

The Costs of Downtime: North American Medium Businesses 2006

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I. Background

A. Introduction

Over the years, Infonetics Research has studied the costs of enterprise network downtime for large organizations (>1,000 employees). 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. This year we surveyed medium organizations (101 to 1,000 employees), looking at 7 key sources of downtime to observe an accurate total of revenue and productivity losses due to downtime, and 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 an e-commerce 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 respondents. The accompanying *Cost Analyzer* allows you to enter your own metrics so that you can tailor the results for your customer's 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 medium 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.

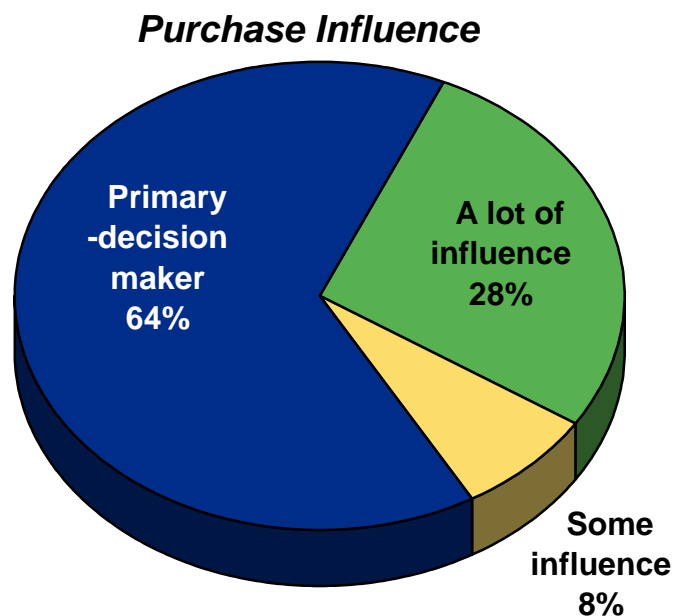
To gather the data required to calculate downtime costs, we surveyed 80 medium North American companies (101 to 1,000 employees) from a variety of vertical markets.

We conducted telephone interviews with high-level IT professionals at each organization. Respondents are required to have knowledge of their company's entire network, including LANs and WANs, and must have detailed knowledge of downtime for their network and systems. 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—92% are either the primary decision-maker or have a lot of influence.

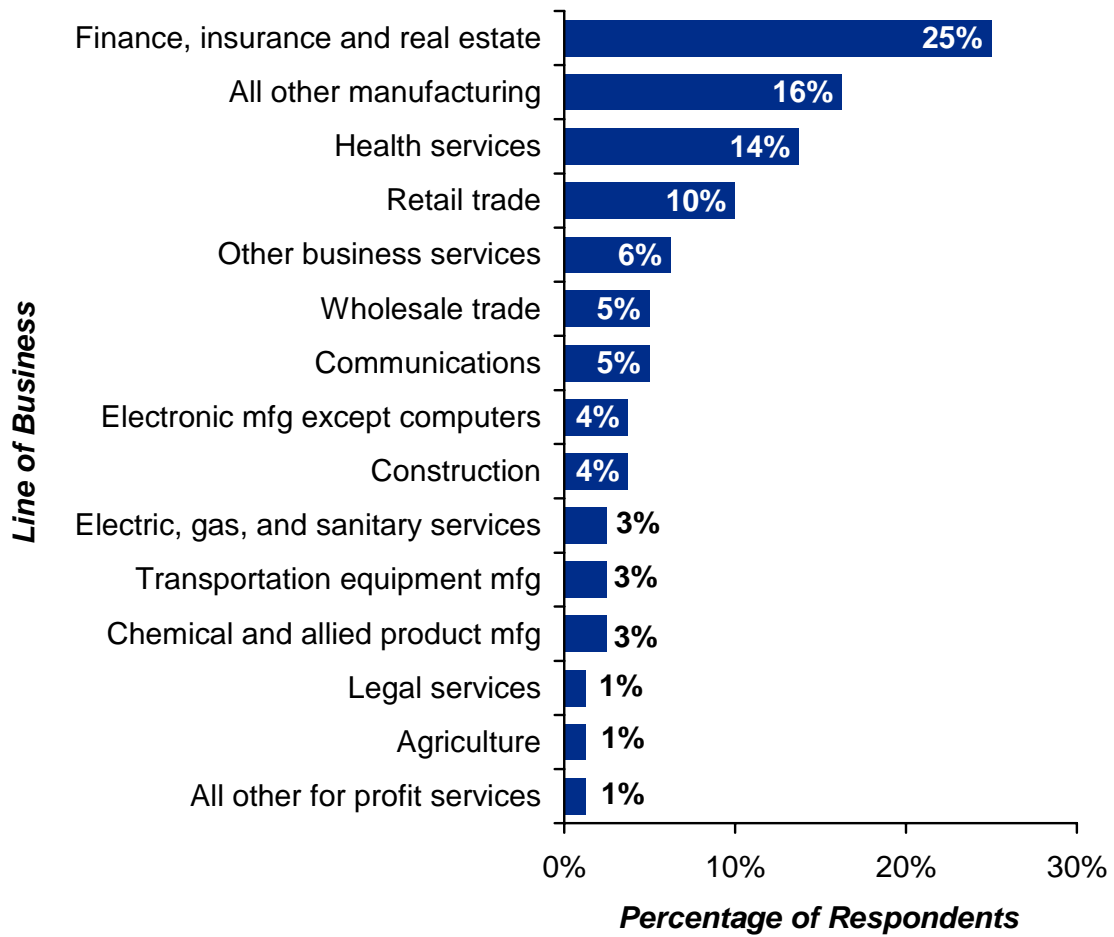
Exhibit II-1

Respondents Influence Purchase Decision
(Q3, n=80)



Respondents come from a wide variety of vertical markets. We did not screen for any verticals in particular, and the chart below shows the types of organizations we interviewed.

Exhibit II-2 **Respondent Organization Types**
(Q5, n=80)



B. 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

C. 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

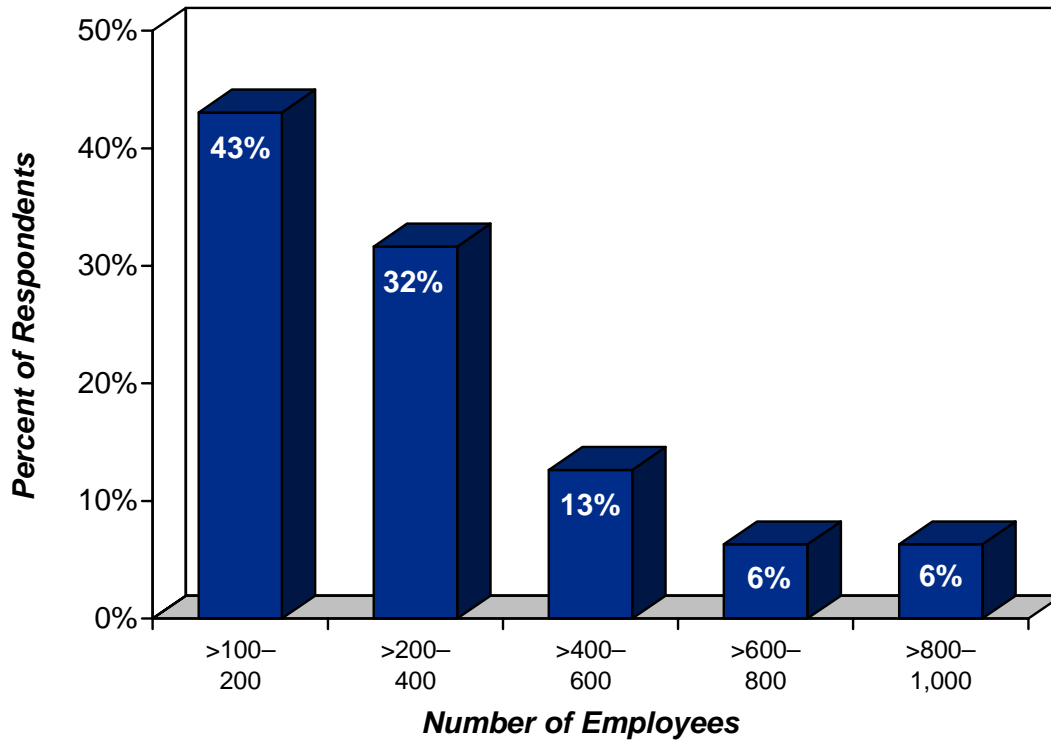
III. Downtime Costs

A. Demographics

The average number of employees in respondents' entire companies is 305. The chart below breaks the number of employees into 5 categories.

Exhibit III-1

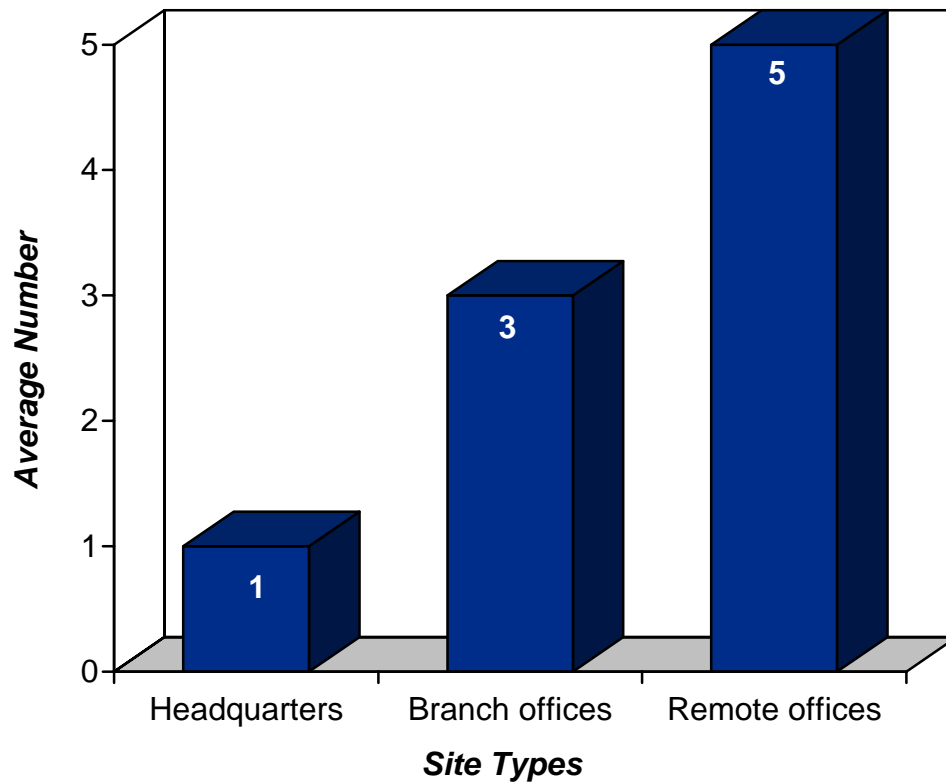
Number of Employees
(Q4, n=80)



Respondent companies average 9 sites, most of which are branch and remote offices.

Exhibit III-2

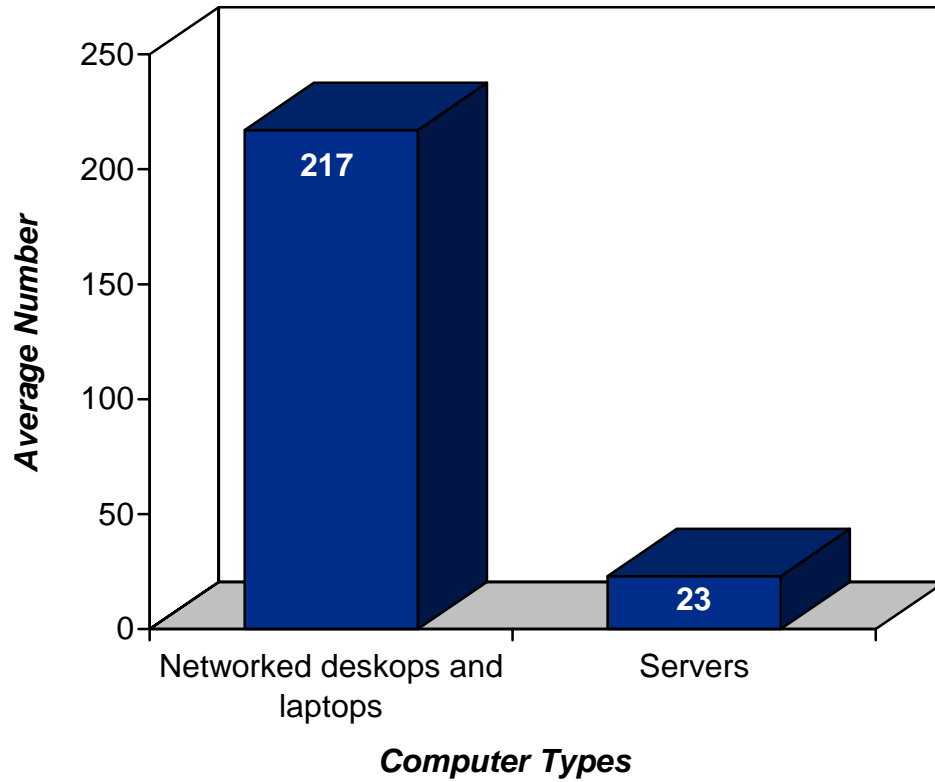
Company Sites
(Q10, n=80)



Respondents average 217 desktops and laptops connected to the network, and 23 servers.

Exhibit III-3

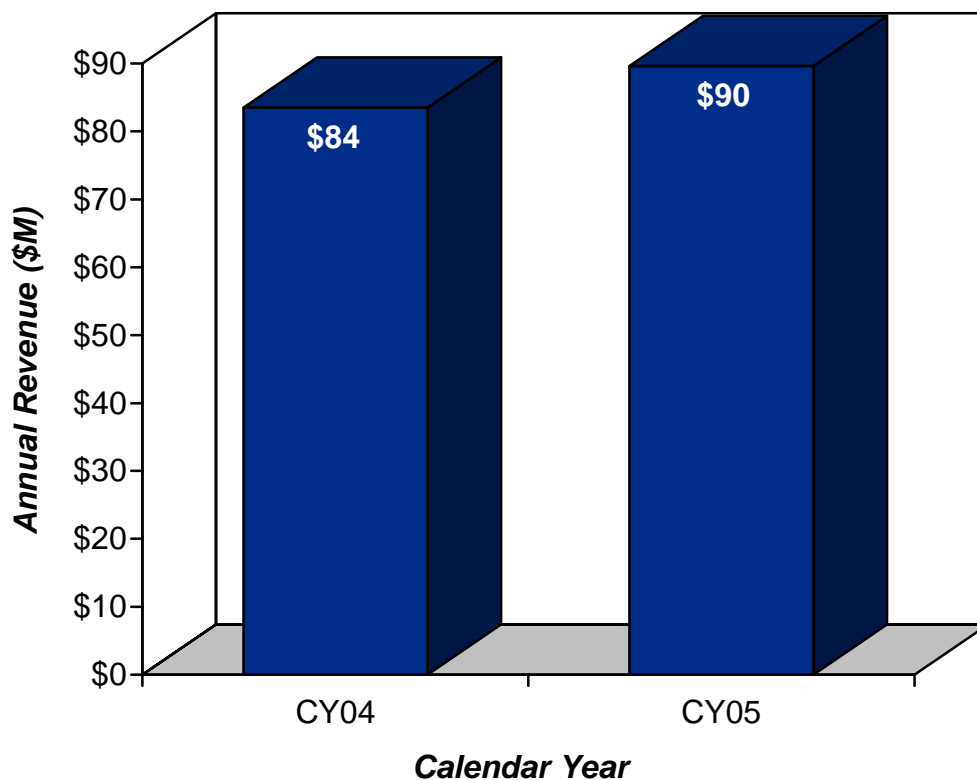
Desktops, Laptops, and Servers
(Q6, n=80)



Respondents' annual revenue averages \$84 million in 2004, growing 7% to \$90 million in 2005. Some respondents couldn't or wouldn't divulge revenue information.

Exhibit III-4

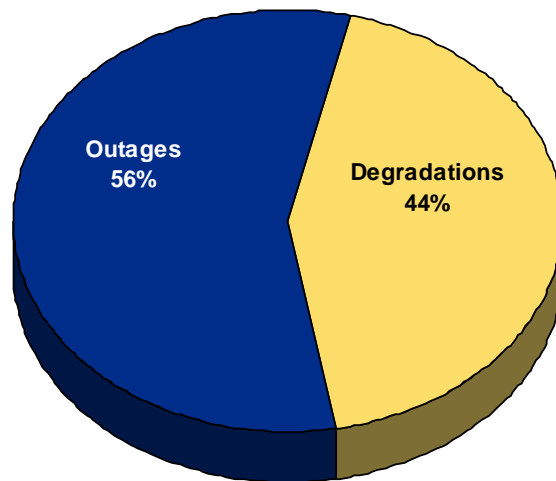
Annual Revenue
(Q9, n=80)



B. Downtime Overview

On average, companies in our study experience nearly 140 hours of downtime every year, weighted towards outages (56% of hours). Medium businesses may have a hard time closely tracking service degradation as many of them don't have the proper network management tools to observe and quantify service degradations.

Exhibit III-5 **Annual Hours of Downtime by Outage vs Degradation**

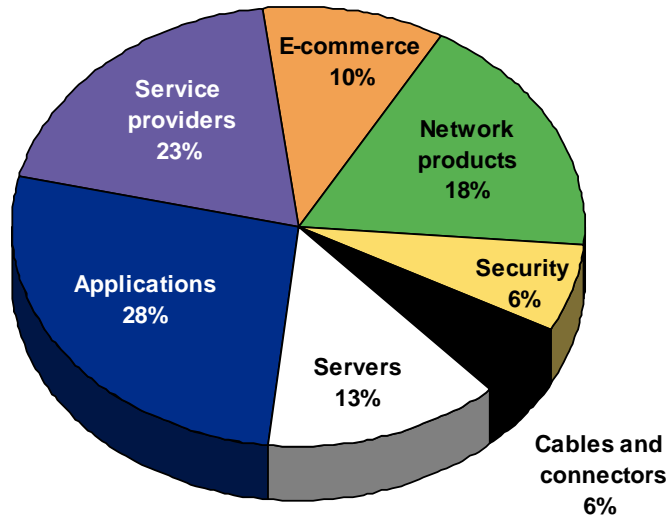


Annual hours: 140

On average, application problems are the largest source of downtime hours annually (28% of hours, compared to 30% among large businesses from our 2004 study). 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, especially in the highly distributed branch networks seen in many financial companies.

Service providers account for 23% of total hours. Medium organizations typically cannot afford to invest in high levels of redundancy in their WAN infrastructure, so service provider downtime is relatively high (as a percent of total downtime).

Exhibit III-6 Annual Hours of Downtime by Source



Annual hours: 140

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 (two to three times the number of outages faced in most other areas of IT infrastructure at medium organizations).

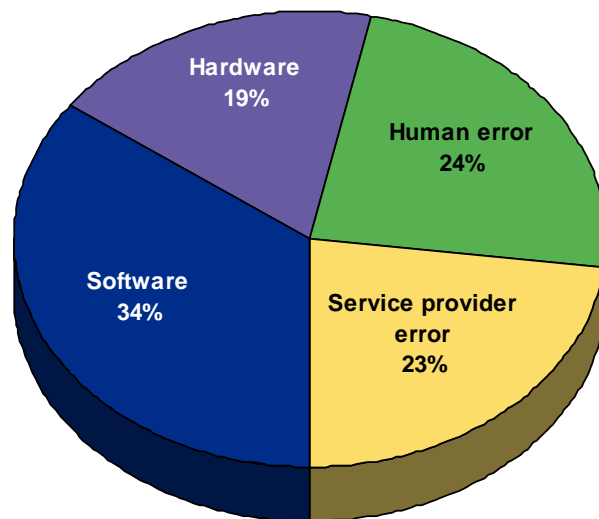
Exhibit III-7 Annual Hours of Downtime by Source, Detail

Causes	Outages	Degradations	Total Hours
Network products	7.4	18.1	25.5
Security products	5.6	3.3	8.8
Cables and connectors	4.5	3.4	7.9
Servers	8.8	9.9	18.7
Applications	19.8	17.7	37.6
Service providers	18.6	8.7	27.3
E-commerce	14.6	NA	14.6
Total	79.3	61.1	140.4

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 percentages for all causes are fairly similar (only 15 points separate the highest and lowest). 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. Human error is the most troubling, because fixes for human error are elusive and require process changes and retraining, which can take a long time and be very expensive.

Exhibit III-8 **Annual Hours of Downtime by Cause**



Annual hours: 140

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

Human error when configuring applications makes a fairly large contribution to overall downtime hours (second only to software failures).

Exhibit III-9 Annual Hours of Downtime by Cause and Source, Detail

Causes	Hardware	Software	Human error	SP error
Network products	3.4	1.8	2.2	NA
Security products	1.4	2.4	1.8	NA
Cables and connectors	2.7	NA	1.9	NA
Servers	2.7	4.4	1.7	NA
Applications	NA	12.9	6.9	NA
Service providers	NA	NA	NA	18.6
E-commerce	2.0	4.8	2.8	5.0
Total	12.3	26.3	17.3	23.5

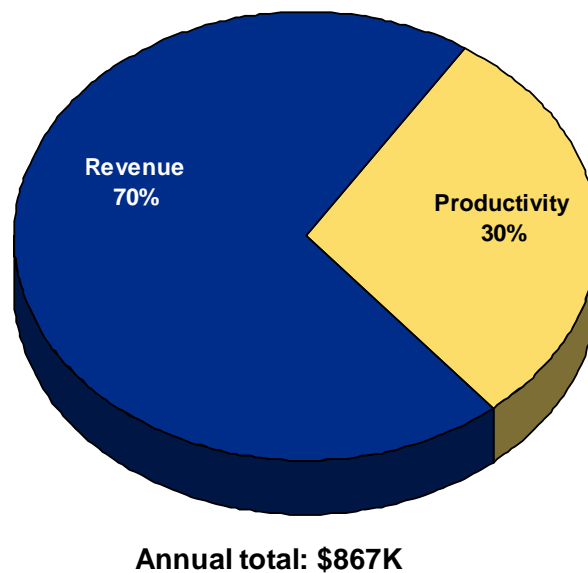
C. Downtime Costs

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 B and C 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 \$867K in total downtime annually; \$258K in annual productivity loss, and \$609K in annual revenue loss. Overall downtime costs average 1% of revenue, a significant number, but not as high as the number for large businesses in 2004 (3.6% of revenue). Only 42% of employees directly generate revenue for their company, which is the reason that the cost of downtime associated with revenue loss is so much lower than the cost due to lost productivity.

Exhibit III-10 Annual Cost of Downtime by Productivity vs Revenue

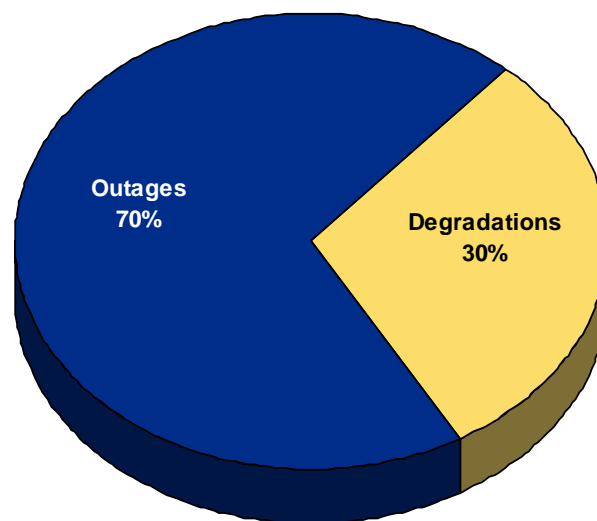


Networked applications are the life-blood of any organization. Note that, on average, respondents report that revenue-generating employees lose 32% of overall productivity during outages, and 17% during a service degradation, while non-revenue-generating employees lose 31% of their productivity during an outage and 17% 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 and service provider outages (as discussed in the next section), and the productivity figures mentioned above.

Exhibit III-11 Annual Cost of Downtime by Outage vs Degradation



Annual total: \$867K

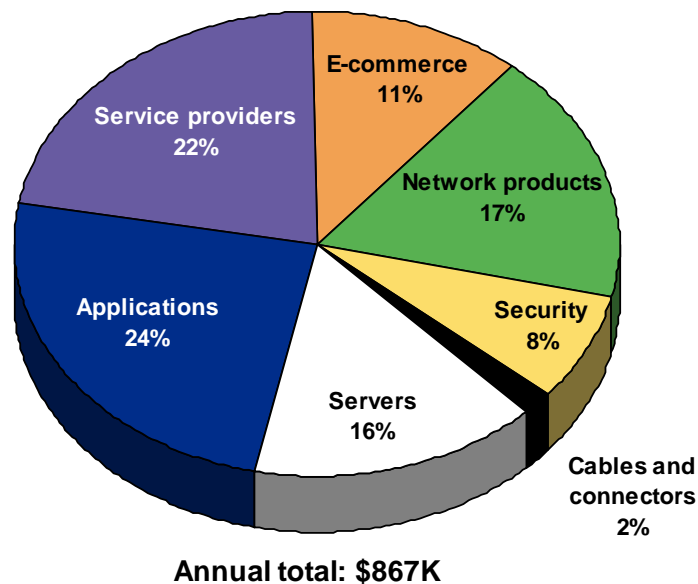
3. Downtime Costs by Source

Looking at downtime costs by the source of the problem paints an interesting picture. Applications account for the biggest slice—roughly one-quarter or \$213K annually, and split 65/35 between outages and degradations. Focusing on the source of application outages could save many organizations a significant amount of money. Service provider outages are also vexing, and largely out of respondent control.

Network product downtime costs are more heavily weighted towards service degradations, implying that for medium businesses, network products may be a performance bottleneck, and may be in need of an upgrade. Also, most medium organizations don't have the resources to invest in performance monitoring and optimization products, or advanced Ethernet switches, and as such have to live with mediocre performance on the LAN in many cases.

Exhibit III-12

Annual Cost of Downtime by Source



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

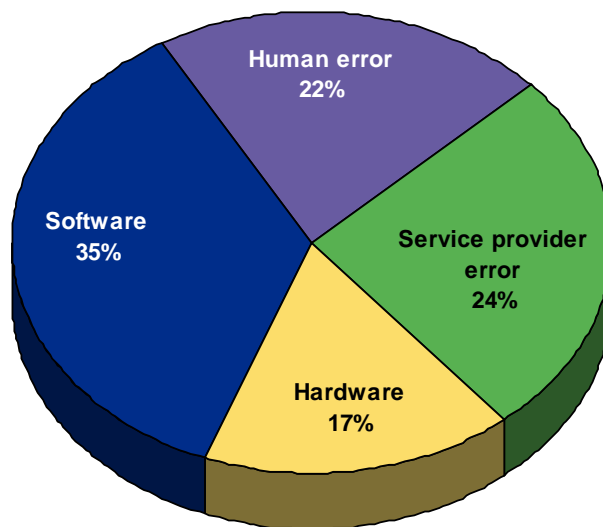
Exhibit III-13 Annual Cost of Downtime by Source, Detail

		Outages (\$K)	Degradations (\$K)	Total Cost (\$K)
Network products	Revenue	\$45.2	\$53.0	\$98.2
	Productivity	\$23.7	\$29.2	\$52.8
	Total	\$68.9	\$82.1	\$151.0
Security products	Revenue	\$35.1	\$9.6	\$44.7
	Productivity	\$16.7	\$4.4	\$21.1
	Total	\$51.8	\$14.0	\$65.8
Cables and connectors	Revenue	\$6.5	\$2.4	\$8.9
	Productivity	\$3.2	\$1.2	\$4.3
	Total	\$9.7	\$3.5	\$13.2
Servers	Revenue	\$56.1	\$32.6	\$88.7
	Productivity	\$29.7	\$16.8	\$46.5
	Total	\$85.8	\$49.4	\$135.2
Applications	Revenue	\$91.9	\$54.1	\$146.0
	Productivity	\$45.1	\$22.2	\$67.3
	Total	\$137.0	\$76.4	\$213.4
Service providers	Revenue	\$98.5	\$24.6	\$123.1
	Productivity	\$52.7	\$13.2	\$65.9
	Total	\$151.1	\$37.9	\$189.0
E-commerce	Revenue	\$99.2	NA	\$99.2
	Productivity	NA	NA	NA
	Total	\$99.2	NA	99.2
Total	Revenue	\$432.5	\$176.2	\$608.7
	Productivity	\$171.0	\$87.1	\$258.1
	Total	\$603.5	\$263.3	\$866.8

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-14**Annual Cost of Downtime by Cause**



Annual total: \$867K

IV. Conclusions

A. Network Products

Downtime costs associated with network hardware are significant, but not the most troubling area. Network products account for 18% of downtime hours and 17% of downtime cost. 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 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 6% of downtime hours and 8% of downtime costs can be traced back to security products. Only 32% 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 6% of downtime hours and 2% 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 13% of downtime hours and 16% of cost. Downtime hours are fairly evenly split between outages and degradations, but costs are weighted toward outages (\$86K annually) compared to degradations (\$49K). Again, human error is not a major factor in server downtime, accounting for only 19% of server outage time.

E. Applications

Application downtime is the largest single contributor to downtime hours (27%) and cost (25%), and application outages alone account for \$137K in annual downtime cost (which is 16% of the total downtime cost on average).

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 31% of service degradation time.

F. Service Providers

Service provider problems are the source of 19% of downtime hours and 22% of downtime cost. Cost associated with outages service provider alone is \$151K annually, the single largest source of downtime cost, and an easier problem to address than others (either by installing redundant WAN infrastructure, or investigating and upgrading SLAs for WAN services).

G. E-Commerce

E-commerce is not a major factor in downtime costs overall, accounting for 10% of downtime hours and 11% of downtime costs. Most medium organizations who offer e-commerce have a good handle on how to keep their commerce sites up and running.

Appendix: Questionnaire

SCREENING

1. 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: _____)
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: _____)*
4. Approximately how many employees are in your organization—not just at your site? *(Fill in number.)*

Number of employees: _____

 - ____ 1. 100 or fewer *(Terminate)*
 - ____ 2. 101 to 1,000
 - ____ 3. Over 1,000 *(Terminate)*

DEMOGRAPHICS

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

6. 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 _____

7. What percent of employees at your organization use networked desktop and laptop computers? *(Fill in percentage.)*

 Percent of employees using networked computers _____ %

8. 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 _____ %

9. Approximately what was your organization's annual revenue in calendar year 2004? What do you expect for calendar year 2005? *(Fill in amounts. State relevant currency.)*

	2004	2005
Approximate revenue:	\$ _____	\$ _____

Headquarters are main sites with executive management team. **Branch offices** are regional medium to large sites with multiple departments. **Remote offices** are small local offices.

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, IP PBXs, 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.)*

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.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

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

DOWNTIME: SECURITY

Security products include firewalls, VPN devices, IDS/IPS 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.)*

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.)*

PERCENT OF NETWORKED EMPLOYEES AFFECTED

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.)*

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

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

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
 ____ 3. 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 the premiere international market research and consulting firm specializing in data networking and telecom. We provide a complete view of the market through constant interaction with equipment manufacturers, service providers, end-users, chip and component manufacturers, sales channels, and the financial community. We offer quarterly market share and forecasting, end-user survey research, service provider survey research, and service provider capex analysis. We are respected in the industry for our objectivity, accuracy, and ability to deliver on time all the time.

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- Optical and Metro Ethernet
- Service Provider Capex
- Service Provider Next Gen Voice
- Service Provider Routers and Switches
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