With the current scarcity of content 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 services in a way that extends the capacity and efficiency of existing content site employees rather than replacing them.
- ◆ Content delivery technology is new, and can present a challenge to potential customers. Providers of content delivery technology should create documents that target readers at different levels of technical expertise, which may include the business- focused buyers, those new to content delivery technology, and technically advanced buyers.
- ◆ Since the current buyer thinking of 47% 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.
- ◆ If caching messaging is introduced in content delivery service market messaging, companies should address the perceived problems that caching itself introduces. The negative concerns regarding caching use described by the study respondents included data degradation, synchronization problems, problematic content updates, tracking banner advertisements, and difficulties with conducting diagnostics.
- ◆ Content delivery services are in an early market period, where there are no clear marketshare winners. Respondents' description of content delivery providers ranged widely. Study responses indicate that there is sufficient room in the content delivery market for providers that are examining content delivery service offerings.
- ◆ Service providers should maintain the capability to validate the end user's experience both internally and through a third party, thus offering levels of end user experience validation in order to optimize margins.
- ◆ Both product manufacturers and service providers should position solution redundancy and resiliency through the cost of downtime pain points. Product testing that includes redundancy and resiliency, done by reputable publications such as Data Communications, are a cost effective way to market products.
- ◆ Technology professionals operate in pockets of tightly-knit communities where the latest and greatest products, services, and technologies are openly discussed in online forums, trade shows, and

list servers. Seventy percent of the study respondents rated a service provider's reputation as critical when choosing a service provider for connectivity. Service providers should incorporate high profile programs promoting constant customer interaction to maintain good customer relationships.

- ◆ Both product manufacturers and service providers should prioritize their Web site as an important medium for marketing to customers. Vendor Web sites should market though educational material on their site.
- ◆ Seminars were rated very useful by 43% of the respondents, slightly higher than Trade Shows (30%) and Conference sessions (27%). Product manufacturers and service providers should investigate seminar opportunities with potential customers.
- ◆ Service providers and product manufacturers must sell to both technical buyers and business buyers. Technical buyers are the IS professionals that fit into the Network Admin category. Sales attempts and marketing collateral targeting technical buyers should include detailed technology information positioning the resiliency and redundancy of products and services.
- ◆ The business buyers are those in the Management category, and include titles such as Presidents, Vice Presidents and Managers. The business buyer is more concerned with how new products and services will increase the bottom line. Sales and marketing collateral should address this through case studies and business-oriented white papers and business models.

## Appendix A

### ***Business Model Details***

#### *Tier 1 In-House Hosting Model*

##### *Assumptions:*

Bandwidth required in Q1 _____	45 Mbps
Bandwidth required in Q2 _____	60 Mbps
Bandwidth required in Q3 _____	75 Mbps
Bandwidth required in Q4 _____	90 Mbps
Total number of T3s _____	2
Site begins with 1 T3, then adds one at end of Q2	
Installation cost per T3 _____	\$1,100
The average monthly fee for one T3 _____	\$43,000
Number of Web servers (one server per 5 Mbps) _____	18
Cost of one Web server _____	\$20,000
Number of routers _____	4
Cost of one router _____	\$20,000
Number of load balancers _____	1
Cost of one load balancer _____	\$7,500
Monthly labor cost for five full-time employees, each averaging \$68K annually _____	\$28,333
Monthly labor cost for two more full-time employees hired at month 6 _____	\$11,333

## *Cost Model*

(\$000)	<i>Quarter 1</i>	<i>Quarter 2</i>	<i>Quarter 3</i>	<i>Quarter 4</i>	<i>Totals</i>
<u><i>Bandwidth required in Mbps</i></u>	45	60	75	90	<b>90</b>
<u><i>Equipment Costs</i></u>					
Web Servers	\$180	\$60	\$60	\$60	<b>\$360</b>
Routers	\$60	\$20			<b>\$80</b>
Load balancers	\$7.5				<b>\$7.5</b>
Total Equipment Costs	\$248	\$80	\$60	\$60	<b>\$448</b>
<u><i>Bandwidth Costs</i></u>					
T3 installation	\$1	\$1			<b>\$2</b>
T3 monthly	\$129	\$258	\$258	\$258	<b>\$903</b>
Total bandwidth cost	\$130	\$259	\$258	\$258	<b>\$905</b>
<u><i>Labor Costs</i></u>					
Internal	\$85	\$119	\$119	\$119	<b>\$442</b>
Total Labor Costs	\$85	\$96	\$119	\$119	<b>\$442</b>
 <i>Total</i>	 <b>\$463</b>	 <b>\$458</b>	 <b>\$437</b>	 <b>\$437</b>	 <b>\$1,795</b>
 Cumulative costs	 <b>\$463</b>	 <b>\$921</b>	 <b>\$1,335</b>	 <b>\$1,795</b>	

## *Tier 1 Hosting Provider Model*

### *Assumptions:*

Bandwidth required in Q1 _____	45 Mbps
Bandwidth required in Q2 _____	60 Mbps
Bandwidth required in Q3 _____	75 Mbps
Bandwidth required in Q4 _____	90 Mbps
Hosting costs for 1 Mbps of bandwidth _____	\$2,400
Number of Web servers _____	18
Cost of one Web server _____	\$20,000
Rack space rental per server (3.5 vertical feet) _____	\$500
Number of load balancers _____	1
Cost of one load balancer _____	\$7,500
Monthly labor cost for four full-time employees, each averaging \$68K annually _____	\$22,667
Monthly labor cost for two more full-time employees hired at month 6 _____	\$11,333

## ***Cost Model***

(\$000)	<i>Quarter 1</i>	<i>Quarter 2</i>	<i>Quarter 3</i>	<i>Quarter 4</i>	<b><i>Totals</i></b>
<i>Bandwidth Required in Mbps</i>	45	60	75	90	<b>90</b>
<b><i>Equipment Costs</i></b>					
Web Servers	\$180	\$60	\$60	\$60	<b>\$360</b>
Load balancers	\$7.5				<b>\$7.5</b>
Total Equipment Costs	\$187.5	\$60	\$60	\$60	<b>\$367.5</b>
<b><i>Bandwidth Costs</i></b>					
Bandwidth	\$108	\$144	\$180	\$216	<b>\$648</b>
Rack Rental	\$4.5	\$6.0	\$7.5	\$9.0	<b>\$27</b>
Total Bandwidth Costs	\$112.5	\$150	\$187.5	\$225	<b>\$675</b>
<b><i>Labor Costs</i></b>					
Internal	\$68.0	\$79.3	\$102.0	\$102.0	<b>\$351.3</b>
Total Labor Costs	\$68	\$79	\$102	\$102	<b>\$351.3</b>
<b><i>Total</i></b>	<b>\$368</b>	<b>\$289.3</b>	<b>\$349.5</b>	<b>\$387</b>	<b>\$1,393.8</b>
Cumulative Costs	<u>\$368</u>	<u>\$657.3</u>	<u>\$1,006.8</u>	<u>\$1,393.8</u>	

## ***Tier 1 CDN Services Model***

### *Assumptions:*

Bandwidth required in Q1 _____	45 Mbps
Bandwidth required in Q2 _____	60 Mbps
Bandwidth required in Q3 _____	75 Mbps
Bandwidth required in Q4 _____	90 Mbps
10% of Mbps delivered through hosting provider	
90% of Mbps delivered through CDN provider	
Monthly cost for 1 Mbps of hosting provider bandwidth _____	\$2,400
Monthly cost for 1 Mbps of CDN provider bandwidth _____	\$3,750
Number of Web servers needed at hosting provider _____	2
Cost of one Web server _____	\$20,000
Rack space rental for one server (3.5 vertical feet) _____	\$500
Number of load balancers _____	1
Cost of one load balancer _____	\$7,500
Monthly labor cost for three full-time employees, each averaging \$68K annually _____	\$17,000

## *Cost Model*

(\$000)	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>	<u>Totals</u>
<i><u>Equipment Costs</u></i>					
Web servers	\$40				
Load balancers	\$7.5				
Total Equipment Costs	\$47.5				<b>\$47.5</b>
<i><u>Bandwidth Costs</u></i>					
Hosting bandwidth	\$11	\$14	\$18	\$22	<b>\$65</b>
CDN bandwidth	\$152	\$203	\$253	\$304	<b>\$912</b>
Rack rental	\$1.5	\$1.5	\$1.5	\$1.5	<b>\$6</b>
Total Bandwidth Cost	\$164.5	\$218.5	\$272.5	\$327.5	<b>\$983</b>
<i><u>Labor Costs</u></i>					
Internal	\$51.0	\$51.0	\$51.0	\$51.0	<b>\$204.0</b>
Total Labor Costs	\$51	\$51	\$51	\$51	<b>\$204</b>
<i>Total</i>	<u>\$263</u>	<u>\$269.5</u>	<u>\$323.5</u>	<u>\$378.5</u>	<u><b>\$1,234.5</b></u>
Cumulative Costs	<u>\$263</u>	<u>\$532.5</u>	<u>\$856</u>	<u>\$1,234.5</u>	



## Appendix B

### **The 1999 Content Delivery Service Study Questionnaire**

Hello, may I speak with \_\_\_\_\_, please?

Hello, my name is \_\_\_\_\_, from the HTRC Group. We are currently gathering research with US based firms regarding their content site in order to help service providers offer better services. With your participation, we would also like to send you a copy of the summary results when it is available in December. First...

*[If name on list is not available, probe for Web Masters or content site managers.]*

#### **Screening Section**

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 (terminate, ask for a reference)

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

*[Range 0-999999. Enter 999998 for Refused. Enter 999999 for DK]*

Number of employees: \_\_\_\_\_

3. Approximately how many of the following types of content site employees do you have now (September 1999)? How many will you have by September of 2000? (Fill in appropriate field)

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

<u>Employee Types</u>	<u>Sept 1999</u>	<u>Sept 2000</u>
1. Web Masters	_____	_____
2. Network Engineers	_____	_____
3. Network Operators	_____	_____
4. Site Operators	_____	_____
5. All other content site employees	_____	_____

*[If 1999 or 2000 = zero, DK, or refused for all categories, terminate]*

4. Which of the following categories would you classify your site in? (Check all that apply -- Read list) [Rotate]

1.  Technology
2.  Entertainment
3.  Financial
4.  News
5.  Sports
6.  Portal
7.  Special events
8.  Adult
9.  E-commerce
10.  Or is it some other category: \_\_\_\_\_
11.  None of the above/Refused [*Do not read -- Terminate*]
12.  Don't know [*Do not read -- Terminate*]

5. Which of the following best describes the Internet connection for your site? (Check only one -- Read list)

1. Self-hosted: host server(s) in your own network
2. Hosted: entire site is hosted on service provider's server
3. Colocation: host server(s) in service provider's network
4. Hybrid colocation: host servers both in service provider's network and your own network
5. Or is it something else: \_\_\_\_\_
6. None of the above/Refused [*Do not read -- Terminate*]
7. Don't know [*Do not read -- Terminate*]

### **Content Delivery Service Section**

Using the definition for **content delivery services** as a service or services that enable web content providers the ability to distribute web site content in multiple locations simultaneously.

6. Which of the following ways do you plan to use content delivery services now? By September of 2000?

<u>Service</u>	<u>September 1999</u>	<u>September 2000</u>
1. Multi-network content delivery service provider (e.g. Akamai and SandPiper)	_____	_____
2. Facilities-based content delivery service provider (e.g. Digital Island)	_____	_____
3. Build your own private content delivery network	_____	_____
4. Do not plan to use content delivery services	_____	_____ (Ask Q7)
5. Other [Do not read]	_____	_____
6. Don't know	_____	_____

(If Q6-2000=4, Ask Q7)

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

1. Don't know
2. Specify: \_\_\_\_\_

*[Ask Q8 only if Q6-now=2,3]*

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

1. SandPiper
2. Akamai
3. IBEAM
4. MirrorImage
5. Edgix
6. Digital Island
7. Enron
8. Willimas
9. Intel
10. AboveNet
11. Frontier GlobalCenter
12. Adero
13. UUNet
14. Exodus
15. Other: \_\_\_\_\_
16. Don't know

*[Ask Q9 only if Q6-2000=2,3]*

9. What service provider(s) do you plan to use for content delivery services by September of 2000? *[Do not read]*

1. SandPiper
2. Akamai
3. IBEAM
4. MirrorImage
5. Edgix
6. Digital Island
7. Enron
8. Willimas
9. Intel
10. AboveNet
11. Frontier GlobalCenter
12. Adero
13. UUNet
14. Exodus
15. Other: \_\_\_\_\_
16. Don't know

10. Why do you use or plan to use content delivery services? (Open ended)
1. Don't know
  2. Specify: \_\_\_\_\_

*[If Q5=1, Do not ask Q11]*

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

12. What service provider(s) do you plan to use for colocation or hosting your site in September of 2000? (Open ended)
1. Don't know
  2. Plan to self host
  3. Specify: \_\_\_\_\_

**Bandwidth and Performance Section**

13. Which of the following technologies does your company currently use to increase performance to the site? (Check all that apply) (Read list -- Rotate)
- \_\_\_\_\_ 1. \_\_\_\_\_ Load balancing
  - \_\_\_\_\_ 2. \_\_\_\_\_ Bandwidth optimization and traffic shaping products (e.g. Xedia)
  - \_\_\_\_\_ 3. \_\_\_\_\_ Caching
  - \_\_\_\_\_ 4. \_\_\_\_\_ Mirroring
  - \_\_\_\_\_ 5. \_\_\_\_\_ Content delivery services
  - \_\_\_\_\_ 6. \_\_\_\_\_ Push technologies (e.g. Marimba, Tibco)
  - \_\_\_\_\_ 7. \_\_\_\_\_ Content Distribution Software (e.g. WebSpective, Microsoft replication mgr.)
  - \_\_\_\_\_ 8. \_\_\_\_\_ Other: \_\_\_\_\_
  - \_\_\_\_\_ 9. \_\_\_\_\_ None *[Do not read]*
  - \_\_\_\_\_ 10. \_\_\_\_\_ Don't know *[Do not read]*

14. 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)

a. Bandwidth, as measured in Megabits per second: \_\_\_\_\_Mbps

*[Range 1.0-9999.0 -- Enter 9998.0 for refused. Enter 9999.0 for DK]*

b. 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]*

c. How many unique visitors per month: \_\_\_\_\_

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

d. What is the 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]*

15-a. What is the peak traffic demand for your site as measured in Megabits per second: \_\_\_\_\_Mbps (Fill in number)

*[Range 1.0-9999.0 -- Enter 9998.0 for refused. Enter 9999.0 for DK]*

15-b. 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]*

16. 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]*

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

18. What are your peak usage times during the weekend? (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 p.m. and 7:00 p.m., 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

## **SLAs**

19. On a scale of 1 to 5, where 1 is not important and 5 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--Enter 6 for DK

- \_\_\_\_\_ 1. \_\_\_\_\_ Latency measured from content delivery server to end user
- \_\_\_\_\_ 2. \_\_\_\_\_ Availability
- \_\_\_\_\_ 3. \_\_\_\_\_ Time to repair
- \_\_\_\_\_ 4. \_\_\_\_\_ End user experience based on 3<sup>rd</sup> 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 deliver services when choosing a service provider for site connectivity?  
*[Specify other agreement and score]*

## **Expenditures Section**

20. 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]*



21a. How much has your company spent on the following expenditure areas for calendar year 1998? (Fill in expenditures)

21b. How much has your company spent, or plan to spend, on the following expenditure areas for 1999? (Fill in expenditures)

21c. How much does your company plan to spend on the following expenditure areas for 2000? (Fill in expenditures)

Expenditures	1998	1999	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. Internet Bandwidth	\$ _____	\$ _____	\$ _____
-----------------------	----------	----------	----------

5. Outsourcing Services	\$ _____	\$ _____	\$ _____
-------------------------	----------	----------	----------

6. All Hardware and software	\$ _____	\$ _____	\$ _____
------------------------------	----------	----------	----------

*[Read Q21a-c-other immediately after Q21a-c]*

21a-other. Were there any other expenditure areas for your content site?

21b-other. Are there any other expenditure areas for your content site?

21c-other. Will there be any other expenditure areas for your content site?

*[Record type and amount if other expenditure areas]*

Expenditures	1998	1999	2000
--------------	------	------	------

Other: _____	\$ _____	\$ _____	\$ _____
--------------	----------	----------	----------

22. 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)

<u>Expenditures</u>	<u>Lost Revenue</u>
---------------------	---------------------

*[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:_____     | \$_____ |

23. 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: \$\_\_\_\_\_

24. On a scale of 1 to 5, where 1 is not important and 5 is critical, please rate the importance of the following features when choosing a service provider for site connectivity? (Fill in rating)

Rotate--Enter 6 for DK

- \_\_\_\_\_ 1. \_\_\_\_\_ Ability to expand site bandwidth capacity immediately
- \_\_\_\_\_ 2. \_\_\_\_\_ Usage based pricing
- \_\_\_\_\_ 3. \_\_\_\_\_ 95<sup>th</sup> percentile billing to the minute
- \_\_\_\_\_ 4. \_\_\_\_\_ Your ability to burst above provisioned bandwidth
- \_\_\_\_\_ 5. \_\_\_\_\_ Flat rate billing
- \_\_\_\_\_ 6. \_\_\_\_\_ Service provider reputation
- \_\_\_\_\_ 7. \_\_\_\_\_ Service and support
- \_\_\_\_\_ 8. \_\_\_\_\_ Established service provider (e.g. AT&T, UUNet, PSINet)
- \_\_\_\_\_ 9. \_\_\_\_\_ Service providers network buildout plans
- \_\_\_\_\_ 10. \_\_\_\_\_ Offers Content Delivery services
- \_\_\_\_\_ 11. \_\_\_\_\_ Ability to add processing and storage capacity immediately
- \_\_\_\_\_ 12. \_\_\_\_\_ Performance to end users
- \_\_\_\_\_ 13. \_\_\_\_\_ Are there any other features that are important when choosing a service provider for site connectivity? [*Specify other feature and score*]

25. On a scale of 1 to 5, where 1 is not useful and 5 is very useful, please rate the following sources for learning about new products and services? (Fill in rating)

Rotate--Enter 6 for DK

- \_\_\_\_\_ 1. \_\_\_\_\_ Trade magazines
- \_\_\_\_\_ 2. \_\_\_\_\_ Seminars
- \_\_\_\_\_ 3. \_\_\_\_\_ Trade Shows
- \_\_\_\_\_ 4. \_\_\_\_\_ Vendor Web sites
- \_\_\_\_\_ 5. \_\_\_\_\_ Online magazines
- \_\_\_\_\_ 6. \_\_\_\_\_ White papers
- \_\_\_\_\_ 7. \_\_\_\_\_ Trade show conference sessions
- \_\_\_\_\_ 8. \_\_\_\_\_ Are there any other sources that are important for learning about new products and services? [*Specify other source and score*]

26. What are the top 3 publications that are influential in your purchase of products and services? (Open ended)
1. Don't know
  2. Specify: \_\_\_\_\_

**Challenges Section**

27. What are the top 3 barriers for subscribing to content delivery services? (Open ended)
1. Don't know
  2. Specify: \_\_\_\_\_
28. What is your view of the use of caching technologies? (Open ended)
1. Don't know
  2. Specify: \_\_\_\_\_
29. Who in your company, department or title, makes the decision to choose a service provider? (Fill in)
- Department or title: \_\_\_\_\_

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

1. Don't know
2. Specify: \_\_\_\_\_

31. What are your largest website business challenges your company faces? (Open ended)

1. Don't know
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.

Just to confirm, do I have the correct e-mail address? *Verify e-mail address*

Thank you very much for your time.



## Appendix C

### Data Summary

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

1 Yes	100
2 No	
3 Don't know	

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

(n=100)

Number of employees:	
Mean	4240
Range	2-150,000

3. Approximately how many of the following types of content site employees do you have now (September 1999)? How many will you have by September of 2000? (Fill in appropriate field)

(n=100)

Employee Types	Sep-99	Sep-00
1.Web Masters	Mean 3.2	Mean 3.6
	Range 0-50	Range 0-60
2.Network Engineers	Mean 5.3	Mean 5.3
	Range 0-100	Range 0-100
3.Network Operators	Mean 4	Mean 4.2
	Range 0-48	Range 0-35
4.Site Operators	Mean 3.5	Mean 4.1
	Range 0-75	Range 0-75
5.All other content site employees	Mean 7.5	Mean 9.1
	Range 0-200	Range 0-250

4. Which of the following categories would you classify your site in? (Check all that apply -- Read list --Rotate)

(n=100)

	<u>Frequency</u>
1. Technology	30
2. Entertainment	9

3. Financial	8
4. News	10
5. Sports	3
6. Portal	7
7. Special events	3
8. Adult	1
9. E-commerce	22
10. Other* (See Below)	39

<i>*Other Responses</i>	<u>Frequency</u>
Educational	8
Government	4
Company Marketing	9
Online Publishing	6
Manufacturing	4
Affinity Community	4
Market Research	1
Business to Business	1

*Please see Verbatim Open Ended responses for details*

5. Which of the following best describes the Internet connection for your site? (Check only one -- Read list)

(n=100)

	<u>Frequency</u>
1. Self-hosted: host server(s) in your own network	36
2. Hosted: entire site is hosted on service provider's server	43
3. Colocation: host server(s) in service provider's network	14
4. Hybrid colocation: host servers both in service provider's	6
5. Or is it something else	<u>1</u>

*Other Responses*

Off-Site Dedicated Server

## **Content Delivery Service Section**

Using the definition for content delivery services as a service or services that enable web content providers the ability to distribute web site content in multiple locations simultaneously.



6. Which of the following ways do you plan to use content delivery services now? By September of 2000?

(n=100)

	<b>1999</b> <u>Frequency</u>	<b>2000</b> <u>Frequency</u>
1. Multi-network content delivery service provider	8	8
2. Facilities-based content delivery service provider	8	8
3. Build your own private content delivery network	40	45
4. Do not plan to use content delivery services	44	30
5. Other* (see below)	1	1
6. Don't know	8	17

*\*Other Responses*

1999	2000
Rebrand and contract	Rebrand and contract

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

1 Don't know

2 Specify: \_\_\_\_\_

(n=29)

<b>Response</b>	<u><b>Frequency</b></u>
No Need	24
Have not evaluated	3
Control	2

*Please see Verbatim Open Ended worksheet for details*

8. What service provider(s) do you use for content delivery services now? (Open ended)

(n=46)

<b>Response</b>	<u><b>Frequency</b></u>
ISP	29
In-house	10
Don't Know	3
Content Delivery Provider	2
None	2

*Please see Verbatim Open Ended worksheet for details*

9. What service provider(s) do you plan to use for content delivery services by September of 2000? (Open ended)

(n=50)

<b>Response</b>	<b><u>Frequency</u></b>
ISP	27
Don't Know	13
In-house	11
Content Delivery Provider	1
None	1

*Please see Verbatim Open Ended worksheet for details*

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

(n=54)

<b>Response</b>	<b><u>Frequency</u></b>
Don't Know	28
Performance	18
Distribute Specific Information	5
No In-house expertise	3

*Please see Verbatim Open Ended worksheet for details*

11. What service provider(s) do you plan to use for colocation or hosting your site? (Open ended)

(n=64)

<b>Response</b>	<b><u>Frequency</u></b>
Other	50
Don't Know	6
AT&T	4
Interland	2
US West	2
Verio	2

*Please see Verbatim Open Ended worksheet for details*

12. What service provider(s) do you plan to use for colocation or hosting your site in September of 2000? (Open ended)

(n=63)

<b>Response</b>	<b><u>Frequency</u></b>
Other	36
Don't Know	17
AT&T	3
PSINet	2
US West	2
Verio	2

*Please see Verbatim Open Ended worksheet for details*

## **Bandwidth and Performance Section**

13. Which of the following technologies does your company currently use to increase performance to the site? (Check all that apply, Read list -- Rotate)

(n=100)

	<b><u>Frequency</u></b>
1. Load balancing	27
2. Bandwidth optimization and traffic shaping products (e.g. Xedia)	25
3. Caching	36
4. Mirroring	22
5. Content delivery services	12
6. Push technologies (e.g. Marimba, Tibco)	9
7. Content Distribution Software (e.g. WebSpective, MS replication)	7
8. None	26
9. Don't know	7
10. Other* (See Below)	6

*\*Other Responses*

MACRO MEDIA FLASH  
 EFFICIENT WEB PAGE WRITING  
 SECURITY  
 SITEVISION  
 ACROBAT  
 HANDELED BY ISP

14. 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)

a. Bandwidth, as measured in Megabits per second:

(n=19)

Mean	454
------	-----

Range	1 to 5400
-------	-----------

(n=18)

Trimmed Mean	180
--------------	-----

Range	1 to 1000
-------	-----------

b. How many page views per month:

(n=68)

Mean	560642
------	--------

Range	35 to 10,000,000
-------	------------------

c. How many unique visitors per month:

(n=64)

Mean	39491
------	-------

Range	1 to 675,000
-------	--------------

d. What is the average page weight in Kilobytes:

(n=27)

Mean	106
------	-----

Range	2 to 300
-------	----------

15-a. What is the peak traffic demand for your site as measured in Megabits per second:

(n=10)

Mean	27
------	----

Range	1 to 142
-------	----------

15. How many page views during peak times per month:

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

Peak page views

(n=38)

Mean	89419
------	-------

Range	1 to 2,000,000
-------	----------------

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

Bandwidth percent growth:

(n=44)	
Mean	8.4
Range	1 to 48

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

(n=100)

	<u>Frequency</u>
12:01 am to 1:00 am	1
6:01 am to 7:00 am	1
7:01 am to 8:00 am	2
8:01 am to 9:00 am	10
9:01 am to 10:00 am	19
10:01 am to 11:00 am	27
11:01 am to 12:00 pm	33
12:01 pm to 1:00 pm	32
1:01 pm to 2:00 pm	31
2:01 pm to 3:00 pm	27
3:01 pm to 4:00 pm	20
4:01 pm to 5:00 pm	12
5:01 pm to 6:00 pm	5
6:01 pm to 7:00 pm	6
7:01 pm to 8:00 pm	5
8:01 pm to 9:00 pm	1
9:01 pm to 10:00 pm	1
10:01 pm to 11:00 pm	1
11:01 pm to 12:00 am	1
Don't Know	21

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

(n=100)

	<u>Frequency</u>
12:01 am to 1:00 am	1
6:01 am to 7:00 am	1
7:01 am to 8:00 am	1
8:01 am to 9:00 am	2
9:01 am to 10:00 am	3
10:01 am to 11:00 am	5
11:01 am to 12:00 pm	6
12:01 pm to 1:00 pm	9

1:01 pm to 2:00 pm	10
2:01 pm to 3:00 pm	9
3:01 pm to 4:00 pm	14
4:01 pm to 5:00 pm	8
5:01 pm to 6:00 pm	4
6:01 pm to 7:00 pm	7
7:01 pm to 8:00 pm	7
8:01 pm to 9:00 pm	8
9:01 pm to 10:00 pm	3
10:01 pm to 11:00 pm	2
11:01 pm to 12:00 am	3
Don't Know	64

19. On a scale of 1 to 5, where 1 is not important and 5 is critical, please rate the following service level agreements for content delivery services when choosing a service provider for site connectivity? (Fill in rating)

(N=100)

Rating 4&5	Avg.	Content Delivery Service SLAs
45%	3.4	1. Latency measured from content delivery server to end user
84%	4.4	2. Availability
80%	4.4	3. Time to repair
23%	2.8	4. End user experience based on 3rd party validation (e.g. Keynote)
41%	3.4	5. End user experience based on content delivery provider validation
60%	3.7	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 deliver services when choosing a service provider for site connectivity?*(See Below)

*\*Other Responses*

SUBSCRIBERS PER LINE, IF THEY HAVE ANY SCHOOLS ON THERE WE DO NOT DEAL WITH THEM

IT IS IMPORTANT THAT YOU GET A PERSON WHEN YOU CALL  
 SECURE TRANSACTIONS  
 RELIABILITY  
 TECHNICAL SUPPORT  
 24 HOUR SUPPORT  
 EASE OF USE

## Expenditures Section

20. Approximately what is the annual revenue generated from your site? (Fill in revenue)  
(n=16)

Annual revenue from site: \$

Mean	\$25,728,846
Range	5000 to 1 billion

Trimmed Mean	\$793,617
Range	5000 to 1 million

21c. How much does your company plan to spend on the following expenditure areas for 1998, 1999, and 2000? (Fill in expenditures)

Expenditures	1998	1999	2000
1. Content development	(n=58) \$64,509	(n=55) \$73,170	(n=44) \$55,264
	Range \$0 to \$1,000,000	\$0 to \$1,500,000	\$0 to \$750,000
2. Site Management (Webmasters, Network Engineering)	(n=54) \$42,022	(n=56) \$46,082	(n=46) \$31,363
	Range \$0 to \$500,000	\$0 to \$500,000	\$0 to \$250,000
3. Content delivery services	(n=48) \$25,849	(n=50) \$25,775	(n=38) \$28,494
	Range \$0 to \$300,000	\$0 to \$400,000	\$0 to \$500,000
4. Internet Bandwidth	(n=47) \$22,262	(n=45) \$21,813	(n=36) \$20,088
	Range \$300 to \$300,000	\$300 to \$350,000	\$100 to \$200,000
5. Outsourcing Services	(n=61) \$16,541	(n=56) \$13,149	(n=48) \$18,920
	Range \$0 to \$250,000	\$0 to \$150,000	\$0 to \$200,000
6. All Hardware and software	(n=61) \$44,528	(n=60) \$42,898	(n=49) \$30,563
	Range \$0 to \$300,000	\$0 to \$600,000	\$0 to \$350,000
7. Other	(n=0)		

22. 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)

*Sites with revenue, includes all non-zero responses*

Source of Revenue		Avg. Lost Revenue Per hr
1. Advertisement impressions lost	(n=58)	\$8,255
(8 non zero responses)	Range	\$10 to \$50,000
2. Products purchased	(n=63)	\$16,201
(12 non zero responses)	Range	\$4 to \$150,000
3. Online subscriptions	(n=64)	\$813
(4 non zero responses)	Range	\$1 to \$2,000
4. Are there any others:	(n=0)	\$0

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

(n=2)	
Mean	\$984



## Market Messaging

24. On a scale of 1 to 5, where 1 is not important and 5 is critical, please rate the importance of the following features when choosing a service provider for site connectivity? (Fill in rating)

(n=100)

Rating 4&5	Avg.	Content Delivery Service SLAs
64%	3.8	1. Ability to expand site bandwidth capacity immediately
31%	2.9	2. Usage based pricing
23%	2.6	3. 95th percentile billing to the minute
52%	3.3	4. Your ability to burst above provisioned bandwidth
49%	3.6	5. Flat rate billing
70%	3.8	6. Service provider reputation
85%	4.5	7. Service and support
54%	3.5	8. Established service provider (e.g. AT&T, UUNet, PSINet)
36%	3.1	9. Service providers network buildout plans
29%	2.8	10. Offers Content Delivery services
53%	3.5	11. Ability to add processing and storage capacity immediately
82%	4.4	12. Performance to end users
		13. Are there any other features that are important when choosing a service provider for site connectivity?*
		(See below)

### *\*Other Responses*

AVAILABILITY  
 BANDWIDTH  
 STORAGE SPACE  
 SERVICE PROVIDERS REDUNDANT FACILITIES  
 LEVEL OF TECH SUPPORT  
 RELIABILITY

25. On a scale of 1 to 5, where 1 is not useful and 5 is very useful, please rate the following sources for learning about new products and services? (Fill in rating)

(n=100)

Rating 4&5	Avg.	Sources For Learning
63%	3.7	1. Trade magazines
43%	3.2	2. Seminars
30%	3.0	3. Trade Shows
64%	3.8	4. Vendor Web sites
40%	3.2	5. Online magazines
26%	2.9	6. White papers
27%	2.8	7. Trade show conference sessions
		8. Are there any other sources that are important for learning about new products and services?* (See Below)

*\*Other Responses*

BULLETIN BOARDS  
 STANDARD MAIL  
 COLD CALLS  
 COLLEAGUES  
 COLLEAGUE REFERENCES  
 WORD OF MOUTH  
 E-MAIL  
 WORD OF MOUTH  
 INTERNET  
 WORD OF MOUTH  
 DIRECT CONTACT  
 NEWS  
 TICKER  
 PEERS  
 OTHER CONTACTS - PEOPLE  
 DIRECT MAIL

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

(n=79)

- 1 Don't know
- 2 Specify: \_\_\_\_\_

<b>Frequency</b>	<b>Publication</b>
30	Internet Week
12	Information Week
11	Interactive Week
11	Internet World
10	PC Week
8	Info World
8	Network World
7	PC Magazine
5	Mac World
5	Web Techniques
5	Wired
4	Industry Standard
4	New Media
3	Computer Shopper
3	PC Computing
3	PC World
3	Network Computing
3	Web Trends

*Other Responses*

AB PRODUCER	INFORMATION TECHNOLOGY
ADOBE MAGAZINE	INSIDE TECHNICAL TRAINING
BANDWIDTH	INTERNET DEVELOPER
BUSINESS 2.0	INTERNET NEWS WEEK
CIO (2)	LOTUS SOLUTIONS
COMMUNICATION ARTS	MAC WAREHOUSE
COMPARISON	MAC WEEK
COMPUTER GAMING	MICROSOFT INTERNET DEVELOPER
COMPUTER GRAPHICS WORLD	PHOTOSHOP USER
COMPUTER TELEPHONY	POST
COMPUTER WORLD	PRINTING ONE
CONSUMER REPORTS (2)	PUBLISH (2)
DIGITAL VIDEO SYSTEMS	RESELLERS NEWS
DV	TELECOMM
E-COMMERCE	THOMAS REGISTER
ENT	TRAINING
FAST COMPANY	TVB TECHNOLOGY
FEDERAL COMPUTER WEEK	UP SIDE
GOVERNMENT COMPUTER NEWS(2)	VAR BUSINESS

GOVERNMENT NEWS  
GROUP COMPUTING  
IMAGING  
INFORMATION AGE

WEB DEVELOPER  
WEB MONTHLY  
WEB TECHNOLOGY  
WINDOWS

## Challenges

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

(n=51)

- 1 Don't know  
2 Specify: \_\_\_\_\_

<u>Barrier</u>	<u>Frequency</u>
Cost	24
No Benefit	14
Understanding Technology	9
Reliability	5
Site Management	5
None	4
Time	3
Reputation	2
Support	2

*Please see Verbatim Open Ended worksheet for details*

28. What is your view of the use of caching technologies? (Open ended)  
(n=63)

- 1 Don't know  
2 Specify: \_\_\_\_\_

<u>Response</u>	<u>Frequency</u>
Positive	33
Negative	16
Neutral	14

*Please see Verbatim Open Ended worksheet for details*

29. Who in your company, department or title, makes the decision to choose a service provider? (Fill in)

(n=96)

Department or title:

<u>Title</u>	<u>Frequency</u>
Network Admin	30
Management	24
Webmaster	22
President	7
Committee	7
CIO	6

*Please see Verbatim Open Ended worksheet for details*

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

(n=86)

- 1 Don't know
- 2 Specify: \_\_\_\_\_

<u>Technical Challenge</u>	<u>Frequency</u>
Performance	22
Content	18
Security	13
Keeping up with Technology	11
Database	9
Personnel	8
Streaming	5
Growth	4

*Please see Verbatim Open Ended worksheet for details*

31. What are your largest website business challenges your company faces?  
(Open ended)

(n=63)

- 1 Don't know
- 2 Specify: \_\_\_\_\_

<b>Business Challenges</b>	<b>Frequency</b>
Content Development	21
Site Traffic	18
Generating Site Revenue	9
E-Commerce	8
Growth	7

*Please see Verbatim Open Ended worksheet for details*

### **Verbatim Open Ended Responses**

4. Which of the following categories would you classify your site in? (Check all that apply -- Read list -  
- Rotate)

***Other responses***

- BROCHURE WARE
- BUSINESS
- COMMUNITY
- EDUCATION
- EDUCATION
- EDUCATION
- EDUCATION
- EDUCATION
- EDUCATION
- EDUCATIONAL
- EDUCATIONAL
- FAMILIES
- GOVERNMENT
- GOVERNMENT
- GOVERNMENT
- GOVERNMENT
- HOME SERVICES
- INDUSTRIAL
- INFORMATION
- INFORMATION ABOUT OUR COMPANY AND PRODUCTS
- INFORMATIONAL
- INFORMATIONAL

MAGAZINE ARTICLES ABOUT TEXAS  
MANUFACTURING  
MANUFACTURING  
MANUFACTURING PURPOSES  
MARKET RESEARCH  
MARKETING  
MULTI-PURPOSE SITE, SHARED DESIGN SERVICES, WHOLESALE PRODUCT  
MGMT

ON LINE PUBLISHING  
PRINTING & PUBLISHING  
PUBLIC RELATIONS  
PUBLISHER/MARKETING INFORMATION ABOUT OUR PRODUCT  
RELIGIOUS  
SECONDARY PUBLISHING  
SERVICE BASED SITE FOUR ENGINEERS ONLY  
TRACE SALE OF CLIENT'S PRODUCTS DAILY

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

***No Need (24)***

DOESN'T SERVE OUR PURPOSES  
DON'T HAVE THE APPLICATION FOR IT  
WE HAVE NO NEED FOR THEM AT THIS TIME  
CUSTOMERS AREN'T LOOKING FOR IT RIGHT NOW  
DON'T SEE A NEED AT THIS TIME  
DOESN'T MEET OUR NEEDS RIGHT NOW  
NOT NEEDED  
I DON'T BELIEVE OUR CLIENTS ARE IN NEED OF IT  
OUR AUDIENCE IS TOO SMALL  
OUR WEBSITE IS A LIVING BROCHURE--WE DON'T NEED THE OTHER  
WE DON'T NEED TO  
WE ARE A LOCAL FIRM AND DON'T CHOOSE TO GO THAT ROUTE  
THERE IS NO NEED YET  
NO NEED FOR THEM RIGHT NOW  
NO NEED FOR IT  
DON'T NEED IT  
DON'T SEE ANY REASON TO EXPAND USE AT THIS TIME  
WE HAVE A LITTLE INFORMATION WEB SITE FOR PEOPLE TO LOOK UP THINGS-  
WE DON'T HAVE RESOURCES TO DO MORE

DON'T HAVE RESOURCES TO DO MORE  
NO NEED FOR OUR PURPOSES  
LIKE THINGS THE WAY THEY ARE  
NO APPLICATION  
NOT THE NATURE OF OUR BUSINESS  
BECAUSE WE ARE HAPPY WITH HOW WE DELIVER CONTENT THROUGH THE  
WEB PRESENTLY

ONLY SERVERS AT THIS LOCATION  
NOT FINANCIALLY STABLE-IT DOESN'T MAKE FINANCIAL SENSE TO DO THAT AS  
IT IS NOT A REVENUE PRODUCING SIDE OF OUR BUSINESS

***Have not evaluated***

**(3)**

HAVEN'T INVESTIGATED IT YET  
UNSURE  
HAVE NOT PROGRESSED THAT FAR

***Control***

**(2)**

AFRAID TO TAKE OUR CUSTOMERS ELSEWHERE AND THEY WON'T GET BACK  
CONTROL

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

***ISP (29)***

ALLTEL  
EROLS AND CROSS LINK  
CABLE ONE  
CONC  
CONNECTION IS THROUGH LINCOLN, NE  
DONET  
HIWAAY  
HOSTAMERICA  
ICS  
INERPASS  
INTEGRITY ONLINE  
LAKES.COM  
MINDSPRING  
NET MART  
NETACCESS  
NEW YORK TIMES CBS SPORTS ATROIDERS  
NORTHRIM COMMUNICATIONS  
ONENET, T-1 LINE  
SMIG  
SURF NET  
US INTERACT  
WEBSERVE  
Intel  
AT&T  
AT&T  
SPRINT  
US WEST  
US WEST.NET  
UUNet



PSINET

***In-house (10)***

IN-HOUSE  
IN-HOUSE  
IN-HOUSE  
IN-HOUSE  
IN-HOUSE  
IN-HOUSE AND ORACLE  
IN-HOUSE, BUILDING IT OURSELVES  
OUR OWN  
WITHIN THE AGENCY  
WINDOWS NT IN SELF-HOSTED FACILITY

***Content Delivery Provider (2)***

Frontier  
IBEAM

***None (2)***

WE DON'T DO THAT RIGHT NOW, OUR CONTENT SITE IS MEMBER ORIENTED  
NONE

9. What service provider(s) do you plan to use for content delivery services by September of 2000?

***ISP (27)***

ALLTEL  
EROLS AND CROSS LINK  
AT&T  
AT&T  
CABLE ONE  
CHANGES EVERY WEEK  
COLD FUSION  
HIWAAY  
ICS  
INERPASS  
INTEGRITY ONLINE  
Intel  
INTERNET EXPLORER  
LAKES.COM  
MINDSPRING  
NET MART

ONENET  
PSINET  
REAL NETWORKS  
SAME AS NOW - INTO NSF BACKBONE  
SPRINT  
SURF NET  
US INTERACT  
US WEST  
USWEST.NET  
UUNet  
WEBSERVE

***In-house (10)***

IN HOUSE AND ORACLE  
DIRECT BACKBONE CONNECTION, BUILD OUR OWN  
IN-HOUSE  
IN-HOUSE  
IN-HOUSE  
IN-HOUSE  
IN-HOUSE  
IN-HOUSE  
KEEP IT IN-HOUSE  
OUR OWN  
OUR OWN NET  
SELF HOSTED

***Content Delivery Provider (1)***

Frontier

***None (1)***

NONE

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

***Performance (18)***

EFFICIENCY  
GOOD WAY TO GET INFORMATION OUT  
TO GIVE INFORMATION OUT  
IMPROVE THE PRODUCT THAT WE ARE TRYING TO DELIVER  
BETTER DELIVERY AND MORE DATA FOR THE CUSTOMER  
PROVIDING SERVICE TO THE CUSTOMERS  
TO ADVERTISE OUR SITE AND PRODUCTS  
EFFICIENCY  
CONSISTENCY  
INFORMATION DISTRIBUTION

TO HAVE MORE PEOPLE VIEW OUR PRODUCTS  
NEW AREA OF E-COMMERCE ON THE HORIZON  
BEST SUITS US  
WE WANT IMMEDIATE ACCESS BY ALL SALES & MARKETING PRODUCTION  
PEOPLE WORLD WIDE

TO GET INFORMATION ACROSS THE CAMPUS AND TO THE MEDICAL CENTER  
ALLOW US TO FILL SUBSCRIPTIONS  
WE CAN'T PROVIDE THE QUALITY THEY CAN, NOT ENOUGH PEOPLE ON STAFF  
TO ELEVATE BANDWIDTHS ISSUES

DUE TO MANY ISSUES, WE PLAN TO DELIVER MUCH CONTENT-VIDEO IMAGING  
AS WELL AS PRINTED CONTENT-AND WE WANT THE OPTIMAL WAY TO DO THAT

THEY ARE RESPONSIVE TO MY NEEDS

***No In-house expertise (3)***

NO IN-HOUSE CAPABILITIES  
WE DON'T HAVE THE TECHNOLOGY  
CAN'T DO EVERYTHING

***Distribute Specific Information  
(5)***

TO PROVIDE OUR CUSTOMERS WITH CUSTOMER SPECIFIC INFORMATION  
PERSONALIZED CUSTOMER ATTRACTION  
DISTANCE EDUCATION  
TO REACH PEOPLE ABOUT OUR EDUCATIONAL INSTITUTE; COURSES ONLINE  
PERSONALIZATION

11. What service provider(s) do you plan to use for colocation or hosting your site? (Open ended)

ARKANSAS.NET  
EROLS  
AT&T  
AT&T  
AT&T  
AT&T  
AT&T  
BIG MIND MEDIA IN LANGLEY WASHINGTON  
CABLE ONE  
COMPLETE INTERNET SOLUTIONS OF MINNEAPOLIS  
CONC  
DEPT ADMIN, STATE OF WISCONSIN  
DIGEX  
DOMAINNAME.COM  
ETI COMMUNICATIONS  
EXODUS  
FESTA NET

HIWAAY  
HOST WAY  
HOSTAMERICA  
ICS  
INET TECH DOES WEB HOSTING  
INFINET  
INFORMATION SVCS DIV OF MONTANA  
IN-HOUSE  
INN - INTERNET NEWSPAPER NETWORK  
INNOVATIVE SOFTWARE DESIGN  
INTEGRITY ONLINE  
INTERLAND  
INTERLAND  
ISP INTERNET DOORWAY  
IT'S ALL INTERNATIONAL  
KDI  
LAKES.COM  
LOCAL ISP-CDC  
LOCAL PROVIDER -ABCS IN INDIANA  
LOUISVILLE NOC  
MARSHALL NET - THEY ARE A LOCAL COMPANY  
MILLSTAR ELECTRONIC PUBLISHING  
MINDSPRING  
PERIGEE  
PROPRIETARY INFORMATION  
PSINET  
REV.NET  
SERVICE PROVIDER IS KIVA NETWORKING-I INTERNET PROVIDER  
SITEVISION  
SMIG  
SNAKE RIVER NETWORK  
SOUTHWEST SIDE REPORT  
SYSTEM SOURCE  
US WEB  
US WEST  
USWEST.NET  
UUNET  
V SERVERS  
VERIO  
VERIO NEW YORK  
VINET  
WEBSERVE  
WINSTAR  
WWISP  
XMISSION.COM

12. What service provider(s) do you plan to use for colocation or hosting your site in September of 2000? (Open ended)

ABCS OF INDIANA

ANYONE BUT ARKANSAS.NET  
AT&T  
AT&T  
AT&T  
BIG MIND MEDIA  
CABLE ONE  
CDC PLUS ANOTHER LOCAL COMPANY  
COMPLETE INTERNET SOLUTIONS  
CONC  
CONTINUE WINSTAR  
DIGEX  
DOMAINNAME.COM  
EROLS  
ETI  
FESTA NET  
GTE  
HIWAAY  
HOST WAY  
HOSTAMERICA  
ICS  
INFINET  
INN  
INTEGRITY ONLINE  
INTERLAND  
INTERNET DOORWAY  
LAKES.COM  
LOUISVILLE NOC  
MINDSPRING  
NET INS  
ONENET  
PERIGEE  
PSINET  
PSINET  
SITEVISION  
SMIG  
SOUTHWEST  
SYSTEM SOURCE  
US WEST  
USWEST.NET  
VERIO  
VERIO  
VINET  
WEBSERVE  
WWISP  
XMISSION.COM

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

**Cost (24)**

COST  
COST  
COST  
COST  
COST  
COST  
COST  
COST  
COST  
COST  
COST  
COST  
COST  
COST  
COSTS MONEY  
BANDWIDTH COST  
FINANCIAL COST  
MONEY  
PRICE  
PRICE  
PRICE  
PRICE  
PRICE  
PRICE  
RATE OF RETURN ON THE INVESTMENT  
THE EXPENSE

***No Benefit (14)***

BENEFIT VALUE DOUBTFUL  
USEFULNESS QUESTIONABLE  
FEASIBILITY  
DON'T DO THAT  
DON'T NEED IT  
DON'T USE THEM  
IT DOESN'T FIT WHAT WE ARE DOING RIGHT NOW  
IT IS NOT A PRIORITY FOR US  
NECESSITY  
NO INTEREST  
NOT NEEDED  
WE DON'T DO THAT  
WE DON'T USE THEM  
LACK OF APPLICATION

***Understanding Technology (9)***

JUST KNOWLEDGE ABOUT IT  
KNOWLEDGE  
LACK OF KNOWLEDGE  
LACK OF UNDERSTANDING

THE ACTUAL SIGNING UP WITH THEM  
THEIR TECHNOLOGY  
SUPPORT OF THE PLATFORM  
CONVERTING TO A SERVICE  
LACK OF DETAILS ABOUT THE SERVICE THEY PROVIDE

***Reliability (5)***

AVAILABILITY  
AVAILABILITY  
RELIABILITY  
RELIABILITY  
SCALABILITY

***Site Management (5)***

ADD DELIVERY COMPANY BRANDING  
EDITORIAL CHANGES TO THE CONTENT SLANT  
CONTROL  
EASE OF IMPLEMENTATION  
HAVING TO MAKE CHANGES

***None (4)***

NONE  
NONE  
NONE  
NONE

***Time (3)***

TIME  
TIME  
TIME

***Reputation (2)***

REPUTATION  
REPUTATION

***Support  
(2)***

CUSTOMER SERVICE  
CUSTOMER SUPPORT

***Other***

FINDING THE RIGHT PROVIDER  
NAME RECOGNITION  
ACCESS  
SECURITY

28. What is your view of the use of caching technologies? (Open ended)

**Positive (33)**

I LIKE IT, IT'S A GOOD IDEA  
PRETTY IMPORTANT  
IMPORTANT AND MOVING VERY FAST  
IMPORTANT PART OF PAGE LOAD TIME  
THEY ARE BENEFICIAL  
EXTREMELY USEFUL WHERE IMPORTANT, BUT MORE DYNAMIC STUFF ON THE  
WEB

THE MORE THE BETTER  
FAIRLY FOND OF IT, A LOT OF POTENTIAL  
GOOD  
SOME BENEFIT  
I LIKE IT, IT SPEEDS UP A LOT OF THINGS  
IT IS USEFUL IF YOU HAVE A COMPANY THAT SETS IT UP CORRECTLY  
IT'S A PLUS  
CUTS DOWN ON BANDWIDTH  
FAVORABLE INCREASED SPEED  
VERY IMPORTANT  
IT'S GOOD  
PRETTY USEFUL  
IT'S FASTER  
IT HELPS YOU BRING UP SITES FASTER  
POSITIVE  
IT'S GREAT  
I LIKE IT WHEN IT WORKS  
THEY ARE USEFUL IF YOU ARE WILLING TO SPEND THE MONEY ON THEM  
IT IS A TEMPORARY PHENOMENON-USEFUL ONLY WHEN BANDWIDTH IS TIGHT  
I THINK THEY ARE IMPORTANT  
IT WILL BECOME IMPORTANT AS MORE DATA IS SENT OUT  
GOOD THING  
GOOD, BUT WE DON'T NEED IT  
POSITIVE  
IT HAS A LOT OF BENEFITS, BUT HARD TO KEEP UP TO THE MINUTE ON THE  
PAGE

VALUABLE BUT REFRESH RATE IS A CONCERN  
GOOD BUT IT CAN CREATE A LOT OF PROBLEMS

**Negative (16)**



COPY RIGHT ISSUES  
I'M NOT A REAL FAN  
VERY NECESSARY BUT CAUSES A LOT OF DATA DEGRADATION  
NOT SUCH A GREAT IDEA  
I DON'T LIKE IT  
HAS DRAWBACKS BECAUSE OF SYNCHRONIZATION  
A LITTLE APPREHENSIVE  
CASHING CAN CAUSE PROBLEMS, SOME THINGS IT IS GOOD AT, SOME THINGS  
IT IS NOT

PEOPLE SHOULD BE ABLE TO VIEW A SITE AS IT IS NOT AS IT WAS  
NOT FOR MY NEEDS  
BAD BECAUSE IT GIVES PROBLEMS WITH CONTENT UPDATES, ALSO PROBLEMS  
WITH OUR AD SERVER

IT MAKES DIAGNOSTICS DIFFICULT  
I DON'T LIKE IT, IT CAN BE FASTER BUT IS NOT FOR US  
DISMAL  
DEPENDS ON WHERE IT IS BEING DONE WE LIKE MORE CONTROL WITH OUR  
OWN

SOMETIMES IT NEEDS TO BE IMPROVED

***Neutral (14)***

MINIMAL INTEREST  
IT'S NOT A PRIORITY TO US  
IT'S REALLY NOT IMPORTANT  
IT NEEDS TO BE SEAMLESS  
IT'S FINE WITH ME  
WE DON'T REALLY DO IT AS SUCH  
SORT OF NEUTRAL ON IT  
SOMETHING WE HAVE NOT USED MUCH OF  
IT IS WORTH LOOKING INTO  
I DON'T CARE-WE ARE TOO SMALL  
MIDDLE OF THE ROAD, NEUTRAL  
DOUBLE EDGED SWORD - GOT TO HAVE IT, HATE TO SEE IT  
USEFUL IN THAT IT SAVES TIME BUT THERE SHOULD BE A LIMIT  
COULD POSSIBLY MEET OUR NEEDS FOR NEXT YEAR

29. Who in your company, department or title, makes the decision to choose a service provider? (Fill in)

***Network Admin (30)***

DATA PROCESSING MGR AND NETWORK ADMIN  
CHIEF ENGINEER  
DIR COMPUTER SVCS  
DIR INFO SERVICES  
DIR INFORMATION TECH DEPT  
DIR IT  
DIR IT  
DIR OF INFORMATION SYSTEMS  
DIR OF TECHNOLOGY  
DIR OF TECHNOLOGY  
DIRECTOR OF ADVANCED MEDIA GROUP  
DIRECTOR OF ONLINE SERVICES  
INTERNET COORD  
IS DEPARTMENT  
IS DEPARTMENT  
IS DEPARTMENT  
IS DIRECTOR  
IT DEPARTMENT  
IT DEPT  
IT GROUP  
MGR IS  
MIS COORDINATOR  
MIS DIRECTOR  
MIS DIRECTOR  
MIS MGR  
NETWORK ADMIN  
NETWORK ADMINISTRATOR  
NETWORK MGR  
OFFICE OF INFORMATION & TECHNOLOGY  
OTSL DEPT

***Management (24)***

COO  
CONTROLLER  
ASST SEC FOR HEALTH AND HUMAN SERVICES DEPT  
GENERAL MANAGER  
HEAD OF NETWORK SERVICES  
INTERACTIVE MGR  
MANAGEMENT  
MARKETING SERVICE MGR  
OWNER

OWNER  
OWNER  
OWNER  
PARTNERS  
SERVICE MANAGER  
SUPERVISOR, GENERAL MANAGER  
VP  
VP  
VP AND MGR TECH SERVICES  
VP ENGINEERING  
VP INFO SERVICES  
VP INFORMATION SERVICES  
VP OPERATIONS  
VP OPERATIONS  
VP PROGRAMMING

***Webmaster (22)***

ART DIRECTOR  
GRAPHIC DESIGNER  
IT DIR & WEBMASTER  
NEW MEDIA DESIGNER  
PRODUCTION DIRECTOR  
PUBLISHER  
WEB ADMIN  
WEB ARCHITECT  
WEB TECHNOLOGIES MGR  
WEBMASTER  
WEBMASTER  
WEBMASTER  
WEBMASTER  
WEBMASTER  
WEBMASTER  
WEBMASTER  
WEBMASTER  
WEBMASTER  
WEBMASTER  
WEBMASTER & MARKETING MGR  
WEBMASTER/PARTNER  
WEBSITE PRODUCER

***President (7)***

PRESIDENT  
PRESIDENT  
PRESIDENT  
PRESIDENT  
PRESIDENT  
PRESIDENT  
PRESIDENT/OWNER

**Committee (7)**

COMMITTEE  
COMMITTEE  
COMMITTEE  
APPLICATIONS DEVELOPMENT GROUP  
GROUP DECISION  
STEERING COMMITTEE  
STEERING COMMITTEE

**CIO (6)**

CIO  
CIO  
CIO  
CIO  
CTO  
CTO

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

**Performance (2)**

THE WEB ITSELF BEING AVAILABLE  
GETTING SERVICES ON-LINE  
DOWNLOAD TIME  
SPEED  
MAKING SURE CONTENT IS USABLE TO END USER AND TIMELY  
SCALABILITY  
SPEED  
GETTING IT INTO THE HANDS OF THE USER  
MORE HITS  
INFRASTRUCTURE  
REAL TIME INFORMATION WITH OUR PRIMARY HOST SYSTEM  
BANDWIDTH - RELIABILITY  
UPTIME-PEOPLE CLAIMING THE SITE IS SLOW GETTING UP  
PROVIDING CONTENT ON A TIMELY BASIS  
SPEED  
TIMELY UPDATE  
PERFORMANCE  
UPTIME  
BANDWIDTH FOR USER END  
PROVIDING CONTENT IN A TIMELY MANNER  
CONTINUOUSLY IMPROVING OUR SITE  
MEMORY CONSTRAINTS

**Content (18)**

CONTENT DEVELOPMENT  
CONVERSION OF CONTENT FROM OLD STATIC HTML SERVER TO A DYNAMIC PUBLISHING SYSTEM

CONTENT MGMT & PRODUCTION  
CONTENT IS OUR BIGGEST CHALLENGE AT THIS TIME  
KEEPING THE CONTENT UP TO DATE  
ONLINE ORDER FORMS  
CONTENT THAT WE NEED TO PRODUCE IN A TIMELY MANNER  
UPDATING IS OUR BIGGEST CHALLENGE  
GETTING CONTENT OUT OF SALES  
CONTENT ORGANIZATION  
THE DOWNLOADING OF SOFTWARE TO EXISTING CD'S  
GETTING GOOD CONTENT  
KEEPING THE CONTENT UPDATED  
INTERNAL CONTENT  
GETTING THE WEB SITE ESTABLISHED  
CGI SCRIPTING  
BROWSER COMPATIBILITY  
COORDINATING THE WEB PAGES BETWEEN DEPARTMENTS

**Security (13)**

MANAGING EXTREMELY LARGE SITES THAT REQUIRE SECURE TRANSACTIONS AND SECURE COLLABORATION

SECURIT  
Y  
E-COMMERCE  
AUTHENTICATION  
SECURIT  
Y  
DATA BASE ACCESS AND SECURITY  
E-COMMERCE  
INTEGRATION OF DATABASES TO WEB BASED INTERFACES & SECURITY  
SECURITY  
E-COMMERCE  
INTERACTION WITH INTERNAL SYSTEMS SECURELY  
SECURE ONLINE BANKING  
SECURITY

**Keeping up with Technology  
(11)**

KEEPING MACHINES RUNNING  
KEEPING CURRENT  
TYING IT IN WITH THE REST OF OUR OPERATIONS

KEEPING UP TO DATE  
TRAINING THE USERS  
STAYING UP ALL THE TIME  
TRAINING  
G  
KEEPING UP WITH TECHNOLOGY  
USER FRIENDLINESS  
I WANT MICROSOFT TO STOP PLAYING WITH ACTIVE-X  
COMPATIBILITY BETWEEN PROGRAMS

***Database (9)***

INTERNET DATABASE SYSTEMS  
CONSTRUCTING A NEWS ARTICLE DATABASE  
INTEGRATING DATA BASES WITH THE WEB  
SEQUEL  
INTEGRATING OUR DATABASE WITH THE WEB  
MIGRATING TO A DYNAMIC DATABASE  
DATA BASE ON WEB (VISUAL)  
IMPLEMENTATION OF LARGE SEQUEL SERVERS ON LINE  
INTEGRATING DATABASE INTO STATIC AREAS

***Personnel (8)***

RESOURCES AND DEVELOPMENT  
SUPPORT STAFF  
MANPOWER  
LACK OF PERSONNEL TO MAINTAIN & UPDATE  
MAINTENANCE AND TIME  
INTEGRATING THE REST OF THE COMPANY  
GETTING EVERYONE TO TALK USING THE SAME LANGUAGE ACROSS THE BOARD  
  
AMOUNT OF TIME IT TAKES TO INSTALL NEW SOFTWARE

***Streaming (5)***

REAL TIME DISCUSSION  
STREAMING VIDEO IMPLEMENTATION  
STREAMING  
MULTI-MEDIA  
STREAMING VIDEO

***Growth  
(4)***

EXPANSION  
GROWTH  
SPACE  
DEALING WITH THE SERVICE PROVIDER

31. What are your largest website business challenges your company faces? (Open ended)

***Content Development (21)***

KEEPING THINGS UP, GOING AND INTERESTING  
REACHING A CONSENSUS BETWEEN VARIOUS BUSINESS UNITS  
CREATING AN INTERESTING SITE  
KEEPING UP WITH THE CUSTOMERS' PERCEPTION OF ITS USEFULNESS  
UPDATE  
MAKING SURE IT IS NOT JUST BROCHURE WARE  
BEING LOCATED ON THE WEB  
COURSE CONTENT  
INTERFACE WITH THE USER  
CONTENT CREATION UP TO DATE  
DOWNLOADS  
BROWSER ISSUES AND JAVA LANGUAGE  
CREATING NEW PRODUCTS  
WEB VISUALS  
MORE USEFUL INFORMATION TO THE USERS  
GETTING INFORMATION BACK TO CUSTOMERS IN A TIMELY MANNER  
PROVIDING CONTENT  
GETTING EVERYTHING UPDATED IN A TIMELY FASHION AND TRYING TO  
CONSERVE COSTS

TIMELINES OF CONTENT DELIVERY  
TIMELINESS  
ONLINE DOCUMENT RETRIEVAL

***Site Traffic (18)***

BEING ESTABLISHED, KNOWN ON THE NET-DUE TO LACK OF ADVERTISING  
BUDGET

GETTING PEOPLE TO VIEW OUR SITE  
ESTABLISHING BRAND  
SIGNING UP MEMBERS  
MORE USERS  
DEVELOPING A CLIENT BASE  
GETTING MORE HITS AND EXPOSURE  
PROMOTION  
TRAFFIC ,GETTING THE CORRECT TRAFFIC THERE  
GETTING OUR CLIENTELE TO USE IT  
ATTRACTING VISITORS  
PUSHING MEMBERS TO THE SITE  
GROWING TRAFFIC  
MARKETING-SEARCH ENGINE ABILITY TO FIND US, COMPETITION ON SEARCH  
ENGINES TO FIND US

DRAWING MORE POTENTIAL CUSTOMERS  
GETTING WORD OUT TO OUR TYPE OF CUSTOMER, OUR INDUSTRY, THAT WE  
HAVE A SITE OUT THERE

EYEBALLS ON THE SITE  
AD TRACKING

***Generating Site Revenue (9)***

CREATION OF REVENUE  
PROFITABILITY  
LOCAL AD SALES  
BUSINESS INFRASTRUCTURE  
SUPPORT SALES  
AD BASING  
ADVERTISING, THE COSTS INVOLVED  
MAKING MONEY  
GETTING REVENUE FROM OUR PAGES

***E-Commerce (8)***

E-COMMERCE DEVELOPMENT  
E-COMMERCE INFORMATION  
E-COMMERCE ISSUES  
E-COMMERCE  
E-BUSINESS  
HOW TO SEE THE PRODUCTS WITH DIRECT SELLING OVER THE LINE  
DEVELOPING AN E-COMMERCE STRATEGY  
E-COMMERCE

***Growth  
(7)***

EXPANSION  
EXPANSION  
GROWTH  
ADAPTING FOR INTERNET USAGE  
FINDING OUT WHAT THE CUSTOMER WANTS  
SELLING THE IDEAS TO UPPER MANAGEMENT  
JUSTIFICATION OF FUNDING FOR IT