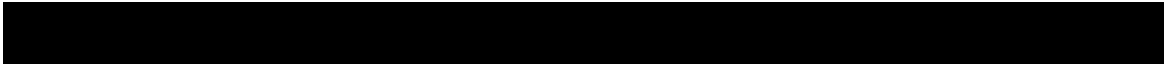


The Costs of Enterprise Downtime, North America 2004

February 2004

**INFONETICS
RESEARCH**



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I. Background

A. Introduction

Over the years, Infonetics Research has studied the costs of enterprise network downtime, focusing on the effects of LAN or WAN downtime in alternate years. The study results were consistent: the average total cost per typical large organization always ran into millions of dollars annually, with most losses invisible to the organization. In 2003 we departed from surveys and wrote case studies of 6 large organizations in different industries, showing the effects downtime had on them, in terms of both direct revenue loss and lost productivity.

For 2004, we are back to surveys, looking at 7 key sources of downtime to observe not only a more accurate total of revenue and productivity losses due to downtime, but the biggest culprits of the outages and degradations leading to downtime. We also investigate whether downtime is more commonly caused by problems with hardware, software, or people.

B. The Problems of Downtime

As networks have grown in speed and ubiquity, their complexity has grown apace. Much work is still done locally, by a user at a desktop computer, but increasingly the work and the dissemination of the work's results requires connections to other desktop computers and servers within the organization, and through WANs and the Internet to distant locales and external organizations. The productivity gains of all this connectivity are well known, as are the wails and gnashing of teeth when it is taken away.

There are 2 types of service interruption: degradation, when a service is slower than usual, perhaps to the point of being useless, and outright outages, when a service is unavailable. The second is usually more serious than the first (although both cause productivity losses), but not always: a customer accessing a Web site may forgive—once—finding the site unavailable, but become too frustrated at a slow-responding site, and leave in a huff, never to return.

The growth of network complexity has produced many more potential points of degradation and failure, from a backhoe slicing a cable in Kansas to an overly

paranoid security device clamping down on all traffic. Organizations plan IT rollouts carefully, buy network management tools, and staff up with quality IT people, but downtime still happens, and the costs can be staggering.

C. Downtime Calculations

To quantify an average, per-company total of revenue and productivity losses due to downtime, as well as the biggest culprits of the outages and degradations leading to downtime, we employ calculations that use metrics provided by our study respondents. This approach allows us to use information that companies are readily able to supply – numbers and durations of outages and service degradations, annual company revenue, etc. – and use it to estimate revenue and productivity losses, information that companies aren't as likely to have at the ready. The exhibits and discussion in this study run the downtime calculations using the averages among all 80 respondents we interviewed. The accompanying *Cost Analyzer* allows you to enter your own metrics so that you can tailor the results for your organization.

II. Methodology

A. Introduction

Downtime in this study comprises outages and service degradations. As we defined for respondents, an outage is when network resources are unavailable to users. A service degradation occurs when there is a severe decrease in performance on the network – it is available to users only on a limited basis.

The purpose of this study is to understand the causes and calculate the cost of outages and service degradations in terms of lost revenue and lost productivity at large organizations in North America. To gather the most specific and accurate information possible, we divided the questionnaire for this study into 7 sources of downtime: network products, security products, cables and connectors, servers, applications, service providers, and e-commerce. We also looked at common causes at each source: hardware problems, software problems, human error, and service provider error.

One premise of this research is that users (and our respondents) don't realize how large the effect of downtime is on their organizations, so we don't ask users directly about the effects of downtime on their networks or on users' productivity, or about loss of revenue. We designed survey questions our respondents could answer accurately: how often do they have outages and degradations due to each of the 7 causes of downtime, how long do those outages and degradations last, and how many users are affected by those outages and degradations. We then compiled the information from the completed questionnaires and calculated the average total costs of downtime for our sample.

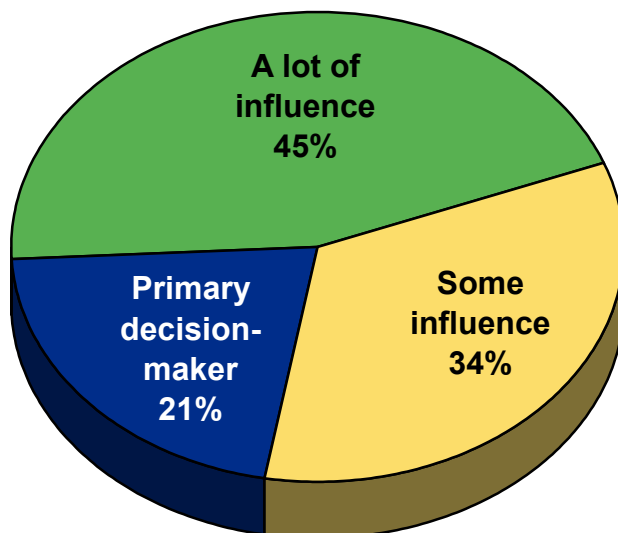
To gather the data required to calculate downtime costs, we surveyed 80 large North American companies (over 1,000 employees) through telephone interviews with IT professionals with knowledge of the downtime in their company's enterprise network. Respondents were required to have knowledge of their company's entire network, including LANs and WANs, and all respondents work at for-revenue companies (we did not interview any non-profits or government organizations).

All respondents influence the planning of and purchase decision for IT infrastructure and services at their companies – 66% are either the primary decision-maker or have a lot of influence.

Exhibit II-1

**Respondents Influence Purchase Decision
(Q3, n=80)**

Purchase Influence

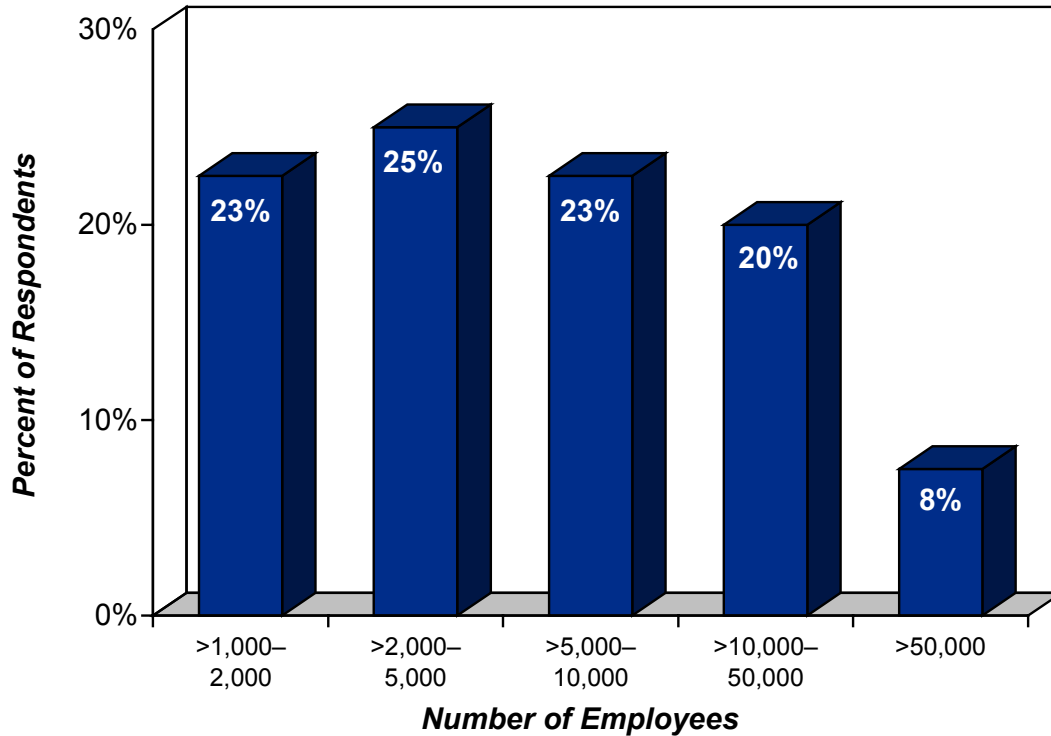


B. Demographics

The average number of employees in respondents' entire companies is 11,262, with a median (half over, half under) of 6,000. We screened for over 1,000 employees: half of the companies have between 1,001 and 6,000 employees.

Exhibit II-2

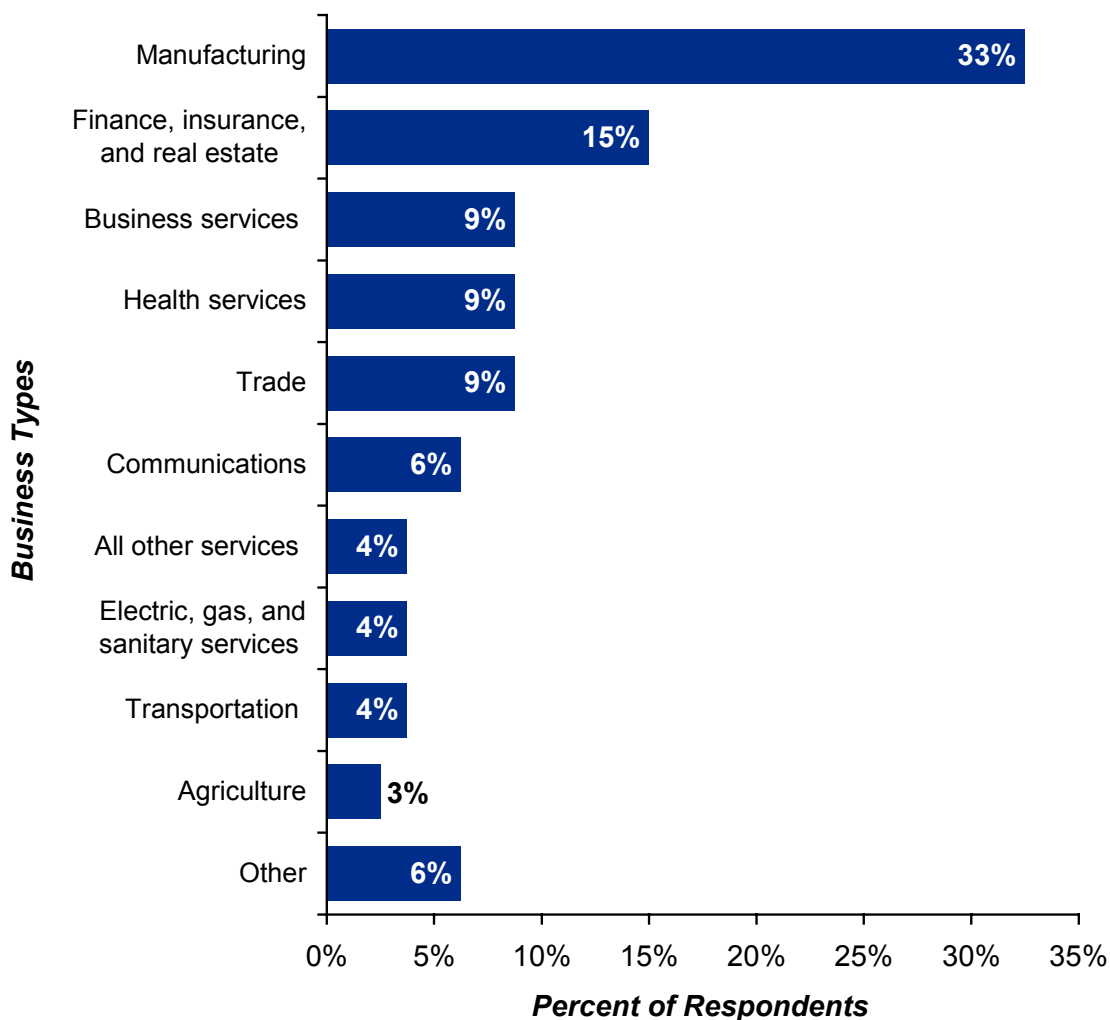
Number of Employees
(Q4, n=80)



Respondent companies represent a wide range of business types, with manufacturing the largest single component. We excluded government, education, and non-profit organizations from our sample to more accurately calculate revenue losses due to downtime.

Exhibit II-3

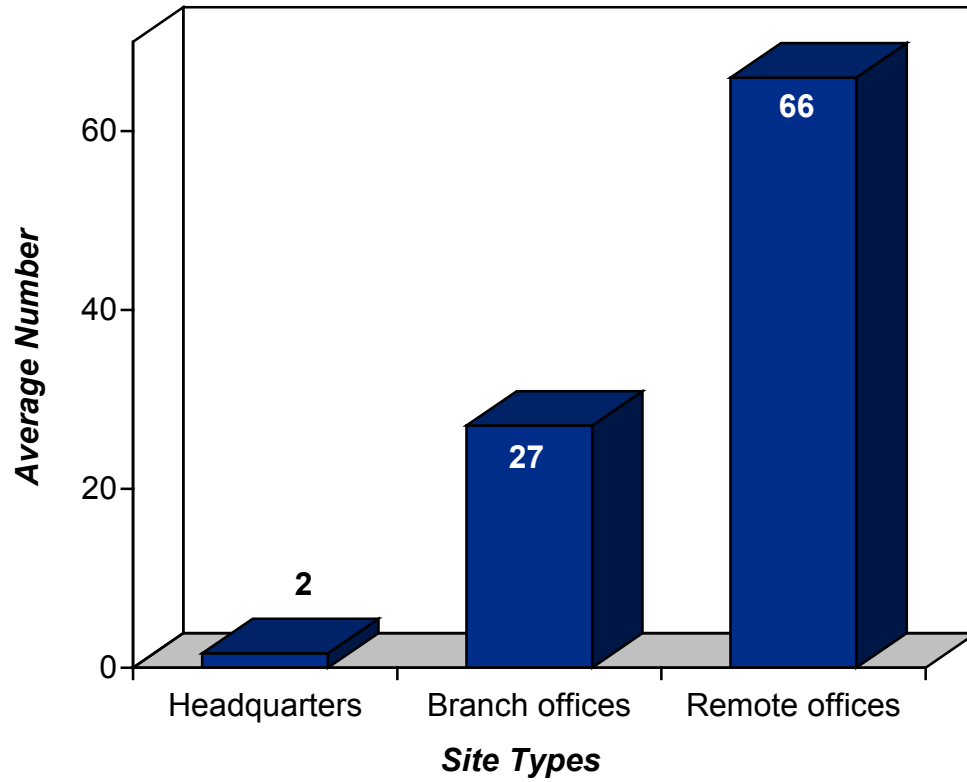
Respondent Business Types
(Q8, n=80)



Respondent companies average 95 sites, most of which are remote offices. The chart below shows average numbers for all types of sites.

Exhibit II-4

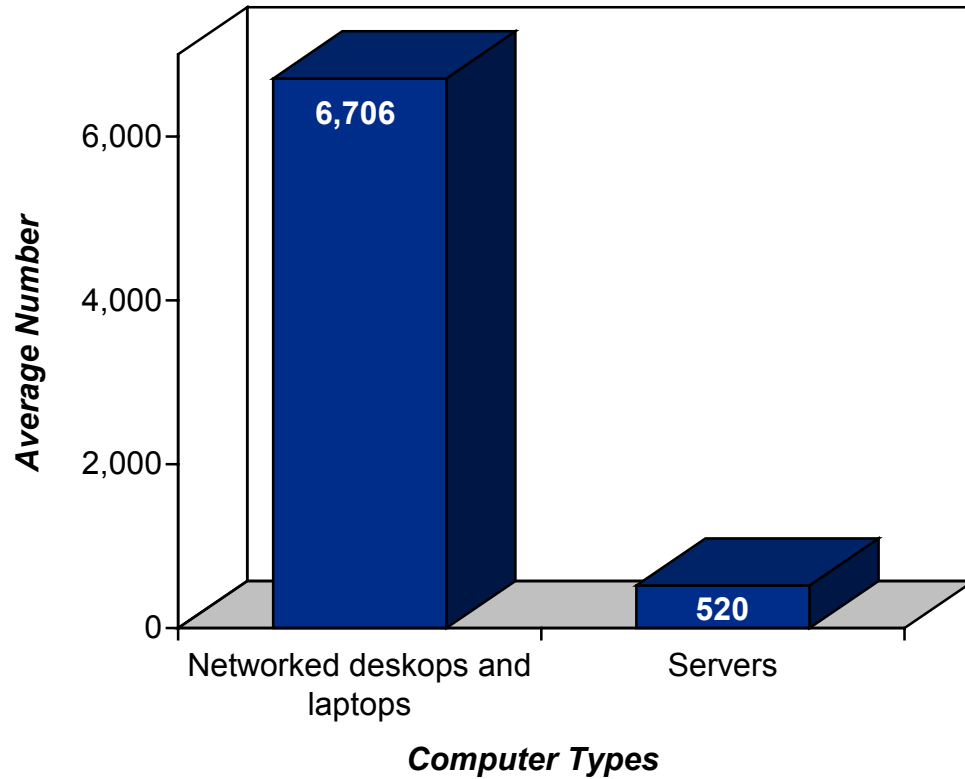
Company Sites
(Q10, n=80)



Respondents average over 6,700 desktops and laptops connected to the network, and over 500 servers.

Exhibit II-5

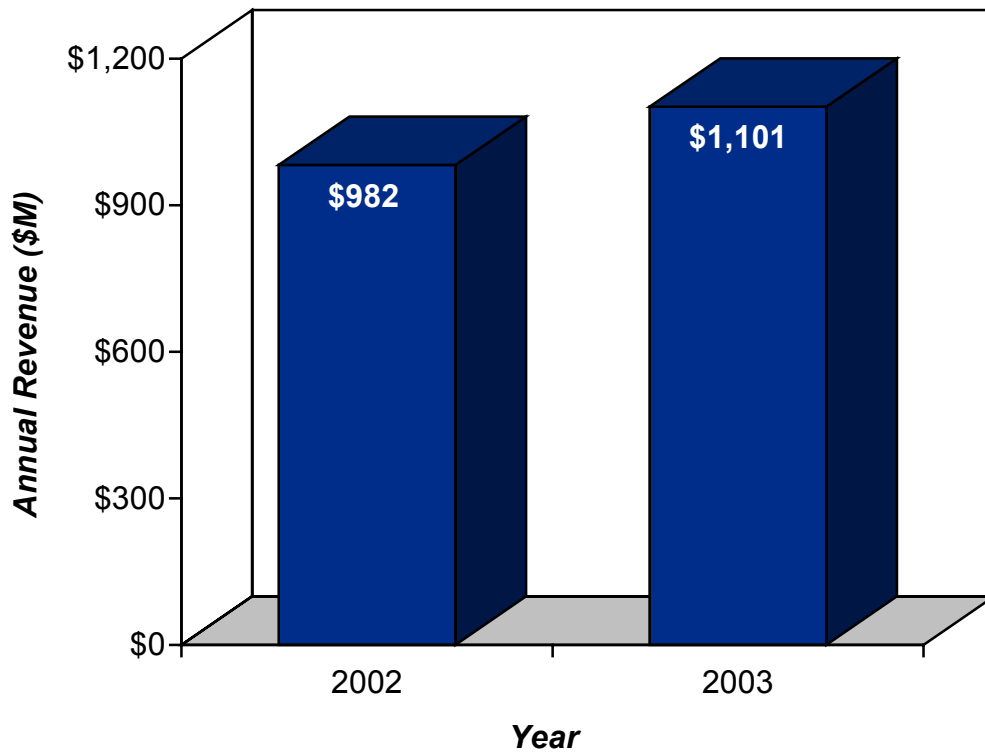
Desktops, Laptops, and Servers
(Q5, n=80)



Respondents' annual revenue averages \$982 million in 2002, growing 12% to \$1.1 billion in 2003. Some respondents couldn't or wouldn't divulge revenue information.

Exhibit II-6

Annual Revenue
(Q9, n=80)



C. Revenue Loss Calculations

As particular employees directly generate revenue, downtime impacts corporate revenue. To calculate the effects is not an exact science, but by applying some reasonable assumptions, we can derive a good estimate that can be used to justify the expense and effort involved in avoiding downtime. The purchase of products that can identify the problem once it has occurred – or even better, products that will identify a potential problem – can help companies lessen or completely avoid downtime.

In our **revenue** loss calculation, we use 5 key pieces of information:

- Total hours per year of outages and service degradations due to each of the 7 causes of downtime, as reported by our respondents
- Total number of revenue-generating employees affected by outages or service degradations (calculated from the total number of employees per company, and the percent of revenue-generating employees that are affected by outages and degradations caused by each of the 7 causes of downtime)
- Average percent of productivity lost by revenue-generating employees during outages and degradations, as reported by our respondents
- Average annual revenue generated by each revenue-generating employee (calculated from the annual revenue per company and the number of revenue-generating employees)
- Total downtime for e-commerce systems multiplied by average hourly e-commerce revenue

The **revenue** loss calculation, used for each of the 7 causes of downtime, is:

- Multiply the amount of revenue generated per revenue-generating employee per hour by the number of revenue-generating employees that are affected by outages or degradations; then multiply the result by the percent of productivity lost by revenue-generating employees during outages or degradations; this gives us the amount of revenue lost per hour of outages or degradations
- Multiply the above by the annual length (in hours) of outages or degradations to find annual revenue loss

D. Productivity Loss Calculations

When users are unable to access network resources at any modern organization, their productivity decreases, which has a distinct impact on a company's bottom line. Large companies invest tens and hundreds of millions of dollars in technologies that increase productivity.

In our **productivity** loss calculation, we use 4 key pieces of information:

- Total hours per year of outages and service degradations due to each of the 6 causes of downtime (we don't calculate productivity losses due to e-commerce downtime), as reported by our respondents
- Total number of employees affected by outages or service degradations (calculated from the number of employees at respondent companies, and the percent of employees affected by outages and degradations caused by each of the 7 causes of downtime)
- Weighted average hourly wage per employee (calculated from the national average wages of clerical, professional, and executive employees, weighted by the average proportions of employee types at sites within respondent companies, and by a loading factor that takes additional costs of employees into account)
- Average percent of productivity lost by employees during outages and service degradations, as reported by our respondents

The **productivity** loss calculation, used for each of the 6 causes of downtime, is:

- To find productivity lost by revenue-generating employees, multiply the weighted hourly wage per employee by the number of revenue-generating employees affected by outages or degradations; multiply the result by the percent of productivity lost by revenue-generating employees during outages or degradation; finally, multiply the result by number of annual hours of outages or degradations
- To find productivity lost by non-revenue-generating employees, multiply the weighted hourly wage per employee by the number of non-revenue-generating employees affected by outages or degradations; multiply the result by the percent of productivity lost by non-revenue-generating employees during outages or degradations; finally, multiply the result by number of annual hours of outages or degradations
- To find total cost of productivity loss by all employees, sum the above

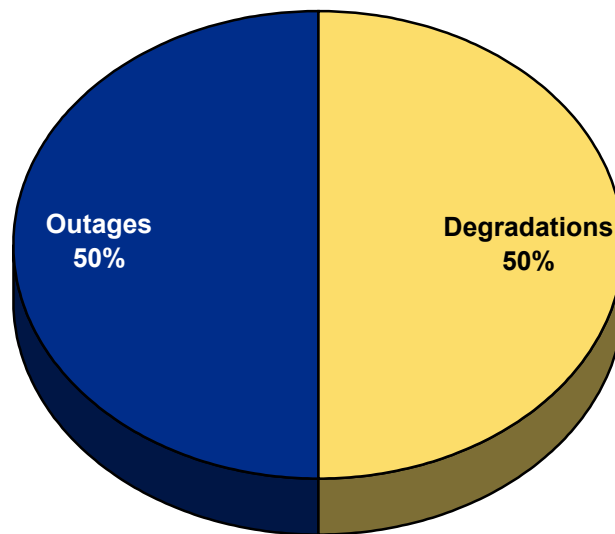
III. Downtime Costs

A. Downtime Overview

On average, companies in our study experience more than 500 hours of downtime every year, evenly split between outages and service degradations. Note that only 59% of the 80 respondents in the study engage in e-commerce, so we took their average number and length of outages and multiplied them by 59% to account for those companies that have no e-commerce outages and revenue.

It is very interesting that duration is roughly equal between outages and degradations; when it comes to cost associated with downtime, outages cost a bit more (58% of downtime costs come from outages, versus 42% from degradations).

Exhibit III-1 Annual Hours of Downtime by Outage vs Degradation

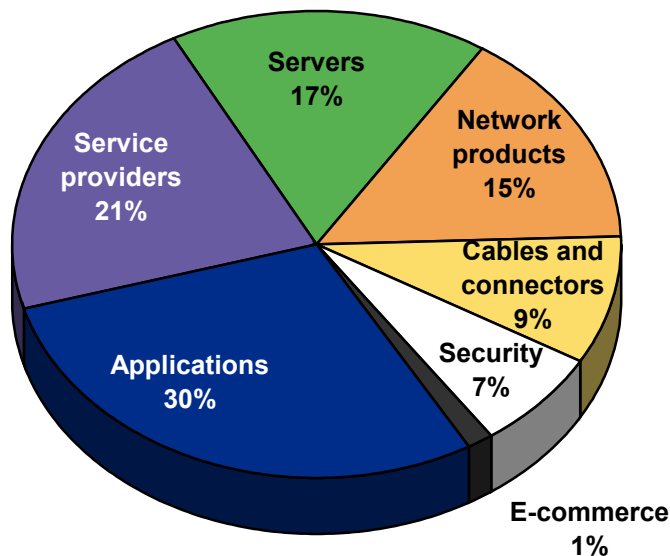


Annual hours: 501

On average, application problems are the largest source of downtime hours annually (30% of hours). This is not surprising, as applications in general tend to be much less stable than the physical infrastructure that supports them, and the effects of application downtime are broader than those of most network problems.

Service providers account for 21% of total hours (108 per year), and servers account for 17% (86 hours).

Exhibit III-2 Annual Hours of Downtime by Source



Annual hours: 501

The table below shows a detail of average annual downtime hours, breaking them down by cause and by outage versus degradation. What really pushes applications over the edge is the sheer number of application outages that respondents face annually (more than double the number of outages faced in any other area of IT infrastructure in this study).

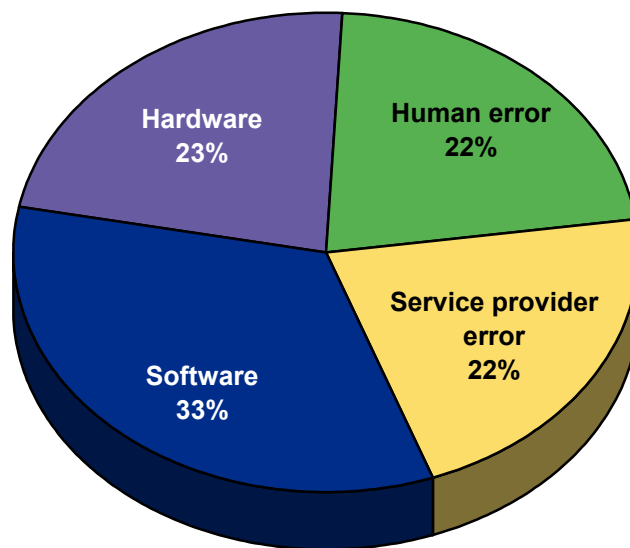
Exhibit III-3 Annual Hours of Downtime by Source, Detail

Causes	Outages	Degradations	Total Hours
Network products	29	47	76
Security products	16	19	35
Cables and connectors	17	27	44
Servers	40	46	86
Applications	97	48	145
Service providers	45	63	108
E-commerce	7	NA	7
Total	251	250	501

For each type of downtime except for service provider downtime, we asked respondents to estimate the percent of total outage and service degradation time that is caused by hardware, software, human error, and service providers. The chart below shows the results, for outages and service degradations, for all downtime causes. (Note that for service provider downtime, we didn't ask respondents to cite the cause of the downtime, and assume service providers account for 100% of downtime hours.)

It is no surprise that overall software problems are the largest source of downtime, but it is interesting to note that the other 3 primary causes are roughly equal, and not much less troublesome than software problems. This implies that there isn't a single problem area that organizations need to focus on, which would be a simpler fix. Every decision is critical, from hardware selection, to product setup and from employee training to SLAs with service providers.

Exhibit III-4 **Annual Hours of Downtime by Cause**



Annual hours: 501

The table below shows a detail of annual downtime hours, breaking them down by cause and by source of the downtime.

Human error accounts for the highest proportion of downtime hours in security products (arguably the most difficult products to install, configure, and maintain in the network).

Exhibit III-5 Annual Hours of Downtime by Cause and Source, Detail

Causes	Hardware	Software	Human error	SP error
Network products	36	23	17	NA
Security products	12	15	8	NA
Cables and connectors	30	NA	15	NA
Servers	34	34	18	NA
Applications	NA	94	51	NA
Service providers	NA	NA	NA	108
E-commerce	2	2	1	1
Total	114	168	110	109

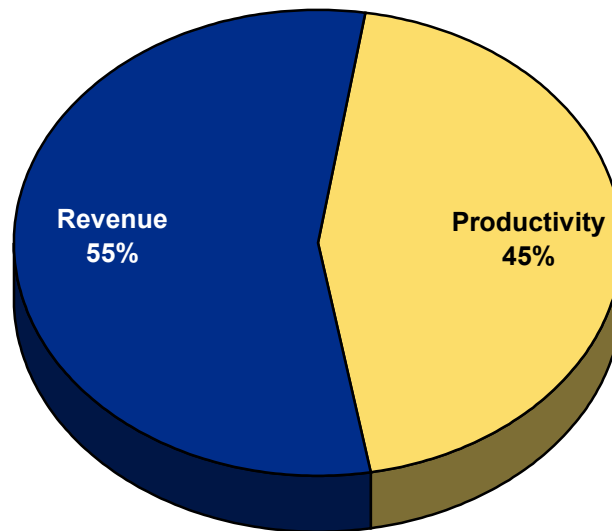
B. Downtime Costs

Total downtime hours are only part of the story when it comes to analyzing downtime cost; some types of downtime affect more employees than others. In this section we look at the productivity and revenue costs associated with outages and service degradations in a variety of ways. Refer to Chapter II, Sections C and D for a detailed explanation of our downtime cost calculations.

1. Productivity vs Revenue

The chart below shows the annual cost of downtime due to lost revenue and lost productivity. Respondent companies average \$18.2 million in annual productivity loss, and \$22.5 million in annual revenue loss. Overall downtime costs average 3.6% of revenue, a significant number, and one likely to surprise many large organizations.

Exhibit III-6 **Annual Cost of Downtime by Productivity vs Revenue**



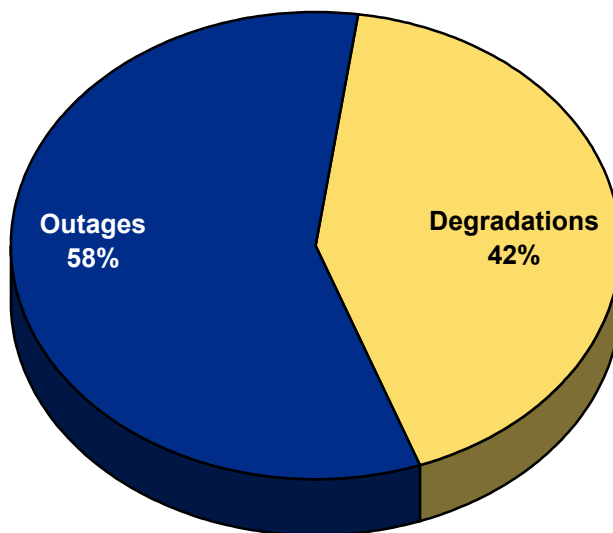
Annual total: \$40.7M

Networked applications are the life-blood of many large organizations. Note that, on average, respondents report that revenue-generating employees lose 41% of overall productivity during an outage, and 26% during a service degradation, while non-revenue-generating employees lose 34% of their productivity during an outage and 22% during a service degradation.

2. Outage vs Degradation

Downtime costs due to outages are higher than those due to degradations. The difference is mainly due to application outages (as discussed in the next section), and the productivity figures mentioned above.

Exhibit III-7 Annual Cost of Downtime by Outage vs Degradation



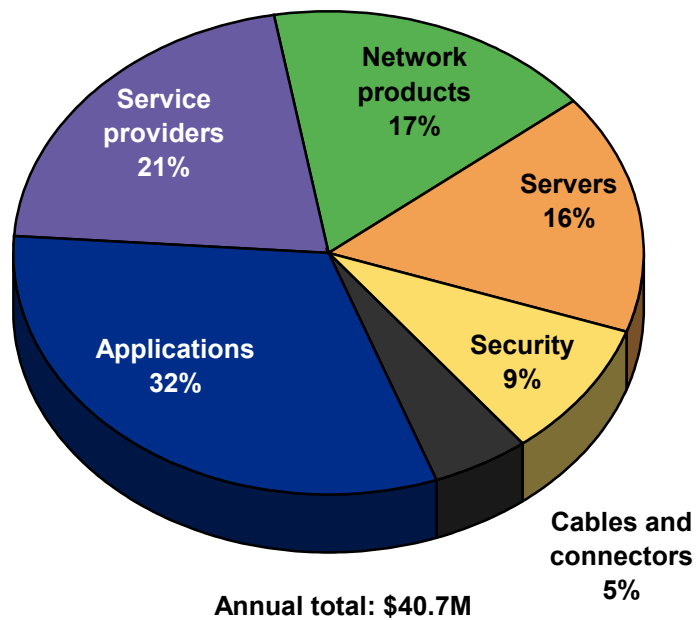
Annual total: \$40.7M

3. Downtime Costs by Source

Looking at downtime costs by the source of the problem paints an interesting picture. Applications account for the biggest slice – 32%, or \$12.9 million annually, and the bulk of that cost (\$9.6 million) comes from outages. Focusing on the source of application outages could save many large organizations a significant amount of money. Costs associated with other sources (besides applications) are more or less evenly divided between outages and degradations, implying that both problems need to be tackled with the same gusto.

Exhibit III-8

Annual Cost of Downtime by Source



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The following table details lost revenue, lost productivity, and total downtime cost relative to the source of the problem.

Exhibit III-9 Annual Cost of Downtime by Source, Detail

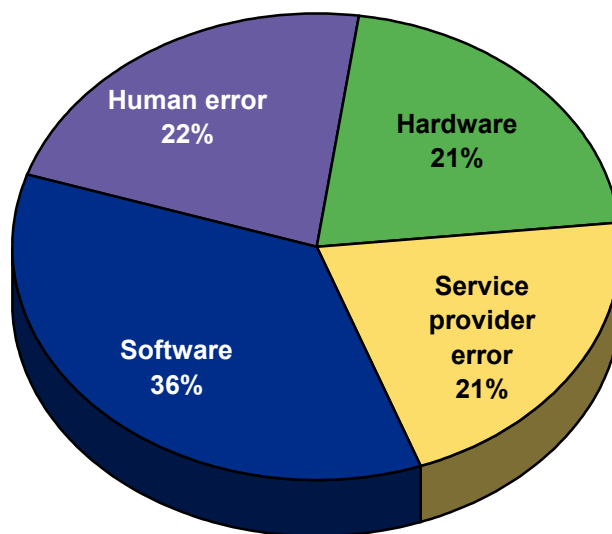
		Outages (\$M)	Degradations (\$M)	Total Cost (\$M)
Network products	Revenue	\$1.8	\$2.1	\$3.9
	Productivity	\$1.4	\$1.6	\$3.0
	Total	\$3.2	\$3.7	\$6.9
Security products	Revenue	\$1.1	\$1.0	\$2.1
	Productivity	\$0.9	\$0.7	\$1.6
	Total	\$2.0	\$1.7	\$3.7
Cables and connectors	Revenue	\$0.5	\$0.7	\$1.2
	Productivity	\$0.4	\$0.5	\$0.9
	Total	\$0.9	\$1.2	\$2.1
Servers	Revenue	\$2.0	\$1.6	\$3.6
	Productivity	\$1.7	\$1.3	\$3.0
	Total	\$3.7	\$2.9	\$6.6
Applications	Revenue	\$5.4	\$1.8	\$7.2
	Productivity	\$4.2	\$1.5	\$5.7
	Total	\$9.6	\$3.3	\$12.9
Service providers	Revenue	\$2.1	\$2.5	\$4.6
	Productivity	\$1.9	\$2.0	\$3.9
	Total	\$4.0	\$4.5	\$8.5
E-commerce	Revenue	\$0.0	NA	\$0.0
	Productivity	NA	NA	NA
	Total	\$0.0	NA	\$0.0
Total	Revenue	\$12.9	\$9.7	\$22.6
	Productivity	\$10.5	\$7.6	\$18.1
	Total	\$23.4	\$17.3	\$40.7

4. Downtime Costs by Cause

Looking at downtime costs by cause of the problem (regardless of the source) shows roughly the same distribution as total hours of downtime by cause. Software problems account for the biggest portion of overall costs, largely because application downtime accounts for the highest annual cost, and most application downtime is caused by software problems (as opposed to human error).

Exhibit III-10

Annual Cost of Downtime by Cause



Annual total: \$40.7M

The table below show the details for total downtime costs relative to the cause of the problem.

Exhibit III-11

Annual Cost of Downtime by Cause: Revenue and Productivity

Causes	Outages (\$M)	Degradations (\$M)	Total Cost (\$M)
Hardware	\$4.7	\$4.0	\$8.7
Software	\$9.5	\$5.0	\$14.5
Human error	\$5.3	\$3.6	\$8.9
Service provider error	\$4.1	\$4.5	\$8.6
Total	\$23.6	\$17.1	\$40.7

IV. Conclusions

A. Network Products

Downtime costs associated with network hardware are significant, but not the most troubling area. Network products account for 15% of downtime hours and 17% of downtime cost. Significantly more of the downtime hours associated with network hardware come from service degradations, but since employee productivity is less hampered by degradations than outages, downtime costs associated with network products are roughly evenly split between outages and degradations. Seventy-six percent of outage hours associated with network products are caused by hardware or software problems as opposed to human error.

B. Security Products

Security products are not a serious source of downtime (it is important to remember that we are not factoring in costs associated with security breaches or attacks). Only 7% of downtime hours and 9% of downtime costs can be traced back to security products. Both hours and costs associated with security product downtime are evenly split between outages and degradations. Only 17% of outage hours associated with security products are a result of human error; hardware or software failure are significantly more common.

C. Cables and Connectors

Cables and connectors are only a minor irritation when it comes to downtime. They only account for 7% of downtime hours and 5% of costs, most of which is due to largely unavoidable accidents.

D. Servers

Servers are very similar to network products in their impact on downtime overall, accounting for 17% of downtime hours and 16% of cost. Downtime hours are fairly evenly split between outages and degradations, but costs are weighted toward outages (\$3.7 million annually) compared to degradations (\$2.9 million).

Again, human error is not a major factor in server downtime, accounting for only 17% of server outage time.

E. Applications

Application downtime is the largest single contributor to downtime hours (30%) and cost (32%), and application outages alone account for \$9.6 million in annual downtime cost (compared to only \$3.3 million for application service degradations). Application outage cost is more than double the cost of any other downtime source.

Human error plays a much larger part in application downtime than in any other area; human error is responsible for 35% of outage time and 39% of service degradation time (in most other areas human error accounts for less than 20% of downtime).

F. Service Providers

Service provider problems are the source of 21% of downtime hours and cost. Cost associated with outages and service degradations associated with service providers are roughly equal.

G. E-Commerce

E-commerce is not a major factor in downtime costs overall, as many large companies don't offer e-commerce, and those who do have a good handle on how to keep their commerce sites up and running. E-commerce accounts for less than 1% of downtime hours and almost no cost (less than 0.1% of total downtime cost).

Appendix: Questionnaire

SCREENING

- 1a. To which of the following levels do you have knowledge of the operations of your network, including LANs and WANs? (*Read list. Check response.*)
- ____ 1. Entire network
 - ____ 2. Headquarters and some branch or remote offices (**Terminate, request referral:** _____)
 - ____ 3. Branch offices only (**Terminate, request referral:** _____)
 - ____ 4. Remote offices only (**Terminate, request referral:** _____)
- 1b. Is your company non-profit, an educational institution, or government? (*Check response.*)
- ____ 1. Yes (**Terminate**)
 - ____ 2. No
2. Do you have knowledge of your organization's IT downtime, including network products, security products, cables and connectors, servers, applications, WAN service providers, and e-commerce? (*Check response.*)
- ____ 1. Yes
 - ____ 2. No (**Terminate, request referral:** _____)
3. How would you describe your **level of influence** in planning and making purchase decisions for IT infrastructure and services? (*Read list. Check one.*)
- ____ 1. Primary decision-maker
 - ____ 2. A lot of influence
 - ____ 3. Some influence
 - ____ 4. None at all (**Terminate, request referral:** _____)

DEMOGRAPHICS

4. Approximately how many employees are in your organization – not just at your site? (*Fill in number.*)
- Number of employees: _____
- ____ 1. 1,000 or fewer (**Terminate**)
 - ____ 2. Over 1,000
5. How many desktop and laptop computers are connected to your company's network now? How many servers? (*Fill in numbers.*)
-
- 1. Networked desktops and laptops _____
 - 2. Servers _____
6. What percent of employees at your organization use networked desktop and laptop computers? (*Fill in percentage.*)
-
- Percent of employees using networked computers _____ %

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7. What percent of networked employees at your organization directly generate revenue for your company with activities such as order entry, order fulfillment, and sales (not including activities such as product development)? This includes professionals billed on an hourly or project basis. *(Fill in percentage.)*

Percent of networked employees who directly generate revenue _____ %

8. What is your organization's line of business? *(Fill in response.)*

9. Approximately what was your organization's annual revenue in calendar year 2002? What do you expect for calendar year 2003? *(Fill in amounts. State relevant currency.)*

	2002	2003
Approximate revenue:	\$ _____	\$ _____

Headquarters are main sites with IT staff. **Branch offices** are regional offices with multiple departments and IT staff. **Remote offices** are small local offices with no on-site IT staff.

10. How many of each of the following types of sites does your organization have now? *(Read list. Fill in numbers.)*

SITE TYPES

- | | |
|-------------------|-------|
| 1. Headquarters | _____ |
| 2. Branch offices | _____ |
| 3. Remote offices | _____ |

11. Please estimate the average percent of productivity lost by your revenue-generating and non-revenue-generating networked employees when they are not able to access data or applications on the network due to an outage. Please estimate the average percent of productivity lost during a service degradation. *(Fill in percentages.)*

- | | |
|---|---------|
| 1. Productivity lost by revenue-generating networked employees during outage | _____ % |
| 2. Productivity lost by non-revenue-generating networked employees during outage | _____ % |
| 3. Productivity lost by revenue-generating networked employees during degradation | _____ % |
| 4. Productivity lost by non-revenue-generating networked employees during degradation | _____ % |

DOWNTIME: NETWORK PRODUCTS

Network products include LAN switches and hubs, routers, NICs, load balancers, QoS devices, etc. **Network product downtime** occurs when any of these products are responsible for network outages or service degradations, regardless of whether they failed due to hardware problems, software problems, or human error. In this section, we only refer to downtime caused by network products that your organization manages; downtime for products operated by service providers will be discussed later.

12. Please estimate the number of non-scheduled **outages** that occur per month at your organization due to network products. *(Fill in number.)*

Number of outages per month _____

13. On average, how long (in hours) does each network product **outage** last? *(Fill in number.)*

Average duration of each outage _____

14. Approximately what percent of total network product **outage** time is caused by each of the following categories? *(Fill in percentages.)*

1. Hardware _____ %
2. Software _____ %
3. Human error _____ %

Total: 100%

15. Approximately what percent of revenue-generating networked employees are affected by each network product **outage**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

1. Revenue-generating _____ %
2. Non-revenue-generating _____ %

16. Please estimate the number of non-scheduled **service degradations** that occur per month at your organization due to network products. *(Fill in number.)*

Number of service degradations per month _____

17. On average, how long (in hours) does each network product **service degradation** last? *(Fill in number.)*

Average duration of each service degradation _____

18. Approximately what percent of total network product **service degradation** time is caused by each of the following categories? *(Fill in percentages.)*

<hr/>	
1. Hardware	_____ %
2. Software	_____ %
3. Human error	_____ %
Total:	100%

19. Approximately what percent of revenue-generating networked employees are affected by network product **service degradations**? non-revenue-generating networked employees? *(Fill in percentages.)*

<u>PERCENT OF NETWORKED EMPLOYEES AFFECTED</u>	
<hr/>	
1. Revenue-generating	_____ %
2. Non-revenue-generating	_____ %

DOWNTIME: SECURITY

Security products include firewalls, VPN devices, IDS systems, etc. **Security downtime** occurs when any of these products is responsible for network outages or service degradations, regardless of whether they failed due to hardware problems, software problems, or human error. Security downtime does not include losses due to security breaches. In this section, we only refer to downtime caused by security products that your organization manages; downtime for products operated by service providers will be discussed later.

20. Please estimate the number of non-scheduled **outages** that occur per month at your organization due to security products. *(Fill in number.)*

Number of outages per month

21. On average, how long (in hours) does each security product **outage** last? *(Fill in number.)*

Average duration of each outage

22. Approximately what percent of total security product **outage** time is caused by each of the following categories? *(Fill in percentages.)*

<hr/>	
1. Hardware	_____ %
2. Software	_____ %
3. Human error	_____ %
Total:	100%

23. Approximately what percent of revenue-generating networked employees are affected by each security product **outage**? non-revenue-generating networked employees? *(Fill in percentages.)*

<u>PERCENT OF NETWORKED EMPLOYEES AFFECTED</u>	
<hr/>	
1. Revenue-generating	_____ %
2. Non-revenue-generating	_____ %

24. Please estimate the number of non-scheduled **service degradations** that occur per month at your organization due to security products. *(Fill in number.)*

Number of service degradations per month _____

25. On average, how long (in hours) does each security product **service degradation** last? *(Fill in number.)*

Average duration of each service degradation _____

26. Approximately what percent of total security product **service degradation** time is caused by each of the following categories? *(Fill in percentages.)*

1. Hardware	_____	%
2. Software	_____	%
3. Human error	_____	%
Total:	100%	

27. Approximately what percent of revenue-generating networked employees are affected by security product **service degradations**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

1. Revenue-generating	_____	%
2. Non-revenue-generating	_____	%

DOWNTIME: CABLES AND CONNECTORS

Cables and connectors include copper and optical cabling, connectors, patch panels, etc. **Cable and connector downtime** occurs when any of these products are responsible for network outages or service degradations, regardless of cause. In this section, we only refer to downtime caused by cabling or connectors that your organization manages; downtime for cables and connectors operated by service providers will be discussed later.

28. Please estimate the number of non-scheduled **outages** that occur per month at your organization due to cables and connectors. *(Fill in number.)*

Number of outages per month _____

29. On average, how long (in hours) does each cable and connector **outage** last? *(Fill in number.)*

Average duration of each outage _____

30. Approximately what percent of total cable and connector **outage** time is caused by hardware? by human error? *(Fill in percentages.)*

1. Hardware	_____	%
2. Human error	_____	%
Total:		100%

31. Approximately what percent of revenue-generating networked employees are affected by each cable and connector **outage**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

1. Revenue-generating	_____	%
2. Non-revenue-generating	_____	%

32. Please estimate the number of non-scheduled **service degradations** that occur per month at your organization due to cables and connectors. *(Fill in number.)*

Number of service degradations per month _____

33. On average, how long (in hours) does each cable and connector **service degradation** last? *(Fill in number.)*

Average duration of each service degradation _____

34. Approximately what percent of total cable and connector **service degradation** time is caused by hardware? by human error? *(Fill in percentages.)*

1. Hardware	_____	%
2. Human error	_____	%
Total:		100%

35. Approximately what percent of revenue-generating networked employees are affected by cable and connector **service degradations**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

1. Revenue-generating	_____	%
2. Non-revenue-generating	_____	%

DOWNTIME: SERVERS

Server downtime occurs when any server is responsible for a network outage or service degradation, regardless of whether it failed due to hardware problems, software problems, or human error. In this section, we only refer to downtime caused by servers that your organization manages; downtime for servers operated by service providers will be discussed later.

36. Please estimate the number of non-scheduled **outages** that occur per month at your organization due to server failure. *(Fill in number.)*

Number of outages per month _____

37. On average, how long (in hours) does each server **outage** last? *(Fill in number.)*

Average duration of each outage _____

38. Approximately what percent of total server **outage** time is caused by each of the following categories? *(Fill in percentages.)*

1. Hardware _____ %

2. Software _____ %

3. Human error _____ %

Total: 100%

39. Approximately what percent of revenue-generating networked employees are affected by each server **outage**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

1. Revenue-generating _____ %

2. Non-revenue-generating _____ %

40. Please estimate the number of non-scheduled **service degradations** that occur per month at your organization due to server failure. *(Fill in number.)*

Number of service degradations per month _____

41. On average, how long (in hours) does each server **service degradation** last? *(Fill in number.)*

Average duration of each service degradation _____

42. Approximately what percent of total server **service degradation** time is caused by each of the following categories? *(Fill in percentages.)*

1. Hardware _____ %

2. Software _____ %

3. Human error _____ %

Total: 100%

43. Approximately what percent of revenue-generating networked employees are affected by server **service degradations**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

- | | |
|---------------------------|---------|
| 1. Revenue-generating | _____ % |
| 2. Non-revenue-generating | _____ % |

DOWNTIME: APPLICATIONS

Application downtime occurs when any network application experiences a network outage or service degradation, regardless of cause. In this section, we only refer to downtime caused by applications that your organization manages; downtime for applications operated by service providers will be discussed later.

44. Please estimate the number of non-scheduled **outages** that occur per month at your organization due to applications. *(Fill in number.)*

Number of outages per month _____

45. On average, how long (in hours) does each application **outage** last? *(Fill in number.)*

Average duration of each outage _____

46. Approximately what percent of total application **outage** time is caused by software? by human error? *(Fill in percentages.)*

- | | |
|----------------|---------|
| 1. Software | _____ % |
| 2. Human error | _____ % |

Total: 100%

47. Approximately what percent of revenue-generating networked employees are affected by each application **outage**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

- | | |
|---------------------------|---------|
| 1. Revenue-generating | _____ % |
| 2. Non-revenue-generating | _____ % |

48. Please estimate the number of non-scheduled **service degradations** that occur per month at your organization due to applications. *(Fill in number.)*

Number of service degradations per month _____

49. On average, how long (in hours) does each application **service degradation** last? *(Fill in number.)*

Average duration of each service degradation _____

50. Approximately what percent of total application **service degradation** time is caused by software? by human error? *(Fill in percentages.)*

<hr/>	
1. Software	_____ %
2. Human error	_____ %
Total:	100%

51. Approximately what percent of revenue-generating networked employees are affected by application **service degradations**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED	
<hr/>	
1. Revenue-generating	_____ %
2. Non-revenue-generating	_____ %

DOWNTIME: SERVICE PROVIDERS

Service provider downtime occurs when a network, server, or application managed by a service provider experiences an outage or service degradation for any reason (e.g., WAN service interruption due to cable cuts or managed router failure, problems with service provider managed security components, problems with hosted servers or applications).

52. Please estimate the number of non-scheduled **outages** that occur per month at your organization due to a service provider. *(Fill in number.)*

 Number of outages per month

53. On average, how long (in hours) does each service provider **outage** last? *(Fill in number.)*

 Average duration of each outage

54. Approximately what percent of revenue-generating networked employees are affected by each service provider **outage**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED	
<hr/>	
1. Revenue-generating	_____ %
2. Non-revenue-generating	_____ %

55. Please estimate the number of non-scheduled **service degradations** that occur per month at your organization due to a service provider. *(Fill in number.)*

 Number of service degradations per month

56. On average, how long (in hours) does each service provider **service degradation** last? *(Fill in number.)*

 Average duration of each service degradation

57. Approximately what percent of revenue-generating networked employees are affected by service provider **service degradations**? non-revenue-generating networked employees? *(Fill in percentages.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

- | | |
|---------------------------|---------|
| 1. Revenue-generating | _____ % |
| 2. Non-revenue-generating | _____ % |

E-COMMERCE DOWNTIME

58. Does your organization engage in commerce via the Internet? *(Check response.)*

- ____ 1. Yes
 ____ 2. No
 ____ 98. Don't know

If respondent says "no" or "don't know," end interview.

59. Please estimate the number of non-scheduled e-commerce **outages** that occur per month at your organization. *(Fill in number.)*

Number of outages per month _____

60. On average, how long (in hours) does each e-commerce **outage** last? *(Fill in number.)*

Average duration of each outage _____

61. Approximately what percent of total e-commerce **outage** time is caused by each of the following categories? *(Fill in percentages.)*

- | | |
|---------------------------|---------|
| 1. Hardware | _____ % |
| 2. Software | _____ % |
| 3. Human error | _____ % |
| 4. Service provider error | _____ % |

Total: 100%

62. Per hour, what are your organization's approximate e-commerce sales? *(Fill in amount. State relevant currency.)*

Approximate hourly e-commerce sales: \$ _____

About Infonetics Research

Infonetics Research (www.infonetics.com) is an international market research and consulting firm covering the data networking and telecommunications industries in North America, Europe, and Asia. We help companies develop, market, and sell smarter by providing objective analysis of **end-users, service providers, and product manufacturers** through in-depth research studies, quarterly market share and forecast services, and consulting and custom research services.

We've been a leader in the industry since 1990, and the first to peg many new markets, including VPNs, remote access, and ISP networks. We are informed from all sides of the market, and are recognized experts on emerging technologies and markets. We have proven market research methodology and statistical expertise and unrivaled forecast accuracy. Our coverage of buying patterns and user trends is the most in-depth in the industry, and we have a long history of delivering on time, all the time.

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