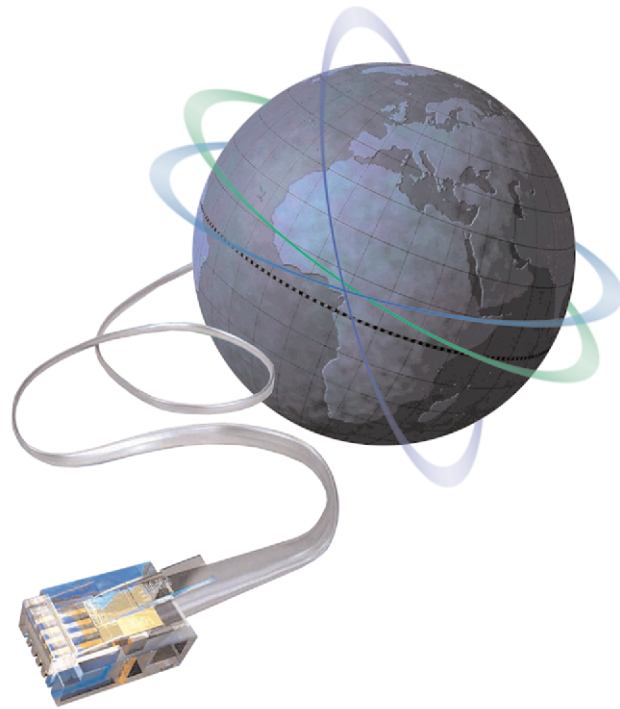


Data Recovery | Performed Remotely

White Paper.2003



Introduction

With the increasing dependency on data in today's world and the proliferation of critical information being stored on business computers and home PC's, there is a growing need for data recovery solutions. Data recovery performed remotely through an Internet connection or modem is the fastest, easiest, most cost-effective, and in many cases, the best solution for recovering missing or corrupt data.

Until recently, data lost due to hardware and software malfunctions, unbootable computers, viruses, user error, and deleted or missing partitions was considered gone forever. Today most lost data is recoverable. In fact, when hardware isn't damaged, this recovery process can be done remotely over the Internet or through a modem connection. To understand how data recovery is performed remotely, it is first important to learn about the trends associated with data loss, the causes and impact of lost data, and the Remote Data Recovery™ solution.

Trends Associated with Data Loss

The loss of data is growing exponentially. Over the course of performing more than 125,000 data recoveries, Ontrack Data Recovery, a leading provider of data recovery software and services, has identified some of the top trends contributing to an increase in lost data:

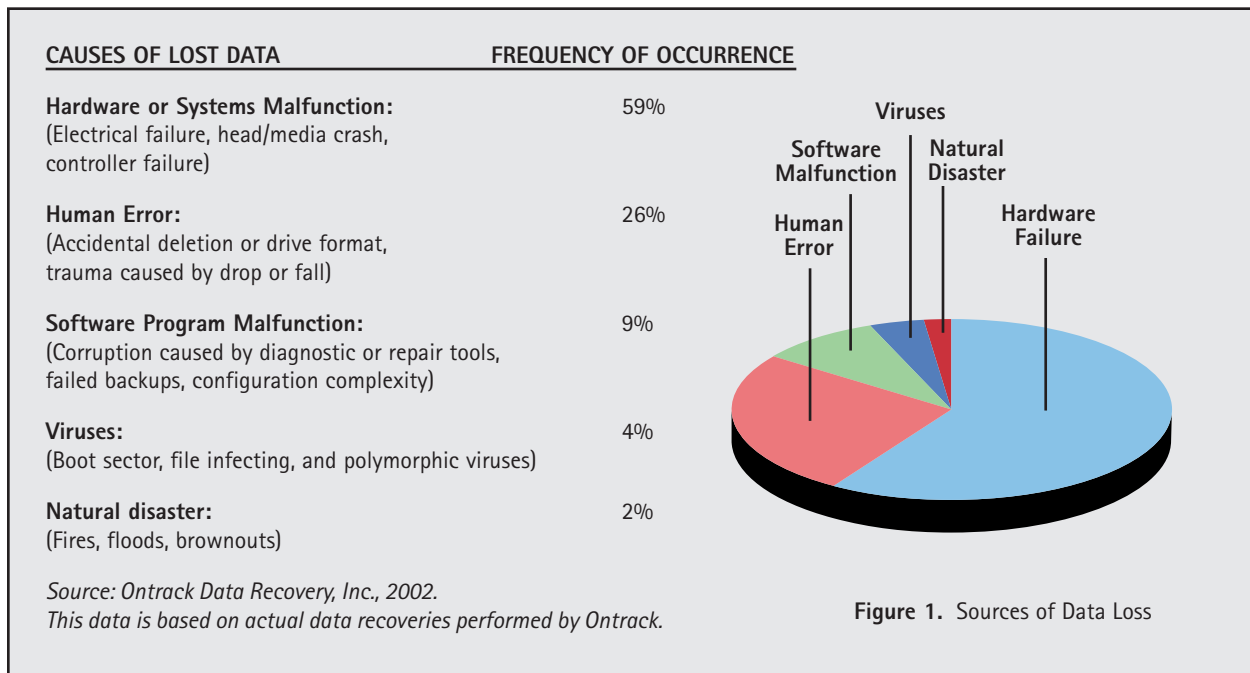
- **Increase in Electronically Stored Data** – As more and more corporations, small companies, and home users rely on computer data to execute their daily operations and subsequently store data electronically, the increase of lost data is inevitable.
- **Larger Storage Modules** – Today's hard drives store substantially more data than the hard drives of a decade ago. Increased storage capacities both increase the likelihood and amplify the impact of data loss.
- **Growth of Mission-Critical Data** – Users today are storing more electronic mission-critical data than ever before. The loss of such data can have staggering financial, legal, and productivity ramifications on businesses and home users alike.
- **Unreliable Backup Tools and Techniques** – Most computer users rely on backups (a recommended practice) as their safety net in the event of data loss. Ontrack research indicates that 80 percent of its data loss customers regularly backup their data, only to find them less than adequate at the critical moment they need to restore them. Backups assume that hardware and storage media are in working order, that the data is not corrupt, and that backups are recent enough to provide full recovery. In reality, hardware and software fail and backups don't always contain current enough data.

Facts About Data Loss

- 93% of companies that lost their data center for 10 days or more due to a disaster filed for bankruptcy within one year of the disaster. 50% of businesses that found themselves without data management for this same time period filed for bankruptcy immediately. (Source: National Archives and Records Administration in Washington.)
- Of those companies participating in the 2001 Cost of Downtime Survey, 46% said each hour of downtime would cost their companies up to \$50,000, 28 percent said each hour would cost between \$51,000 and \$250,000, 18 percent said each hour would cost between \$251,000 and \$1 million, 8 percent said it would cost their companies more than \$1million per hour. (Source: 2001 Cost of Downtime Survey Results, 2001.)
- At what point does loss of data threaten the survival of a business? 40% of companies in the Cost of Downtime Survey said 72 hours, 21% said 48 hours, 15% said 24 hours, 8% said 8 hours, 9% said 4 hours, 3% said 1 hour, 4% said within the hour. (Source: 2001 Cost of Downtime Survey Results, 2001.)

Causes of Lost Data

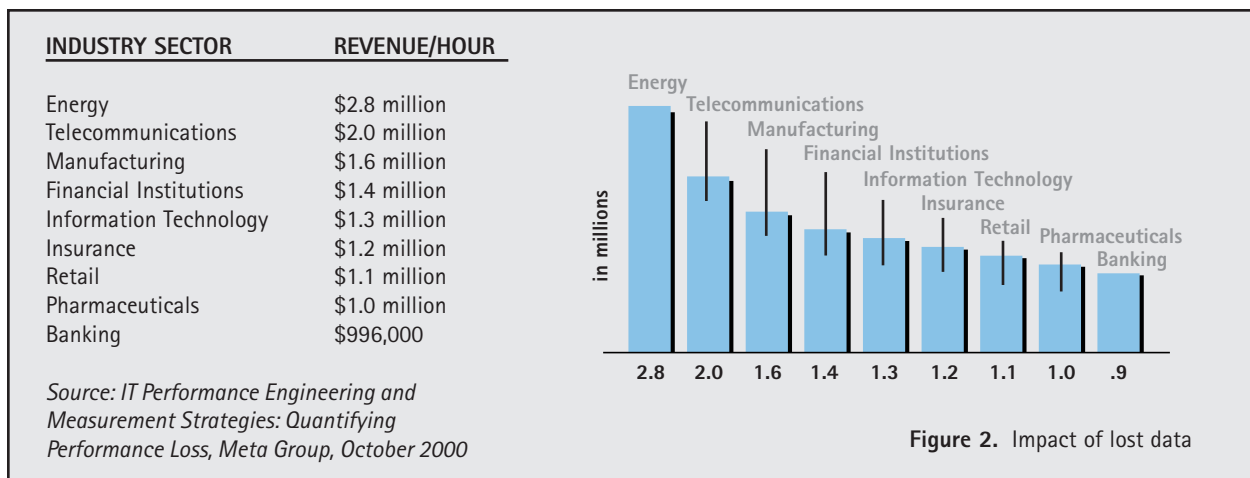
Where and how does the loss of data occur? According to Ontrack engineers, the primary causes are illustrated by Figure 1 below.



These five major threats to computer data have two things in common: they are unpredictable and, in many cases, uncontrollable. As a result, even the precautions taken by IS professionals to safeguard company data cannot always prevent a data disaster.

Impact of Lost Data

In addition to being a vulnerable asset, computer data is also a valuable asset. According to a Gallup Poll, most businesses value 100 megabytes of data at \$1 million. Referencing this figure, it is easy to see how significant the costs of lost or inaccessible data can be. The following is a summary of the average hourly impact of lost or inaccessible data on a selection of different businesses.



On an individual user level, evidence suggests that six percent of all PCs will suffer an episode of data loss in any year. Given the number of PCs used in U.S. businesses, this statistic translates to approximately 4.6 million data loss episodes annually. There are three main quantifiable costs associated with each incident of data loss: the cost of technical support in the recovery effort, lost productivity due to user downtime, and the cost associated with data that is permanently lost. The total of these costs is approximately \$2,557 per data loss incident. This figure multiplied by the total number of PC data loss incidents in the U.S. suggests that data loss cost U.S. businesses \$11.8 billion in one recent year. This is likely a conservative estimate, since it does not include costs that are difficult to quantify such as loss of revenue and damaged business reputations.¹

The Remote Data Recovery Solution

Today there is good news for businesses and individuals facing economic and productivity effects of lost data. In nearly 50 percent of data loss situations, damaged or malfunctioning hardware isn't the culprit at all. Instead, data loss in these situations is caused by a failure such as corrupt files system structures, human error, or virus attacks.² The good news is that when this happens, it is no longer necessary to remove storage drives and ship them to a data recovery company for recovery. Now the services of these engineers are available through a remote recovery service.

For many users, the key benefit of Remote Data Recovery (RDR®) is time. A typical in-lab recovery can take about two to five days to complete. Restoring data from backup tapes can take just as long. (Plus backup tapes will never be as current as the data that was just lost.) RDR, which is available 24 hours a day, can be completed in as little as an hour and can be performed anywhere in the world. This service can turn data loss from a business, professional, or individual trauma into little more than an inconvenience.

The leading example of remote recovery today is Ontrack's patented Remote Data Recovery™ technology. RDR allows Ontrack engineers to perform lab-quality data recovery on servers, desktops, or laptops anywhere in the world via a modem or Internet connection. There is no need to remove the drive or dismantle the system and ship it in. Ontrack is the world's leading data recovery specialist and the only company to offer this type of service.

RDR currently recovers data from DOS, Windows® 3.x, 95, 98, Me, 2000, NT, XP, Linux, and Novell NetWare. Additionally, RDR is available for Microsoft® SQL and Microsoft Exchange Servers.

Data security is assured thanks to Ontrack's proprietary communication protocol, encrypted packets and secure Ontrack facilities. (Ontrack is a two-time recipient of the James S. Cogswell Award from the U.S. Department of Defense for outstanding participation in the National Industrial Security Program [NISP]. Less than 0.5 percent of eligible Department of Defense contractors received this prestigious award, and Ontrack has received it both times it has been eligible.)

As a rule of thumb, if a drive is physically healthy, RDR can usually recover lost data. This process reduces the time and monetary costs of unnecessary downtime, the extra labor associated with removing and shipping equipment to a data recovery laboratory, the possibility of further damage through shipment, and the additional restoration efforts associated with in-lab data recovery.

1) The Costs of Data Loss, September 1999, David M. Smith, Ph.D., Pepperdine University.

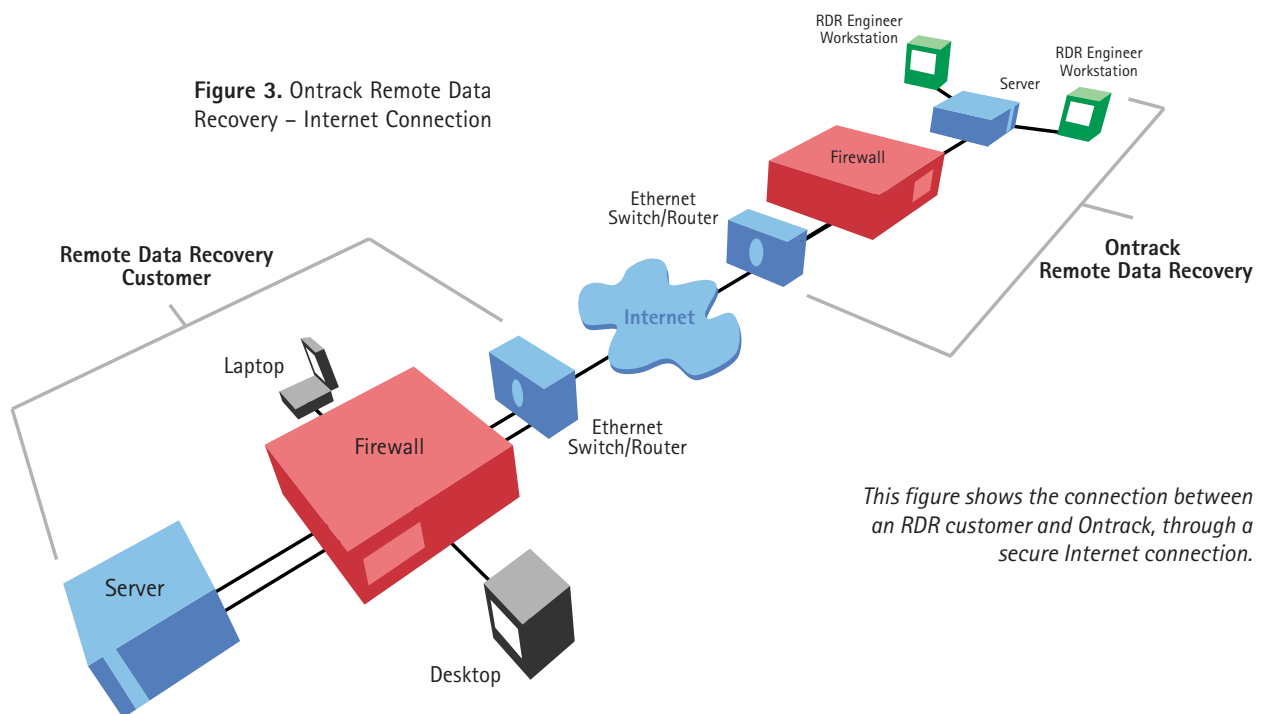
2) Lost data can be caused by numerous things, including:

- Reformats/repartitions
- Invalid boot sectors
- Invalid volume tables/definitions
- Deleted partitions
- Lost RAID configurations
- Damaged File Tables (File Allocation Table, Master File Table)
- Drives damaged by utility use

How It Works

Ontrack Remote Data Recovery consists of three main components:

- 1) **Communications Client** – The customer initiates a connection to an Ontrack RDR Server using the specially designed RDR QuickStart™ software. The software is available in a form native to your operating system and also in a self-booting diskette for situations in which the operating system is not bootable. After initiating the application the customer selects the mode of communication, which can include a direct modem or Internet connection.
- 2) **RDR Server** – Once the connection is established to the Ontrack Server it is distributed to the next available Remote Data Recovery engineer in any of our worldwide locations.
- 3) **RDR Workstation** – A specially designed application allows the RDR engineer to run advanced data recovery tools on the computer system that lost data. Before beginning the recovery process, the engineer enables proprietary technologies that track and backup all changes that will be made to the system. This process provides the engineer with the ability to complete the recovery "virtually" before any changes are made to the system. Any changes made can be reversed or modified in order to provide the most complete recovery possible.



After the customer initiates a connection, the Remote Data Recovery process itself typically has seven steps:

- 1) The RDR Engineer uses Ontrack tools to begin diagnosis.
- 2) Physical media tests are performed to verify that hardware problems are not present.
- 3) Data protection technology is enabled to track and backup all system changes.
- 4) Data recovery diagnostic and repair tools are run to determine the cause of the data loss and prospects for recovery.

- 5) Identified problems are repaired and changes are written to the computer system.
- 6) The RDR Engineer disconnects the communication link and has the customer reboot the system.
- 7) The customer is able to access their recovered data.

Practical Applications

Although RDR is the quickest, easiest, and most cost-effective method for recovering data, it may not be the right solution for every situation. Lost data resulting from a hardware malfunction requires an in-lab data recovery method and cannot be recovered remotely. However, when hardware is completely intact, lost data can be recovered from servers, desktops, and laptops with Ontrack's Remote Data Recovery service. Practical applications for Remote Data Recovery performed on servers, desktops, and laptops are outlined below:

Server Recovery

Many businesses use large RAID servers as enterprise storage solutions, but these servers can also cause problems when it comes to repairing and restoring data from backup tapes. In some cases it can take over 24 hours to get a backup restored to a RAID server.

For example, when something happens to a RAID configuration that causes the operating system to no longer correctly recognize it, data stored in the RAID configuration becomes inaccessible. In the past the only real option at this point was to reconfigure the RAID server and restore data from backup tapes. This could mean an extended period of downtime, possibly up to several days.

Using the Ontrack Remote Data Recovery service, the problem can be diagnosed and repaired in as little as a few hours. The RDR Engineer downloads diagnostic and repair tools into the memory of the server and launches tests to determine the physical health of the server. Once the RDR engineer determines that the hardware is functioning, special tools are used to determine the cause of inaccessible data from the RAID server. After authorization, the engineer completes all repairs, disconnects the computer system, and contacts the user when the job is done. The user reboots the computer and once again has access to the data in the RAID configuration.

Microsoft® Exchange Recovery

A Microsoft Exchange Server is an essential communication link for many businesses. Imagine a failure during business that interrupts access to all email, contacts, and business schedules for the day, the week, or even longer. Potential sources of such failures include power fluctuations, failed restores from backup, corruption, or deletions to the Exchange Database. A simple restore from tape may not have the current data. Requirements to duplicate the failed Exchange Server to restore a backup are also complicated and can take precious time.

In this example, an Exchange Administrator encounters a problem where the Exchange Database becomes corrupted and cannot be accessed due to an electrical power fluctuation. Since the most recent backup is

Ontrack RDR Data Security

Ontrack secures data transferred in a Remote Data Recovery situation by using a proprietary communication protocol, encrypted packets, and secure Ontrack facilities. Minimal data is sent across the communication medium. In addition, the only data accessed by Ontrack engineers is the data required to repair the file system. Remote Data Recovery also has an "undo" feature that allows engineers to undo any changes made to the system during the recovery process if an unforeseen problem should arise. Security features like these help protect systems and data throughout the entire recovery process.

over two weeks old, contacts, schedules, and communication are disrupted. The server's administrator simply contacts Ontrack Data Recovery to initiate a Remote Data Recovery service. The process is explained and the customer downloads the RDR QuickStart client and initiates a connection. Once connected, the RDR engineer downloads tools into the memory of the server, the Exchange Database is scanned for structural integrity, and a report is produced for the customer with the mailbox and message count that is recoverable. After authorization, the engineer extracts the individual mailboxes to PSTs that are ready to be imported back into a new Exchange Database on the same server with the current data. The user reboots the computer and once again has access to the Exchange database.

Microsoft SQL Server Recovery

Microsoft SQL Server is a common database used to warehouse, query, and report on critical business data. A database failure could shut down e-commerce applications, customer databases, and operational reporting. Dropped tables, deleted rows, dropped databases, corruption, and incidents caused by server problems are examples of such failures. Luckily data lost through such incidents can be recovered by Remote Data Recovery services directly into a working database.

For any of the stated problems, the server's administrator contacts Ontrack, the RDR engineer discusses the situation with the customer, and the customer downloads the RDR QuickStart software. After authorization is completed, the RDR engineer uses Ontrack proprietary software to search for and recover the missing data and extract it into a working database on the server. Even when there is a combination of server and file problems a recovery solution is possible.

Desktop Recovery

Even with virus protection enabled on computer systems, users may not have complete protection. New viruses are appearing all the time. One particular category of viruses makes a system unbootable to Windows. These viruses are often times referred to as "boot sector" viruses. Since the system is no longer bootable, the only method of data recovery is to reinstall the computer operating system and restore files from backup tapes. Once again, this assumes that the most recent backup is available.

An alternative solution is using Remote Data Recovery

When do you need a data recovery specialist?

Ontrack has been recovering data since 1987 and has discovered that almost all data is recoverable. The following are examples of situations that warrant the intervention of data recovery service professionals:

- **Unreliable Backup System** – Without a tested, reliable backup system, data loss of any size could prove disastrous, if not fatal, to a business.
- **Backup and Restore Failure** – Backup and restore processes can be compromised by unreadable tapes, corrupt data, and improper backup procedures. Even when backups are performed properly, there can be a time lag between the most current data and the last backup session.
- **Extensive Time Required for Restore of Backup Process** – In many cases, the amount of time required to restore data from a backup process can result in significant productivity and financial losses.
- **Impractical and Impossible Data Re-creation** – Data re-creation or re-keying involves a number of costs including lost time, revenue, and quality that can make it an impractical, if not an impossible, option.
- **Unbootable System** – Even minor damage to operating system structures can keep a system from booting.
- **Mirrored or RAID System Failure** – Many organizations concurrently copy data into two separate storage locations. However, if that data is corrupt before it is copied, or if one (or both) of the two systems fails, the data may be destroyed or rendered inaccessible. In the case of RAID systems, data also may be threatened when two or more drives within the same logical device simultaneously fail, or a rebuild of a lost drive in a RAID is unsuccessful. Additionally, mirrored and RAID systems can't protect the system from viruses, software corruption, or user error.
- **Intentionally Altered or Destroyed Data** – Data is susceptible to being intentionally deleted or destroyed by malicious viruses, security breaches, or disgruntled employees.
- **Accidentally Altered or Destroyed Data** – Almost everyone using electronic data is susceptible to accidentally deleting or destroying data by pure human error.
- **Corrupted or Deleted MS SQL or MS Exchange Database Files** – System malfunctions, power failures, and accidental or intentional deletions are some examples that may cause system-critical information to become inaccessible.

to repair the virus damage. Since RDR QuickStart software is available as a self-booting floppy diskette, access to the non-booting system is easy. Using the QuickStart diskette (either downloaded through another computer or a previously made copy), the user boots the computer and connects to Ontrack. After approval the Ontrack RDR engineer locates the file system structures damaged by the virus and confirms that the files are recoverable. The engineer then completes the repairs, disconnects the computer system, and instructs the user by phone on how to reboot to Windows. The user is back in business.

Laptop Recovery

Nearly everyone has accidentally deleted a file. However, the commonplace nature of accidental file deletion doesn't make it any less devastating, especially if the deleted file represents many hours or days of work, or if it contains information that cannot be re-created and is needed immediately. For example, a business executive is on a plane to an important business meeting that could result in a large contract for the organization. While using the laptop, the executive inadvertently deletes the Microsoft® PowerPoint® presentation required for the meeting. A duplicate copy of the presentation is not available and there isn't enough time to re-create the presentation prior to the meeting.

In this example, once the executive lands and checks into their hotel, they call Ontrack and request a Remote Data Recovery. The RDR engineer instructs the executive to download the RDR QuickStart software to a diskette using a hotel computer and the Internet connection in the hotel's business center. (Please note: It is unwise to install software onto or use a computer that contains deleted files because additional damage could occur.) The executive uses the QuickStart diskette to boot the laptop. Once the laptop is booted, a modem connection is initiated to an Ontrack RDR Server. After the connection is made, and the service is approved the engineer begins the diagnostic process to locate the deleted file. Once the file is located, the damage is assessed. The file is then recovered and the executive is provided with final instructions to remove the RDR QuickStart floppy and reboot to Windows. The presentation is made as scheduled.

What To Look For in a Data Recovery Specialist?

Do they have the expertise?

Data recovery is technologically complex and requires a great deal of expertise and experience. Look for companies that have made a substantial investment in research and development, have developed a significant number of proprietary tools and techniques, and have performed data recovery for a large number of clients. Your best bet is a company that offers diagnostics and data recovery services, as well as software solutions.

Do they know the hardware and software involved?

Look for a data recovery company that is a certified developer or solutions partner for Microsoft®, Novell, Apple, Sun, SCO, and other major hardware and software companies. Your data recovery provider should also be able to recover data from every type of system (including portable and desktop PC Systems [DOS, Windows, and NT], networks, Apple Mac, Unix systems and HP, DEC, and IBM platforms); and media types (include all types of hard disk, optical disks, removable disks, flash media, multi-drive volumes and RAID systems, as well as every type of tape including DAT, Travan, Exabyte, DLT, AIT, and more). Finally, a data recovery specialist should be recommended by major hard drive manufactures.

Will your data be secure?

To protect your sensitive business data, a data recovery company must have strong data security protections in place, including proprietary protocols, data encryption, and secure facilities.

Do they offer a remote data recovery solution?

Most data recovery companies will require you to ship your hard drive into the company for recovery – this can be a lengthy and expensive process. To get data back fast and cost-effectively, you need a company that can perform lab-quality data recovery right on your server, desktop, or laptop through a modem or Internet connection without requiring you to remove or dismantle your system.

Consumer Case Study

How does Remote Data Recovery work in real life? Just ask Trivideom president Gregory Ris who began experiencing problems with the Windows NT operating system used on the computer that stores all of his client's video images. Anticipating a system crash, Ris backed up all essential files onto his video hard drive - a separate drive used to store TriVideom's video files.

Ris' computer system did crash and he had to delete everything from his initial drive to create a clean slate devoid of any corrupted files. After reformatting his hard drive, Ris tried to transfer the backed up files on the video drive to his initial computer system. But the video drive would not reconnect to the computer operating system. "I thought all the data I stored in the last two years was lost," Ris said. "I was under a deadline and could not access any of the files I needed."

After a frustrating week of being out of business, Ris contacted the manufacturer of his personal computer, Dell Computer, which referred him to Ontrack Data Recovery. Ris explained his data loss situation to Ontrack's consultants and engineers, who recommended Ontrack's Remote Data Recovery service.

Ontrack engineers helped Ris download the Remote Data Recovery software. Once the software was downloaded, Ontrack engineers used a modem connection to interact directly with Ris' hard drive.

Within two hours, Ontrack's Remote Data Recovery engineers recovered all of TriVideom's lost files. "Needless to say, the end result was amazing," Ris said. "I thought all was lost and then unbelievably my files were restored right in front of me. And even more amazing, it was done in a couple of hours and did not require me to overnight my hard drives to anyone. Being a small business owner with the huge amount of work to get out, it was essential for me to be back in business the next day. And, thanks to Ontrack engineers, I was back in business within a couple of hours."

Conclusion

Gregory Ris got his business critical data back faster and more easily than he ever dreamed possible. Ris is by no means alone. More and more businesses and individuals are discovering the power and convenience of Remote Data Recovery. Like Ris, they are learning that the data they once feared was "lost" isn't really lost at all. Instead, it can be recovered quickly and easily, even when systems won't boot. RDR makes it possible. And that's good news for everyone who faces the prospect of data loss - a group that includes nearly all of us.

In fact, Ontrack's RDR is the right solution for any business or individual facing devastating data loss in the nearly 50 percent of situations where hardware isn't damaged. RDR can be a real lifesaver. And it's only available from Ontrack.

Appendix A: RDR QuickStart Minimum System Requirements

A working system to download connection software.

Microsoft Windows 95, 98, Me, NT, 2000, XP and .NET

Self-booting Diskette (also supports DOS and Windows 3.x)

Used on systems where operating system is not bootable or data loss is on boot partition

- Requires 32 MB of memory
- 1.44 MB floppy diskette drive
- Internet access via LAN, ISP, or modem (minimum 14.4k, WinModems not supported)

Windows Application

Used when operating system is bootable and data loss is present on another partition

- Requires 32MB of memory
- Internet access via LAN, ISP, or modem (minimum 14.4k WinModems supported)

Data loss problems solved:

- Deleted files
- Deleted partitions
- Virus damage
- Drives damaged by utility use
- Volume Overwrite/Reinstall
- Invalid boot sectors tables/definitions
- Damaged file tables (File Allocation Table, Master File Table)
- Reformats/repartitions
- Invalid volume
- FDISK'ed drives
- CHKDSK Damage
- Lost RAID configurations

Novell Netware 3.x, 4.x, 5.x, and 6.x

NetWare NLM

Used when server kernel is available. This can be used even when volumes are not recognizable or mountable.

- Requires 32Mb of memory
- Internet access via LAN
- The default installation of NetWare 4.x, 5.x, and 6.x will automatically load VREPAIR when a problem is encountered during a volume mount. To ensure the fullest data protection this feature should be turned off.
- 1.44 MB floppy diskette drive
- Working DOS partition accessible to the Novell NetWare server.
- Requires a fully functional Novell NetWare server v3.12 or greater. With v3.12 server, Novell 3.2 Enhancement Pack or the NWPA patch upgrade needs to be installed.
- Any special sub-system drivers for SCSI and RAID hardware should be loaded and fully functional before loading.

Data loss problems solved:

- Reformats/deleted repartitions
- Invalid boot sectors
- Virus damage
- Lost RAID configurations
- Invalid volume, Hotfix, Mirror, redirect tables/definitions
- FDISK'ed drives
- Directory/FAT damage
- Drives damaged by utility use
- Invalid/Missing volume definitions

Linux (x86 platform, ext2fs)

Self-booting Diskette

Used on systems where operating system is not bootable or data loss is on boot partition

- Requires 64 MB of memory
- 1.44 MB floppy diskette drive
- Internet access via LAN, ISP, or modem (minimum 14.4k, WinModems not supported)

Data loss problems solved:

- FDISK'ed drives
- Virus damage
- Invalid volume table/definitions
- Super Block/Group Table/ Inode corruption
- Invalid boot sectors
- Lost RAID configurations
- Drives damaged by utility use (fsck)
- Deleted or repartition of file systems (Unix term for partition)



Ontrack Remote Data Recovery™

White Paper

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