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## **Achieving Increased Backup Availability and Portability with Disk-to-Disk-to-Disk Technology**

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*Revinetix Backup and Storage White Paper*

## Abstract

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<b>Title</b>	Achieving Increased Backup Availability and Portability with Disk-to-Disk-to-Disk Technology
<b>Product</b>	Revinetix Backup Appliance
<b>Target Audience</b>	Technical Decision Makers IS and IT Managers

**Abstract** Corporate backup solutions are reaching new highs with recent advancements. New serial ATA drives have come down in price to where they now match tape prices. The increased speed of disk-to-disk backup in both backups and restores greatly reduces overall backup cost. One challenge that many companies experience when using a disk-to-disk solution is how to provide removal of the data to an offsite location. The solution is removable RAID drives that are designed for transportation and storage at remote locations.

**Related Information** To understand the many aspects involved with serial ATA drives, visit the [Serial ATA Working Group](http://www.serialata.org). (www.serialata.org)

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## Introduction

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Today's data files are an integral component of business. In many cases, these files contain mission-critical information of the business and require 100% accessibility and restorability. This business climate requires a strategy to keep critical data backed up 100% of the time while performing at levels that enable users to complete their business in an efficient, effective manner.

Backup principles are not new. We have been taught them for years and are continually reminded of their virtues. Surprisingly, a 2003 survey by Strategic Research Corp. found 75% of companies' "edge data" is still unprotected. The data is either ineffectively backed up or not backed up at all. Edge data resides outside managed servers on remote networks, desktops and mobile systems and ends up being 60% of a corporation's data. This is a risky business practice as edge data can be as critical to the company's survival as its more manageable centralized data.

In most scenarios, regular backups are a time-consuming and tiresome process. In the event that you need to recover data, finding the file to restore is also a hassle — assuming you can even find the right version.

**Legislation:** Further, by not having adequate backup and restore capabilities there is the growing potential legal risk from undocumented communications and non-compliance with government mandates under regulations such as the *Sarbanes-Oxley Act*, *The USA Patriot Act*, the *Health Insurance Portability and Accountability Act (HIPAA)* and the *Gramm-Leach-Bliley Act*. Penalties include imprisonment and heavy fines for U.S. businesses that do not meet government regulations relating to the secure archiving of electronic data.

**Tapes:** For over 2 decades now, tape technologies have been the dominant force in backup and recovery. The low cost of tape and the fact that tape cartridges can be easily removed and stored off-site are the medium's most attractive features.

With the projected amount of data that needs to be backed up climbing at a rapid rate, and the projected growth in tape drive units shipped staying relatively flat, each of those backup tape drive units must deliver more capacity than ever before. Analysts predict that there may be the potential for a melt-down if the backup technology does not keep up with that sharply rising demand curve.

**Serial ATA Drives:** The arrival of next-generation serial ATA (SATA) disk technology promises to solve many of the problems that IT administrators face with tape backups and restores. At the outset, new host-based Disk-to-Disk backup strategies using SATA disk arrays seem to offer the most promise by using low-cost disks and providing increased data transfer speeds for backup and recovery. The use of RAID (Redundant Array of Inexpensive Drives) technology further increases the advantages of disk-to-disk backup by adding redundancy to the backup media. Should one of the disks fail in a RAID array the data it contains is not lost.

However, just as tape solutions have virtues and deficiencies, Disk-to-Disk SATA disk arrays also have limitations. Selecting an appropriate backup product is an important step in architecting a backup solution that will provide scalability over time. Important factors to consider include the software features, licensing fees, installation and configuration and the ability to archive backup data to off-site storage. These combined requirements determine the selection of the most appropriate solution.

## Comparison of Tape and Disk Attributes

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Each of the different technologies being touted today has intrinsic benefits that fit a different scenario better than another. The attributes of each can be argued infinitely but the most common characteristics are described below.

### Tape Backups

Tape backup units typically consist of a tape drive and a tape cartridge. The tape drive contains the drive mechanisms and the tape head, which records to and reads from the tape. The tape cartridge houses the magnetic tape, which stores the data. The actual tape varies in width from 4 mm to 1/2 inch depending on the specific tape technology. Both internal and external tape drives of varying storage capacity are available from a variety of manufacturers.

#### Advantages:

- Digital tape libraries remain a cheap form of storage, at about \$0.50 to \$4.50 per gigabyte. However, this advantage has recently weakened as the prices of SATA drives now are similar in price.
- Easily removable to an offsite location. This protects data from having a single point of failure.

#### Disadvantages:

Backup and restore from tape has been a source of consternation for IT administrators for years. For example, when data is actually written to a tape, the info needs to be written sequentially and can't be interrupted or the backup is incomplete. Also, when the tape is being written to, it cannot be read from which limits the ability to access files during a backup.

"We see one or two tape drive failures every day. To us, it's not super unreliable, but it still has mechanical properties and does break down, which requires manual intervention,"

-Steve Curry, architect for storage operations at Yahoo.

Other notable complaints of tape solutions include:

- Tape failures during backup
- Failed notifications of incomplete backups
- Inability to locate an appropriate or current backup tape
- Inability to make the backup window – (The time given in which to write all the data to tape.)
- Inadequate restore speeds from tape

A 2003 report by Gartner found that IT departments spend between 20 and 30 percent of their manpower dealing with tape backup problems. Over 30 percent of all storage problems stem from tape backup systems. Another 2003 study by the Strategic Research Corporation found that while tape backups are used extensively, restoring data from a tape backup system fails an astounding 70 percent of the time. The reasons for such an alarming rate of failure range significantly and may vary from bad tapes or tape drives to the inability to find the backup tapes or careless processing by IT staff.

In spite of all of these difficulties, organizations have been left with few alternatives to traditional backup technologies until recently. New products have sprouted almost over night to try and replace the legacy tape systems but they haven't solved everything.

## Disk Backups

Over the past few years, IT administrators have begun to look to disk-to-disk based solutions to solve some of the drawbacks of tape backup and recovery. In order to utilize a disk-based solution, IT administrators were often faced with doubling their total disk capacity to create an online backup, yet still having to further backup to tape for offsite disaster recovery protection. This approach helps solve the problem of backup overruns and tape restore speeds, but still carries a cost that is typically insurmountable. Though RAID technology helped with the problem of redundancy, it did not solve the problems of mistakenly deleted files or disaster recovery. These nightmares of traditional backup soon set the stage for new disk-to-disk technology that could offer the data protection of tape and the performance of disk at a cost that was still in the same ballpark as tape technology.

### Advantages:

- Faster writes of backup data to disk
- Faster restores from disk which meet recovery time objectives
- Familiar RAID storage technology
- Completing the backup during the time allocated
- Aids in meeting legislated requirements for corporations

Recovery of data in tape-based systems takes about four to five times longer than backing up information with a disk.

- According to Jon Murray of EMC

- Making multiple backup copies
- Responding to individual restore requests
- Reducing operational & mgmt costs
- Managing capacity growth
- Can be both written to and read from at the same time.

At one point, cost was a disadvantage. However, this old notion is no longer true as the price per GB is almost equal across both technologies.

#### **Disadvantages:**

- The most prevalent problem with implementing disk-to-disk based backup systems has been the inability to remove drives to an offsite location.
- And even if the drive is removed, most solutions lack the indexing ability to know what is on that drive.
- The inability to scale the disk-to-disk solution for the needs of a growing network.

## **Conclusion**

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A Disk-to-Disk-to-Disk appliance, which combines the speed and ease of disk backups with the mobility and security of tape backups, gives companies of all sizes the best advances in storage technology while maintaining the principles of business backup by giving indexing and mobility to their data. Disk-to-Disk-to-Disk appliances come with hot swappable drives that enable mission critical data can be archived in a safe, offsite location.

It's a good idea to keep some backups physically separate from the systems hosting the active data. Fire, flood, theft and other destructive forces are fortunately uncommon, but must be accounted for nonetheless. This requires a secure, independent location.

Byte and Switch magazine had this observation: "While backup to tape has been the predominant way organizations both large and small have protected their information, new disk-based backup and archival solutions are percolating into the market. These offer the promise of faster backup and recovery times, which would allow a business to recover more quickly in the event its primary storage goes down." Disk-to-Disk-to-Disk appliances provide for just such a recovery by enabling business to store much faster disk drives to offsite locations. Thus when a disaster happens, the business can restore using the archived disk(s) and get back to work many times faster than by using conventional tape.

"Restoring from a tape backup can take hours or even days as files are uncompressed and transferred back to disk. However, a RAID-based backup can be online as a replacement within minutes or even seconds."

- According to analyst John Webster of the Data Mobility Group

Another huge benefit for Disk-to-Disk-to-Disk solutions is the overall price when one considers that tapes should be replaced each year. Tape backup software is very expensive, adding additional cost. For example, a 2.6TB tape backup system would include a 26 tape LTO library, costing about \$26,000, with an additional \$10,000 for four weeks of tapes. Then add another \$9,000 to replace the tapes after one year, and \$8,000 for the third year's replacements as tape prices continue to drop. For Windows and/or Unix server software, add another \$25,000. Total cost, without a maintenance contract, is about \$78,000. A comparable Disk-to-Disk-to-Disk solution costs a fraction of that price and offers much better return on your investment.

## Summary

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Backing up a business's data is a labor intensive proposition that is increasingly necessary for all businesses regardless of size. However, once business data is organized, backing it up isn't complicated; it just takes a small amount of discipline to create and stick to a schedule.

Disk-to-Disk-to-Disk solutions provide innovative backup hardware that is worth getting excited about. Whether you are implementing a backup solution for the first time or revamping an existing corporate system, find an expert in Disk-to-Disk-to-Disk to show you the proper way to backup data with a disk solution that is robust and removable.

### **Best of Breed Disk-to-Disk-to-Disk Product Features**

- Feature rich software providing full, incremental and differential backup levels
- Internal scheduler for automatic backup execution
- Robust indexing software for tracking data on removed disks
- Data compression for maximum efficiency of disk space
- Hardware based RAID controller
- Hot swappable SATA drives
- No per client licensing fees
- Ability to perform multiple backups and restores simultaneously
- Prioritized backup job scheduling

A survey in 2003 by the Enterprise Storage Group found that offsite storage was the second major component to a successful disaster recovery plan. The survey also found that 85% of the respondents consider removable media to be an essential feature for any complete backup solution.