



# GST Research Report

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## Mirrored Backup

### The Need for Mirrored Backup



**SafeDR™ Family – Dual AIT Tape Subsystem**



**SafeDR™ Family – Dual LTO Tape Subsystem**



**SafeDR™ Family – Dual SLR Tape Subsystem**



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### **Abstract**

*Today, the protection of data in a highly resilient manner has become as important as generating data in the first place. Data is both a critical asset of the enterprise and a perishable asset. The strategies for storing critical data and applications must take into account strategies for the resilient protection and restoration of data and applications as well. One major way to do this is with a technique called Mirrored Backup. This report presents what it is and how it can be helpful in the resilient protection and restoration of data.*

*A dedicated manufacturer of tape storage solutions, GST, Inc. is providing this GST Research Report as part of its commitment to provide information leading to the better management of data and application protection within the IT industry.*



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### ***Mirrored Backup – Does it Make Sense?***

Three critical questions are faced today, by IT installations considering how to protect their data and critical applications:

1. How fast can I restore my data and programs onto my servers?
2. How fast can the disaster recovery site come up?
3. Where do I save my backup data?

Backup and restore are two of the most critical operational aspects of any IT installation today. Both are needed to protect against lost or damaged data. Moreover, disaster recovery services are needed to protect against the possibility of servers or the entire IT installation failing. The manner in which the backup data is captured and retained can have a significant effect on the backup process, the restore process and the disaster recovery function.

This GST Research Report summarizes the key issues as they relate to the *mirrored backup process* developed by GST. Mirrored backup is a new development that is aimed at making the backup, restore and DR processes more effective. Such a development deserves attention, for the benefits can be quite significant.

### **GST's Mirrored Backup Process**

Mirrored Backup technology works the same for stand-alone dual-drive mirrored tape subsystems and for a GST tape library with two drives.

The GST Commander Controller contains logic that enables any dual-drive GST tape subsystem or library to perform mirrored backups. All GST Mirrored Backup configurations produce identical sets of backup cartridges simultaneously. GST's tape controller takes the backup data from the server and makes two copies of the data so it can be written simultaneously to both drives. The GST tape controller places no extra burden on the server to produce the identical backup sets. There is no overhead software and no performance degradation to do this. One set of



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backup tapes is retained on-site to more quickly initiate the restore process. The other set of backup tapes is transported to a secure remote site that can either be a disaster-proof vault or the Disaster Recovery Center, to be used in the case of catastrophic failure of the IT center.

What follows is a discussion of the value of Mirrored Backup for the user.

### **1. What risks are faced by IT installations today?**

Backup and its companion, restore, have become more critical than ever in IT installations, particularly when the IT functions are a central part of the organization's mission. In fact, most other protective strategies (archiving, high availability and clustering) depend on regular backups for their foundation.

Risks to server integrity continue to grow in intensity and in form. Some of these risks that are faced by most IT installations today include the following:

- The hurricane season has been projected to increase in the US
- Forest fires, floods, earthquakes and other natural disasters
- The continuing increase in the cost of an hour of downtime (exacerbated by increased need to take systems down for maintenance/upgrades)
- Decreasing tolerance of errors on the part of customers
- The requirement for 24X365 uptime my for global operations
- Sabotage by unhappy staff

More recently, a new list of threats has been added:

- Physical terrorism that focuses on highly visible American entities
- Cyber terrorism that targets large server complexes

To this list will be added new risks in the years to follow. The nature of these risks cannot always be predicted ... this is one of the serious challenges faced by IT operations today.

### **2. What happens to organizations that don't protect against catastrophic threats?**

The effects of the first World Trade Center Disaster in 1994 were highly publicized and showed that organizations that loose access to their critical applications and data for time periods of as little as one or two weeks were highly at risk of failing



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within a year or two. This was even more the case with those compute-intensive apps like Enterprise Resource Planning, Business Intelligence, and simulations.

The industry analyst group, Gartner Group of Massachusetts, has made a startling report regarding company disasters:

- 20% of all small to medium businesses suffer a disaster every 5 years.
- 75% of all US businesses have experienced some type of business interruption.
- 43% of all US companies do not re-open after an unexpected business interruption
- 29% of all US companies close within 3 years after an unexpected business interruption.
- 93% of companies that experience a significant data loss close their doors within 5 years.

### **3. What is the best line of defense against unexpected business interruption?**

Business interruptions are of two categories: planned and unplanned. Planned downtime is a normal part of most IT operations, unless they are running a 24 x 7 operation. These pose no real threat to the organization, unless outside demands are pressuring the organization to go to a 24 x 7 operation. However, unplanned interruptions take the server(s) down at unexpected times and leave users compromised and the viability of the organization threatened. The degree of that threat is governed by the business continuity plans and processes that are in place. The two most basic safeguards are the two most basic processes in most well-prepared businesses:

**Backup/Restore Process** – generally incremental backups during the week and full system backups on the weekend; daily full systems backups are becoming more popular.

**Disaster Recovery Process** – generally a contract with a DR firm to provide for rapid transfer of critical applications to the DR site for execution until the failed IT site can be restored to operation. The DR site can be a hot site where computers are standing by ready to run, or a cold site that is set up to receive a computer that the customer provides. In any case, the most recent backup tapes must be delivered to the DR site and the applications synched up to the last point of full backup capture, before the DR center can begin to operate.



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### 4. What is the backup storage dilemma?

Backup cartridges need to be stored *near the IT installation* so they can be retrieved faster to speed initiating the restore process. However, it's also true that backup cartridges need to be stored *near the disaster recovery site* in case the primary IT installation is rendered inoperable. Thus, the backup cartridges must be stored somewhere nearby the server for rapid restores, but also near the DR site in case of a catastrophic failure ... that makes where the cartridges are stored a critical issue.

The best way to solve this dilemma is by having a second set of backup tapes. This provides one set to be kept at the IT installation and another nearby the DR recovery site. This has been achieved up to now by using the COPY function of the server to make a duplicate set of backup tapes. Doing it this way consumes server cycles and takes time ... this can impact production when the backup files are large.

Mirrored Backup is another technique that can solve this dilemma. It does so by generating identical sets of backup cartridge sets. Instead of a subsequent COPY operation that takes time and uses processor cycles, identical sets of tape backup cartridges are generated *simultaneously* during the backup process. This efficiently resolves the dilemma:

1. To rapidly get backup tapes to the restore process.
2. To rapidly get backup tapes to the DR center in the event of a catastrophic failure of the IT installation.

Mirrored backup eliminates the copying of backup set to get around this dilemma. These identical backup sets are produced without the additional workload associated with the COPY function.

### 5. How does mirrored backup support DR?

Disaster Recovery has become more important than ever, since the World Trade Center disaster and subsequent terrorist threats. A key part of any IT strategy document today must include the steps to be taken if the IT center is completely compromised. Due to the need to be online to meet customer demands, DR Plans must include steps to get the critical applications up and running rapidly at the



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remote DR center. Any delay can result in lost business, lost customers and lost customer goodwill.

Mirrored Backups enable an organization to more quickly move to a DR Center operation. This is because one of the identical backup sets can be stored at the Disaster Recovery Center, or a nearby safe facility, assuring a much faster initiation of the DR process. Business continuity is assured as the organization's key applications are brought up rapidly at the DR Center.

### **6. How does mirrored backup support the restore process?**

The restore process on many servers can be a long and complex process, taking many hours, or even days, to complete. Having a dedicated set of backup tapes at the site of each backed up server greatly speeds the initiation of the restore process, permitting the restore to be completed in a shorter time period. Moreover, the second backup set that is retained off-site serves as an emergency replacement set, if the restore set is lost or damaged.

### **7. How does mirrored backup provide a fail-safe operation?**

The dual-drive tape subsystem and two-drive library used by GST's Mirrored Backup function can be used in a way that provides a fail-safe operation for the backup and restore processes. In the event of a drive failure, GST's Commander tape controller will continue to operate the second drive, ensuring the backup or restore is completed successfully. In a long backup, or an even longer restore operation, the ability to avoid having to start over due to a failure near the end of the backup or restore process can be the difference between getting back online within an acceptable time or not ... and the implications of the latter can be very costly.

### **8. The effect of high-capacity cartridges on backups.**

Recent increases of capacity per cartridge have entered the hundreds of Gigabytes of data per cartridge. Compression doubles these numbers. This is in contrast to older cartridge capacities of 5 or 10 Gigabytes. The higher capacity cartridges have resulted in some backup operations that put the entire backup on one or two cartridges. This can cause additional exposure in the restore process since the failure of one cartridge now takes out a much greater portion of the backup data than before. In the past, if one cartridge of a ten cartridge backup set was bad, there was a good chance of restoring the other nine cartridges. If a higher-capacity





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cartridge fails, much more of the backup data is lost. This further underscores the need for redundancy of backup sets. The second backup set generated by Mirrored Backup takes on greater value when high-capacity cartridges are used, since the duplicate cartridge now protects a much greater portion of the total backup.

### **Conclusion**

With mounting threats to IT safety and security, and the cost of recovery spiraling upwards, the need to shorten and make safer the backup/restore process is no longer debated. Furthermore, even with improved security measures, the requirement of a fully-tested DRP that assured rapid recovery at a remote and secure site is also a given. With these two objectives in place, the search for ways to improve these processes has resulted in a variety of developments, including clustering, high availability and remote vaulting. A highly cost-effective way to improve these processes is with duplicate backup sets, and Mirrored Backup is the most transparent way to produce duplicate sets.

In addition, implementing fault-tolerant measures through redundancy of dual-drives solutions can greatly reduce down time due to a failed tape drive. This capability is built into Mirrored Backup.

GST has recommended a new standard for Mandatory Redundant Backup. Whereas in the past, backups were not considered safe unless they were performed daily with a single tape drive, now the minimum hardware configuration for satisfactorily performing backups and restores is a mirrored pair of drives. We expect to see this trend grow, with the requirement for both an on-site set and an off-site set of backup tapes becoming the minimally accepted level of backup to be performed.

Mirrored Backups can be a key weapon in the organization's arsenal to fight off the growing array of threats that can bring a system down, and the organization with it.

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### **About the author**

This GST Research Report was prepared under the leadership of David Breisacher, CEO/Chairman at GST. David is the founder of several successful companies, including GST and BCC Technologies, a manufacturer of eServer disk, tape and memory storage devices. A visionary for the storage industry since the early 90's, David lends his market insight and predictions for the IBM midrange storage marketplace to the research conducted at GST. His experience in sensing shifts in technology and industry directions has made it possible for him to organize and structure successful companies to rapidly meet the evolving needs of storage users.

### **Feedback**

We value your feedback on this GST Research Report. Please send your comments, suggestions and questions to: [research@gstinc.com](mailto:research@gstinc.com).

### **About GST, Inc.**

GST, Inc. ([www.gstinc.com](http://www.gstinc.com)) engineers, manufactures, markets and sells a line of innovative storage products to meet the need for high-performance, continuous reliability and cost-effective data storage. These products include tape solutions available today, and will include storage-related services, software and disk subsystems in the future. A comprehensive array of tape solutions range from single and dual tape subsystems, autoloaders, midrange tape libraries, to modular enterprise-wide tape libraries, with focus on improved backup and disaster recovery solutions. Modular design enables field upgrades, scalability, investment protection for existing GST tape solutions, and lower life-cycle costs. GST's product development is guided by several advisory boards to closely track market needs and fully utilize the latest engineering developments in product design. Complete information about products, support and company background can be found at the company's Website.

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