The 2002 Route Control Study

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The HTRC Group
P.O. Box 2087
San Andreas, CA 95249
www.htrcgroup.com

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Author:

Greg Howard

Principal Analyst & Founder

greg@htrcgroup.com

About The HTRC Group, LLC

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

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Abstract

The growing use of multi-homed locations and increased use of VPNs are driving the need to more effectively manage and optimize upstream Internet connections. According to The 2002 Route Control Study, a significant number of enterprises are migrating away from private lines to less costly VPN solutions, in turn increasing the importance of Internet connectivity. The increased reliance on Internet connectivity is driving the need for multi-homed locations. For enterprise organizations this marks a clear shift in priority for sustained Internet connectivity. Using critical supply and demand side information, The HTRC Group's 2002 Route Control Study examines the opportunity for emerging route control vendors.

The Route Control Market

The burning questions we set out to find in this study is how large is the route control market opportunity and what should vendors do to reach potential customers. The immediate opportunity for route control vendors are with organizations that have multi-homed locations. Briefly, a multi-homed location is a single location that uses multiple upstream Internet connections and with one or more upstream Internet Service Provider and likely uses a unique autonomous system number (ASN). ASN assignment represents organizations that have multi-homed locations. The majority of growth of multi-homed locations and ASNs has come from Internet Service Providers (ISPs) in the past. However, more enterprise organizations are registering for ASNs and multi-homing locations than ever before. ASNs aren't the only indicator of a multi-homed location; an organization may have more than one upstream Internet connection at a single location with the same ISP, which does not require an ASN. Organizations that multi-home to the same upstream Internet provider can benefit from route control solutions, however some of the benefits that come from diversifying upstream ISPs are lost.

Autonomous system number (ASN): a unique number in the Internet used to identify an AS. ASNs are used to exchange routing data among systems. A multi-homed location that uses more than one upstream Internet Service Provider uses an ASN.

Organizations are becoming more reliant on Internet connectivity for critical network functions such as VPNs, self hosted Web sites, and Web services. From our research we found that 85% of respondents multi-home for redundancy, while only 32% cited performance, and 27% cited additional capacity. For enterprise organizations this marks a clear shift in priority for sustained Internet connectivity. In the past, most enterprise organizations used Internet connections for employee email and Web browsing. Enterprises with multi-homed locations are faced with the difficulties of installing, configuring, and maintaining theses locations with multiple upstream Internet connections. Route control solutions simplify installation, configuration, and optimize upstream Internet connections based on cost and performance policies.

The immediate opportunity for route control vendors are in two primary markets: multi-homed locations and organizations with VPNs.

- Multi-homed market: the ranks of organizations with multi-homed locations are swelling with new recruits motivated by an uncertain ISP market and a heavy dependence on Internet connectivity for applications including remote access and site-to-site VPNs, Web site connectivity, e-Commerce, Web services, Multi-media, Multi-cast, and voice over IP (VOIP). Route control solutions balance traffic loads

for multiple upstream Internet connections at multi-homed locations, easing configuration and management burdens.

- VPN market: the VPN market continues to grow at fast pace, fueled by the need to increase low cost connectivity, site-to-site VPNs are increasing in popularity. Many organizations plan to migrate away from private network connections to VPNs, increasing their reliance altogether on Internet connectivity. Most plan to maintain a combination of private line and site-to-site VPN connections with the need to balance private line and public network traffic loads. Route control solutions balance public VPN and private line connections, easing configuration and management burdens.

Symmetric or Asymmetric?

For most organizations, Web traffic is asymmetric, small requests are sent out from employee Web browsers for larger Web content such as Web page graphics, objects, and other content. Simply, there was more inbound traffic than outbound. For organizations that hosted their Web site internally, the opposite was true; there was more outbound traffic than inbound. The nature of traffic flow has changed over the past few years to reflect the changing use of Internet connections. Our research reveals inbound bandwidth averaging 97.51 Mbps and outbound bandwidth averaging 114.08 Mbps. We found that most respondents still host their Web site in-house (61%), which should account for a large outbound bandwidth metric. However, now organizations of all types are using VPNs to connect users to vital applications and data as well as intranets and extranets. The result is a better-balanced Internet connection that looks more symmetric than in past years.

Virtual Private Networks (VPNs): a network that uses tunneling and encryption at the IP level so data can securely traverse IP networks. VPNs can be used to connect dial-up users to private corporate resources or for secure site-to-site data communications over the Internet.

Route control solutions can be used to optimize traffic loads between a private Wide Area Network (WAN) and site-to-site VPN connections. This means that an organization need only have a private WAN and site-to-site VPNs in order to benefit from route control solutions. While the population of organizations with multi-homed locations continues to increase, the total population of organizations that can use route control solutions for migrating to site-to-site VPNs is much larger.

VPNs

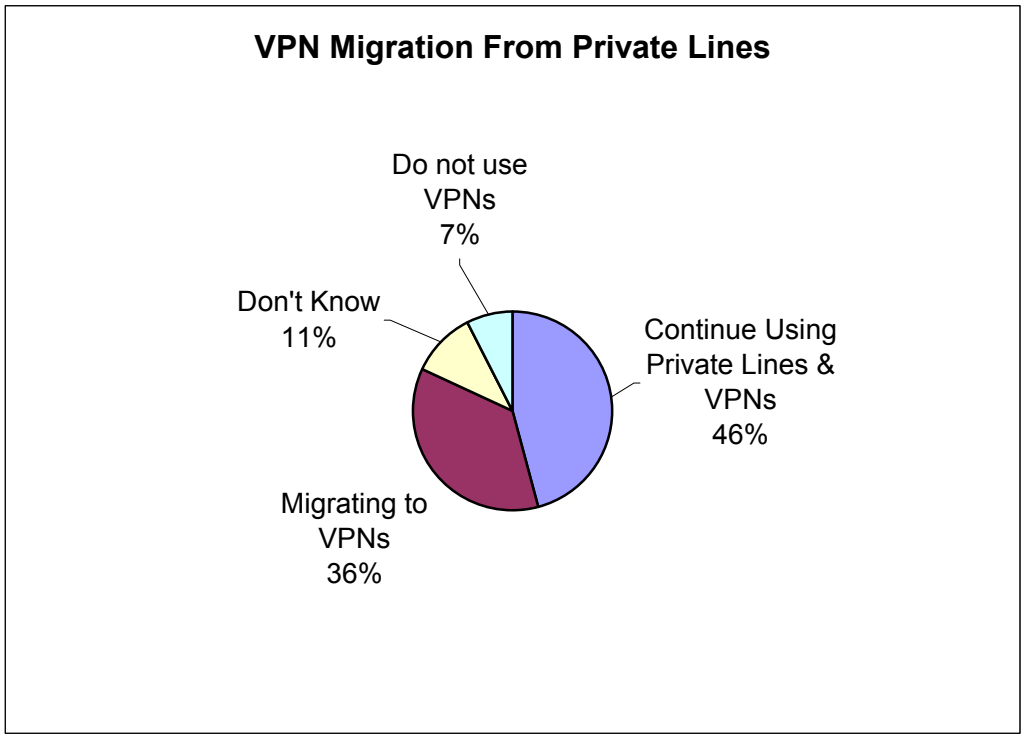
VPNs have increased in popularity, providing low cost secure connectivity for employees, customers and suppliers to company resources. The importance of reducing costs has increased for nearly all organizations during this economic downturn. Site-to-site VPNs offer a way for organizations to reduce costs by

using low cost Internet connections to exchange private data. Before VPNs, most organizations used costly private data connections between locations. However, using site-to-site VPNs increases the dependence on Internet connectivity.

The migration from private data lines to public Internet VPNs will have significant influence on the rate of deploying multi-homed locations. We found 46% of respondents use both VPN and private data connections with no plans to change. These companies can use route control solutions to optimize and balance traffic between private networks and site-to-site VPNs. However a total of 36% have or plan to migrate to VPNs instead of private lines, reflecting a growing dependence on Internet connectivity. Many of these organizations will likely elect not to renew contracts for private WAN connections, instead electing to migrate traffic to site-to-site VPNs over time. This growing trend points to healthy growth in the number of multi-homed locations within an organization.

The chart below shows respondent plans for migrating from private lines to VPNs.

Chart 1-1: Private Line Migration to Site-to-Site VPNs (n=98) Q31



Web Sites

The Internet provides a common connection to personal and professional users globally, enabling a variety of new services. New Internet-based media types are continually developed and used. The growth rate of content on Web sites continues to increase as organizations around the world harness developing content types, such as streaming media and dynamic content, to further Web site differentiation. Since most Web users have little tolerance for slow-loading content, Web performance and consistency become key points of differentiation. (Users are more likely, for example, to purchase while browsing a high-performing e-Commerce site.)

For those organizations that host their own Web site, Internet connectivity is more critical than ever before. Sixty-one percent of study respondents still host their own Web site, which means basic Internet connectivity is critical for maintaining an online presence. Those organizations that host their own Web site strive to maintain a high level of performance and keep ahead of capacity demand, all the while maintaining uptime, especially those conducting e-Commerce. Any Web site that has an interest in performance will likely have an interest in multi-homing for resiliency. For Web sites that cannot afford downtime, multi-homing is a justifiable expense for maintaining redundancy and performance.

Web Services

What are Web services and what do they have to do with the route control market? Web services represents a significant class of technologies that have emerged to provide greater means to integrate disparate applications and services together. Web services provide a common framework for finding, invoking, and integrating distributed components/services over the Internet. What makes Web services particularly unique that its framework utilizes the Internet's current open data standards and protocols, such as XML, and HTTP, unlike earlier component models such as DCOM and CORBA that relied on proprietary object models and protocols.

With Web services, components that are implemented in a multitude of different languages and platforms, and that reside in different locations in the network, can now be loosely coupled together to form distributed applications. To this end, Web services provide a standards-based mechanism for applications to programmatically request information from other applications over the Internet.

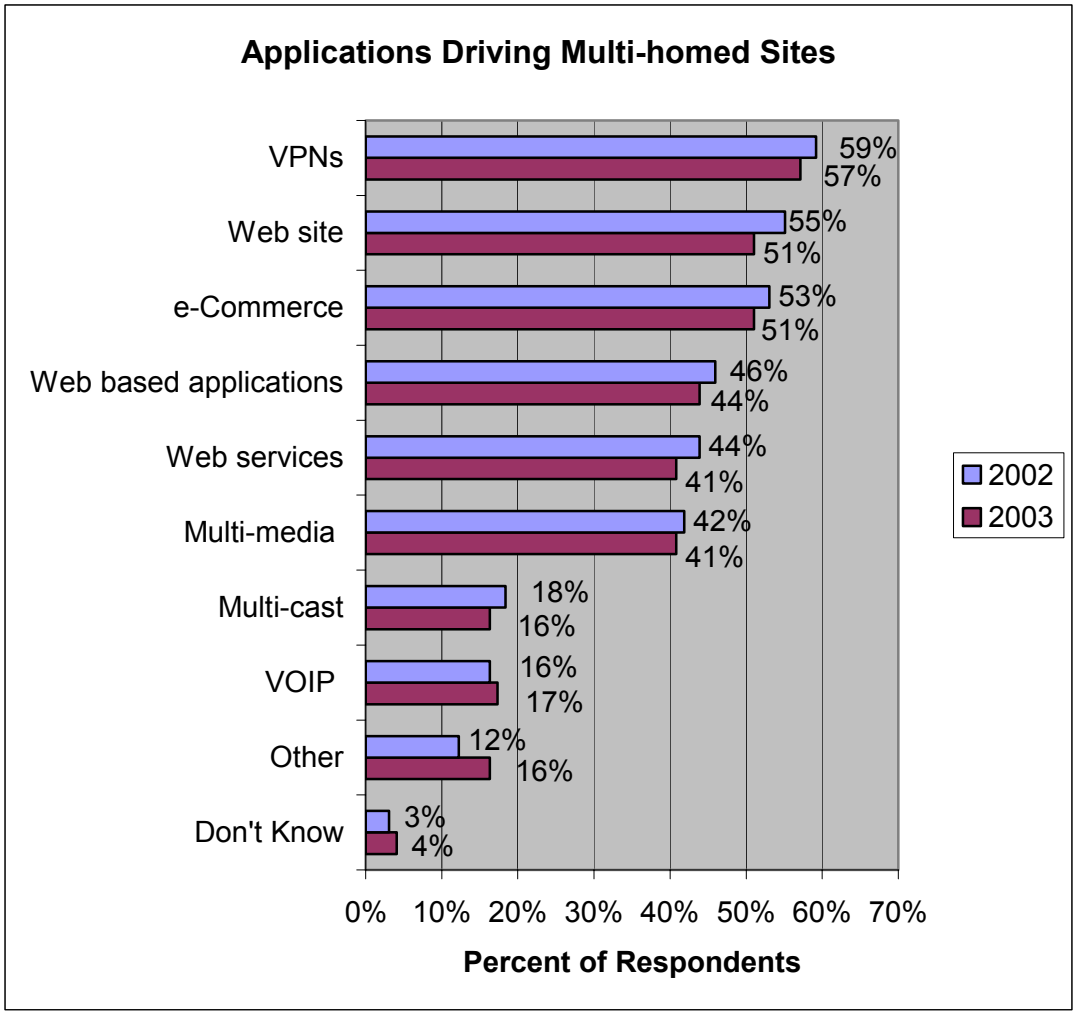
Respondents cited Web-based applications (46%) and Web services (44%) as applications driving the need for multi-homed locations. The Web services market is new and off to a healthy start, assisted by large marketing campaigns from Microsoft, IBM, and Sun. In our recent 2002 Application Data Router (ADR) study, we examined Web-based applications and Web

services in great detail. Respondents in the 2002 ADR study indicated massive plans for Web services in 2003, of which roughly half destined for internal customers (behind the firewall), and the other half destined for Internet use. Both in this study and the 2002 ADR study, respondents were asked what web service technologies they use or plan to use in 2002 and 2003. Microsoft clearly has the early advantage in Web services platforms.

Web services are planned for new applications as well as connecting legacy applications. Migration to Web services enables organizations to make greater use of low cost VPN and Internet connections. The implementation of Web services and Web-based applications are driving the need for a more reliable and consistent connection to the Internet. The criteria for operating these mission critical applications will include a greater dependence on Internet connectivity and the need to diversify upstream ISPs.

The chart below shows applications that are driving the need for multi-homed locations.

Chart 1-2: Applications Driving Multi-homed Locations



Fear, Uncertainty, and Doubt: The WorldCom Threat

The debacle of WorldCom has shed light on the potential frailty of Internet connectivity in the US. Not long ago European KPNQuest shut it's digital doors leaving many customers scrambling for connectivity. What once thought stable providers have become questionable and uncertain. Those organizations that thought a single upstream provider, most recently WorldCom, could provide a consistent high performance connection now host serious doubts. The criticality of Internet connectivity is driving the need to diversify upstream service provider connections in order to guarantee smooth consistent network operations. The increasing importance of Internet connectivity is being driven by applications, such as VPNs and Web services, critical to business operations. By multi-homing, organizations can reduce Internet bandwidth costs by using 2 or more lower cost ISPs, instead of one high performance high cost provider.

Barriers and Pain Points

Most CEOs and CFOs are generally not concerned with specific emerging technologies, instead they care a great deal about a secure and reliable network. Route control solutions run the risk of being yet another appliance that sits on top of a Cisco router. Route control vendors are challenged with educating decision makers on the value of their technology. In all successful technology markets, products were created to solve one or more painful problems. These pain points can range widely, dependent on the specific problems being solved. Any good sales person understands their customer's pain points and tailors their pitch to them. According to our respondents, the major pain points and barriers for the route control market include cost, expertise, outages, multi-homed location implementation, and connection provisioning.

A company must first strategically value their network as a business resource to be interested in route control solutions. If a company does not see their network as a true business asset, they will likely not comprehend the value of route control technology and likely not multi-home locations or implement a route control solution. That said, a company that does not multi-home may still place strategic value on their network and invest in route control technology. In the absence of route control solutions, organizations will have great difficulty manually configuring routers and switches to balance network traffic loads, and find it near impossible to set policies such as least cost and performance threshold without a great deal of expertise.

In order to gain a better understanding of what the pain points are, we asked respondents to name the top three multi-home implementation challenges they have. Surprisingly, only 7% of respondents said they have no challenges. The "None" responses indicate that the vast majority of those companies with multi-homed locations will encounter problems when implementing and

maintaining multi-homed locations. Our open-ended responses indicated a wide range of challenges, ranging from a lack of BGP expertise (at enterprise organizations) to problems with vendors.

One painful issue many IT decision makers must come to terms with is the shakiness of the ISP market, primarily caused by WorldCom's spectacular fall from grace. Organizations of all types are increasingly dependant on their Internet connections for VPNs, Web services, and Web site traffic. Maintaining Internet connectivity with a single ISP in this market can be risky. In our research, 36% of respondents are currently, or plan to migrate from private WANs to VPNs.

The applications pushing organizations to diversify Internet connectivity (multi-homed locations) are also driving non multi-homed organizations to introduce consistent connectivity—by using both site-to-site VPNs and private WANs. Route control solutions can help installing, configuring, and maintaining complex mixtures of private and public network connections. In today's economy, cost control continues to be an area of focus for many organizations. These organizations are moving from private data connections to VPNs because of the significant cost savings. However, by moving to VPNs, these organizations become much more reliant on their Internet connections—a risky venture with a single ISP in today's uncertain market.

Organizations with international locations are faced with high private data connection costs. Many are migrating to use site-to-site VPNs wherever they can. International locations require high availability of connectivity. International locations are increasingly using VPNs to connect to corporate resources. These organizations are multi-homing when and where it makes sense with clear business benefits. These organizations can use route control for multi-homed locations or to balance private WAN and site-to-site connections. For many of these multinational organizations, information technology (IT) expertise is generally centrally located at head quarters, and possibly regional offices. Regional, remote, and local offices will need a solution that can be easily managed and maintained, and that can be remotely managed by a centralized IT group.

What will motivate organizations to buy route control products? We think it is a combination of pain points, coupled with the understanding of route control technology and the realization that network resources are a strategic business advantage. Following are the major pain points:

- ***Cost***: according to our research, the cost of route control products is the top barrier to purchasing route control products. Economic trends have weighed heavily on budgets, forcing spending cuts to the bare minimum. IT decision makers are more sensitive to price than in years past. It has been argued that those organizations that understand the benefits of route control products do not have an

issue with price. While this may be true for some organizations, the fact remains that IT expenditures are at an all time low. Products with similar perceived value are always evaluated on price. In other words, when like products are evaluated, price is generally the top judgment criteria.

- ***Expertise***: new technologies continually emerge to solve thorny problems and issues for IT groups, obtaining and retaining expertise in the IT market continues to be a problematic. The challenge, as cited by our respondents, is keeping up with the high learning curve presented by the onslaught of new technology. Few enterprises have BGP gurus that can manage multi-homed locations and effectively balance traffic loads between private WANs and site-to-site VPNs. While some organizations may have some IT professionals with the expertise needed to manage these complex network environments, this expertise does not scale throughout a large multinational company. Any company that hosts their own Web site knows the challenges of maintaining uptime and the unpredictability of demand. IT managers at multi-homed locations are required to manage and maintain their network environment. The real issue facing most IT groups today is not knowing what they don't know. In the absence of route control solutions, implementing, managing, and maintaining these complex network environments is time consuming and costly.
- ***Multi-homed location Implementation***: installing, configuring and maintaining a multi-homed location is difficult. In an open-ended question, respondents named implementation challenges as the top challenge for their multi-homed locations. Configuring equipment at a multi-homed location is challenging, especially if an organization has little experience with multi-homed locations. Route control solutions reduce the time it takes to implement a multi-homed locations and eases initial and ongoing configurations through policy-based management.
- ***Outages***: network outages cost big dollars for both employee productivity and Web site downtime. The increasing dependence on Internet connectivity for remote access and site-to-site VPNs and Web services are driving up the cost of unplanned network outages that can weigh on a company's bottom line. Route control solutions increase uptime by balancing redundant upstream Internet connections or by balancing a private WAN with a public site-to-site VPN.
- ***Connection Diversification***: Provisioning new connections for Internet connectivity can be a painful time consuming process. Some respondents cited the frustration of finding competent ISP in rural

America and world wide, while others cited the inability to find a decent national ISP. Provisioning local loop lines can take weeks to months, potentially delaying critically needed Internet capacity. Organizations must find ways to use private and public Internet connections to make ends meet during provisioning delays. Route control solutions can optimize the use of existing connections to balance performance needs while critical network connections are provisioned.

Market Players

This section examines how the market is likely to change based on our primary market research, interviews with vendors, and market factors. The current iteration of the route control market includes 6 players: NetVmg, Opnix, Proficient Networks, Radware, RouteScience, and Sockeye Networks. Each technology company endorses their own product and service differentiations, and in this early market, it is too early to tell which is the market leader. Based on our research, the route control market presents a large opportunity once it picks up, and can easily sustain more than 6 solution providers.

Product Future

Our research indicates that the majority of respondents expect to purchase a route control product vs. a service. Currently only Opnix and Sockeye offer services. Opnix solution includes a product plus a service while Sockeye offers a pure service play. We expect all players will eventually migrate to a pure product strategy, some with service options. We believe there is room for growth for route control services; however, it will be a small fraction of the product market.

What About the 800 lb Gorilla?

The company that stands to have the greatest influence on the route control market is Cisco. Named by 58% of our respondents in an unaided brand awareness question, Cisco does not yet have an official route control product offering. The question we had for route control vendors in this market was, "What if Cisco includes route control free in IOS?" The response was the same from nearly all the vendors: it is not in Cisco's best interest to offer route control free in IOS—and we agree. Cisco gains nothing by offering route control for free; they would deprive themselves and others from generating revenue from a new market. Also, Cisco enterprise routers may not posses the processing resources to scale when performing route control duties while handling enterprise traffic loads. Eventually Cisco will have a route control product offering, either through internal development or acquisition.

Other companies that could enter the market include Juniper, Foundry, and possibly Extreme. However, it will likely take 9-12 months to develop a competitive product. New product development will also be influenced by economic trends; most are likely to defer development because of the current recession.

Reaching The Market

Reaching Out

IT professionals are in a constantly changing industry, where the churn of technology frequently has a direct impact. The people responsible for maintaining enterprise networks are continually struggling to stay abreast of technology changes that affect their business. Currently, most IT decision makers are not familiar with route control technology.

We believe the best way reach decision makers of route control product and service purchases is through education. Education and awareness marketing campaigns can be costly, especially in the network equipment market. Educational campaigns should target both business and technical decision makers. Vendors should continue to develop technical as well as business-oriented information on their Web sites.

In order to gain a better understanding of the sources that respondents use to learn about new technology, we asked respondents to rate a list of information sources. Of the top sources for information, trade magazines (70%) and independent white papers (70%) were rated as critical sources. These two sources should be prioritized as an important medium for marketing to potential customers. Vendors should strive to be included in columns and articles of significant trade publications along with maintaining good relationships with industry press that cover the route control market. Vendors should also consider investing in independent white papers as a marketing tool. Product manufacturer and service provider Web sites should market product and service educational material on their site.

Vendor Web sites (rated critical by 66% of respondents) are one of the most important medium for conveying information to potential customers; great emphasis should be put on Web site development. Dollars spent on Web site content differentiation are well spent.

We strongly recommend developing educational material to be made available on the Web site. Business and technical decision makers are two distinct groups. Material targeting these groups should reflect their interests. Business readers should be targeted with the business benefits of route control. Technical readers will likely have a varied level of expertise; vendors should consider creating documents that address high and low levels of expertise. We recommend examining the possibility of developing an

interactive Web-based learning application. Web-based applications such as these can be a valuable resource for potential customers, channel partners, sales people, training, and industry partners.

Positioning

The basic value proposition for route control products and services may be as simple as creating resilient Internet connectivity; however, successfully conveying product and service differentiation among market players can be difficult. Redundancy was the most frequent response that respondents gave to describe the reason for multi-homing locations. Route control's manipulation of BGP can be difficult for some IT decision makers to understand. Market players who market through education will have an advantage by educating business and technical prospects on specific technology benefits. Product and service solution positioning should be simplified and made easy to comprehend. Business value propositions should be tied in with revenue gains based on applications driving the criticality of Internet connectivity. Product and service differentiation should be presented from an educational and awareness prospective.

The largest barrier for implementing route control solutions, represented by 44% of the study respondents, was cost. It is incumbent upon vendors to develop explanatory case studies and financial models. There are potential entrants, such as Cisco, that will likely help drive awareness of the route control market. Integrators may also play a significant role in driving market awareness by recommending multi-homed environments for customers requiring a high level of Internet connectivity. Integrators will benefit from the additional work required to implement, manage, and maintain customer networks.

Partnerships

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

Synergistic partnerships are a way to provide customers with greater overall value. Route control product manufacturers and services providers should consider mutually beneficial partnerships that extend the overall solution value for customers. Partnerships may include manufacturers of VPN, firewall, or bandwidth optimization products.

Market Requirements

In order to better understand the route control market, we have created a process of visually mapping market requirements with product solutions. The market requirements map rates six key areas including cost, ease of installation, partnerships, device management and reporting, redundancy, and service and support. All market requirement sections are rated on a scale from 1 to 5, where 1 is the lowest and 5 is the highest. The route control market requirements below are scored based on interviews from this study.

Route Control Requirements Map

In this section, we examine the baseline market requirements for the route control markets. Please note that this is only a baseline score of requirements that product solutions can be compared against.

Technology products have been in the enterprise market for some time. The decision for an enterprise to implement a route control solution may stem from top-down (from management), or from a bottom-up needs analysis based on the drive for cost control and from application driving site-to-site VPN and multi-homing locations. In both cases, technical decision makers do product evaluations. The research used to define the market requirements is based on primary market research with technical decision makers. The resulting map of market requirements is based on six key areas of route control solution functionality.

Each entry in the enterprise market category below includes the category name, the possible contents within each category, the market requirements, and the score.

Cost

Score: 4

Cost is an important criterion for potential customers in the route control market. From small to large companies, cost is always an influential criterion when 2 or more products of perceived similar function are compared. Our cost conscious respondents also stated they require cost controls (45%), and 44% stated cost was their largest barrier to purchasing route control solutions. We gave the Cost category a score of 4 because of the importance cost plays in both products and Internet bandwidth.

Ease of Installation

Score: 5

Simple and easy installation is a fundamental requirement for the majority of enterprise organizations. While those organizations with multi-homed locations may have some experience with BGP, most enterprise organizations without multi-homed locations do not. Vendors should assume the person

implementing a route control solution has 6 months of experience with BGP. We gave this category a 5 because we think many regional, remote, local enterprise locations and small businesses will need to install route control products without the benefit of years of BGP expertise.

Partnerships

Score 3

Partnerships will play an important role in the success of route control solutions in two areas, sales channels and the expanding product requirements. Vendors must focus on their core technology expertise, lest they become unfocused while attempting to produce too many products, spreading development resources too thin. Only 36% require a stand-alone route control product. Smaller companies may want more functionality; larger companies may want to consolidate functions for remote and local offices. We gave this category a score of three because partnerships are needed over time to expand a complete solution and develop a sales channel. Partnerships with synergistic vendors promote interoperability and cross vendor differentiation such as integrated management functions.

Device Management and Reporting

Score: 4

Management among hardware vendors has always been an area of differentiation. Route control solutions must be easy to install and use. Overburdened IT workers must make use of the little time they have. Ease of use is the most important differentiation route control vendors can have. While we believe basic NetFlow stats and policy control mechanisms are required, management and reporting is an area where vendors have a great deal of opportunity to differentiate. According to our research 81% use self-collected NetFlow statistics and 48% require performance optimization controls. Because of the strategic location of route control products, vendors could also measure Internet connection SLA violations.

Redundancy

Score: 5

Redundancy was an important theme repeated throughout this study by respondents. Briefly, 85% multi-home for redundancy and 55% require hot swappable redundancy. We gave the redundancy category a score of 5 because of the importance expressed by respondents.

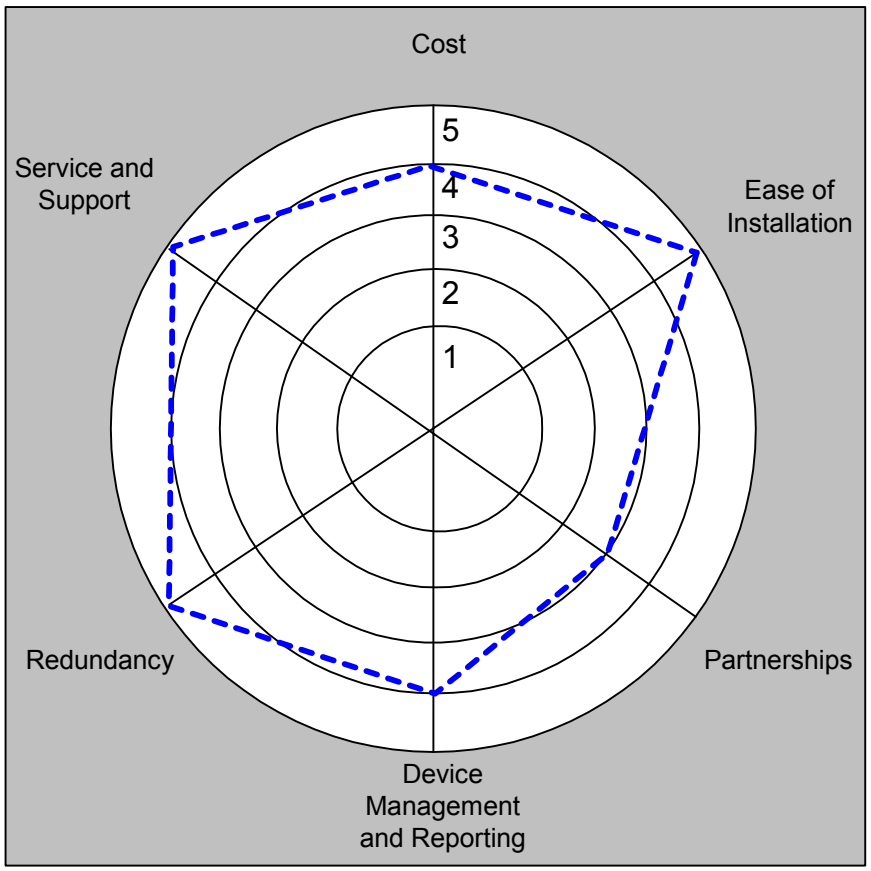
Service and Support

Score: 5

Excellent service and support is required from vendors in the route control market. The emerging route control market is faced with customers

unfamiliar with the technology. Based on the importance of Internet connectivity, customers need problems solved fast. Service and support always rate in the top three criteria for selecting a product manufacturer or service provider. We gave the service and support category a score of 5 because of the paramount importance of solving customer problems.

Chart 1-3: Route Control Market Requirement Map



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Market Size and Growth

The 2002 Route Control Study forecasts cover products and services that optimize multi-homed locations from vendors including NetVmg, Opnix, Proficient Networks, Radware, Route Science, and Sockeye Networks.

Currently, the economy is in a downturn, which is impacting capital expenditures. Route control holds the promise of saving significant amounts of money when used with a migration strategy from a private WAN to using site-to-site VPNs.

Following are significant market factors influencing our forecasts:

Market Factors and Assumptions

- Economy will begin picking up at the end of 2003
- Uncertainty in the service provider market will drive multi-homed locations
- Market education is a significant challenge for route control vendors; integrators, service providers, and vendors will drive education
- The growth of the total number of enterprises with multi-homed locations increases conservatively through 2006
- The number of multi-homed locations within an organization increases significantly Q3 of 2003 and 2004
- Cost is the largest barrier to the immediate adoption of route control solutions
- The price of route control products and services will decrease over time, driving adoption rates up
- New applications, such as Web services and VPNs in the enterprise, will drive the need for multi-homing and creating redundant network infrastructure, such as using both a private WAN and site-to-site VPNs
- Route control solutions can be implemented and used by organizations without Multi-homed locations, organizations can optimize private WAN and site-to-site VPN connections
- Most organizations implementing route control solutions will deploy product at headquarters first, and over time deploy product outward at regional locations, then at remote/local locations
- Many multinational organizations are US based, but have locations around the world
- International locations have the greatest need for connectivity

- The number of ASNs increases 30-50% per year
- The total number of enterprise ASNs will continue to increase
- The larger the company, the more likely they will have multi-homed locations
- The larger the company, the greater number of potential multi-homed locations
- For organizations that have one or more multi-homed location, the total number of multi-homed locations grows significantly over the next 3 years
- Greater market adoption of route control solutions will begin in Q2 of 2003, and increase significantly in 2004
- Smaller companies (less than 1000 employees), that value their network as a strategic asset, will begin to multi-homing locations
- Many organizations that multi-home outside of North America do not use BGP

Methodology

The 2002 Route Control Study Forecast examines the opportunity for route control product manufacturers and service providers. This forecast is based on primary and secondary information sources. To understand the total population of enterprises, we considered public information gathered on the total number of businesses by size. For this, we used statistics gathered in 1999 and aggregated by the US government, and statistics gathered in 2000 and aggregated by the Canadian government.

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

North American Route Control Forecast

What's Included

Included in this forecast are products that organizations use and plan to use for route control. For this forecast, we include route control hardware and software. Some route control products require services, such as those from Sockeye Networks and Opnix. This forecast includes these products and services.

Products counted for this report include the following:

- Route control hardware

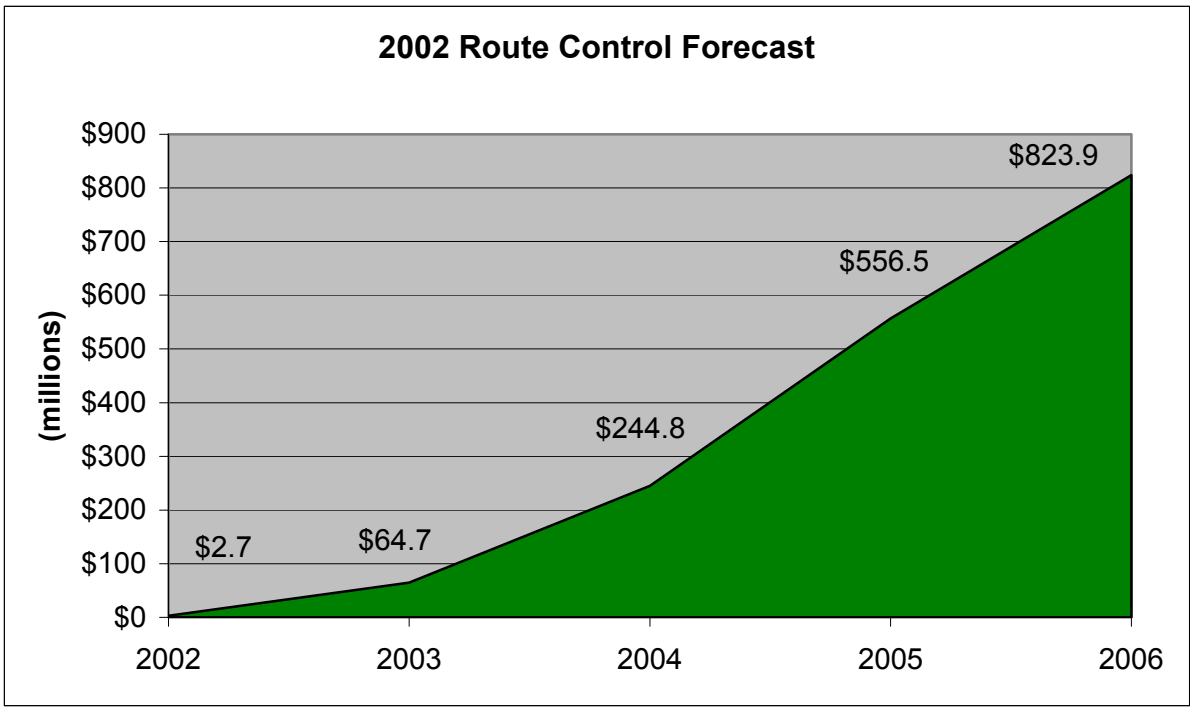
- Route control software
- Route control monthly service fees

What's Not Included

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

- General-purpose operating systems
- General-purpose operating system servers
- Routers, switches, and hubs

Chart 2-1: 2002-2006 North American Route Control Forecast



The 2002 Route Control Study

The growing use of multi-homed locations is driving the need to more effectively manage and optimize upstream Internet connections. During economic uncertainty, the most successful technologies are those that reduce costs while increasing the effectiveness of business. According to The 2002 Route Control Study, a significant number of enterprises are migrating away from private lines to less costly VPN solutions, in turn increasing the importance of Internet connectivity. The increased reliance on Internet connectivity is driving the need for multi-homed locations.

The 2002 Route Control Study was conducted to gather critical market information on route control implementation plans. This demand-side study examines the opportunity for route control vendors. Route control products and services are positioned to optimize the value of multi-homed locations by reducing costs with least cost connection configurations as well as increasing performance and consistency.

The HTRC Group's 2002 Route Control Study examines the opportunity for emerging route control products and services. Using critical supply and demand side information, this study examines the market opportunity for providers of route control products and services. The growth of route control market is positioned to significant momentum in 2003.

The 2002 Route Control Study provides an in-depth analysis of critical market information gathered including:

- 2 Valuable Forecasts:
  - Route Control solutions forecast
  - Multi-homed location growth forecast
- Plans for route control products and services
- The connection types and speeds of multi-homed locations
- Reasons for multi-homing
- Web site hosting strategies
- Internet connection measurements and reporting statistics
- Internet bandwidth growth plans
- Service provider billing methods
- Expertise level with BGP
- Familiarity with route control solutions
- Purchase plans for route control solutions

- Applications driving the need for multi-homed locations
- Web service platform plans
- Traffic types driving multi-homed locations
- Plans for migrating away from private lines to VPNs
- Important criteria for selecting an ISP
- Important criteria for selecting route control solutions
- Expected sources for purchasing route control solutions
- Expenditures for route control solutions
- Sources for learning about new products and services
- Influential publications
- Influential analyst firms
- Barriers to purchasing route control solutions
- Final decision maker titles
- Multi-homed technical challenges

Study Methodology

To gain a thorough understanding of the opportunity for route control products and services, we interviewed 98 technical decision makers, selected at random from content professionals who subscribe to one or more of CMPs publications. All respondents have 1000 or more employees; interviews were terminated with individuals at organizations with less than 1000 employees. All respondents were decision makers for purchasing products and services. Interviews were terminated with individuals with no decision making influence. Determination of a respondent's knowledge of the multi-homed location was based on the first interview question. Selection was further refined by actual contact; interviews were terminated with prospects that did not have detailed knowledge of their organization's multi-homed location configurations as indicated by their inability to answer the majority of the interview questions. Not all survey participants answered all questions, the "n" is indicated on each chart.

Interviewers, trained by the HTRC Group, conducted 18-minute telephone interviews using The 2002 Route Control Study Questionnaire located in the appendix. Greg Howard, Principal Analyst of the HTRC Group, LLC, developed the study questionnaire based on market trends, hot issues, and feedback from route control solution providers.

Respondents were offered a copy of the summary results of this study. A combination of telephone interviews and Web based research was conducted.

Quick Take

- Number of respondents: 98
- Respondent organizations had 1000 or more employees
- All respondents were decision makers
- All respondents had detailed knowledge of their upstream Internet provider connections, network plans, services, bandwidth, management, performance, and challenges
- Eighteen minute interviews
- Respondents received summary of survey results

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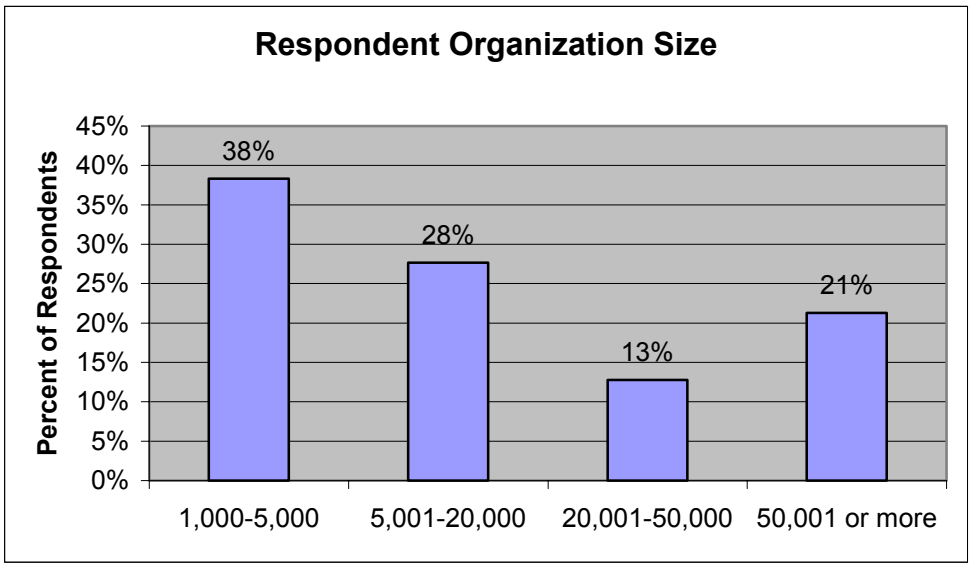
Demographics

Company Sizes

Survey responses revealed a wide variety of company sizes, with employees ranging in number from 1000 to 999,000, with a mean of 50,389. With this wide range, the mode was 5000 and standard deviation 124294.89. The largest number of respondents (38%) was organizations with 1,000 to 5,000 employees. (See Chart 3-1)

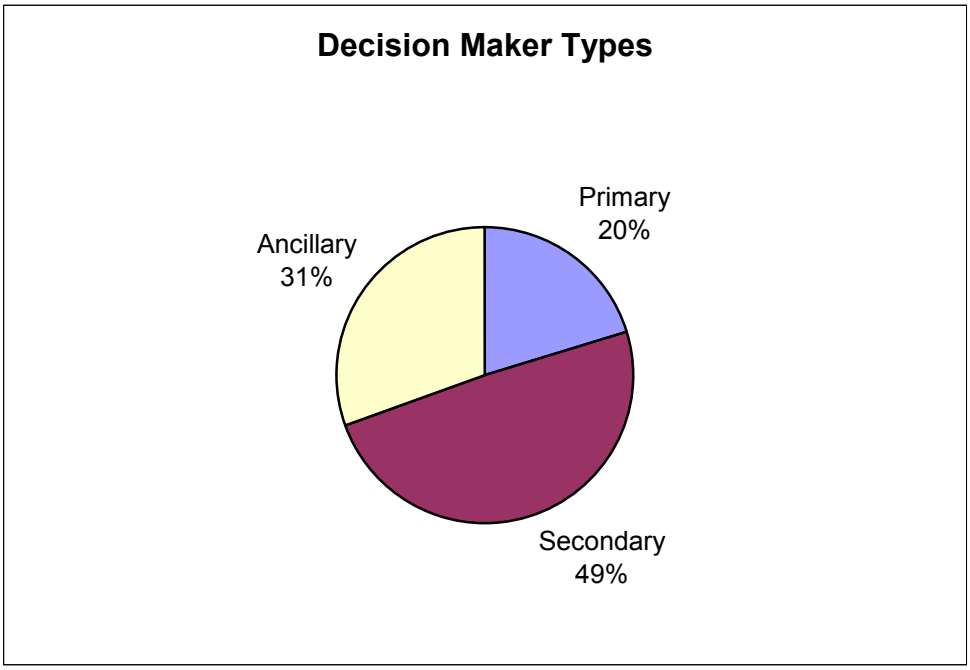
Chart 3-1: Respondent Organization Size (n=94) Q2



Decision Makers

Targeting the right decision makers to interview in organizations can be difficult. However, it is necessary in order to obtain dependable data that reflects current buyer thinking. Respondents must have influence on product and service purchase decisions. In Question 8, we asked respondents what type of decision maker they were, including primary decision maker, secondary decision maker, and ancillary decision maker. Primary decision makers are those responsible for making the final decision on products and services. Secondary decision makers were defined as those having *significant* influence on product or service procurement; ancillary decision makers as those having *some* influence on product or service procurement. Interviews were terminated with respondents that had no influence on the purchase decision. Of the three decision maker groups, percentiles were as follows: primary 20%, secondary 49% and ancillary 31%. Chart 3-2 below shows the breakdown of respondent decision maker types.

Chart 3-2: Decision Maker Types (n=98) Q8



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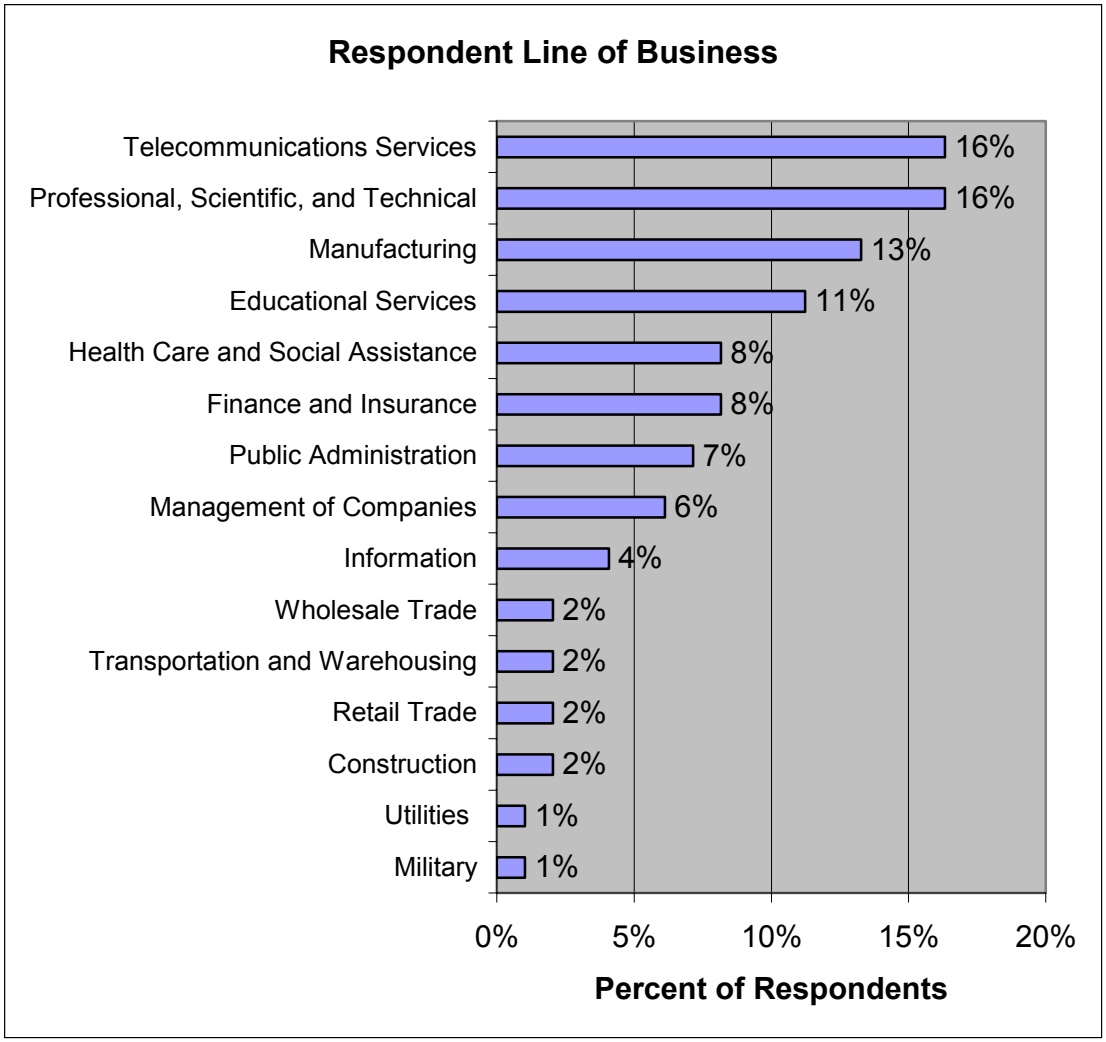
Company Line of Business

Respondents were asked what type of business their company was in, as an open-ended question. Responses to Question 9 ranged from educational services to wholesale trade. Responses were organized into the categories below.

Telecommunications services and Professional services both listed at 16%, were the most frequent organization type in the sample, followed by Manufacturing at 13%, and Educational Services at 11%. Chart 3-3 below shows respondent line of business.

Chart 3-3: Company Line of Business (n=98) Q9

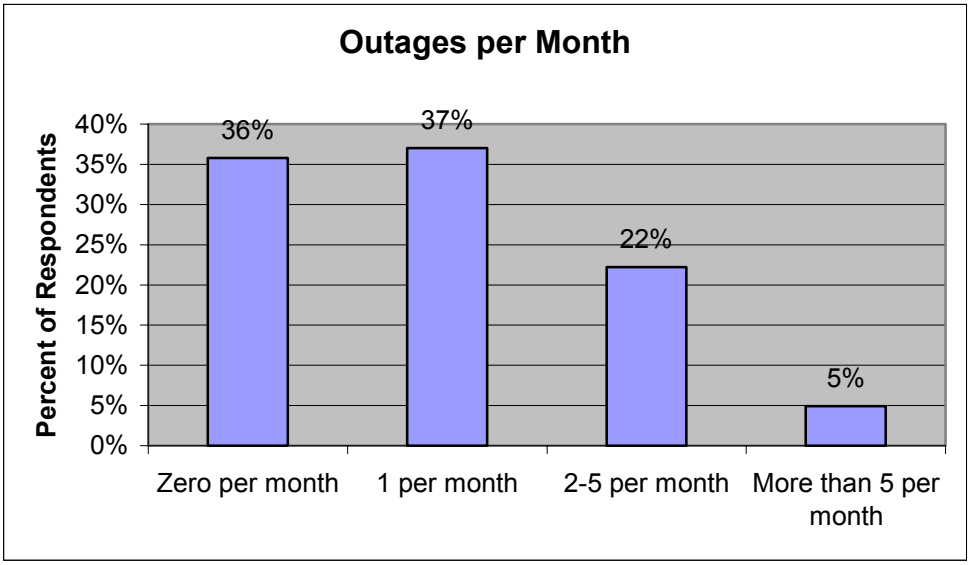


Network Outages

Downtime, Downtime, Downtime

Downtime continues to plague organizations of all sizes. Outages can last minutes or hours. In order to gain a better understanding of the frequency of outages, we asked a high level question that gives us insight into the number of significant outages per month. Significant outages can be LAN or WAN based and have an impact on company productivity. Respondents were asked how many significant outages and delays their networks experience per month. Of our respondents, 36% claim to have no significant outages, while 37% have at least one per month. Only 22% have between 2-5 outages, and 5% have more than 5 per month. All respondents have or plan to have multi-homed locations, leading us to believe that companies that have multi-homed locations will have fewer outages because of the emphasis on redundancy and performance.

Chart 4-1: Network Outages (n=81) Q3



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Multi-homed Locations

The Growth of Multi-homed Locations

In conducting our research, for companies with over 1000 employees, we encountered an unexpected high number of respondents with multi-homed locations. During the course of our interviews, we expected to interview more respondents without multi-homed locations. In total, we interviewed 32 respondents without multi-homed locations and 98 respondents with current or future plans for multi-homed locations. While there is little growth planned for the study respondents, we believe the number of multi-homed locations to increase at a rate more represented by the number of assigned autonomous systems numbers (ASN). Historically, service providers made up the bulk of the ASN registrations. However, that trend is changing. The increasing number of enterprise organizations registering for ASNs indicates strong growth in the number of multi-homed enterprise locations.

The number of ASNs has historically increased from 30% to 50% from year to year. Respondents were asked if they have or plan to have multi-homed locations in 2002, 2003, and 2004. The table below shows respondent plans for multi-homed locations.

Table 5-1: Multi-homed Locations (n=98) Q4-6

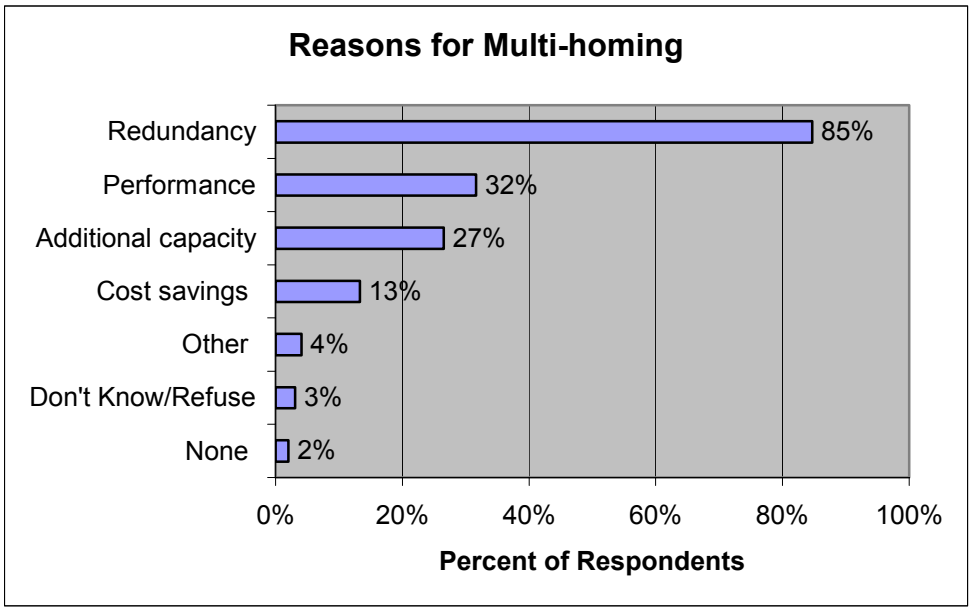
Multi-homed	2002	2003	2004
Yes	93%	96%	94%
No	7%	2%	1%
Don't Know		2%	5%

The Reasoning for Multi-homed Locations

Respondents were asked to select the reasons they multi-home one or more location to multiple ISPs. Data communications today is still not an exact science, many problems still occur, such as local loop connection failure, upstream Internet provider problems, equipment failures, and bad configurations. When asked why respondents multi-home locations, an overwhelming 85% of respondents selected "Redundancy" as the reason. Internet connections continue to increase in importance, not just for a self-hosted company Web site, but also for Extranet, Intranet, and VPN traffic. The importance of maintaining a connection to the Internet is increasing with the number of business critical applications, such as Web services, that use the connections. Surprisingly, only 32% of the respondents cited "Performance" as a reason for multi-homing locations. Performance is very important, however, based on responses, maintaining a consistent connection

to the Internet is the greatest reason for multi-homed locations. The chart below shows reasons why organizations multi-home locations.

Chart 5-1: Reasons for Multi-homed Locations (n=98) Q13



Why Companies Don't Multi-home Locations

For those organizations that do not plan to multi-home locations, the primary reason was that they did not see the need for multiple upstream connections. In our open ended question, responses were categorized into the following groups: "No Need", "Cost", "Government Policy", Security", and "Too Complex". Responses that fell into the "No Need" category included those that indicated respondents did not see a need for multiple upstream connections to the Internet. Responses included in the "Cost" category described multi-homed locations as too expensive or that budgets were not big enough. Responses in the "Government Policy" category were from educational, state and federal government organizations that had policies that restricts them to a single Internet connection.

Chart 5-2 shows reasons for not multi-homing locations from those respondents that do not currently or plan to multi-home.

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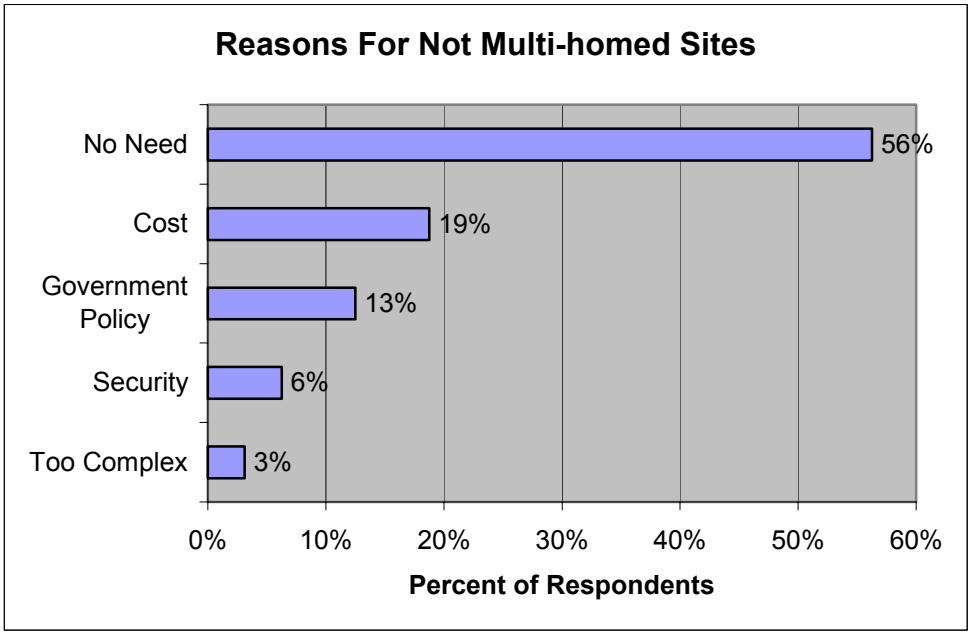
Chart 5-2: Reasons Respondents Don't Multi-home (n=32) Q7

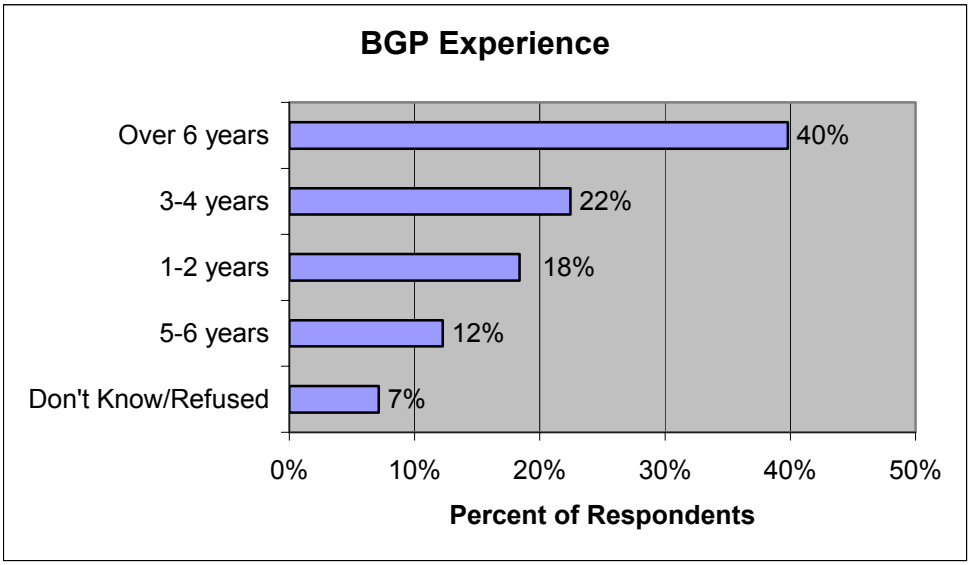


Expertise

BGP is a protocol that most IT workers are familiar with, however few are experts. In order to gain a better understanding of the expertise with BGP at respondent organizations, we created a question that asked about the level of BGP expertise the most experienced BGP technician had. A surprising 40% of technicians at respondent organizations have over 6 years of experience with BGP. The majority of those companies with BGP expertise over 6 years came from service providers. Another 40% of respondents have 4 or less years of experience, indicating a potential expertise deficit for configuring, problem solving, and maintaining multi-homed locations.

Chart 5-3 below shows respondent organizations expertise level in number of years. Please note that there were a number of service providers in the respondent sample, accounting for most of the 6 or more years BGP expertise category.

Chart 5-3: Experience with BGP (n=98) Q19



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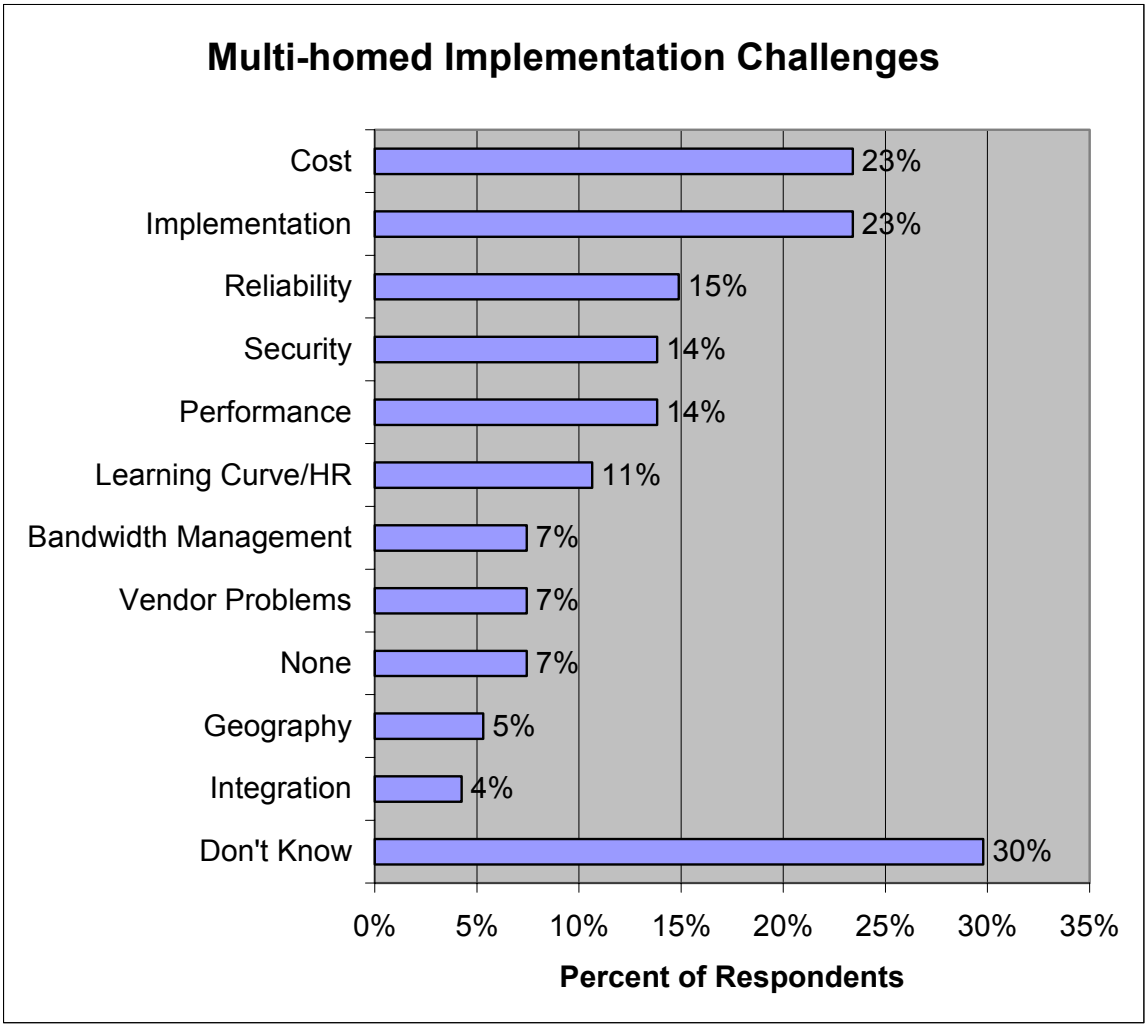
Challenges for Multi-homed Locations

Multi-homing a location can be challenging. Respondents were asked in an open-ended question what the top 3 multi-homed implementation challenges and barriers they faced. Open ended responses were categorized into the following categories: “Implementation”, “Cost”, “Reliability”, “Security”, “Performance”, “Learning Curve”, “Bandwidth Management”, “Vendor Problems”, “None”, “Geography”, “Integration”, and “Don’t Know”. While Cost and Implementation categories included 23% of the responses each, responses ranged widely from security to integration challenges. Only 7% of respondents stated they don’t have multi-homed implementation problems. For further detail, please see the verbatim responses in appendix C.

Chart 5-4: Multi-homed Implementation Challenges (n=94) Q45

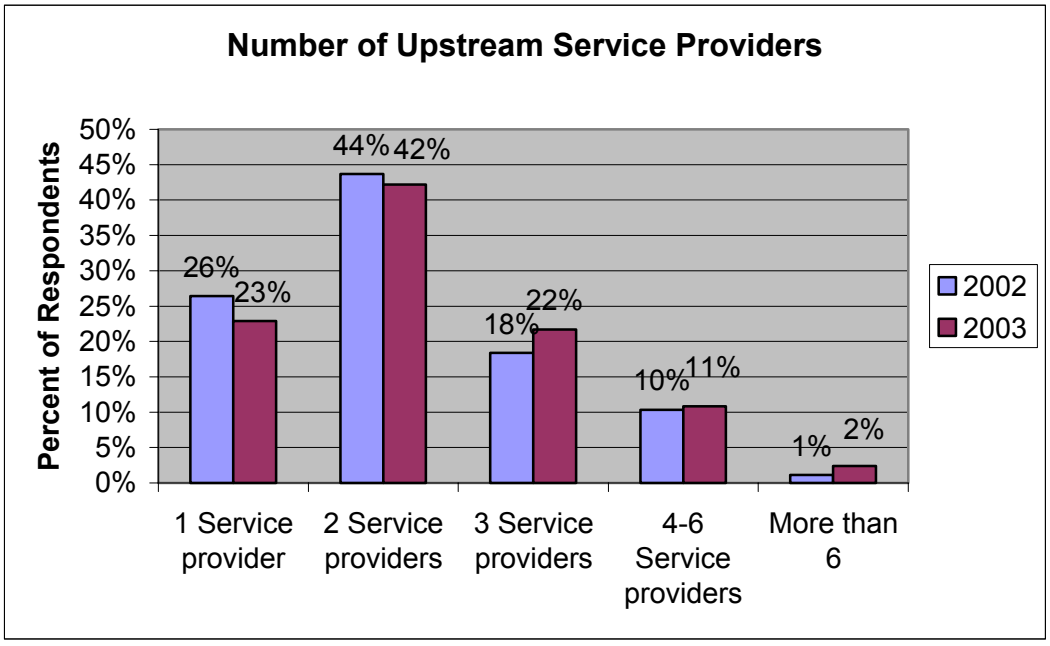


Service Providers for Multi-homed locations

Service Provider Diversity

Understanding upstream service provider diversity gives us further insight into how important redundancy is to respondents of this study. Respondents average 2.5 service providers in 2002 and 2.6 in 2003. While there is no significant change in the number of different providers, a strong trend of diversifying ISP connections exists. Roughly a quarter (26%) of respondents have only one ISP, however they maintain multiple connections.

Chart 6-1: Number of Upstream Service Providers (n=87) Q10



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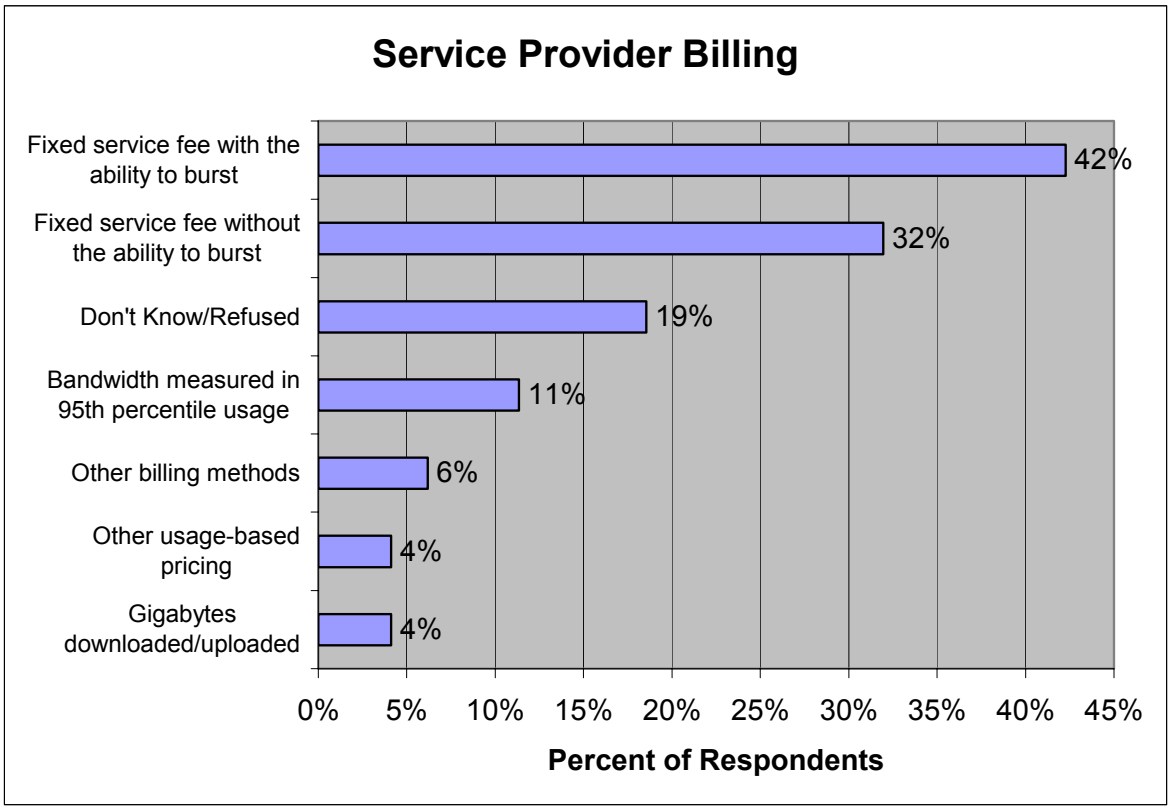
Service Provider Billing

Respondents were asked to indicate how their ISP bills for the bandwidth their company uses. The most popular (42%) way respondents are billed was with a fixed service fee with the ability to burst above the rate. The second most popular (32%) was a fixed service fee without the ability to burst above the committed rate. An overwhelming 72% use some fixed service fee billing. Only 11% of respondents use 95th percentile billing, and 4% use Gigabytes downloaded/uploaded.

Chart 6-2: Service Provider Billing (n=97) Q18

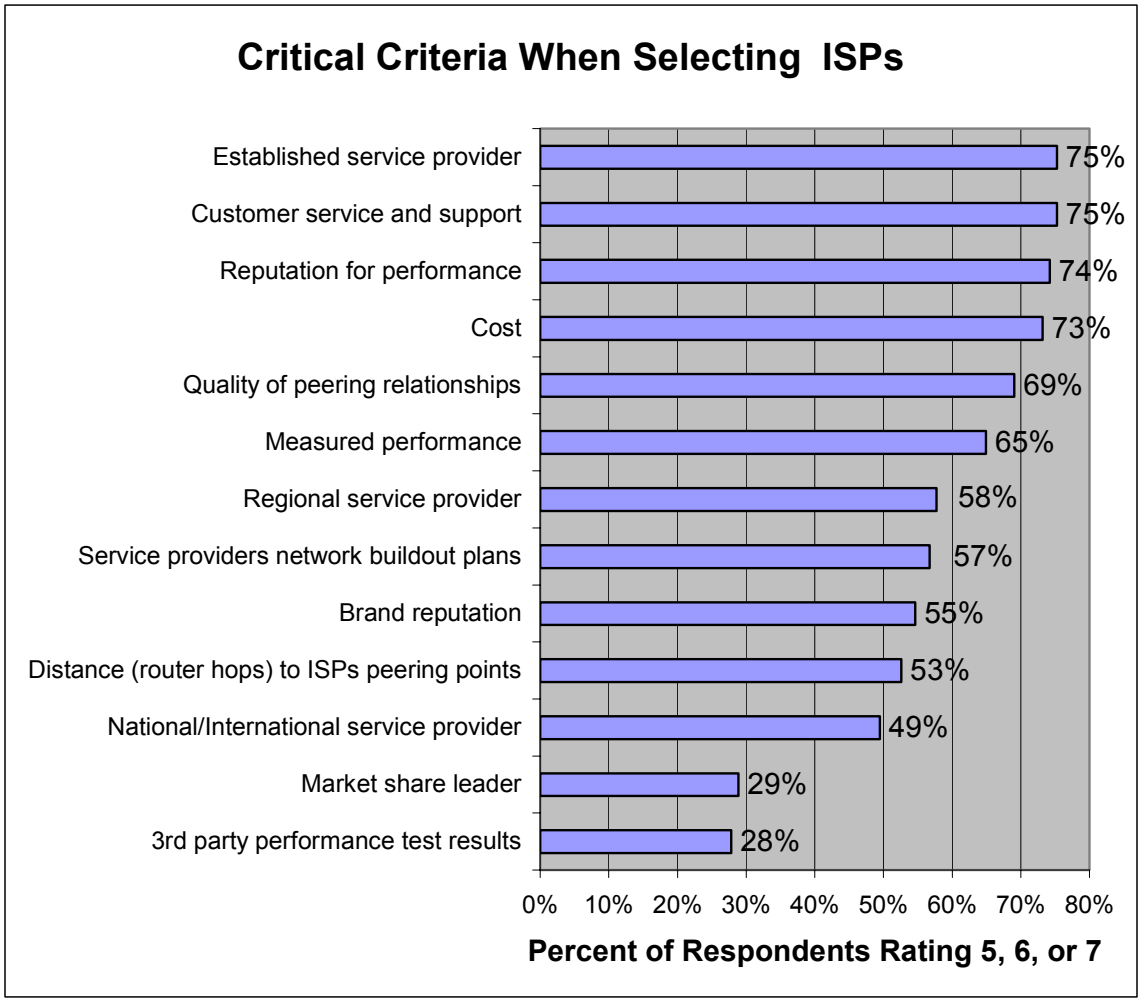


Critical Criteria When Selecting a Service Provider

Respondents were asked to rate the importance of criteria for selecting an ISP on a scale of 1 to 7, where 1 is not important and 7 is critical. Only responses of 5, 6, or 7 were included in the chart below. The fundamental business practices, such as customer service, continue to be most important criteria in which ISPs are selected. The top four criteria rated by respondents, service and support, reputation, brand, and cost, all range

between 73% and 75% of respondents, and indicate that IT decision makers seek ISPs with good business practices.

Chart 6-3: Criteria for Selecting an ISP (n=97) Q34



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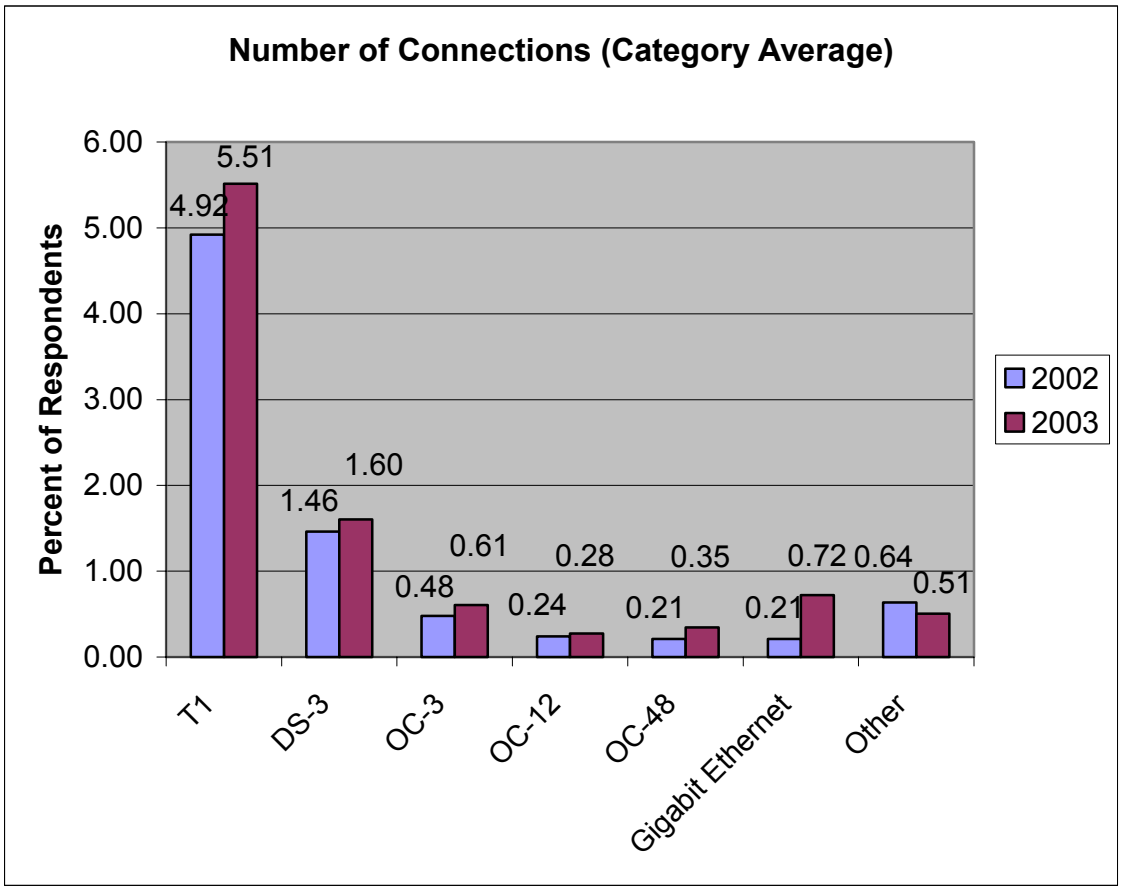
Connections and Bandwidth

Connection Types and Growth

Respondents use upstream Internet connections for a variety of reasons, such as hosting a company Web site internally, connecting remote access users to corporate data via VPNs, Intranet, and Extranet applications. We asked respondents to tell us whether their demand for Internet bandwidth increases or decreases, and by how much. The good news for the industry is that not a single respondent indicated that their Internet bandwidth was decreasing. On the contrary, bandwidth requirements were increasing at an average of 23% per year (with a median of 15% and a mode of 10%). While this may be lower than in past years, bandwidth requirements are still growing at a healthy rate. Healthy bandwidth demand is likely attributed to the increase of enterprise applications that are slowly being migrated to use Internet connections rather than private data lines.

To gain a better understanding of the types of connections used to connect multi-homed locations, respondents were asked what types of connections and how many they have for upstream Internet connectivity in 2002 and 2003. The chart 7-1 below shows the category averages for Internet connections.

Chart 7-1: Multi-homed Connections by Type (n=78) Q11



Bandwidth and Growth

The nature of traffic flow has changed over the past few years to reflect the changing use of Internet connections. We found that most respondents still host their Web site in-house, which should account for a large outbound bandwidth metric. However, now organizations of all types are using VPNs to connect users to vital applications and data as well as increasingly deploying intranets and extranets. The result is a better-balanced Internet connection that looks more symmetric than in past years. The table 7-1 below shows inbound bandwidth averaging 97.51 Mbps and outbound bandwidth averaging 114.08 Mbps.

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Table 7-1: Monthly Inbound and Outbound Traffic (n=30) Q12

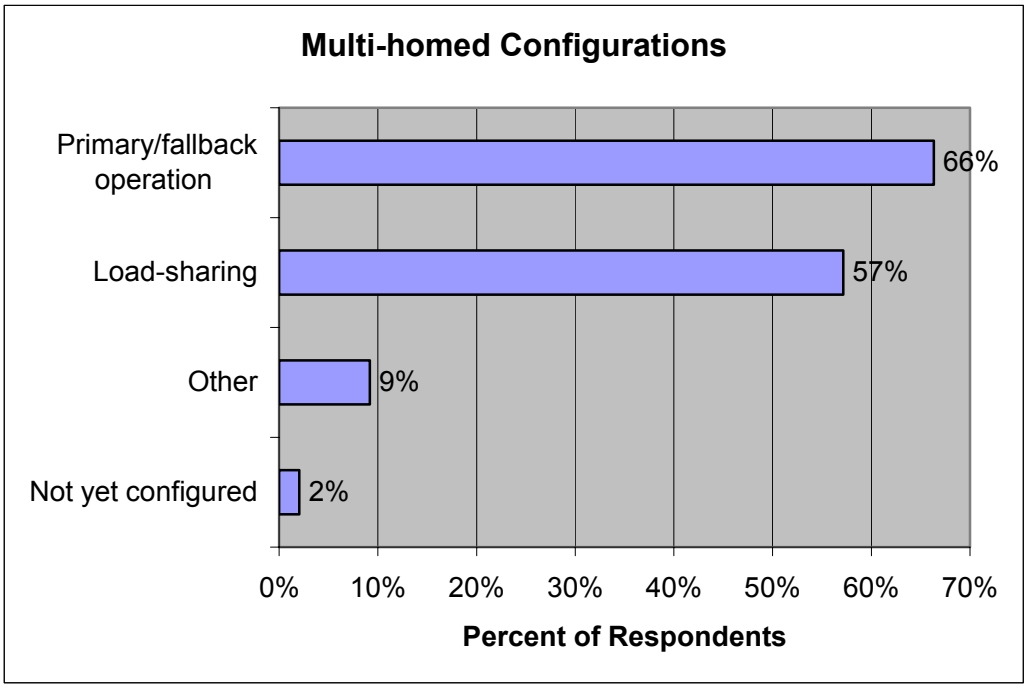
Inbound		Outbound	
N	30	N	29
Mean Mbps	97.51	Mean Mbps	114.08

Multi-homed Connection Configurations

Multi-homed locations can be configured in a number of ways, and to gain a better understanding, we asked respondents how their locations were configured. Following the same theme of providing redundancy, most of the connections (66%) are configured for primary/fallback operation. That is if one connection fails, traffic will be routed to the remaining connection(s). In addition to a redundancy configuration, 57% of respondents have their multi-homed connections configured for load sharing. These configurations balance the bandwidth demand among the multi-homed connections. The Other category (9%) included responses such as geographic diversity, remote access, VPNs, and latency. Please see the data summary for complete list.

Chart 7-2 below shows multi-homed configurations by respondents.

Chart 7-2: Multi-home Configurations (n=98) Q14

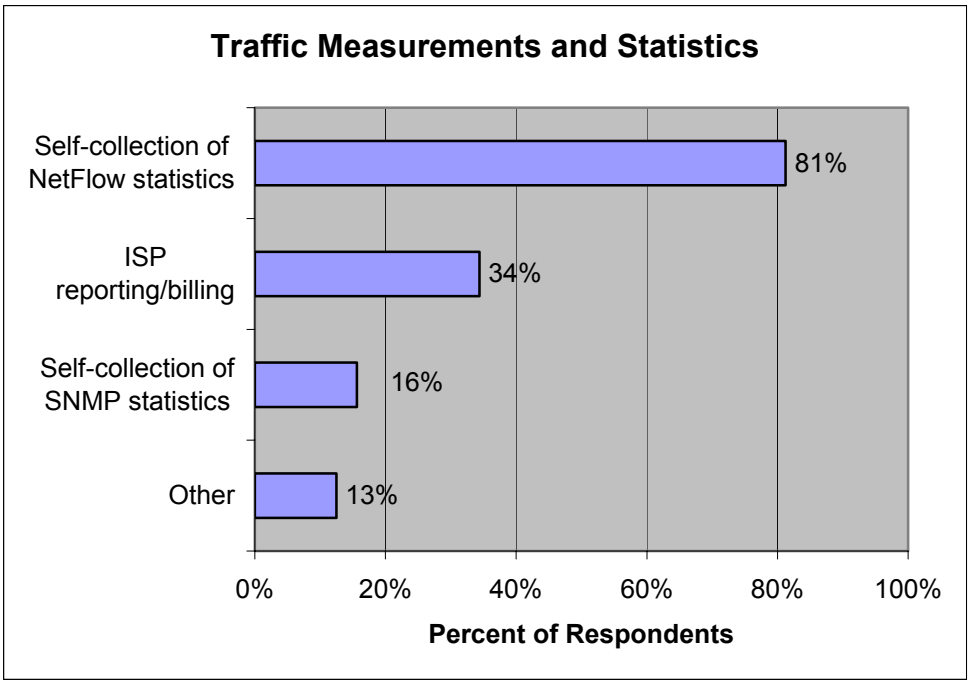


Traffic Statistics

How companies use measurements and reporting gives us insight into the information they use to make configuration, bandwidth, and even product decisions. The vast majority (81%) of respondents use self-collected NetFlow statistics measurements used to generate reports. Only 16% use SNMP, a dramatic decline of its popularity in past years.

Chart 7-3 below shows traffic measurements and reports used by respondents.

Chart 7-3: Measurement and Reporting Traffic Statistics (n=32) Q16



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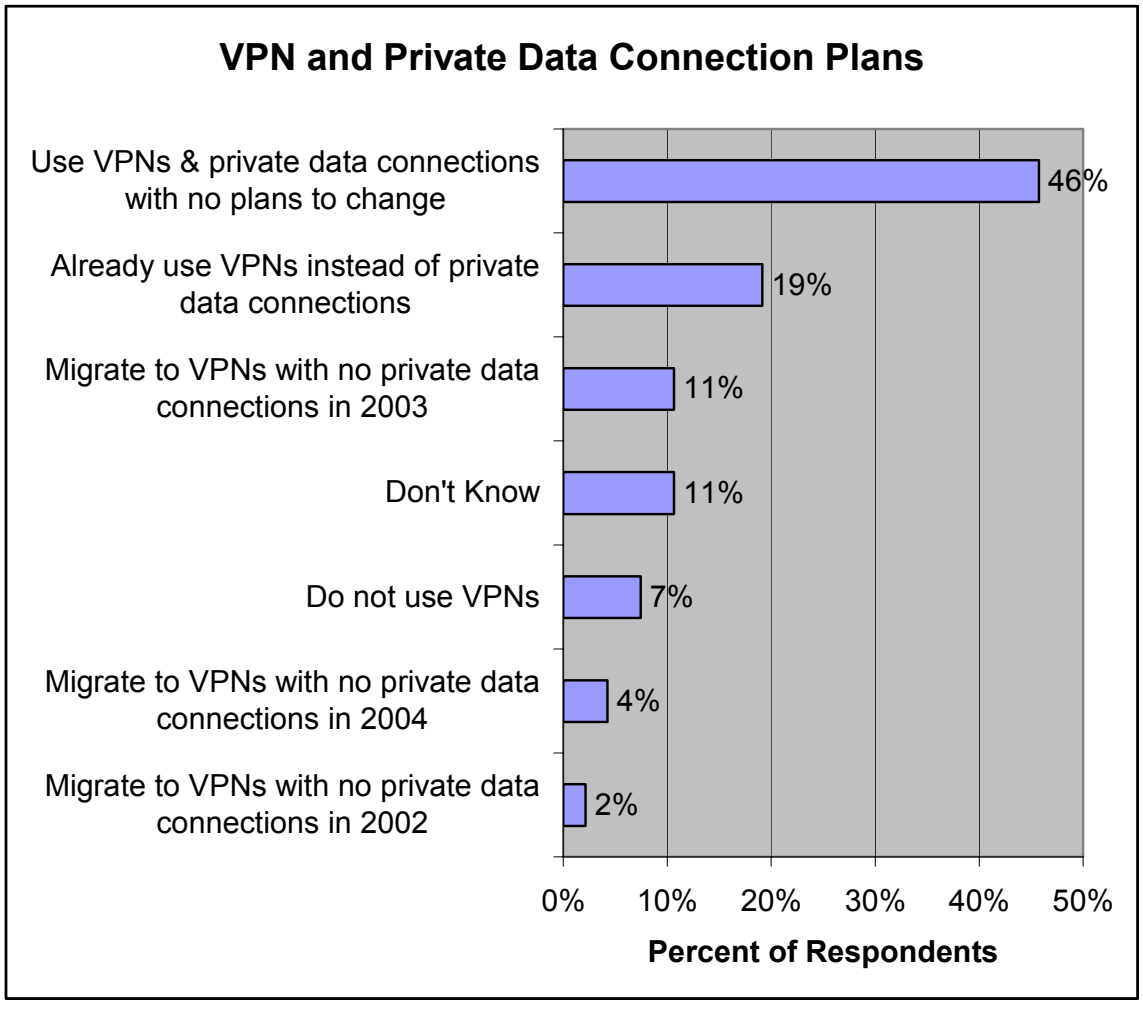
Private Line Replacement

The migration from private data lines to public Internet VPNs will have significant influence on the rate of deploying multi-homed locations. We found 46% of respondents use both VPN and private data connections with no plans to change. However a total of 36% have or plan to migrate to VPNs instead of private lines. This growing trend points to healthy growth in the number of multi-homed locations within an organization. Currently 19% of respondents already use VPNs instead of private data connections, and 11% have plans to migrate to use VPNs with no private data connections in 2003. Only 7% of respondents do not use VPNs.

Chart 7-4 below shows respondent plans for migrating private data connections to VPN connections.

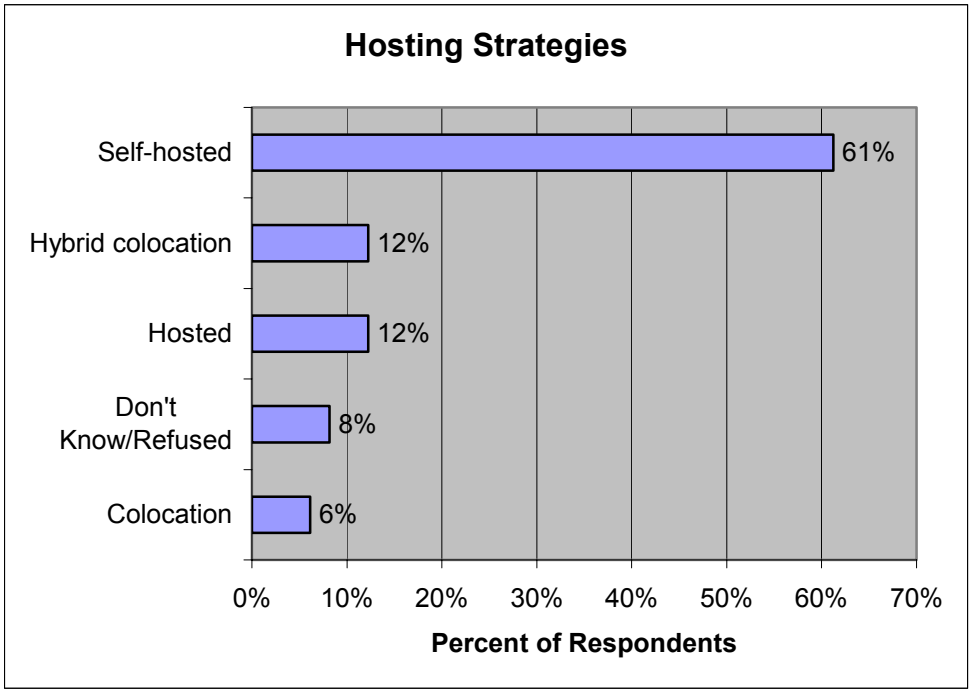
Chart 7-4: Data Connection Migration Plans (n=94) Q31



Web Site Hosting Strategies

Respondents were asked to identify the category that best describes their hosting strategy for their organization's Web site. The majority (61%) of respondents host their own Web site, driving the need to multi-home locations. Web site uptime is critical for a number of reasons, such as customer relations, service and support, e-Commerce, marketing, and reputation.

Chart 8-1: Web Site Hosting Strategies (n=98) Q15



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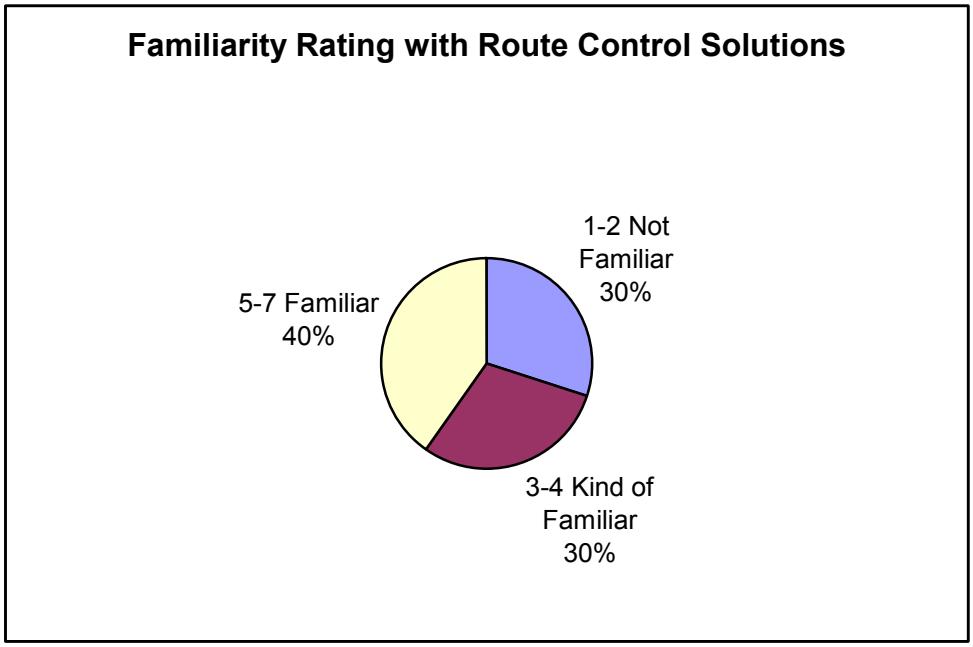
Route Control

Route Control Technology Awareness

Respondents were asked to rate their familiarity of route control products and services on a scale of 1 to 7 where 1 is not familiar and 7 is extremely familiar. A surprising 40% rated their familiarity a 5, 6, or 7, indicating they were familiar with route control solutions. While this percent is unexpectedly high given route control technology has only recently emerged in the market, we believe respondents are not as familiar with route control solutions as they have indicated.

We defined route control products and services for respondents as a product or service that uses BGP at multi-homed locations to dynamically control which upstream ISP (network connection) traffic is sent based on user defined policies such as least cost and best performance.

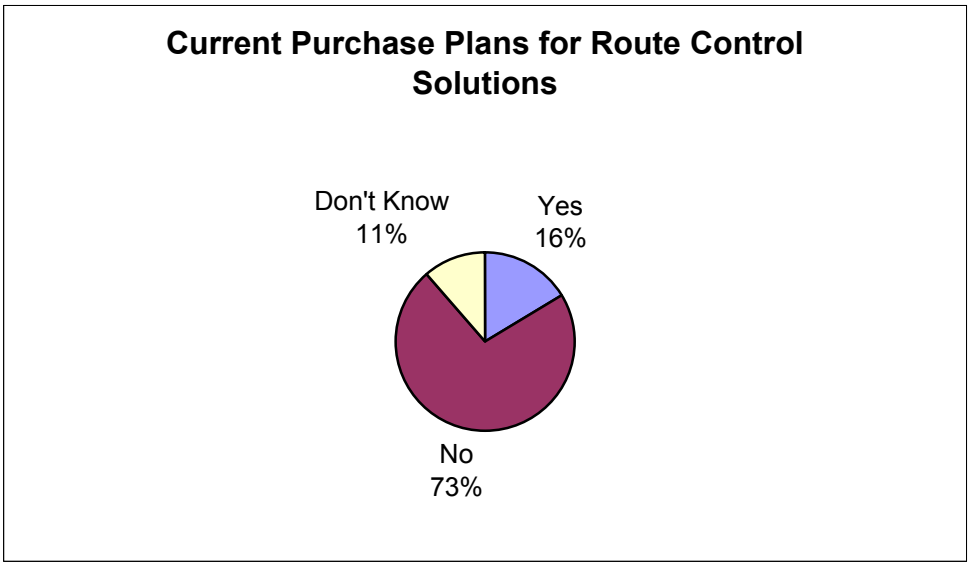
Chart 9-1: Familiarity with Route Control Solutions (n=97) Q20



Currently Evaluating Route Control Solutions

In order to gauge respondents' current interest in route control solutions, we asked if they were currently considering purchasing route control products or services. The majority of respondents (73%) said they had no current plans, however 16% indicated they have plans to purchase route control solutions.

Chart 9-2: Current Purchase Plans for Route Control (n=97) Q21



Current and Future Plans for Route Control Solutions

Route control solutions have recently emerged on the market. In order to gauge respondents' plans for route control solutions, we asked respondents if they currently use route control products or services, as well as for 2003 and 2004. Again, we defined route control products and services for respondents as a product or service that uses BGP at multi-homed locations to dynamically control which upstream ISP (network connection) traffic is sent based on user defined policies such as least cost and best performance. The chart below shows respondents current and future plans to use route control solutions.

A surprising number (44%) claim to currently use route control products. Respondents may think they are using route control products when they are not. This high percentage of respondents may be misleading, however, the significant decrease in "No" responses points to good potential growth. Many respondents that think they are using route control products are likely configuring their multi-homed locations manually. Many respondents are not familiar with route control products, as indicated in our unaided brand awareness question. Respondents with no plans for route control solutions decreases from 44% in 2002 to 19% in 2003, and further to 13% in 2004. The increase in "Don't Know" responses is typical of IT decision makers examining new technologies.

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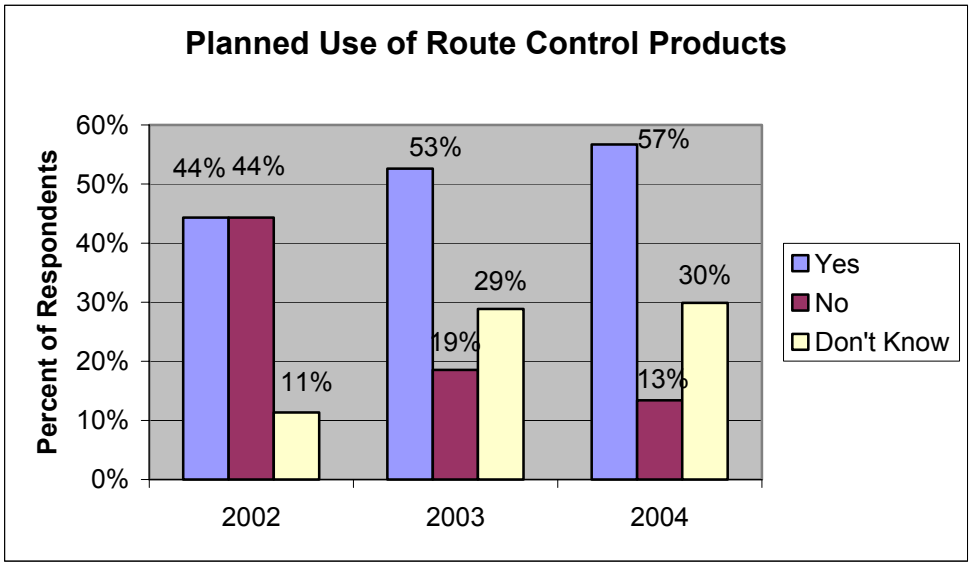
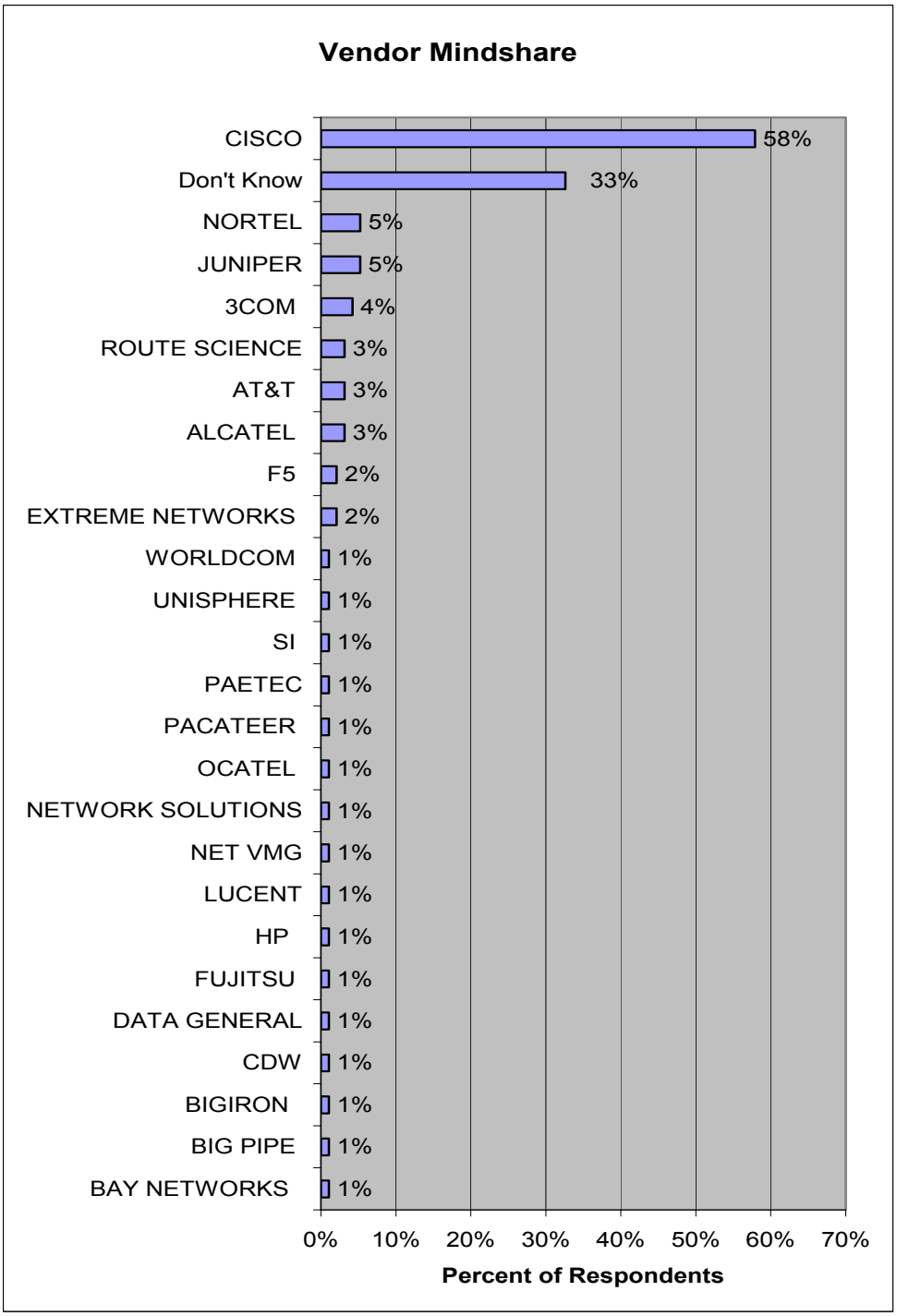
Chart 9-3: Plans for Route Control Solutions (n=97) Q22, 23, 24



Route Control Vendor Mind Share

Respondents were asked to name route control vendors in an unaided brand awareness question. netVmg and Route Science were the only two route control vendors named. All other vendors named do not yet publicly have a route control product. Cisco dominates the list with 58% of respondents, followed by a very distant second with Nortel and Juniper with 5% each. Clearly most are not familiar with route control products although they claim to be. Inability to cite a route control vendor points to the large problem of educating decision makers.

Chart 9-4: Route Control Vendor Mind Share (n=95) Q25



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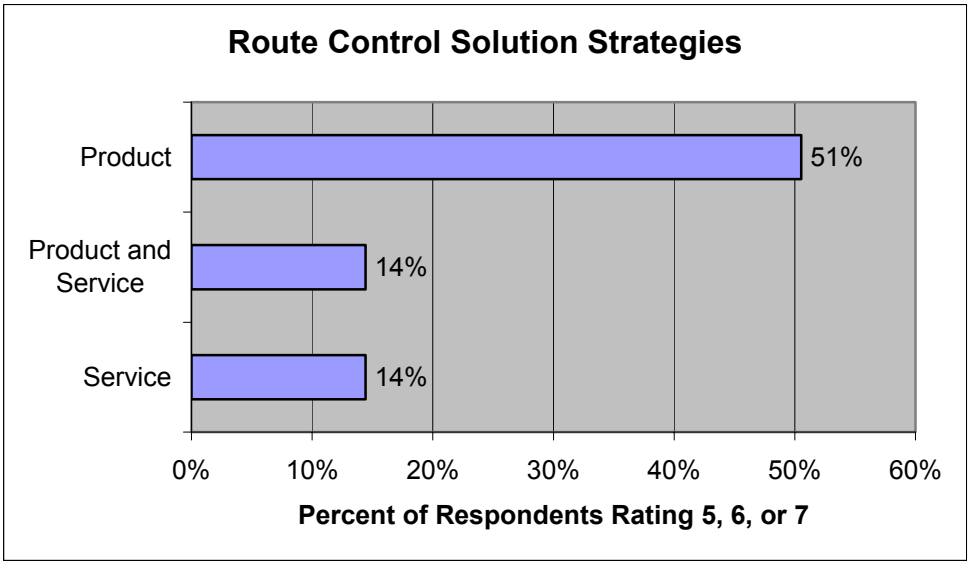
Route Control Solution Strategies

Respondents were asked to rate on a scale of 1 to 7, where 1 is not likely and 7 is definitely, the likelihood of implementing three different route control solution approaches. By a wide margin 51% of respondents rated a stand-alone product solution a 5, 6, or 7, over the combination of a product and service (14%) and a pure service play (14%).

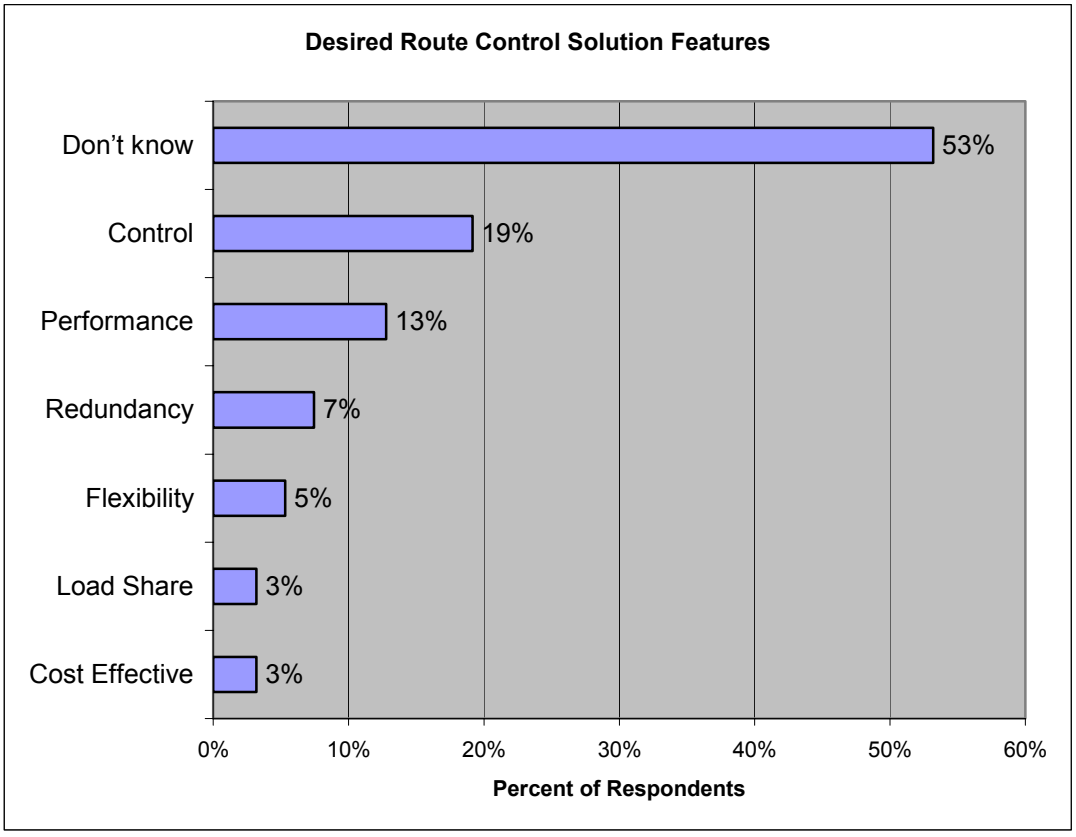
Chart 9-5: Route Control Deployment Strategies (n=95) Q26



Benefits of Route Control Solutions

In an open-ended question, respondents were asked what they liked most about route control products and services. Responses were categorized into the following: "Don't Know", "Control", "Performance", "Redundancy", "Flexibility", "Load Sharing", and "Cost Effective". The majority of respondents were not familiar with route control products, creating the 53% "Don't Know" category. "Control" was the leading category with 19% of the responses, and included responses such as "The ability to control the routed network," "Better control over traffic," and "Control over usage of bandwidth."

Chart 9-6: Desired Route Control Features (n=94) Q27



Applications Driving Route Control Solutions

Respondents were asked to identify the applications that are driving the need for multi-homed locations. Earlier in the study respondents identified redundancy as the primary reason for multi-homing locations. There were no significant changes from year to year; respondents expect the same applications that drive the need for multi-homed locations this year will be the same for 2003. According to respondents, VPNs (59%) are the top

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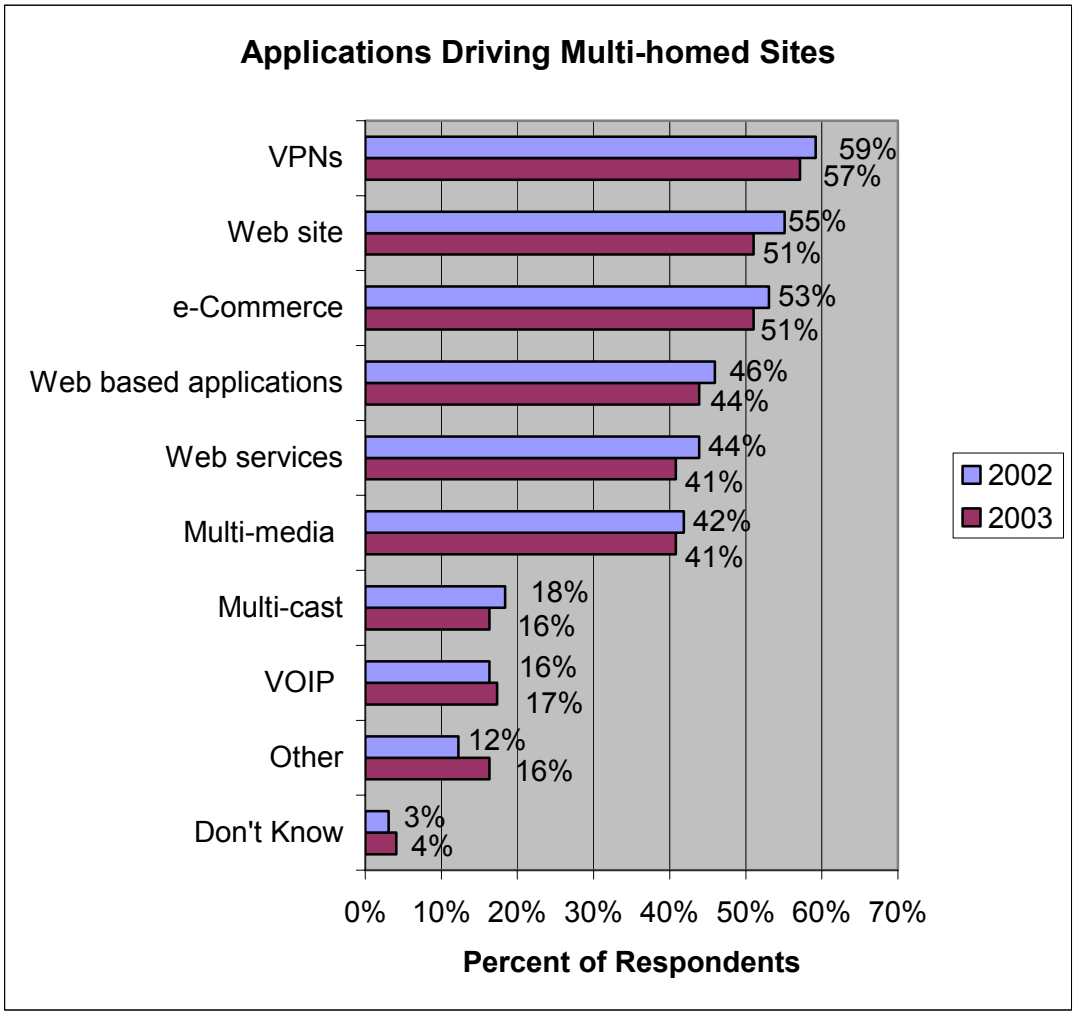
application driving the need for multi-homed locations followed by organizations' Web site (55%). A close third is e-Commerce (53%), largely influenced by the number of respondents that still host their own Web site. Web based applications (46%) and Web services (44%) are surprisingly high, but reflect the overall industry trend of migrating applications to the Web.

Chart 9-7: Applications Driving Multi-homed Locations (n=98) Q28,29

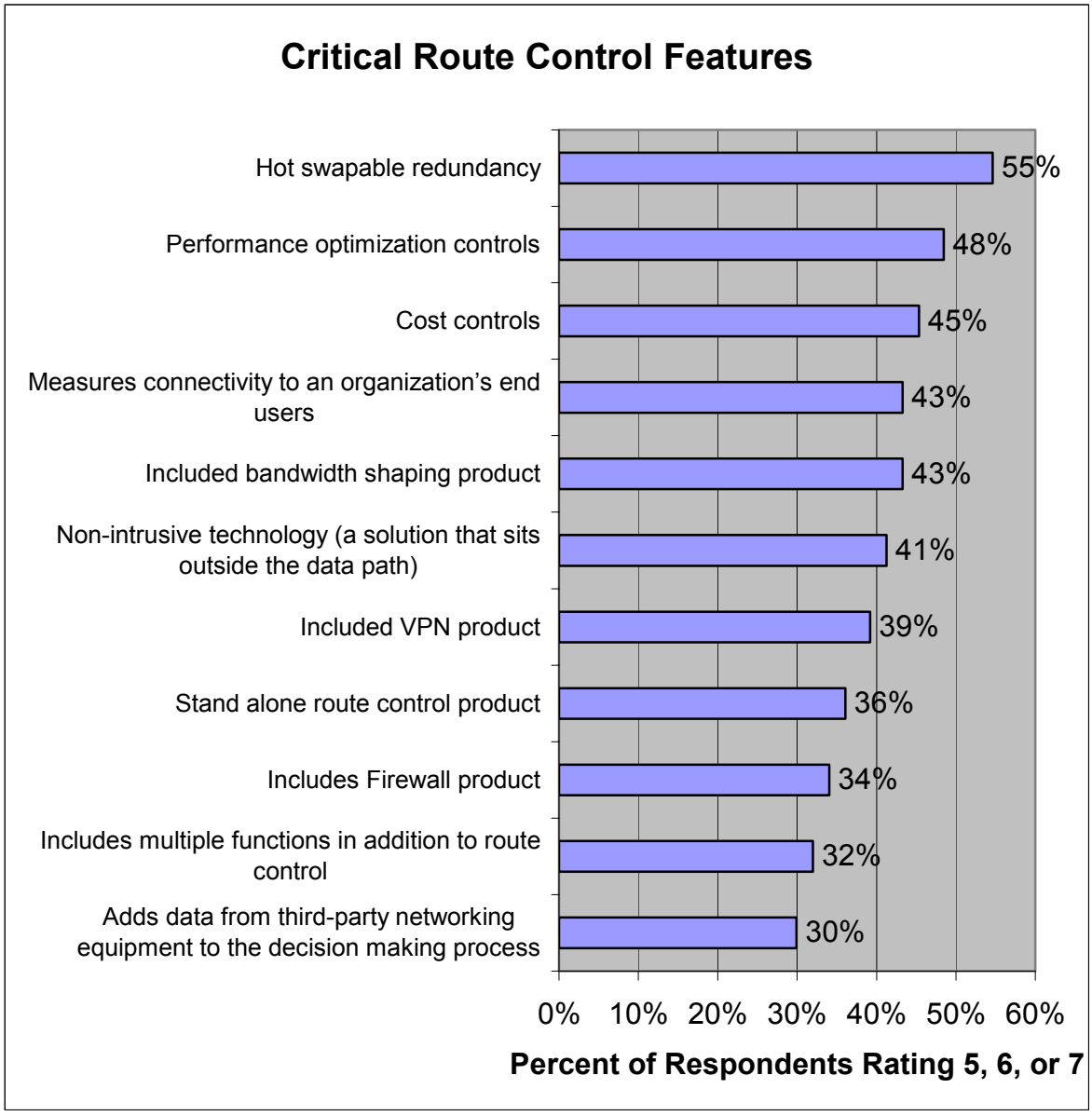


Desired Features For Route Control Solutions

Respondents were asked to rate features for route control solutions on a scale of 1 to 7, where 1 is not important and 7 is critical. Respondents had to rate the feature a 5, 6, or 7 in order to be considered critical. Topping the list of features was hot swappable redundancy (55%). Redundancy is a key trend throughout the study; redundancy continues to be the key issue for multi-homed locations. Performance optimization controls were rated critical by

48% of respondents, indicating the need to get a handle on bandwidth control—another theme indicated by respondents in open ended questions. Cost continues to be a critical factor in today's downtrodden economy and 45% of respondents rated cost control a critical feature.

Chart 9-8: Critical Route Control Features (n=97) Q35



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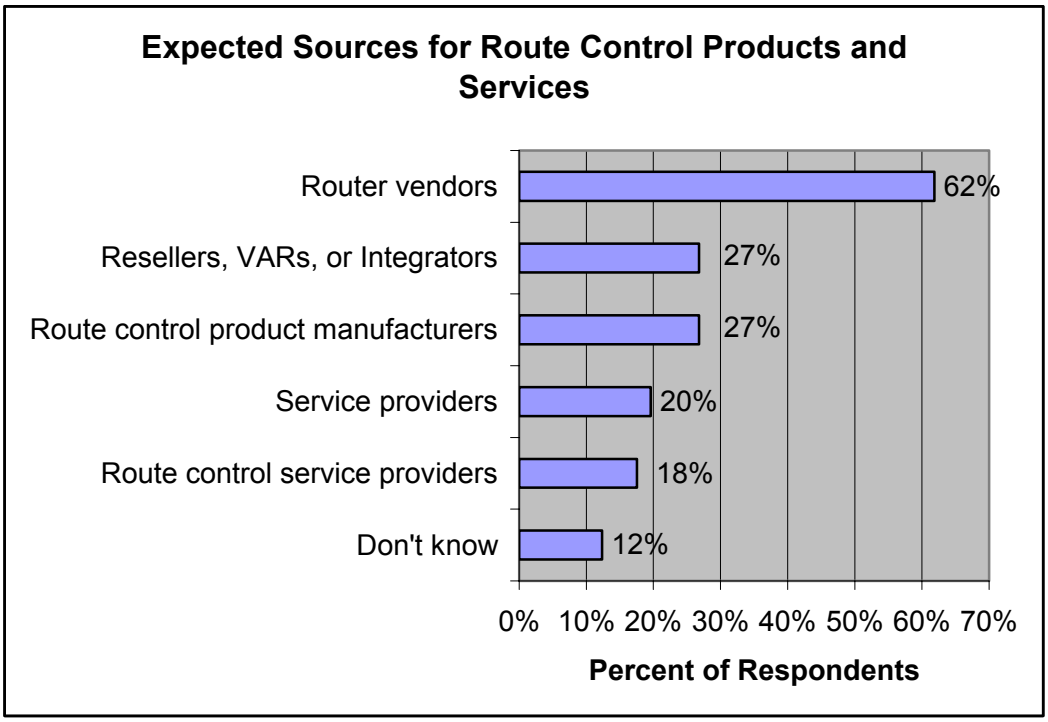
Expected Sources for Route Control Products

Respondents were asked to indicate the source they would expect to purchase route control products and services from. Predictably, most respondents expect to purchase route control product from router vendors (62%). This is consistent with the large number citing Cisco as a route control vendor. Both route control product manufacturers and resellers are expected product sources for 27% of respondents. Route control vendors should carefully consider a channel strategy, partnering only with qualified resellers, VARs, and integrators.

Chart 9-9: Sources for Route Control Products (n=97) Q36

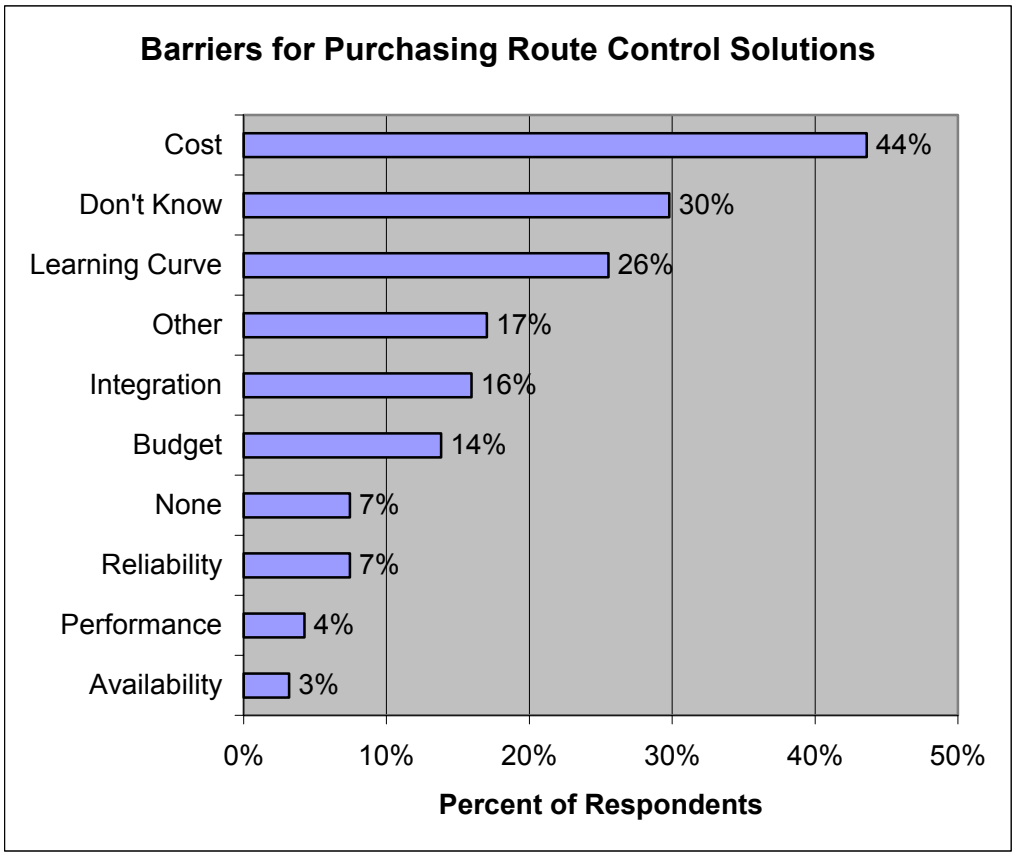


Barriers for Implementing Route Control Solutions

Respondents were asked in an open-ended question what their top three barriers for purchasing route control products or services were. Responses were categorized into the following: “Cost”, “Don’t Know”, “Learning Curve”, “Integration”, “Budget”, “None”, “Reliability”, “Performance”, “Availability”, and “Other”. By a wide margin, Cost (44%), made up the largest category. Responses in this category indicated route control solutions were too expensive. The next significant barrier was Learning Curve (26%), indicating the complexity of configuring multi-homed locations. Route control products

simplify multi-home location configurations, there respondents are likely not familiar with route control products.

Chart 9-10: Purchase Barriers (n=94) Q42



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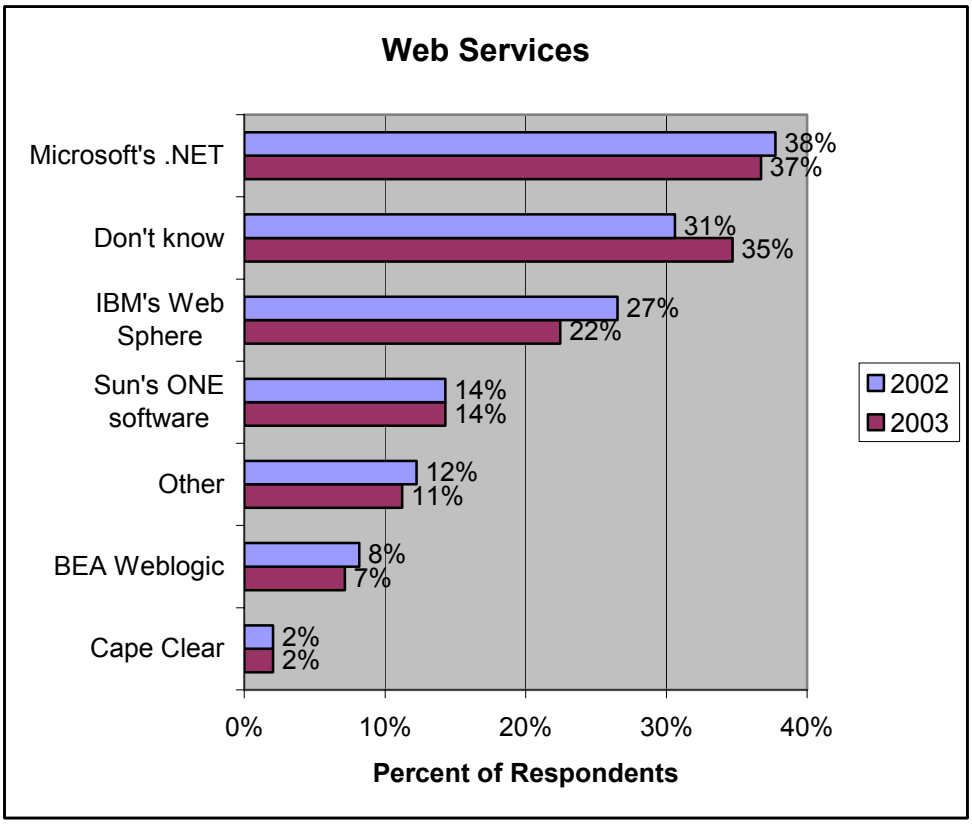
Current and Future Plans for Web Services

Web services represents a significant class of technologies that have emerged to provide greater means to integrate disparate applications and services together. Web services provide a common framework for finding, invoking, and integrating distributed components/services over the Internet. What makes Web services particularly unique in that its framework utilizes the Internet's current open data standards and protocol, such as XML, and HTTP, unlike earlier component models such as DCOM and CORBA that relied on proprietary object models and protocols. With Web services, components that are implemented in a multitude of different languages and platforms, and that reside in different locations in the network, can now be loosely coupled together to form distributed applications. To this end, Web services provide a standards-based mechanism for applications to programmatically request information from other applications over the Internet.

Respondents were asked what web service technologies they use or plan to use in 2002 and 2003. The chart below shows respondent plans for Web services platforms. Microsoft clearly has the early advantage in Web services platforms.

Chart 10-1: Web Services (n=98) Q32, 33



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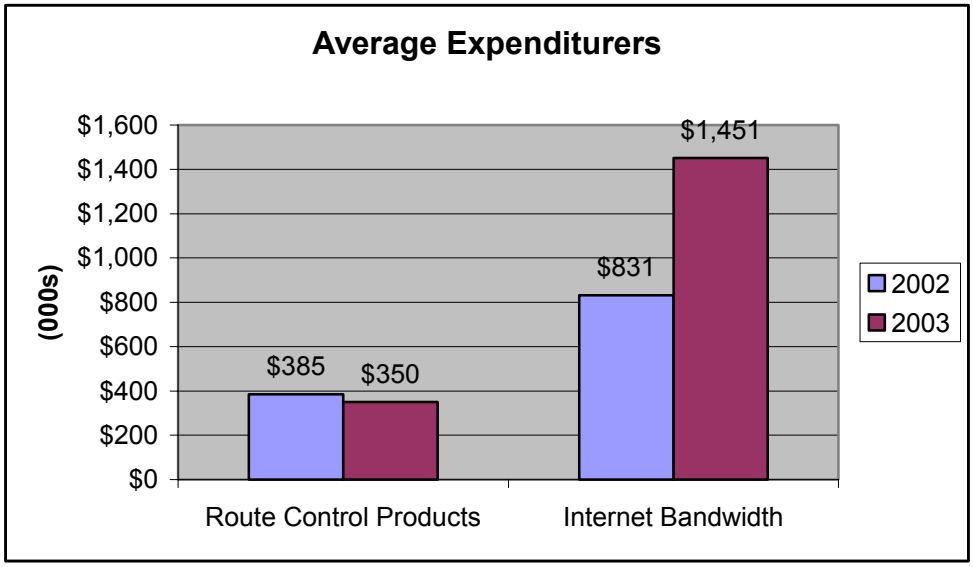
Expenditure Plans

In two open-ended questions, we asked respondents to approximate their expenditures in several areas for 2002 and 2003. Those expenditure areas include route control products and Internet bandwidth.

The largest increase in expenditures from 2002 to 2003 was in Internet bandwidth. Expenditures rise from $831,000 in 2002 to $1,451,000 in 2003.

Chart 11-1 below shows the average expenditures for 2002 and 2003.

Table 11-1: Expenditures (n=51) Q37, 38



Market Messaging

Information Sources

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

Of the top sources for information, "Trade Publications" and "Independent White Papers" were rated by 70% of study respondents as the most useful. Independent white papers are essential for helping customers understand the technology of the product or service in general and the problem it addresses in the industry. In The HTRC Group's ongoing research, results have consistently shown that customers lack the educational material needed to diligently evaluate product and service offerings. Marketing confusion sets in when customers can recall the vendor's name but not what their product or service is used for.

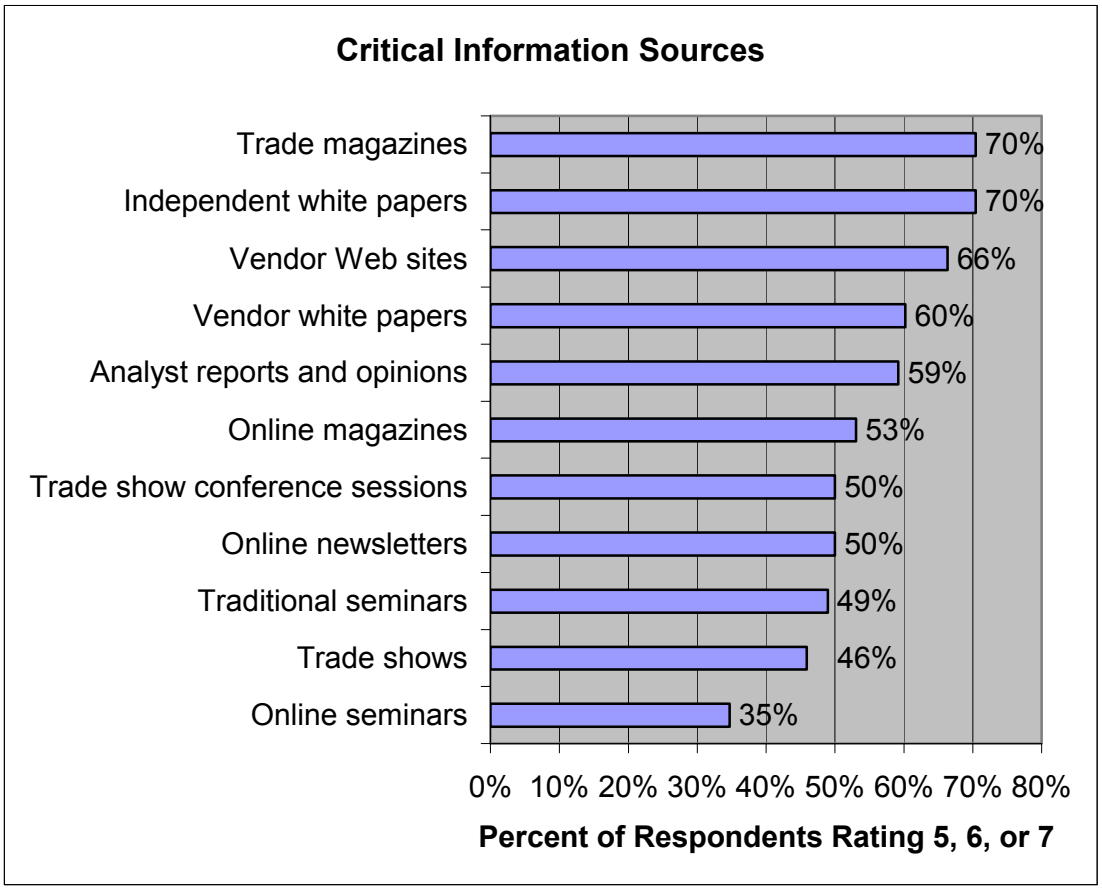
"Vendor Web Sites" were rated by 66% of study respondents as very useful. A vendor's Web site is a useful and important source of information for customers. Customers visit vendors Web site to gather and research information about your products and services. It is the first impression the customer experiences of your business even before it interacts with a live person from your organization. Customers can be drawn to vendor Web site by marketing efforts. For example, 60% of respondents rated "Vendor White Papers" a very useful information source. If a vendor's Web site does not offer product or service educational material or the specific information prospects are looking for, they will likely consider another vendor in for their buying decision.

"Analyst Reports and Opinions" were described by 59% of respondents as another useful source. Ongoing efforts should be made to keep key analysts informed on product differentiations and company developments. Analysts are an important source of information for trade publications, rated at the top of the list of information sources.

"Trade Shows" continue to decrease in importance as only 46% of respondents rated them very useful. There are too many unfocused trade shows to send IT professionals. The benefit of attending a trade show to gather information is diminishing because most of the beneficial information customers seek is collected on the vendor's Web site.

The chart below shows the different sources for learning and how they rated among the 98 respondents.

Table 12-1: Information Sources (n=98) Q39

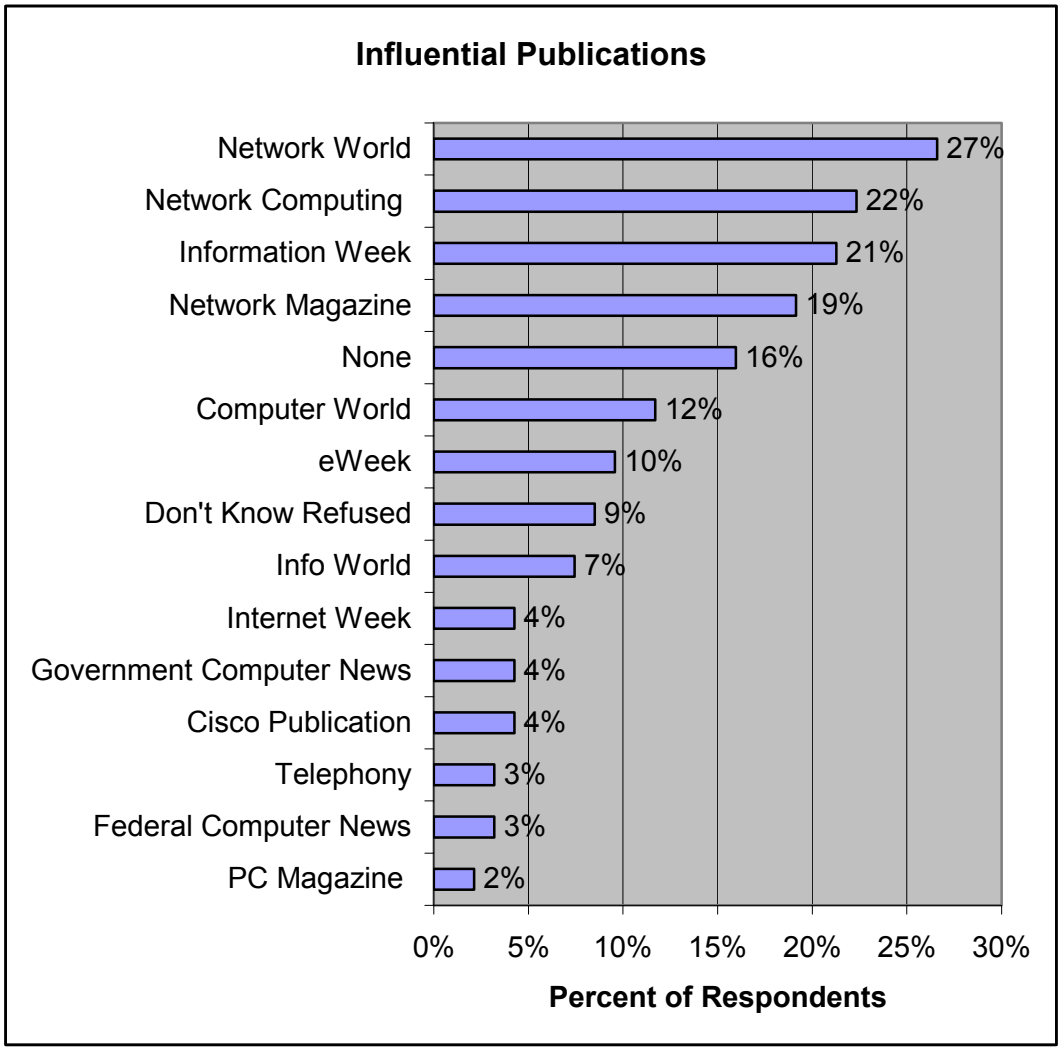


Top Publications

IT professionals read many publications; this creates a challenge when determining which publications to advertise in. In an open-ended question, we asked respondents for the top three publications influential in their purchase of products and services. Only 16% of respondents claimed there were no publications influential in their purchase process. Chart 12-2 below shows the most influential publications.

The list of publications varied widely. Twenty-seven percent of the study respondents rated Network World as the most influential publication. The significant publications with which product manufacturers and service providers should maintain close relationships also include Network Computing (22%), Information Week (21%), and Network Magazine (19%).

Chart 12-2: Most Influential Publications (n=94) Q40



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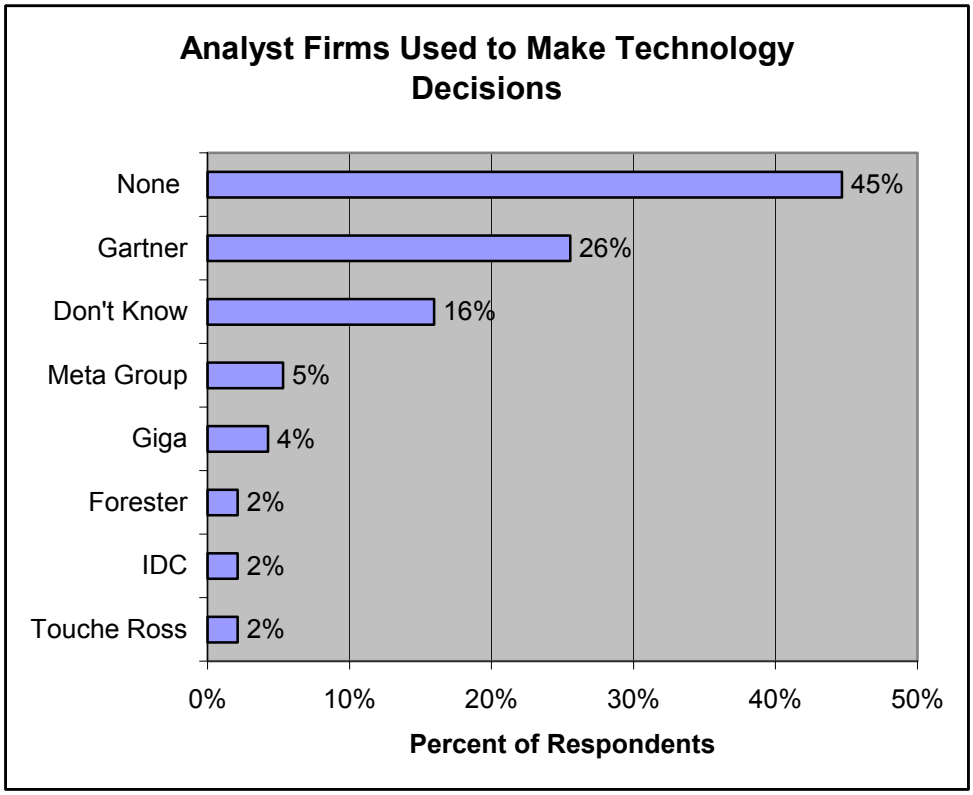
Analyst Firms

In an open-ended question, respondents were asked to name the analyst firm they use to help make technology decisions. Nearly a half of respondents (45%) do not use analyst firms to help make decisions. This is fairly consistent with the 59% of respondents that rated analyst reports and opinions an important information source. Of all the analyst firms that offer end user reports and consulting, Gartner (26%) has the most influence.

Chart 12-3: Most Influential Analyst Firms (n=94) Q49

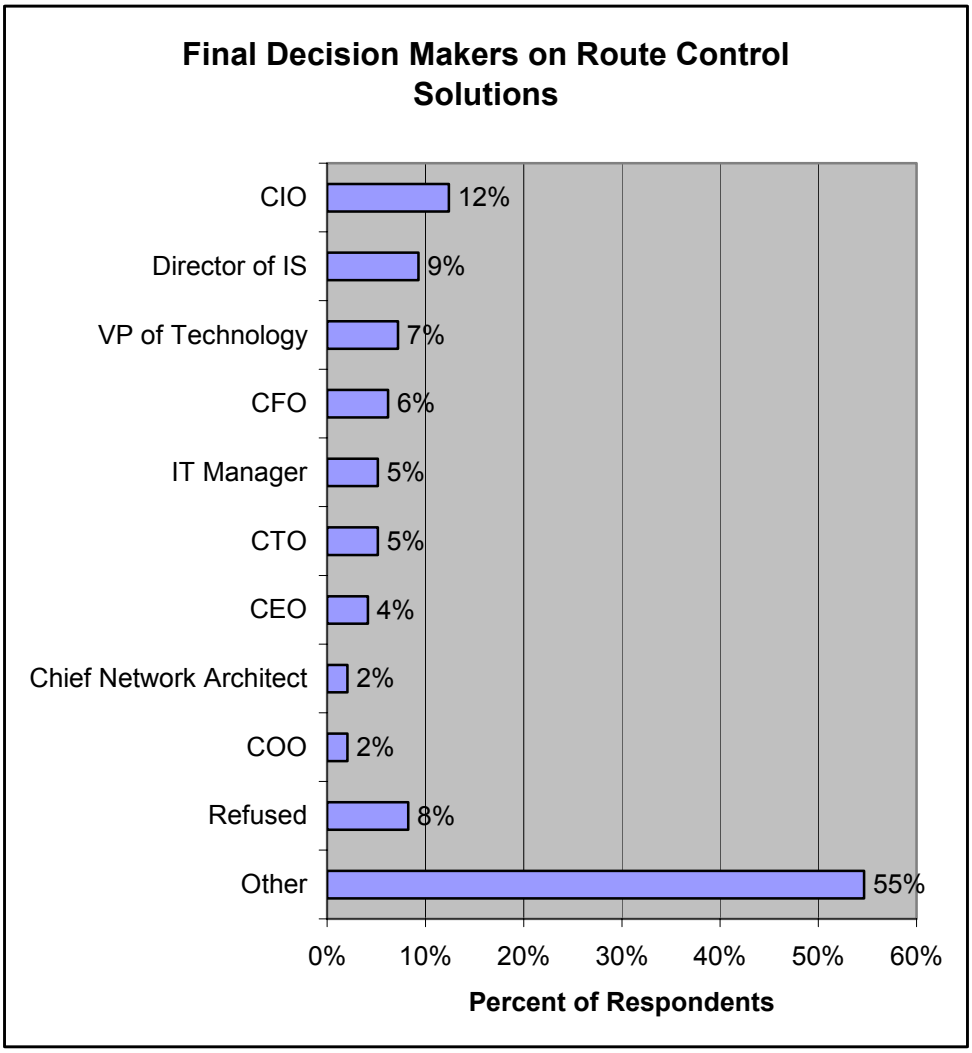


The Decision Maker

To better understand who are the final decision makers, we asked respondents, in an open-ended question, to identify the individual(s), by title, in their companies who make the decision to choose content delivery products or services. Chart 12-4 below shows the breakdown of the categorized responses for company decision makers.

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

Chart 12-4: Final Decision Makers (n=97) Q43



Multi-homed Enterprise location Forecast

The multi-homed enterprise location forecast examines and predicts the number of enterprise multi-homed locations.

Market Factors and Assumptions

- Economy will begin picking up at the end of 2003.
- Uncertainty in the service provider market will drive multi-homed locations
- Market education is a significant challenge for route control vendors; education will be driven by vendors, service providers, and integrators beginning in 2003
- The growth of the total number of enterprises with multi-homed locations increases conservatively through 2006
- The number of multi-homed locations within an organization increases significantly Q4 of 2003 and 2004

Methodology

We used extrapolation techniques based on primary market research with IT decision makers, interviews with route control vendors, and market factors to estimate the size and growth for the number of multi-homed enterprise locations. Using demand-side information gathered in this study, as well as supply-side sources, we projected the opportunity for CDN product manufacturers.

Multi-home Enterprise Location Forecast

What's Included

Included in this forecast is the number of enterprise locations that are multi-homed. For this forecast, we include enterprise locations multi-homed to different service providers requiring an ASN, as well as those multi-homed locations with a single upstream ISP.

Multi-homed locations counted for this forecast include the following:

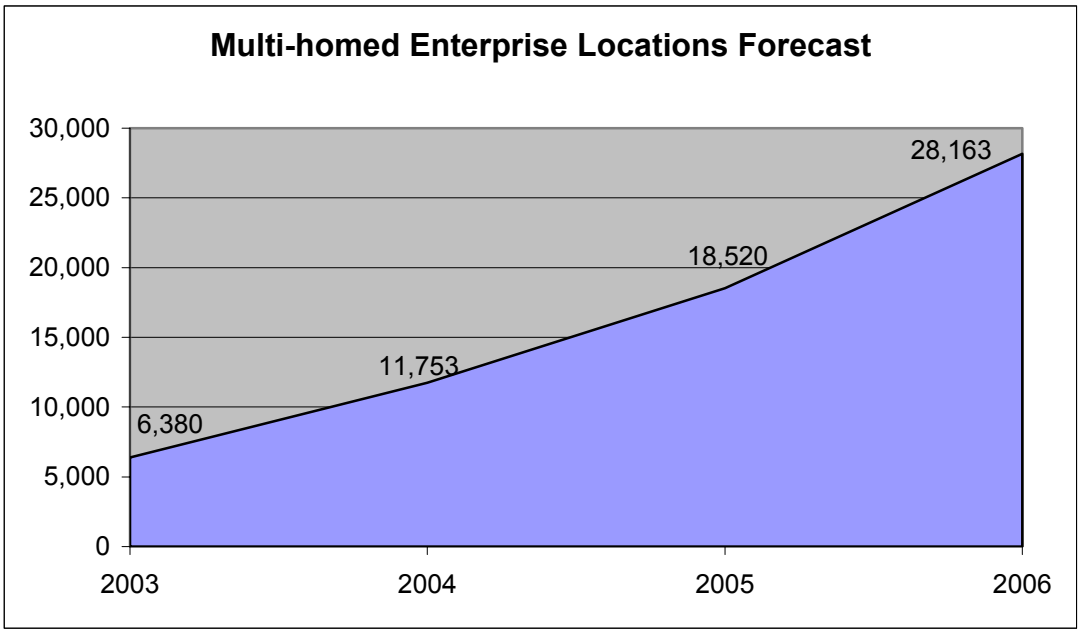
- Enterprise locations multi-homed to different providers
- Enterprise locations multi-homed to different providers

What's Not Included

This forecast does not include the following types of multi-homed locations:

- Multi-homed locations of ISPs

Chart 13-1: Multi-home Enterprise Location Forecast



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Appendix A

The 2002 Route Control Study Questionnaire

Hello, my name is_____, conducting research for the HTRC Group. We are currently gathering research with firms regarding their use of Internet connections, do you have some time to answer some questions? We value your opinion, and for your participation, we will email you the executive summary of the final study.

Please know that all information is kept strictly confidential, no information other than means, standard deviations, and ranges from the total sample will be used in our research.

1. Do you have detailed knowledge of your upstream Internet provider connections, including network plans, services, bandwidth, management, performance, and challenges? (check one)

   1._____Yes

   2._____No (terminate, ask for a reference)

   3._____Don't know/Refuse (terminate, ask for a reference)

2a. Would you say your company has 1000 employees or more or does it have less than 1000 employees?

   1._____1000 + employees (Ask 2b)

   2._____Less than 1000 employees (terminate)

   3._____Don't know (terminate)

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

   Number of employees:_____ (RANGE: 1,000 – 9,999,997)

   1) Specify

   2) DK

3. How many significant outages and delays does your network experience per month?
   Specify number:_____ RANGE= 0 – 99,997

   1) Specify

   2) DK

4. Do you have at least one multi-homed site? A multi-homed site is a single location that uses more than one upstream Internet Service Provider.

1._____Yes

2._____No

3._____Don't know/Refused

5. Do you plan to have at least one multi-homed site by August 2003? (IF REMINDER NEEDED: A multi-homed site is a single location that uses more than one upstream Internet Service Provider.)

1._____Yes

2._____No

3._____Don't know

6. Do you plan to have at least one multi-homed site by August 2004? (IF REMINDER NEEDED: A multi-homed site is a single location that uses more than one upstream Internet Service Provider.)

1._____Yes (go to Q8)

2._____No (go to Q7)

3._____Don't know (go to Q7)

[ASK 7 IF Q4,5 and 6 NOT YES. OTHERWISE GO TO Q.8]

7. Why don't you currently multi-home, or plan to multi-home in the future? (open ended)

1) Specify:_____

2) DK/Refuse

8. Of the following categories of decision makers, which would best describe your position when purchasing products or services? Are you a... (Read List. Check only one)

1._____Primary decision maker

2._____Secondary decision maker, that is you have *significant* influence on product or service procurement, or an

3._____Ancillary decision maker, where you have *some* influence on product or service procurement

4._____***DNR*** No influence on purchase decisions? (Terminate, ask for someone who is)

5._____***DNR*** Don't know/Refuse (Terminate, ask for someone who is)

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9. What is your company's line of business? (**DO NOT READ** List. Check all that apply)

1 _____ Accommodation and Food Services
2 _____ Administrative and Support and Waste Management and Remediation Services
3 _____ Agriculture, Forestry, Fishing and Hunting
4 _____ Arts, Entertainment, and Recreation
5 _____ Construction
6 _____ Educational Services
7 _____ Finance and Insurance
8 _____ Health Care and Social Assistance
9 _____ Information (i.e. publications, media, newspapers)
10 _____ Management of Companies and Enterprises
11 ____Manufacturing
12_____ Military
13 _____ Mining
14 _____ Professional, Scientific, and Technical Services
15 _____ Public Administration (Government)
16 _____ Real Estate and Rental and Leasing
17 _____ Retail Trade
18_____Telecommunications Services (Service Providers)
19 _____ Transportation and Warehousing
18 _____ Utilities
19 _____ Wholesale Trade
20 _____ *DNR* Other [Specify]_____
21 _____ *DNR* None of the above/Refused
22 _____ *DNR* Don't know

10. For your multi-homed location, how many different upstream service providers do you have connections with now? By August of 2003? **[SKIP "2002" IF Q4=2 OR 3. SKIP "2003" IF Q5=2 OR 3]**

Locations	**August 2002**	**2003**
1. Number of service providers RANGE = 1-100; DK/Ref=999	_____	_____

11a. For your multi-homed site, how many of the following connections do you have for upstream Internet connectivity? (Read list. Fill in numbers) RANGE = 0-100; DK/Ref= 999. **[SKIP IF Q4= 2 OR 3]**

Connections	2002
1. T1	_____
2. DS-3	_____
3. OC-3	_____
4. OC-12	_____
5. OC-48	_____
6. Gigabit Ethernet	_____
7. Other, specify	_____

11b. For your multi-homed site in 2003, how many of the following connections do you plan to have for upstream Internet connectivity? (Read List. Fill in numbers) RANGE=0-100; DK/Ref=999. **[SKIP IF Q5= 2 OR 3]**

Connections	2003
1. T1	_____
2. DS-3	_____
3. OC-3	_____
4. OC-12	_____
5. OC-48	_____
6. Gigabit Ethernet	_____
7. Other, specify	_____

[ASK IF Q4=YES; OTHERWISE SKIP TO Q13]

12. Please tell me what the monthly averages are for each of the following traffic demands for your multi-homed location?

a) Monthly average of INBOUND bandwidth, as measured in Megabits per second:_____Mbps (Megabits per second) RANGE=0.1-10,000; DK/Ref=99999.

1) Specify
2) DK

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b) Monthly average of OUTBOUND bandwidth, as measured in Megabits per second:_____Mbps (Megabits per second) RANGE=0.1-10,000; DK/Ref=99999.

1) Specify

2) DK

13. For which of the following reasons do you multi-home to multiple Internet service providers? (Read list. Check all that apply) **ROTATE ANSWER CHOICES**

1.____Redundancy

2.____Performance

3.____Cost savings

4.____Additional capacity

5.____Any other reasons?: _____

*6.*____*DNR* None

*7.*____*DNR* Don't Know/Refuse

14. For your multi-homed connections, are they configured for the following? (Read list. Check all that apply)

1.____load-sharing

2.____primary/fallback operation

3.____Any other reasons?: _____

4.____*DNR* Not yet configured

5.____*DNR* Don't Know/Refuse

15. Which of the following best describes the hosting strategy for your Web site? (Read list. Check only one) **ROTATE ANSWER CHOICES**

_____1. Self-hosted: host server(s) in your own network

_____2. Hosted: entire site is hosted on service provider's server

_____3. Colocation: your server(s) are hosted in service provider's network

_____4. Hybrid colocation: host servers both in service provider's network and your own network

_____5. *DNR* Don't know/Refuse

16. Please indicate how your organization measures and reports traffic statistics? (Read list. Check all that apply) **ROTATE ANSWER CHOICES**

_____ 1. _____Self-collection of SNMP statistics

_____ 2. _____Self-collection of NetFlow statistics

_____ 3. _____ISP reporting/billing

_____ 4. _____Some other measurements? *[Specify other]*

_____ 5. _____*DNR* Don't Know/Refuse

17. For your organization, does the demand for Internet bandwidth grow or decrease per year? (Fill in percentage) RANGE= 0-10,000; DK/REF=999. (IF INCREASE ASK Q17A. IF DECREASE ASK Q17b)

a. What is the bandwidth percent growth per year:_____%

b. What is the bandwidth percent decrease per year:____%

18. Please indicate how your Internet Service Providers bill for the bandwidth your company uses? (Read List. Check all that apply) **ROTATE ANSWER CHOICES**

_____ 1. _____Gigabytes downloaded/uploaded

_____ 2. _____Fixed service fee with the ability to burst above committed bandwidth via a separate usage charge for the overage

_____ 3. _____Bandwidth measured in 95th percentile usage (burstable)

_____ 4. _____Other usage-based pricing

_____ 5. _____Fixed service fee with without the ability to burst above provisioned bandwidth

6. _____Are there any other billing methods? *[Specify other]*

7. _____*DNR* Don't Know/Refuse

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19. Please indicate the level of expertise with Border Gateway Protocol (BGP) your IT group has? (IF ASKED: the highest level…not combined total) (Read list. Check only one)

_____ 1. _____1-2 years of experience with BGP

_____ 2. _____3-4 years of experience with BGP

_____ 3. _____5-6 years of experience with BGP

_____ 4. _____Over 6 years of experience with BGP

5. _____*DNR* Don't Know/Refuse

Route Control Section

READ: For this survey we will define **route control products and services** as a product or service that uses BGP at multi-homed sites to dynamically control which upstream ISP (network connection) traffic is sent based on user defined policies such as least cost and best performance.

20. On a scale of 1 to 7, where 1 is not familiar and 7 is extremely familiar, how familiar are you with route control products and services? (fill in rating) 8=DK/Refuse

1._____Route Control

21. Are you currently considering purchasing route control products or services?

1._____Yes
2._____No
3._____DK/Refuse

22. Do you currently use route control products or services?

1._____Yes
2._____No
3._____DK/Refuse

23. Do you plan to use route control products or services by August 2003?

1._____Yes
2._____No
3._____Don't know/Refused

24. Do you plan to use route control products or services by August 2004?

1._____Yes
2._____No
3._____Don't know/Refused

25. What vendors come to mind when you think about route control products and services? (open ended)
    1. Specify:_____
    2. DK/Refuse

26. On a scale of 1 to 7, where 1 is not likely and 7 is definitely, please rate the likelihood of your organization implementing the following options for route control products and services ? (Read list. Fill in rating) **ROTATE ANSWER CHOICES.** RE-READ SCALE AS NECESSARY. 8=DK/Refuse

_____ 1. _____Route control product managed and operated by ***your*** organization in your network

_____ 2. _____Managed Route control service where the product managed and operated by a ***service provider*** in your network

_____ 3. _____Route control product managed and operated by ***your*** organization in your network that requires subscribing to an Internet performance service to determine the best route

27. What do you like most about route control products and services? (open ended)
    1) Specify:_____
    2) DK/Refuse

28. What applications are driving your need for multi-homed sites in 2002? (Read list. Check all that apply) **ROTATE ANSWER CHOICES**

_____1. Web site

_____2. VPNs

_____3. Web based applications

_____4. Web services

_____5. e-Commerce

_____6. Multi-media

_____7. Multi-cast

_____8. VOIP

_____9. Or is it something else?_____

_____10. *DNR* Don't know/Refused

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29. What applications will drive your need for multi-homed sites in 2003? (Read list. Check all that apply) **ROTATE ANSWER CHOICES**

____1. Web site

_____2. VPNs

_____3. Web based applications

_____4. Web services

_____5. e-Commerce

_____6. Multi-media

_____7. Multi-cast

_____8. VOIP

_____9. Or is it something else?_____

_____10. *DNR* Don't know/Refused

30. Of the following types of traffic, which of the following types of traffic are used with your multi-homed site? (Read list. Check all that apply) **ROTATE ANSWER CHOICES**

_____1. Web traffic for employees using the Internet

_____2. Corporate Intranet traffic

_____3. Extranet traffic

_____4. Web traffic for company Web site

_____5. Or is it something else:_____

_____6. *DNR* Don't know/Refused

31. At what point are you planning to migrate some or all of your traffic from private line data connections (Frame Relay or ATM) to using VPNs on the public Internet? (Read list. Check only one)

_____1. Currently use VPNs and private data connections with no plans to get rid of Frame Relay or ATM.

_____2. Already use VPNs instead of private data connections

_____3. Plan to migrate to VPNs with no private data connections in 2002

_____4. Plan to migrate to VPNs with no private data connections in 2003

_____5. Plan to migrate to VPNs with no private data connections in 2004

_____6. Do not use VPNs

_____7. *DNR* Don't Know

32. What Web services technologies does your organization plan to use in 2002? (Rotate, Read list, Check all that apply)
1. ____Microsoft's .NET
2. ____IBM's Web Sphere
3. ____Sun's ONE software
4. ____BEA Weblogic
5. ____Cape Clear
6. ____No plans for Web application platforms
7. ____Other: Specify
8. ____Don't know/Refused

33. What Web services technologies does your organization plan to use in 2003? (Rotate, Read list, Check all that apply)
1. ____Microsoft's .NET
2. ____IBM's Web Sphere
3. ____Sun's ONE software
4. ____BEA Weblogic
5. ____Cape Clear
6. ____No plans for Web application platforms
7. ____Other: Specify
8. ____Don't know/Refused

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34. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following criteria you used when you chose your current Internet Service Providers? (Read list. Fill in rating; 8=DK/Refuse) **ROTATE ANSWER CHOICES**

_____ 1. _____Cost

_____ 2. _____Brand reputation

_____ 3. _____Customer service and support

_____ 4. _____Established service provider (e.g. AT&T, UUNet)

_____ 5. _____Service providers network buildout plans

_____ 6. _____Reputation for performance

_____ 7. _____3rd party performance test results

_____ 8. _____Quality of peering relationships

_____ 9. _____Measured performance (self-measured or third-party)

_____ 10. _____National/International service provider

_____ 11. _____Regional service provider

_____ 12. _____Distance (router hops) from your site to ISPs peering points

_____ 13. _____Market share leader

35. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following features for route control products? (Read list. Fill in rating; 8=DK/Refuse). **ROTATE ANSWER CHOICES**

_____ 1. _____Includes multiple functions in addition to route control

_____ 2. _____Included VPN product

_____ 3. _____Includes Firewall product

_____ 4. _____Included bandwidth shaping product

_____ 5. _____Stand alone route control product

_____ 6. _____Measures connectivity to an organization's end users

_____ 7. _____Adds data from third-party networking equipment to the decision making process

_____ 8. _____Cost controls

_____ 9. _____Performance optimization controls

_____ 10. _____Hot swapable redundancy

_____ 11. _____Non-intrusive technology (a solution that sits outside the data path)

_____ 12. _____Are there any other critical criteria? *[Specify other.* ***DO NOT RATE SPECIFY****]*

36. Of the following sources for purchasing route control products and services from, what sources would you expect to buy from? (Read list. Check all that apply) **ROTATE ANSWER CHOICES**

_____ 1. _____Router vendors

_____ 2. _____Independent companies that specialize in route optimization products

_____ 3. _____Service providers

_____ 4. _____Service provider specialized in route optimization services

_____ 5. _____Resellers, VARs, or Integrators

_____ 6. _____*DNR* DK/Refuse

37. How much has your company spent, or plan to spend, on the following expenditure areas for 2002? (Read list. Fill in expenditures: RANGE= 0-$20 MILLION; = 99999999=DK/Refuse)

Expenditures	2002
1. Route Control products	$_____
2. Internet Bandwidth connections	$_____

38. How much does your company plan to spend on the following expenditure areas for 2003? (Read list. Fill in expenditures: RANGE=0-20 MILLION ; 99999999=DK/Refuse)

Expenditures	2003
1. Route Control products	$_____
2. Internet Bandwidth connections	$_____

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39. On a scale of 1 to 7, where 1 is not useful and 7 is very useful, please rate the following sources for learning about new products and services? (Read list. Fill in rating 8=DK/Refuse) **ROTATE ANSWER CHOICES**

_____ 1. _____Trade magazines

_____ 2. _____Traditional Seminars

_____ 3. _____Trade Shows

_____ 4. _____Vendor Web sites

_____ 5. _____Online magazines

_____ 6. _____Vendor White papers

_____ 7. _____Online newsletters

_____ 8. _____Trade show conference sessions

_____ 9. _____Online Seminars

_____ 10. _____Analyst reports and opinions

_____ 11. _____Independent White papers

12. _____Are there any other sources that are important for learning about new products and services? *[Specify other source]*

40. What are the top 3 publications that are influential in your purchase of products and services? (Open ended. Publications are coded, but for testing use paper list.)
    1) Specify:_____
    2) None
    3) DK/Refuse

41. Which analyst firms do you use to help make technology decisions? (Open ended)
    1) Specify:_____
    2) None
    3) DK/Refuse

42. What are the top 3 barriers for purchasing route control products or services? (Open ended)
    1) Specify:_____
    2) None
    3) DK/Refuse

43. What is the title of the person or persons responsible for making the final decision on route control products or services? (Do not read list, check all that apply)

_____ 1. _____Chief Technology Officer (CTO)

_____ 2. _____Chief Executive Officer (CEO)

_____ 3. _____Chief Financial Officer (CFO)

_____ 4. _____Chief Operations Officer (COO)

_____ 5. _____Chief Information Officer (CIO)

_____ 6. _____Director of Information Systems

_____ 7. _____VP of Technology

_____ 8. _____Webmaster

_____ 9. _____Chief Network Architect

_____ 10. _____IT Manager

_____ 11. _____Other, Specify Title: _____

_____ 12. _____DK/Refuse

44. What is your title? (Do not read list, check all that apply)

_____ 1. _____Chief Technology Officer (CTO)

_____ 2. _____Chief Executive Officer (CEO)

_____ 3. _____Chief Financial Officer (CFO)

_____ 4. _____Chief Operations Officer (COO)

_____ 5. _____Chief Information Officer (CIO)

_____ 6. _____Director of Information Systems

_____ 7. _____VP of Technology

_____ 8. _____Webmaster

_____ 9. _____Chief Network Architect

_____ 10. _____IT Manager

_____ 11. _____Other, Specify Title: _____

_____ 12. _____DK/Refuse

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45. What are your top 3 multi-homed implementation challenges and barriers your company faces? (Open ended)
    1) Specify:_____
    2) None
    3) DK/Refuse

Thank you for participating in the HTRC Groups route control study. We will email you a PDF version of the executive summary for your participation as soon as it is available in August.

Appendix B

Data Summary

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

N=94	
Missing	4
Mean	50389.68
Median	10000
Mode	5000
Std. Deviation	124294.89
Variance	15449219644
Range	999000

3. How many significant outages and delays does your network experience per month?

N=81	
Missing	17
Mean	1.69
Median	1
Mode	0
Std. Deviation	3.71
Variance	13.75
Range	30

4. Do you have at least one multi-homed site?

N=98	
Yes	93%
No	7%

5. Do you plan to have at least one multi-homed site by August 2003?

N=98	
Yes	96%
No	2%
Don't Know	2%

6. Do you plan to have at least one multi-homed site by August 2004?

N=98

Yes	94%
No	1%
Don't Know	5%

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

N=98

Primary	20%
Secondary	49%
Ancillary	31%

9. What is your company's line of business?

N=98

Military	1%
Utilities	1%
Construction	2%
Retail Trade	2%
Transportation and Warehousing	2%
Wholesale Trade	2%
Information	4%
Management of Companies	6%
Public Administration	7%
Finance and Insurance	8%
Health Care and Social Assistance	8%
Educational Services	11%
Manufacturing	13%
Professional, Scientific, and Technical	16%
Telecommunications Services	16%

10. For your multi-homed location, how many different upstream service providers do you have connections with now?

	2002	2003
N	87	83
Missing	11	15
Mean	2.5	2.6
Median	2	2
Mode	2	2
Std. Deviation	3.2	2.8
Variance	10.0	7.6
Range	29	24

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11a. & 11b. For your multi-homed site, how many of the following connections do you have for upstream Internet connectivity? And in 2003

2002		2003	
T1		T1	
N	76	N	72
Missing	22	Missing	26
Mean	4.92	Mean	5.51
Median	1	Median	1
Mode	0	Mode	0
Std. Deviation	13.8	Std. Deviation	17.29
Variance	189.11	Variance	298.99
Range	100	Range	100
DS-3		DS-3	
N	76	N	78
Missing	22	Missing	20
Mean	1.46	Mean	1.60
Median	0	Median	0
Mode	0	Mode	0
Std. Deviation	3.22	Std. Deviation	3.45
Variance	10.36	Variance	11.88
Range	24	Range	24
OC-3		OC-3	
N	75	N	74
Missing	23	Missing	24
Mean	0.48	Mean	0.61
Median	0	Median	0
Mode	75	Mode	0
Std. Deviation	1.52	Std. Deviation	1.61
Variance	2.31	Variance	2.60
Range	12	Range	12
OC-12		OC-12	
N	75	N	76
Missing	23	Missing	22
Mean	0.24	Mean	0.28
Median	0	Median	0
Mode	0	Mode	0
Std. Deviation	0.82	Std. Deviation	0.95
Variance	0.67	Variance	0.90
Range	6	Range	6

OC-48		OC-48	
N	75	N	78
Missing	23	Missing	20
Mean	0.21	Mean	0.35
Median	0	Median	0
Mode	0	Mode	0
Std. Deviation	0.83	Std. Deviation	1.89
Variance	0.68	Variance	3.55
Range	5	Range	16

Gigabit Ethernet		Gigabit Ethernet	
N	74	N	75
Missing	24	Missing	23
Mean	0.72	Mean	0.72
Median	0	Median	0
Mode	0	Mode	0
Std. Deviation	2.66	Std. Deviation	2.72
Variance	7.06	Variance	7.42
Range	16	Range	16

Other		Other	
N	77	N	77
Missing	21	Missing	21
Mean	0.64	Mean	0.51
Median	0	Median	0
Mode	0	Mode	0
Std. Deviation	2.93	Std. Deviation	2.11
Variance	8.60	Variance	4.44
Range	20	Range	16

12. Please tell me what the monthly averages are for each of the following traffic demands for your multi-homed location?

Inbound	Outbound
97.51	114.08

13. For which of the following reasons do you multi-home to multiple Internet service providers?

N=98

None	2%
Don't Know/Refuse	3%
Other	4%
Cost savings	13%
Additional capacity	27%
Performance	32%
Redundancy	85%

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14. For your multi-homed connections, are they configured for the following?
N=98

Not yet configured	2%
Other	9%
Load-sharing	57%
Primary/fallback operation	66%

15. Which of the following best describes the hosting strategy for your Web site?
N=98

Colocation	6%
Don't Know/Refused	8%
Hosted	12%
Hybrid colocation	12%
Self-hosted	61%

16. Please indicate how your organization measures and reports traffic statistics?
N=32

Other	13%
Self-collection of SNMP statistics	16%
ISP reporting/billing	34%
Self-collection of NetFlow statistics	81%

17. For your organization, does the demand for Internet bandwidth grow or decrease per year?
N=71

Missing	27
Mean	22.55
Median	15
Mode	10
Std. Deviation	27.95
Variance	781.22
Range	199

18. Please indicate how your Internet Service Providers bill for the bandwidth your company uses?
N=97

Gigabytes downloaded/uploaded	4%
Other usage-based pricing	4%
Other billing methods	6%
Bandwidth measured in 95th percentile usage	11%
Don't Know/Refused	19%
Fixed service fee without the ability to burst	32%
Fixed service fee with the ability to burst	42%

19. Please indicate the level of expertise with Border Gateway Protocol (BGP) your IT group has
N=98

Don't Know/Refused	7%
5-6 years	12%
1-2 years	18%
3-4 years	22%
Over 6 years	40%

20. On a scale of 1 to 7, where 1 is not familiar and 7 is extremely familiar, how familiar are you with route control products and services
N=97

Rating	Percent
1	14.43%
2	15.46%
3	16.49%
4	13.40%
5	21.65%
6	5.15%
7	13.40%

21. Are you currently considering purchasing route control products or services?
N=97

Yes	16%
No	72%
Don't Know	11%

22. Do you currently use route control products or services?
N=97

Yes	44%
No	44%
Don't Know	11%

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23. Do you plan to use route control products or services by August 2003?
N=97

Yes	53%
No	19%
Don't Know	29%

24. Do you plan to use route control products or services by August 2004?
N=97

Yes	57%
No	13%
Don't Know	30%

26. On a scale of 1 to 7, where 1 is not likely and 7 is definitely, please rate the likelihood of your organization implementing the following options for route control products and services?
N=95

51%	Route control product managed and operated by ***your*** organization in your network (Rated 5, 6, or 7)
39%	Don't Know

N=97

14%	Managed Route control service where the product managed and operated by a ***service provider*** in your network (Rated 5, 6, or 7)
36%	Don't Know

N=97

14%	Route control product managed and operated by ***your*** organization in your network that requires subscribing to an Internet performance service to determine the best route (Rated 5, 6, or 7)
41%	Don't Know

28. What applications are driving your need for multi-homed sites in 2002?
29. What applications will drive your need for multi-homed sites in 2003?
N=98

	2002	2003
Don't Know	3%	4%
Other	12%	16%
VOIP	16%	17%
Multi-cast	18%	16%
Multi-media	42%	41%
Web services	44%	41%
Web based applications	46%	44%
e-Commerce	53%	51%
Web site	55%	51%
VPNs	59%	57%

30. Of the following types of traffic, which of the following types of traffic are used with your multi-homed site?
N=98

Other	6%
Extranet	82%
Employees Internet	85%
Corporate Intranet	85%
Company Web site	90%

31. At what point are you planning to migrate some or all of your traffic from private line data connections (Frame Relay or ATM) to using VPNs on the public Internet?
N=94

Migrate to VPNs with no private data connections in 2002	2%
Migrate to VPNs with no private data connections in 2004	4%
Do not use VPNs	7%
Don't Know	11%
Migrate to VPNs with no private data connections in 2003	11%
Already use VPNs instead of private data connections	19%
Use VPNs & private data connections with no plans to change	46%

32. What Web services technologies does your organization plan to use in 2002?

33. What Web services technologies does your organization plan to use in 2003?
N=98

	2002	2003
Cape Clear	2%	2%
BEA Weblogic	8%	7%
Other	12%	11%
Sun's ONE software	14%	14%
IBM's Web Sphere	27%	22%
Don't know	31%	35%
Microsoft's .NET	38%	37%

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34. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following criteria you used when you chose your current Internet Service Providers?

N=97	(Rated 5, 6, or 7)
3rd party performance test results	28%
Market share leader	29%
National/International service provider	49%
Distance (router hops) to ISPs peering points	53%
Brand reputation	55%
Service providers network buildout plans	57%
Regional service provider	58%
Measured performance	65%
Quality of peering relationships	69%
Cost	73%
Reputation for performance	74%
Customer service and support	75%
Established service provider	75%

35. On a scale of 1 to 7, where 1 is not important and 7 is critical, please rate the importance of the following features for route control products?

N=97	(Rated 5, 6, or 7)
Adds data from third-party networking equipment to the decision making process	30%
Includes multiple functions in addition to route control	32%
Includes Firewall product	34%
Stand alone route control product	36%
Included VPN product	39%
Non-intrusive technology (a solution that sits outside the data path)	41%
Included bandwidth shaping product	43%
Measures connectivity to an organization's end users	43%
Cost controls	45%
Performance optimization controls	48%
Hot swapable redundancy	55%

36. Of the following sources for purchasing route control products and services from, what sources would you expect to buy from?

N=97	
Don't know	12%
Route control service providers	18%
Service providers	20%
Route control product manufacturers	27%
Resellers, VARs, or Integrators	27%
Router vendors	62%

37. How much has your company spent, or plan to spend, on the following expenditure areas for 2002?
38. How much does your company plan to spend on the following expenditure areas for 2003?

	2002		2002
Route Control Products		Internet Bandwidth	
N	52	N	41
Missing	46	Missing	57
Mean	384654	Mean	831000
Median	0	Median	60000
Mode	0	Mode	0
Std. Deviation	1527235.8	Std. Deviation	2102389.212
Variance	2.33E+12	Variance	4.42004E+12
Range	10000000	Range	12000000

	2003		2003
Route Control Products		Internet Bandwidth	
N	26	N	32
Missing	72	Missing	66
Mean	349769	Mean	1450844
Median	7000	Median	117500
Mode	0	Mode	0
Std. Deviation	882276.9	Std. Deviation	3276423.4
Variance	7.78E+11	Variance	1.0735E+13
Range	3500000	Range	14000000

39. On a scale of 1 to 7, where 1 is not useful and 7 is very useful, please rate the following sources for learning about new products and services?

N=98	(Rated 5, 6, or 7)
Online Seminars	35%
Trade Shows	46%
Traditional Seminars	49%
Online newsletters	50%
Trade show conference sessions	50%
Online magazines	53%
Analyst reports and opinions	59%
Vendor White papers	60%
Vendor Web sites	66%
Independent White papers	70%
Trade magazines	70%

43. What is the title of the person or persons responsible for making the final decision on route control products or services?

N=97

Other	55%
Refused	8%
COO	2%
Chief Network Architect	2%
CEO	4%
CTO	5%
IT Manager	5%
CFO	6%
VP of Technology	7%
Director of IS	9%
CIO	12%

Appendix C

Verbatim Responses

7. Why don't you currently multi-home, or plan to multi-home in the future?

No Need

DON'T RELY ON BUSINESS INTERNET
EXPANSION NOT THERE YET
I THINK BECAUSE WE HAVE 2 T1 LINES ALREADY TO PROVIDE REDUNDANCY
IT'S JUST A BUSINESS DECISION
IT'S NOT IN THE PLANS
NO CURRENT PROBLEMS
NO NEED
NO NEED (NO OUTAGES)
NOT NEEDED
OUR PROVIDER IS CURRENTLY RELIABLE AND WE DON'T HAVE A NEED FOR A SECOND PROVIDER
PROVIDER WILL BE GIVING US A DEDICATED LINK, NOT A STANDARD
UPLINK DEDICATED 10 MEGABYTE CONNECTION
BACKBONE IS RELIABLE
THAT SERVICE IS PROVIDED
THERE'S NO NEED
WHEN WE HAVE AN OUTAGE IT IS NOT THE NETWORK PROVIDER'S PROBLEM, BUT THE PHONE COMPANY'S.
RELIABILITY
SOLE USER
WE ARE DOING OUR OWN ISP

Cost

COST
COST
COST
DUE TO THE COST
DO NOT SEE THE REASON TO SPEND THE EXTRA MONEY OR INCUR THE BUSINESS RISK.
NOT COST EFFECTIVE

Security

FOR THE MOST PART IT IS FOR SECURITY WITH A BIG GAUNTLET FIREWALL TO LOCK DOWN ALL INFORMATION; WE JUST GO THROUGH ONE PIPE.
GOV'T SECURITY CONSIDERATIONS

Government Policy
GOES THROUGH STATES (ONE SERVICE PROVIDER)
IT'S A PUBLIC SCHOOL. WE MUST GO THROUGH THE COUNTY
SMALL LOCAL GOV'T
WE ARE REQUIRED TO USE THE STATE RUN SERVICE PROVIDER OF OKLAHOMA

Too Complex
COMPLEXITY OF BGP4 WAS TOO MUCH.

25. What vendors come to mind when you think about route control products and services?
N=95

BAY NETWORKS	1%
BIG PIPE	1%
BIG IRON	1%
CDW	1%
DATA GENERAL	1%
FUJITSU	1%
HP	1%
LUCENT	1%
NET VMG	1%
NETWORK SOLUTIONS	1%
OCATEL	1%
PACATEER	1%
PAETEC	1%
SI	1%
UNISPHERE	1%
WORLDCOM	1%
EXTREME NETWORKS	2%
F5	2%
ALCATEL	3%
AT&T	3%
ROUTE SCIENCE	3%
3COM	4%
JUNIPER	5%
NORTEL	5%
Don't Know	33%
CISCO	58%

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27. What do you like most about route control products and services?
N=94

Control

CONTROL
CONTROL
CONTROL
CONTROL AND SECURITY ASPECTS REDIRECTING TRAFFIC VERIFYING DATA END TO END TO DIMINISH RISK OF HACK LOSSES
CONTROL OVER USAGE OF BANDWIDTH
CONTROL TO MAINTAIN AVAILABILITY
ABILITY TO CONTROL THE ROUTING OF YOUR NETWORK
ABILITY TO CONTROL TRAFFIC
BETTER CONTROL OVER YOUR TRAFFIC
IT ALLOWS US TO CONTROL ROUTES
IT HELPS CONTROL
PROVIDES THE ENTITIES THE ABILITY TO CONTROL THEIR TRAFFIC STREAMS
THE ABILITY TO DO SOME DETERMINISTIC ROUTING, IMPROVING PERFORMANCE
THE CONTROL OF TRAFFIC
YOU CAN MAP IP AND PROTOCOLS
PREDICTABLE NATURE OF THE SERVICE
STATIC ADDRESSING
WE USE THE TOOLS TO IMPLEMENT CORPORATE POLICY EQUITABILITY. WE TRY NOT TO DISCOURAGE INDIVIDUAL USAGE PATTERNS AS LONG AS THEY ARE WITHIN CORPORATE POLICIES.

Performance

EFFICIENCY
EFFICIENCY PURPOSES FOR USING THE EQUIPMENT
HELPS MAKE SURE WE HAVE BETTER FLOW CONTROL SO WE DON'T BOTTLENECK
IT JUST HELPS US MOVE OUT THE BUMPS IN THE ROAD
PERFORMANCE
WHEN THEY WORK
THEY WORK
ABILITY TO PICK BEST ROUTES THE QUICKEST
BEST PATH TO CUSTOMER LOCALITY
IT JUST GETS THE JOB DONE
SPEED IN FINDING THE AVAILABLE ROUTE
CUSTOMER AGREEMENTS

Redundancy

ABILITY TO MULTI HOME WITH DIFFERENT SERVICE PROVIDERS FOR REDUNDANCY
AUTOMATIC FAIL OVER
FALLBACK
REDUNDANCY
REDUNDANCY
REDUNDANCY
THE REDUNDANCY IT PROVIDES

Flexibility

ABILITY FOR VARIABLE OPTIONS
ABILITY TO CHANGE ROUTING PRIORITIES ON DEMAND
ABILITY TO PICK AND CHOOSE
FLEXIBILITY
THE OPTION TO BE FLEXIBLE

Load Share

ABILITY TO LOAD SHARE
I WOULD LIKE IT TO BE AUTOMATIC SO IT WOULD TAKE CARE OF ITSELF (THE ROUTE CONTROL PRODUCTS)
LOAD BALANCING

Cost Effective

COST EFFECTIVENESS
COST EFFECTIVENESS
THE CONVENIENCE

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

N=94

PC Magazine	2%
Federal Computer News	3%
Telephony	3%
Cisco Publication	4%
Government Computer News	4%
Internet Week	4%
Info World	7%
Don't Know Refused	9%
eWeek	10%
Computer World	12%
None	16%
Network Magazine	19%
Information Week	21%
Network Computing	22%
Network World	27%

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41.Which analyst firms do you use to help make technology decisions?

N=94

Touche Ross	2%
IDC	2%
Forester	2%
Giga	4%
Meta Group	5%
Don't Know	16%
Gartner	26%
None	45%
Local Company	1%
AEC	1%
Bergman GP	1%
Boston IPC	1%
Burton GP	1%
Business Class	1%
Cisco	1%
Deloite	1%
GE Solutions	1%
Poly Group	1%
Verizon	1%
Yankee Group	1%

42. What are the top 3 barriers for purchasing route control products or services?

N=94

Cost

COST
COST
COST
COST
COST
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COST
COST
COST
COST
COST
COST
COST
COST
COST IMPLEMENTATION
PRICE
PRICE
PRICE
PRICE
OPPORTUNITY COST

Budget

BUDGET
BUDGET
BUDGET
BUDGET
BUDGET
BUDGET
BUDGET
BUDGET
MONEY
MONEY
MONEY
MONEY TO BUY THEM
APPROVAL

Learning Curve

EXPERIENCE
EXPERTISE FOR INSTALLATION
KNOWLEDGE
KNOWLEDGE OF TYPES OF PRODUCTS
LEARNING CURVE
TECHNOLOGY
TECHNOLOGY IS NEW
NEW FIELD
TYPES OF TECHNOLOGY (MPLS VERSUS OTHERS)
WILL THEY HANDLE SNA

USERS
ANALYSIS PROCESS
BANDWIDTH OF EMPLOYEES
CLEAR INFORMATION ON THE PRODUCT
COMPANIES ARE BRAND NEW
EASE OF USE
EFFORT OR MANPOWER OF MY COMPANY
NEED
NEED
NEEDS ANALYSIS
PERCEIVED NEED
RESOURCES
SORTING THROUGH INDUSTRY HYPE
TIME ENOUGH TO STUDY

Integration

INTEGRATION
INTEGRATION
INTEGRATION
INTEGRATION
INTEGRATION TESTING
INTEROPERABILITY
INTEROPERABILITY
INTEROPERABILITY
IMPLEMENTING WITH CURRENT SYSTEMS
BUSINESS MODEL OF SERVICE INCLUDED IS NOT FOR US
COMPATIBILITY
INVASIVENESS
INVASIVENESS
TIME TO IMPLEMENT
UPFRONT IMPLEMENTATION COST

Reliability

RELIABILITY
RELIABILITY
RELIABILITY
RELIABILITY
RELIABILITY
RELIABILITY
DOWNTIME

Performance

PERFORMANCE
PERFORMANCE
PERFORMANCE
PERFORMANCE

Availability
AVAILABILITY
AVAILABILITY
AVAILABILITY

Other
EVALUATING
FINDING USED EQUIPMENT
FUNCTIONALITY
ISP
LACK OF SUITABLE PRODUCTS
MANAGEABILITY
REANALYZING CUSTOMER DEMANDS
RETURN ON INVESTMENT
SCALABILITY
SECURITY
SUPPORT
THE TARIFFS TO THOSE LOCATIONS
THEIR LOCATIONS
TRACK RECORD
VENDORS (PROBLEMS WHO ARE PERSNICKETY)
VENDORS INABILITY TO UNDERSTAND OUR INDIVIDUAL NEEDS

44. What is your title?
N=86
VP OF TECHNOLOGY
ADVANCED WAN ENG
ANALYST
ANALYST
ASSOC DIR
ASSOC MGR
ASST ENG
BUS ANALYST
BUSINESS OWNER
CHIEF OF DIVISION COMPUTING
CLIENT SS
COMPUTER SPEC
CONSTRUCTION MGR
CONSULTANT
CORP BUS STRATEGIST
CTO
DATA ARCHITECT
DATA COMM FIELD MGR
DIR OF ENTERPRISE SVCS
DIR OF IS
DIR OF IS
DIR OF IT
DIR OF TELECOMM

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GRP PROGRAM MGR
IS DIR
IS MGR
IT DIR
IT DIR
IT DIR
IT MANAGER
IT MANAGER
IT MANAGER
IT MANAGER
IT MANAGER
IT MANAGER
LAN ADMIN
LEAD BUS ANALYST
LEAD NETWORK ENG
MGR
MGR
MGR
MGR NETWORK OPS CTR
MGR NETWORK SVCS
MGR OF COLLABORATED NETWORKS
MGR OF SYS DEVL
NETWORK ADMIN
NETWORK ADMIN
NETWORK ADMIN
NETWORK ANALYST
NETWORK AND SYS TECH
NETWORK ARCHITECT
NETWORK ENG
NETWORK ENG
NETWORK ENG
NETWORK ENG
NETWORK ENG
NETWORK MGR
NETWORK MGR
NETWORK MGR
NETWORK MGR
NETWORK OPS MGR
NETWORK SECURITY MGR
OPS DIR
PROGRAMMER
PROJ MGR
PROJ PROGRAM SPEC
REGIONAL SYS ENG
SECURITY MGR
SECURITY NETWORK ADMIN
SR ANALYST
SR IT
SR MGR ENG
SR NETWORK ENG

SR NETWORK ENG
SR NETWORK ENG SPEC
SR PROD MGR
SR PROGRAMMER AND SR SYS ANALYST
SR PROJ MGR
SR SYS ENG
SR SYS ENG
SVP IT SYS
SVP OF IT OPS
SYS CNSLT
SYS SUPPORT
TEAM LEADER NETWORK DEVL
TECH ACQUISITION SPEC
TECH CONSULTANT
TECH COORD
TECH DIR
TECH MGR
TECH SITE SUPVR
TELECOMM ENG
TRAINER
VP

45. What are your top 3 multi-homed implementation challenges and barriers your company faces?
N=94

Integration

INTEGRATION
INTEGRATION
INTEGRATION
LEGACY EQUIPMENT

Vendor Problems

CUSTOMER SERVICE
IT SUPPORT
POINT OF CONTACT VENDOR
STABLE VENDOR
SUPPORT
VENDER REPORTING
VENDER SELECTION

Geography

GEOGRAPHIC LOAD BALANCE
LOCALIZATION
LOCATION
LOAD BALANCING
REMOTE SITES

Bandwidth Management

BANDWIDTH
BANDWIDTH LAG
BANDWIDTH MGMT
BANDWIDTH MGMT
BANDWIDTH ALLOCATION
AVOIDING OUTAGES
USING BANDWIDTH PROPERLY

Learning Curve

EXPERTISE FOR INSTALLATIONS
INVASIVENESS
MANPOWER
RESOURCES
STAFFING
TECHNOLOGY
TIME
TIME AND RESOURCES
TRAINING
BGP CONFIGURATION

Performance

PERFORMANCE
PERFORMANCE
PERFORMANCE
SPEED
SPEED OF DELIVERY FROM VENDORS
WIDE AREA APPLICATION OVER DISA NET
PEER CONNECTIVITY
GETTING THE BEST PERFORMANCE FOR END USERS
KEEPING UP WITH CUSTOMER DEMAND
PEERING
ROUTE OPTIMIZATION
THE AMOUNT OF TRAFFIC ON THE SYSTEMS
CAPACITY PLANNING

Reliability

RELIABILITY
RELIABILITY
RELIABILITY
DOWNTIME
KEEPING THE UPTIME
MAINTENANCE
MONITORING
MUST HAVE FAIL OVER
PHYSICAL CONNECTIVITY
REDUNDANCY
REDUNDANCY

REDUNDANCY
ROUTE DIVERSITY
ROUTING WITH MORE THAN TWO PROVIDERS

Security

SEC
SEC
SEC
SECURITY
SECURITY
SECURITY
SECURITY
SECURITY
SECURITY
SECURITY
DENIAL OF SERVICE PROBLEMS
INTERNET FUNCTIONALITY IN A WEB BASE SOLUTION (LIKE VPN ACCESS BUT FOR INTERNET INTERFACES USING SSL OR CLIENT LIST VPN)
VPN CONNECTIVITY

Implementation

IMPLEMENTATION
AGGREGATION
APPROVAL FOR ANOTHER CIRCUIT
AVAILABILITY
DATA
EQUIPMENT CHANGES
FINDING A PROVIDER IN RURAL AMERICA
FINDING NATIONAL VENDER
GETTING FIBER, INFRASTRUCTURE
GETTING PGP
INTERNAL PLANNING CYCLE
INTERNATIONAL SITES
IP ADDRESSING
ISP THAT DOESN'T UNDERSTAND ROUTING
MANAGEABILITY
MULTICAST CONNECTIVITY
PROVISIONING FROM CARRIERS
ROUTE INTEGRATION
TIME TO GET A CIRCUIT UP
GEOGRAPHIC LOCATION
VALIDATING NEW ROUTER OPERATING SYSTEMS
NETWORK SERVICES

Cost

BUDGET
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST
COST CONTROL
COST SAVINGS
MONEY
MONEY
MONEY
WANT VERSUS COST
EXPENSES
FUNDING
NEED IN REFERENCE TO COST
SLOW ECONOMY