

## ACCELERATING BACKUP/RESTORE WITH **SUN STORAGE TEK™ VIRTUAL TAPE LIBRARY**

Selecting an Optimized, Secure Configuration  
to Fit Your Environment

White Paper

February 2007

### **Abstract**

Virtual Tape Libraries have many benefits to an organization. From the ability to emulate more tape drives than a physical tape library, to allowing multiple backup streams to run simultaneously, thus enabling organizations to easily complete their backups within their allotted window. The choice to implement a virtual tape library solution is a simple one. This white paper will help you choose the right VTL configuration for your business.

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## Chapter 1

# Accelerating Backup/Restore with Optimized Sun StorageTek Virtual Tape Library Configurations

In most organizations, data users don't generally care where their information is stored. They just want it to be protected and available at a moment's notice. Sun's virtualization solutions make that happen all with the choice of using physical tape, virtual tape and disk infrastructures to get the most effective data protection solution possible.

The Sun StorageTek™ Virtual Tape Library (VTL) increases the speed and reliability of backups that use standard third-party backup applications by leveraging disk space to emulate industry standard tape libraries. Since VTL uses the Sun StorageTek 6000 Disk Series to back up data, it eliminates the media and mechanical errors that can occur with physical tapes and drives.

Recognizing the benefits of disk-based backup, some backup administrators implement VTL to backup data solely to a disk-based virtual tape library (D2D), replacing the need for physical tape libraries. Many other backup administrators, who want or need to have backup data on physical tapes, choose to complement their existing tape backup strategy with VTL. Used in this way, VTL dramatically accelerates backups and then moves data to physical tapes as a background process without impacting production servers.

When planning your VTL deployment, you need to determine what type of configuration best suits your organization. The flexibility of the StorageTek VTL supports three possible disk-to-disk-to-tape (D2D2T) configurations (many VTL vendors are limited to a single mode of deployment). To serve the diverse requirements of today's organizations, this flexibility is essential. With the StorageTek VTL, you choose your preferred configuration, while still making it easy for backup administrators to manage both virtual tapes and physical tapes.

## Chapter 2

# VTL Configurations for Disk-to-Disk-to-Tape Backup

## Integrating Sun StorageTek VTL with Third-Party Backup Software and Physical Tape Libraries

- **Basic Configuration** – In this configuration, the backup software manages all tapes – virtual and physical – and interacts with the virtual tape library provisioned by VTL as though it were just another standalone tape library that has been attached to the backup server. No reconfiguration is required to copy data from virtual to physical tapes and the backup software’s “TapeCopy” function is utilized.
- **Advanced Configuration** –The backup software in this configuration, manages backups to the virtual tape library while VTL manages the export of data from virtual to physical tapes. This innovative approach enables data to be moved to physical tapes as a background process without impacting production servers.
- **Automated Tape Caching Configuration** – Backups to the virtual tape library are managed by the backup software while VTL acts as a transparent cache to the physical tape library, dramatically accelerating backups, and making restoring data a simple, seamless process. This revolutionary method automatically migrates data to a physical tape based on flexible administrator-defined policies and enables transparent access to data, whether it is located on physical or virtual tape.

### Basic VTL Plus Configuration

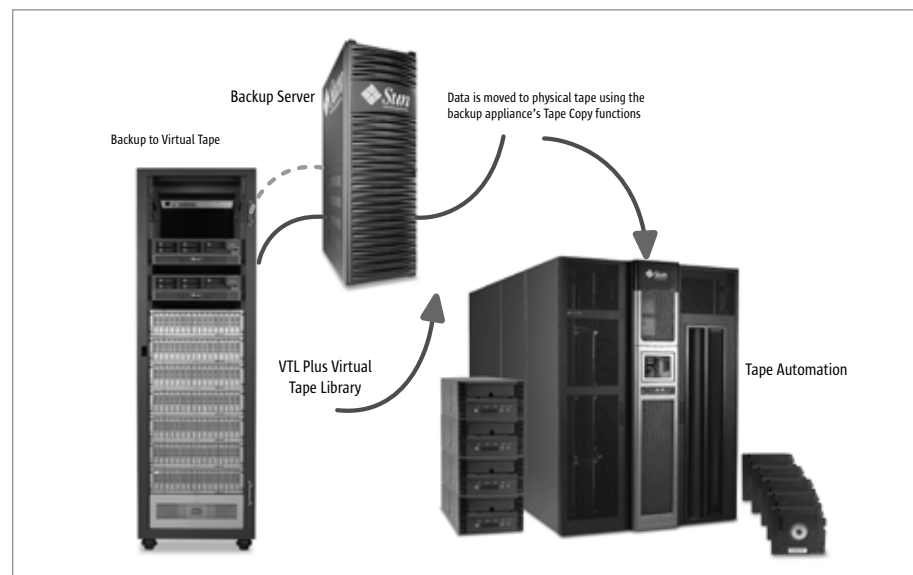


Figure 1: Basic VTL Plus Configuration

In the basic VTL configuration, the backup software manages all tapes — virtual and physical — by treating the virtual tape library as though it were just another standalone tape library attached to the backup server. The backup software runs on an existing backup server.

The basic VTL configuration is ideal for organizations that already have a backup process in place with which they are comfortable but it is not currently meeting all of their backup objectives. Adding a VTL appliance as another tape library allows backup administrators to easily increase their parallel backup streams and take advantage of VTL's rapid data recovery without having to alter their current configuration. With the backup application managing the entire backup process, virtual tapes and physical tapes are seen in the same way — a virtual tape is just another tape.

In this VTL configuration, backups to virtual tapes occur more quickly. It even allows a backup server at a later time to copy the data to physical tapes without impacting the production environment. Because the backup server performs the tape copying function in addition to backups, additional overhead can be incurred by the backup server. Therefore, it is best to perform tape copying at off-peak hours.

#### **Benefits of the Basic VTL Configuration**

- Simplest deployment and the most familiar configuration for many backup administrators.
- Uses the “TapeCopy” function from within the backup application’s console to copy data from the virtual tape library to the physical tape library.
- Since the backup application performs the copy, data can span across tapes. Some backup applications also allow copying to a different media type (e.g., DLT to LTO). This can conserve media since many smaller virtual tapes can be stored on fewer physical tapes.
- Virtual tapes are seen in the same way as physical tapes — both are visible from the backup server’s database.
- Can replace the need and expense of purchasing additional physical tape libraries.

## Advanced VTL Plus Configuration

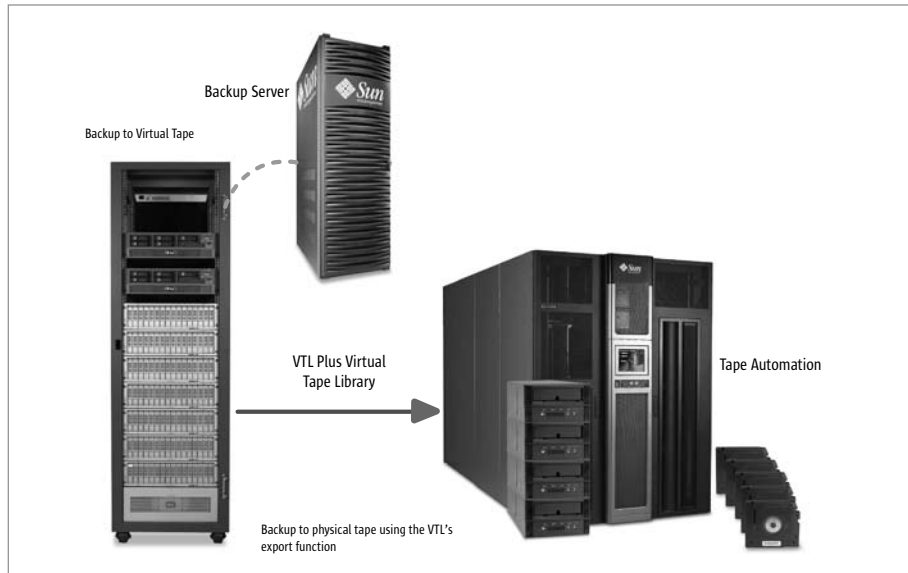


Figure 2: Advanced VTL Plus Configuration

The advanced VTL configuration presents backup in an innovative fashion — backups to the virtual tape library as the VTL appliance manages the export of data from virtual to physical tapes. In this approach, the backup server is not involved in the offload of virtual tape to physical tape.

With the advanced VTL configuration, backups to virtual tapes occur very quickly. Then, at a later time, when you are done using a given tape, you can export data to a physical tape for offsite vaulting or disaster recovery without impacting the production environment. VTL can also be set up in “Auto Archive” mode so that after each backup to the virtual tape completes, data is automatically exported to physical tape. For increased data security, the VTL Secure Tape Option (STO) can be deployed to ensure that data exported to tape is kept confidential and secure. The STO uses the Advanced Encryption Standard (AES) algorithm published by the U.S. government’s National Institute of Standards and Technology to encrypt data when it is exported to physical tape and decrypt it when it is imported back to virtual tapes. The data on encrypted physical tapes cannot be read without being decrypted, protecting it from being accessed by unauthorized persons.

The advanced VTL configuration requires the administrator to set up the initial physical tape library emulation so that there is a 1:1 mapping, with identical barcodes between virtual and physical tapes. This enables the backup software to keep track of what data is on which tape and it also prevents tapes from being created that would be unidentifiable by the backup software. Whenever data is written to physical tape, the virtual tape can then be deleted or can be maintained for rapid data recovery from disk.

The physical tape will always have the same barcode as its virtual tape counterpart, providing the administrator the flexibility to easily restore data from either virtual or physical tape.

When it comes time to restore, the backup software identifies the barcode of the tape containing the needed data. If the data still resides on virtual tape (i.e., it was never exported or it was exported with the virtual tape maintained), it can be restored very quickly because data is being read from disk. If the data only resides on a physical tape, this tape must first be reintroduced to the VTL with a few simple keystrokes in the VTL console so that the backup software can access it and restore it in its usual manner. It is not necessary to reimport data into VTL before it can be accessed because VTL has a “direct access” feature which allows backup applications to directly access data on physical tapes without first having to copy the data back to disk. This gives users the ability to restore data as quickly as possible regardless of whether it is on virtual tape or on physical tape.

There are many of Sun’s customers who are deploying VTL in this way with great success. For example, one of the world’s largest providers of financial services and mutual funds significantly accelerated and improved the success rate of its backup operations with this VTL configuration. VTL allows the firm to export data on virtual tapes to physical tapes on demand or automatically by policy. Export to physical tapes is accomplished as a background task and can be completed at any time without impacting the performance of production and backup applications. Moreover, lower administrative costs enabled the company to save \$80,000 - \$100,000 per datacenter, per year.

#### **Benefits of the Advanced VTL Configuration**

- VTL appliance can use the backup application’s current physical tape library license. No changes are required.
- Can duplicate data between VTL and physical tape library without impacting the backup server.
- VTL exports to physical tape as a background operation for offsite vaulting and disaster protection.
- For additional redundancy, virtual tape data can be securely replicated to a secondary location.
- Data restore is straightforward: The backup application identifies the tape containing data to restore irrespective of whether data is on virtual or physical tape.
- Enables a physical tape library to be upgraded without having to reconfigure backup software or policies.
- Data on physical tapes can be encrypted, adding security so that data cannot be accessed by unauthorized persons if tapes are lost or misplaced.

## Automated Tape Caching VTL Plus Configuration

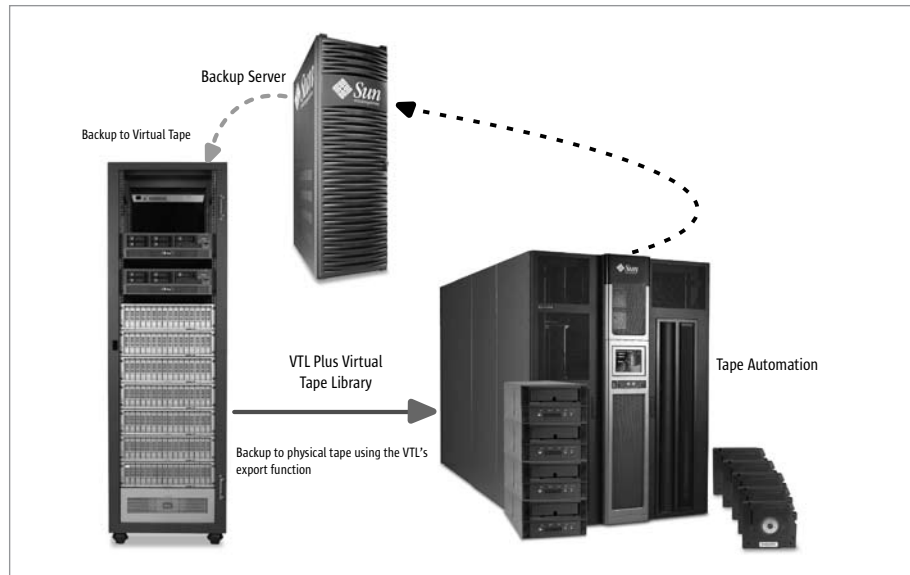


Figure 3: Automated Tape Caching VTL Plus Configuration

In the Automated Tape Caching VTL Configuration, VTL acts as a transparent cache to the physical tape library, dramatically accelerating backups while facilitating transparent access to data, even when it is located on physical tapes. This delivers greater simplicity because the physical tape and virtual tape are seen as the same entity by the backup application, regardless of whether the data is on disk (virtual tape) or on physical tape. Note that this approach requires the StorageTek VTL Automated Tape Caching option.

As in the Advanced VTL Configuration, the backup software manages backups to the virtual tape library while data export to physical tape is handled by the VTL appliance as a background process that does not impact production servers. However, since the Automated Tape Caching Configuration provides direct access to data on physical tape, the restore process becomes transparent from the perspective of the backup application.

To simplify deployment, the Automated Tape Caching Configuration detects the physical tape library that has been assigned to VTL and automatically matches VTL's configuration to it. This creates a 1:1 mapping, with matching barcodes between virtual and physical tapes. This is an effortless approach for many backup administrators who prefer automation to manually setting up the initial physical tape library emulation (as required by the Advanced VTL Configuration). Moreover, this high level of simplicity streamlines the backup process for organizations with multiple backup servers (each with their own physical tape library), since the Automated Tape Caching Configuration supports the caching of multiple physical tape libraries simultaneously.

The Automated Tape Caching Configuration makes it easy for backup administrators to tailor VTL data migration policies according to their information management (IM) requirements. Flexible policies automatically trigger data export to physical tapes based on a variety of thresholds, such as the length of time data has been on virtual tape or when disk space available for virtual tapes is running low. The Automated Tape Caching Option also provides very flexible space reclamation policies (free space immediately upon migration, after specified retention period, when run out of space).

For increased data security, the VTL Secure Tape Option can be deployed to ensure that data exported to tape is kept confidential and secure. The Secure Tape Option uses the Advanced Encryption Standard (AES) algorithm published by the U.S. government's National Institute of Standards and Technology to encrypt data when it is exported to physical tape and decrypt it when it is imported back to virtual tapes. The data on encrypted physical tapes cannot be read without being decrypted, protecting it from being accessed by unauthorized persons.

#### **Benefits of the Automated Tape Caching Configuration**

- Provides direct access to data regardless of whether it is on virtual or physical tape.
- Detects the physical tape library that has been assigned to the VTL and automatically matches the VTL's configuration to it.
- Easy tape management. Backup application will only see one tape, even if the VTL migrates it to the physical tape library.
- Automatically migrates data to physical tape based on highly flexible policies, enabling backup administrators to tailor policies according to their IM requirements.
- Data on physical tapes can be encrypted, adding security so that data cannot be accessed by unauthorized persons if tapes are lost or misplaced.
- Provides flexible space reclamation policies.
- The VTL appliance can use the backup application's current physical tape library license. No changes are required.
- You can duplicate data between the VTL and physical tape library without impacting the backup server.
- The VTL handles exports to physical tape as a background operation for offsite vaulting and disaster protection.
- For additional redundancy, virtual tape data can be securely replicated to a secondary location.
- Data restore is straightforward: The backup application identifies the tape containing data to restore irrespective of whether data is on virtual or physical tape.

## Chapter 3

# Delivering Encryption Everywhere it Matters

“Data encryption has become a necessity...With privacy-protection laws and regulatory-compliance guidelines hardening in virtually every industry, IT managers who don’t have encryption in place should be scouring the marketplace for an appropriate solution.”

– Henry Baltazar, Senior Analyst, eWEEK

## The Case for Encryption

In today’s corporate storage environments, it’s no secret that data security is a prominent concern: data retention and privacy regulations proliferate, the news headlines are constantly shouting about lost tapes or data intercepted in transit, and everyone’s heard of a company whose backup data has been compromised. In the scramble to shore up data security, IT managers are now besieged with problems revolving around data encryption for physical tapes.

Moreover, since data security is only as good as its weakest link, securing data both on backup media and during any replication processes should not be overlooked — the integrity of companies’ IT and business infrastructures depends on it.

Sun’s advanced VTL encryption technology, an integral part of its VTL appliance, offers businesses two absolutely essential levels of encryption to protect their sensitive corporate data when it is offline from production systems:

- StorageTek VTL Secure Tape feature: Encryption of data on export from virtual to physical tapes — encrypted data on physical tapes cannot be accessed by unauthorized users.
- StorageTek VTL Encryption for Replication feature: Encryption of the data stream during remote replication from one location to another so that data cannot be read if intercepted.

## StorageTek VTL Secure Tape Option — Securing Tape Encryption Without Impacting Backup Performance and Simple Key Management

StorageTek’s VTL Secure Tape feature is a highly secure, easy-to-use tape encryption service, based on the Advanced Encryption Standard (AES) — a U.S. government standard. It prevents unauthorized access to data on physical tapes and protects against information theft.

Because encryption and decryption functions are part of the VTL solution, they are offloaded from the backup servers, enabling third-party backup solutions to concentrate solely on the backup. This increases the VTL’s ability to speed up the backup process by minimizing the variables that slow down a production environment during backup. Encryption occurs as a secondary process without degrading backup

performance or eating into the backup window. This is a critical benefit, since the high overhead of tape encryption, as performed by backup applications, is cited as the most common reason why backup administrators fail to encrypt tapes in the face of already maxed-out backup windows.

A unique feature of the StorageTek VTL is that encryption keys can be set for individual tapes, a set of tapes or at the virtual tape library level. Moreover, key management is painless — VTL provides a simple mechanism to generate secure packages (keyrings) of one or more keys that can be transported/transmitted separately from the encrypted tapes. Since keys can be imported/exported or emailed, restoring data offsite or for disaster recovery, is easier with StorageTek's VTL than other virtual tape solutions.

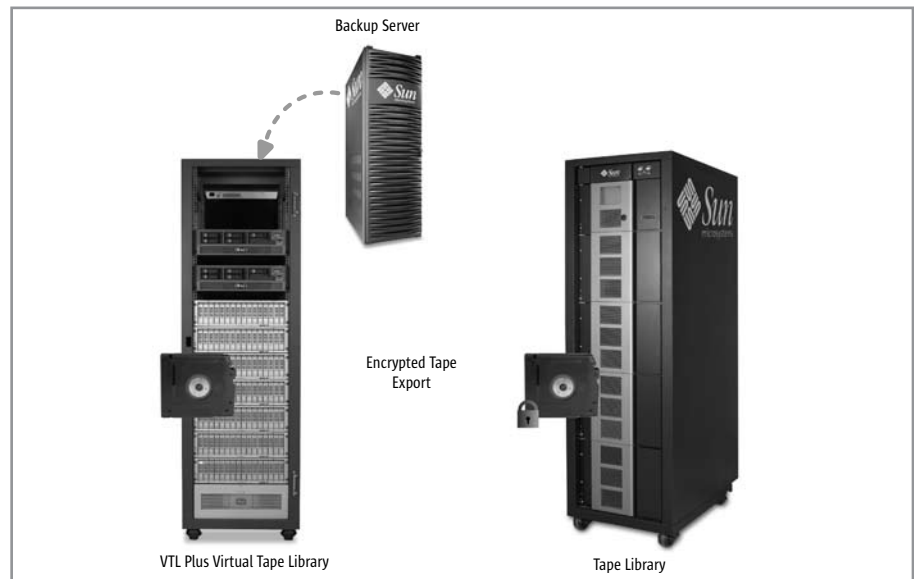


Figure 4: StorageTek VTL Secure Tape option.

The StorageTek VTL's tape encryption and decryption mechanism is fully integrated with the solution's tape export/import subsystem and is 100 percent transparent to third-party backup software applications. To deliver rapid return on investment (ROI) and minimal total cost of ownership (TCO), VTL and its "Secure Tape" feature can be easily deployed into any backup environment while leveraging existing backup software and policies.

## StorageTek VTL Encryption for Replication — Safe Remote Replication of Virtual Tapes

Another vital layer of data protection within StorageTek's VTL VTL addresses data that is moving over a wide area network (WAN). The "Encryption for Replication" feature encrypts the data stream during the transmission. StorageTek's VTL replication feature allows users to efficiently, safely, and securely replicate virtual tapes over IP for electronic vaulting, based on policy, in a peer-to-peer or many-to-one configuration from one VTL appliance to another.

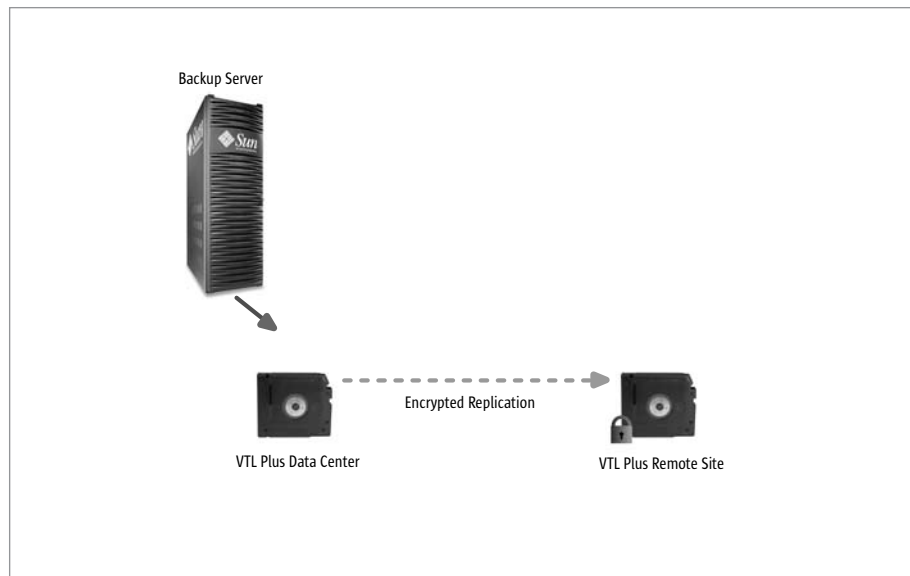


Figure 5: StorageTek VTL Encryption for Replication.

## Chapter 4

# Conclusion

The StorageTek VTL storage appliance combines a server, disk storage, and software in a single cabinet that looks to the operating environment like tape — really fast tape. No matter what configuration you choose, your backup and recovery applications interact not with tape but with disk, getting disk-to-disk performance and reliability. Backups are faster. Recoveries are more reliable and automated tape management is integrated seamlessly behind the virtual tape interface.

Our VTL solution offers backup administrators an alternative to the high overhead of backup software-based encryption: it provides advanced encryption and decryption features for third-Sun's encryption solutions protect both data exported to physical tapes and virtual tape data in transit during remote replication from location to location. Security of backup tapes is achieved through encryption for physical tapes and the Sun Solaris platform for online virtual protection.

Begin experiencing the benefits of the Sun's virtual tape-based backup today by choosing the StorageTek VTL configuration that works for your business.



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