HPE StoreEver Tape Libraries with CommVault Simpana
Contents

Introduction .......................................................................................................................... 3
Technology overview ............................................................................................................. 3
  HPE StoreEver Tape key features and benefits .................................................................. 3
  HPE 3PAR StoreServ Storage key features and benefits ..................................................... 4
  HPE StoreAll Storage key features and benefits .................................................................. 4
Integrating HPE StoreEver Tape with CommVault Simpana .................................................. 5
Installation and configuration ............................................................................................. 5
  Installation checklist ........................................................................................................ 5
  Installing CommVault Simpana ........................................................................................ 6
  Installing CommVault Simpana Software ......................................................................... 6
  Initial Setup .................................................................................................................... 7
Backup and restore jobs ..................................................................................................... 8
Performance and tuning .................................................................................................... 12
  Chunk and block size allocation .................................................................................... 13
  File (data) compression ratio .......................................................................................... 13
  Source disk and file systems ........................................................................................... 14
  Tape drive ........................................................................................................................ 14
Conclusion ......................................................................................................................... 15
Useful links ......................................................................................................................... 15
Introduction

In today’s business environment, Enterprise business customers rely on the most efficient, high performing, and reliable data protection and archiving systems. Customers need to protect increasing levels of data while keeping costs under control. In particular, businesses today are concerned about the costs of backing up and archiving important data from mission-critical servers.

Tape storage is a critical component of a comprehensive, tiered, and converged data protection and archiving solution that balances cost and performance. The ideal approach to data protection and archiving is to match the access, retention and cost requirements for a business with the right storage technology. Most often, the result is a multi-tier strategy that blends the access speeds of disk with the low cost, offline and long shelf-life benefits of tape.

When paired with HPE 3PAR StoreServ Storage and HPE StoreAll Storage—which incorporate Hewlett Packard Enterprise innovations such as storage federation, scale-out architecture, and adaptive optimization—HPE StoreEver Tape lowers costs while increasing data security and reliability. HPE Storage enables businesses to efficiently respond to new and ever changing demands.

Technology overview

HPE StoreEver Tape key features and benefits

HPE StoreEver Tape products protect your data longer, for less

As the worldwide leader1 in tape drives and automation, HPE StoreEver Tape provides tape storage that is critical to comprehensive data protection and archiving. HPE StoreEver also addresses all of your long-term retention needs. With the broadest and most advanced portfolio in the industry, HPE StoreEver now features support for LTO-7. HPE StoreEver includes tape media, standalone tape drives, and tape libraries that accommodate more than 180 PB2 in a single system.

HPE StoreEver tape automation libraries include HPE StoreEver ESL G3 and MSL Tape library families.

HPE StoreEver:

- Reduces TCO and management burden—efficiently protect and retain rapidly growing data

  With support for LTO-7, HPE StoreEver offers significant cost, energy and footprint advantages. Lowest cost per Gigabyte for longer-term storage with limited power or energy requirements as the less frequently accessed data is stored or as media become full.

  The HPE MSL6480 Tape library offers up to 195 TB (equivalent to 13 LTO-7 tape cartridges) per 1U of rack space using LTO-7 drives, while providing the highest tape drive density per module of any mid-range tape library, providing flexible options to consider for your business.

  HPE Command View for Tape Libraries software is a single pane of glass management software which eases data protection with remote management, diagnostics, and configuration of all your ESL G3 and MSL tape libraries through a single console.

- Is reliable—protect and retain data over the long term

  With enhanced reliability, extreme durability, and proactive monitoring by HPE StoreEver TapeAssure Advanced technology, you can store essential but less frequently accessed data with confidence.

  TapeAssure Advanced makes managing, fine-tuning, and archiving faster and easier with comprehensive reports on status, performance, utilization, and health of all tape drives and media. The advanced analytics feature of TapeAssure Advanced makes use of predictive analytics to predict the likelihood of failures, bottlenecks, and load balancing issues in the tape infrastructure. This data can be exported on demand or at scheduled times through HPE Command View Tape Library software.

  HPE StoreEver Tape is ideal for archiving cold or active data with a media shelf-life of up to 30 years in normal ambient conditions.

- Is secure—enable a vital “last line of defense”

  Hardware-based data encryption, WORM protection, and removable storage that are offline to threats make HPE StoreEver a highly reliable safety net and an optimal platform for long-term digital archive.

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1 According to the IDC Branded Tape Tracker CQ4 2012, Hewlett Packard Enterprise is the worldwide market share leader in total units.
2 Using 2.5:1 compression and a fully populated 16 frame ESL G3 tape library.
• Delivers enormous scalability and high availability—answer data growth challenges

The HPE StoreEver ESL G3 can scale from 100 to up to 12,006 tape cartridges—from 1 to 96 LTO-4 or newer Ultrium tape drives—and 1 to 16 library frames, with each frame in a standard 19-inch rack form factor which is the smallest enterprise library footprint available.

Support ongoing host and SAN connectivity under varying conditions with library LUN control failover. Achieve near-continuous data access with new dual-robotic capabilities available with the HPE StoreEver ESL G3.

The HPE StoreEver MSL6480 Tape library has scale-out architecture which allows you to pay as you grow—simply add in new modules to boost capacity and performance without investing in a whole new library.

An MSL6480 can scale vertically from 80 to 560 cartridge slots to store up to 8.4 PB in a single 19-inch rack; add in between 1 and 42 LTO-5 or newer half-height SAS or FC drives for speeds of up to 113.4 TB/hour (assumes LTO-7 with 2.5:1 data compression) which can save you lots of time.

HPE 3PAR StoreServ Storage key features and benefits

HPE 3PAR StoreServ Storage products optimize your storage on-the-fly to maximize capacity utilization while delivering high service levels

HPE 3PAR StoreServ Storage are storage systems which range from Tier 1, mission-critical solutions with the highest performance and scalability that support cloud and IT as Service environments, to storage solutions with enterprise class features at a midrange price, designed for the virtualized data center.

HPE 3PAR StoreServ is:

• Efficient
  Reduce capacity requirements by 50%—guaranteed.3

• Autonomic
  Simplify, automate, and expedite storage management by handling storage provisioning, tiering, and change management autonomically—intelligently, at a sub-system level, and without administrator intervention—reducing administration time by up to 90 percent.

• Federated
  Meet the needs of today’s data center with the ability to move data and workloads between arrays without impact to applications, users, or services. Simply and non-disruptively shift data between HPE 3PAR StoreServ systems without additional management layers or appliances.

HPE StoreAll Storage key features and benefits

HPE StoreAll Storage products let you hyperscale your storage to tame and mine business value from your large amounts of unstructured data

HPE StoreAll Storage reduces the cost, complexity, and time to store, protect, and extract business value from massive amounts of unstructured data. HPE StoreAll Storage instantaneously pinpoints data and turns it into actionable intelligence. Bring structure to unstructured data with custom metadata attributes, data retention policies, and autonomic protection for data durability.

HPE StoreAll is:

• Hyperscale—Massive scalability without complexity
  Scale to over 1000 nodes, 16 PB, and billions of objects and files in a single namespace.

• Harnessed—Structure for unstructured data
  Custom meta tagging, rapid deployment tools, and autonomic protection for data durability.

• Instant—Ultra-fast search and value extraction at petabyte scale
  Express Query from HPE Labs lets you access billions of files in minutes. Run scans and queries you could never execute before due to time constraints.

3 Requires the use of HPE 3PAR Thin Conversion Software and HPE 3PAR Thin Provisioning Software. For details, refer to the Get Thin Guarantee Terms and Conditions. More information is available at: hp.com/storage/getthin.
Integrating HPE StoreEver Tape with CommVault Simpana

CommVault Simpana is an Enterprise class backup and recovery solution. CommVault Simpana software can be used to analyze, back up and recover, replicate, archive, and search data and information across your enterprise and across any storage devices—from data centers to desktops to laptops and in the cloud. CommVault delivers disk and tape data protection for any operating system, database, and application. A list of compatible operating systems, platforms, and applications can be found on the CommVault Simpana website: commvault.com/simpana.

Installation and configuration

Hewlett Packard Enterprise has joined with leading software companies to develop a comprehensive approach to ensuring that all hardware, firmware, driver, and software components are properly fitted into certified and supported data protection and archiving solutions. Before configuring and implementing a data protection and archiving solution, refer to the following:

- The HPE StoreEver information held within the HPE Backup, Recovery and Archive (BURA) Solutions Design Guide—hpe.com/storage/buracompatibility
  Extensive documentation to design, configure, and implement a broad selection of data protection and archiving solutions that are fully supported and certified with HPE StoreEver Storage in homogeneous and heterogeneous environments.

- The StoreEver section of the HPE Data Agile BURA Compatibility Matrices—hpe.com/storage/buracompatibility
  A single point of reference for the latest HPE StoreEver interoperability and device compatibility details. It contains tape device connectivity details including supported servers, operating systems, controllers and infrastructure components, as well as Backup and Archival ISV partner compatibility.

- SAN Design Guide—hp.com/go/san
  Explains how HPE Storage systems, storage management tools, and Fibre Channel products can be used in open heterogeneous SANs.

Installation checklist

If the answer to each of the following questions is “yes”, then all components on the SAN are logged in and configured properly:

- Are all of the following hardware components at the minimum supported firmware revisions specified in the current Data Agile BURA Compatibility Matrix: servers, HBAs, Fibre Channel switches, Command View Tape Library, tape drives, and library robots?
- Is the minimum patch level support for each operating system installed?
- Is the minimum supported drivers specified in the Data Agile BURA Compatibility Matrix installed (HBA, tape drives)?
- Is the HPE StoreEver tape library or partition(s) online?
- Are all of the host HBAs correctly logged into the Fibre Channel switch?
- If the Fibre Channel switches are cascaded or meshed, are all Inter-Switch Link (ISL) ports correctly logged in?
- Are all tape and robotic devices zoned, configured, and presented to each host from the Fibre Channel switch?
- Are the host(s) HBAs, tape, and robotic devices in the same switch zone(s)? See the below note.
- Do the hosts detect all of the tape and robotic devices intended to be used?
- Are all HPE StoreEver storage devices seen by HPE Command View Tape Library?
- Has connectivity been verified using HPE Library and Tape Tools or operating system specific tools (for example, the SG utility in Linux®)?

Note: Hewlett Packard Enterprise strongly recommends creating zones by HBA port. For more detailed information on creating zones by HBA port, refer to the BURA Solutions Design Guide: hpe.com/storage/buracompatibility.
Installing CommVault Simpana

After all components on the SAN are logged in and configured, the hosts are ready for installation of CommVault Simpana. Refer to the CommVault CommCell Quick Start Guide to download and install Simpana or contact CommVault customer support for detailed installation procedures and requirements.

Before installing Simpana, you should complete the following tasks:

- Hewlett Packard Enterprise recommends that you remove any other backup software currently configured on your computer before installing Simpana. Other backup software, tape device applications that are part of the OS, and SAN or system management software can negatively affect how Simpana installs and functions.

- Check your Windows® security settings to make sure that they work properly with Simpana.

- Proper Simpana licensing is required to run the application beyond the trial period. Licensing information can be found at: commvault.com/simpana-software/licensing

Installing CommVault Simpana Software

Figure 1 shows the CommVault Simpana architecture. Refer to the Install CommServe and MediaAgent section of the CommVault CommCell Quick Start Guide when installing Simpana. For this technical brief, the following components were installed using the standard install option in the order listed:

1. CommCell
2. MediaAgents
3. Windows and Linux clients (iDataAgents)

Figure 1. CommVault architecture with an HPE StoreEver ESL G3 tape library, an HPE 3PAR StoreServ system, and an HPE StoreAll system
Initial Setup

When the Simpana Express Administrative Console is first launched, the **Getting Started** interface is displayed:

- Under **Initial Setup**, click on **Initial CommCell Configuration** to initially configure the CommCell to download software packages, updates, and configure email and web server settings.

**Note:** For detailed information for any step while using the **Getting Started** interface, click on any of the question marks to the right of either the main topic or the individual steps for CommVault’s online help.

- Once the initial CommCell configuration settings have been modified/verified, click on **Configure Storage** at the bottom-right of the Initial Setup interface. You can view/edit or add media agents on this page if necessary. For this technical brief, the media agents were joined to the CommCell when the software was installed on each server.

- Next, you can configure storage devices. Under **Configure Storage Devices**, click on **Add Tape Storage**.

- The **Add Tape Library** interface will be displayed. Any media agents that have been configured should be available in the drop-down menu for **MediaAgent**. Individually select the media agents then click on **Scan Hardware**. Click **OK** when the hardware scan successfully completes.

- Under **Configure Storage Devices**, the newly created/added tape libraries should be displayed. You can view/edit the properties for any libraries, if necessary, by clicking on that library. This includes renaming the library, changing which media agent controls the library, media overwrite options, etc. If the media being used is not new/blank, the library properties must be edited to allow media to be overwritten. See figure 2 as an example.

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**Figure 2.** Editing the library properties to allow media to be overwritten when content verification fails
• Click on **Configure Policies** at the bottom-right of the Initial Setup interface. Add a storage policy, create a schedule for the storage policy, and define the data to be backed up by adding a Subclient policy. Once each step is completed, you can view/edit the policy or schedule and create additional policies and schedules if necessary.

• Click on **Configure Agents** or **Configure Virtualization** in the bottom-right of the Initial Setup interface. Select configure agents to verify/edit the Subclient settings depending on the backup to be performed. You can change the content (the data to be backed up), modify the storage policy, change the data transfer option (software compression), enable or disable deduplication, etc.

• Select configure virtualization to configure virtual server agents, VMware® vCenter, and virtual Subclients. No virtualization components were configured for this technical brief. Click on any of the question marks to the right of either the main topic or the individual steps for CommVault's online help.

### Backup and restore jobs

A backup job is created once the user has defined clients and/or MediaAgents, including the content to be backed up, and associated the client and/or MediaAgent with a storage policy. Backup jobs will be run once a schedule is defined for the storage policy. These steps were completed during the initial setup.

A restore job must be manually created by following these steps:

• From the CommCell browser, navigate to and expand **Policies**.

• Select and expand **Storage Policies** then select the storage policy that was used to create the backup job to be restored.

• Right-click on that storage policy and choose **View** then select **Jobs**. See figure 3 as an example. A job filter for the storage policy will be displayed.

![Figure 3. How to view jobs for the selected storage policy](image)
• Under **Specify Time Range**, update the **Start Time** and **End Time** accordingly then click on **OK**. A list of jobs for the selected storage policy will be displayed—if not, modify the start and end time again in the job filter.

• Jobs are displayed starting with the most recent. The client name, agent type (Windows or Linux file system for this example), when the job was started as well as other useful criteria are listed.

• Find and select the job ID to be restored, right-click on that job ID and choose **Browse and Restore**. See figure 4 as an example.

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**Figure 4. Selecting to Browse and Restore**
A window to specify browse and restore options will be displayed. The time range does not need to be specified—and should be grayed out—since a specific job ID has been selected. Click on the **View Content** tab to specify what will be restored. See figure 5 as an example.

**Figure 5.** Browse and restore options—selecting the **View Content** tab
The file system for the selected job ID will be displayed. By expanding the displayed folders, you can specify what will be restored. Click on the **Recover All Selected...** tab. See figure 6 as an example.

*Figure 6. Specifying the files to be restored and the Recover All Selected... Tab*
A window to specify the restore options for all selected items will be displayed. Under **Restore Destination**, uncheck the box **Restore to same folder** then click on **Browse** to specify the destination path for the restore. See figure 7 as an example. If the preference is to restore the data to the original location also overwriting the data, then do not redirect the restore.

![Image of the restore options window](image)

**Figure 7.** Specifying restore options for all selected files—specifically the restore destination

After specifying the destination path for the restore, click on **OK** to start the restore operation.

Go to the Job Controller tab to view the progress of the restore operation.

### Performance and tuning

To analyze speed and performance, it is necessary to examine the entire backup and archive process as a system. Although many factors contribute to the overall performance of the system, there are five main factors that must be thoroughly understood to determine the maximum performance in any specific situation. These factors are:

- **Storage Connection**—For Backup, Recovery and Archive Solutions (BURA) with HPE StoreEver tape libraries, this is the Fibre Channel connection.
- **Chunk and Block Size Allocation**—BURA Solutions with CommVault Simpana supports configurable chunk sizes. See “Chunk and Block Size Allocation” for specific details.
- **File (Data) Compression Ratio**—The amount of compression has a direct impact on the rate at which a tape drive can read/write data.
- **Source Disk and File Systems**—Data source, local disk, RAID array storage, file system type, and volume type.
- **Tape Drive**—In BURA, these are the various types of tape drives in HPE StoreEver storage.
**Chunk and block size allocation**

A chunk is the unit of data that the MediaAgent software uses to store data on media. The CommVault Simpana default values for chunk size are configured to get the optimal throughput to the storage media. Table 1 lists default chunk size for tape and the recommended range of chunk size. For detailed information regarding setting the chunk size for the CommCell or controlling the chunk size on the MediaAgent, the file server, or the data path, follow these instructions from the CommVault CommCell Performance Tuning documentation.

<table>
<thead>
<tr>
<th>STORAGE MEDIA</th>
<th>BACKUP TYPE</th>
<th>DEFAULT CHUNK SIZE</th>
<th>RECOMMENDED RANGE OF CHUNK SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape</td>
<td>Granular Backup</td>
<td>4 GB</td>
<td>8 GB, 16 GB, 32 GB</td>
</tr>
<tr>
<td></td>
<td>Database Backup</td>
<td>16 GB</td>
<td>8 GB, 16 GB, 32 GB</td>
</tr>
</tbody>
</table>

Increasing block size increases the speed of write operations to tape media. The CommVault Simpana default block size value for a write operation is 64 KB. Before increasing the block size, CommVault recommends verifying that the following criteria are satisfied:

- New block size is supported by the Host Bus Adapter Driver installed in the MediaAgent and the tape device. The most commonly used values are 128 KB or 256 KB.
- All the MediaAgents that are associated with a Storage Policy support the block size that is configured on that storage policy.
- If different MediaAgents are used for backup and restore operations, and the backup MediaAgent has higher block size, then ensure that the restore MediaAgent is configured with Host Bus Adapters, and that tape drives that are able to read the data written with higher block size.

For detailed information regarding increasing block size, reference this section of the CommVault CommCell Performance Tuning.

The CommVault CommCell Best Practices documentation provides the following section which includes several parameters to improve your backup system performance and avoid bottlenecks: Basic Tuning Suggestions to Maximize the Backup Performance.

**File (data) compression ratio**

Hewlett Packard Enterprise tests show that not all data can be compressed equally. The compression ratio affects the amount of data that can be stored on each tape cartridge, as well as the speed at which the tape drives can read or write the data. Table 2 shows typical compression ratios of various applications.

<table>
<thead>
<tr>
<th>DATA TYPE</th>
<th>TYPICAL COMPRESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD</td>
<td>381</td>
</tr>
<tr>
<td>Spreadsheet/Word Processing</td>
<td>251</td>
</tr>
<tr>
<td>Typical File/Print Server</td>
<td>201</td>
</tr>
<tr>
<td>Lotus Notes Databases</td>
<td>161</td>
</tr>
<tr>
<td>Microsoft® Exchange/SQL Server Databases</td>
<td>14.1</td>
</tr>
<tr>
<td>Oracle/SAP® Databases</td>
<td>121</td>
</tr>
</tbody>
</table>
Source disk and file systems
In the past, tape performance was typically identified as a bottleneck. However, tape performance has now surpassed many of the source systems available today. Items to consider when calculating desired throughput and performance metrics include:

- Source hardware (disk subsystems)
- Source file system status
- Server configuration

The following factors critically affect the speed of backup from disk to tape:

- **Data size**
  The larger the number of smaller files, the larger the overhead associated with backing them up. The worst-case scenario for backup is large numbers of small files due to system overhead of file accession.

- **Data compressibility**
  Incompressible data will back up slower than higher compressible data. For example, JPEG files are not very compressible, but database files can be highly compressible. The accepted standard for quoting tape backup specifications revolves around an arbitrary figure of 2:1 compressible data.

- **Disk array performance**
  It is often overlooked that data cannot be put onto tape any faster than it can be read from disk. Backup is more sequential in nature than random (from a disk array access perspective). Disk array performance depends on the number of disks, RAID configuration, the number of Fibre Channel ports accessing the array, and queue depth available, for example.

- **Fragmentation**
  The more fragmented the files are on disk, the more random will be the disk access method, hence the backup will take longer. If the system has a defragmentation utility, it is advisable to run it before full backups or on a regular scheduled basis to ensure that files are contiguously arranged on the disk.

**Tape drive**
The tape drives is the fifth factor in determining backup and restore performance. HPE StoreEver tape drives have varying levels of performance. Factors such as file size (larger is better), directory depth, and data compressibility all affects system performance. Data interleaving during backup also affects restore performance. Table 3 shows performance information for various HPE StoreEver tape drives.

<table>
<thead>
<tr>
<th>TAPE DRIVE</th>
<th>NATIVE THROUGHPUT MB/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultrium 15750 (LTO-7 FH)</td>
<td>300</td>
</tr>
<tr>
<td>Ultrium 15000 (LTO-7 HH)</td>
<td>300</td>
</tr>
<tr>
<td>Ultrium 6650 (LTO-6 FH)</td>
<td>160</td>
</tr>
<tr>
<td>Ultrium 6250 (LTO-6 HH)</td>
<td>160</td>
</tr>
<tr>
<td>Ultrium 3280 (LTO-5 FH)</td>
<td>140</td>
</tr>
<tr>
<td>Ultrium 3000 (LTO-5 HH)</td>
<td>140</td>
</tr>
<tr>
<td>Ultrium 1840 (LTO-4 FH)</td>
<td>120</td>
</tr>
<tr>
<td>Ultrium 1760 (LTO-4 HH)</td>
<td>80</td>
</tr>
<tr>
<td>Ultrium 920 (LTO-3 HH)</td>
<td>60</td>
</tr>
</tbody>
</table>
Conclusion

Enterprise business customers demand an efficient, reliable data growth management backup and archiving solution while keeping costs under control. Hewlett Packard Enterprise Storage provides a comprehensive range of reliable data protection storage solutions which allow small and medium-sized business customers to maximize the value from their data over its entire lifecycle while minimizing total cost of ownership. HPE StoreEver Storage with CommVault Simpana can provide a complete solution in itself or be used as a major constituent of a disk-to-disk-to-tape implementation. HPE StoreEver Tape systems offer significant cost, energy and footprint advantages, while addressing data growth by adding drives and capacity on-demand as needed. In all, HPE StoreEver Storage systems integrate easily with CommVault Simpana and are a critical component for comprehensive data protection and archiving of mission-critical applications.

Useful links

HPE Backup, Recovery and Archive Solutions
HPE StoreEver ESL G3 Tape manuals
HPE StoreEver MSL6480 Tape manuals
HPE StoreEver MSL G3 Tape manuals
HPE 3PAR StoreServ 10000 Storage manuals
HPE 3PAR StoreServ 7000 Storage manuals
HPE StoreAll Storage manuals
CommVault Simpana V10 documentation
SAN-Attached Libraries—CommVault Best Practices

Learn more at
hpe.com/storage/tape