



Hewlett Packard
Enterprise

Data protection of virtual machines with HPE StoreEver Tape Libraries

Using Veeam Backup & Replication software

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Introduction

Many organizations are looking for ways to reduce power consumption, cooling requirements, and server footprint. Similarly, storage capacity is another major concern for businesses today. Moving to virtualized environments mitigates these concerns by providing an avenue to achieve data center consolidation. Likewise, moving virtual data from expensive disk-based storage to a less resource-intensive tape-based solution is a complementary strategy.

HPE Tape Storage provides dependable, secure, and scalable tape storage. Copying data to tape will reduce storage costs by moving data off expensive disk storage. Tapes can then also be vaulted at an offsite repository for security and disaster recovery.

Protecting virtualized data can present its own unique challenges. Veeam Backup & Replication is built specifically for backup and archive of virtual environments. Starting with Veeam Backup & Replication v7, administrators can create an automated solution for moving virtual data from the disk storage tier¹ to inexpensive and dependable tape storage, greatly simplifying data management.

This document will provide general guidelines and configuration information for configuring disk-based backup copies to tape using Veeam Backup & Replication and HPE Tape Storage.

Technology overview

HPE StoreEver Tape key features and benefits

HPE StoreEver Tape products protect your data longer, for less

As the worldwide leader² 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 one of the broadest and most advanced portfolios in the industry, HPE StoreEver features support for Linear Tape-Open 7 (LTO-7). HPE StoreEver includes tape media, standalone tape drives, and tape libraries that accommodate more than 180 PB³ in a single system.

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

HPE StoreEver:

- **Reduces total cost of ownership (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. HPE StoreEver lowers cost per gigabyte for longer-term storage with limited power or energy requirements as the less frequently accessed data is stored or as media becomes 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 midrange tape library and flexible options to consider for your business.

HP Command View for Tape Libraries is a single-pane-of-glass management software that 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**

New HP Data Verification software increases the verification of a successful restore of critical business data from infrequently accessed LTO tape cartridges by periodically scanning tapes to validate the quality of data on each tape.

With enhanced reliability, extreme durability, and proactive monitoring by HP 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 HP Command View for Tape Libraries 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.

¹ For information about setting up the primary backup-to-disk environment, see: go.veeam.com/hp-and-veeam.html and choose the manual that is appropriate for your hypervisor

² "Branded Tape Tracker," IDC, CQ2 2013

³ Using 2.5:1 compression and a fully populated 16-frame ESL G3 tape library

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

Hardware-based data encryption, write once, read many (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.

- **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 one to 192 LTO-5 or newer Ultrium tape drives—and one 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 logical unit number (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 one and 42 LTO-5 or newer half-height serial-attached SCSI (SAS) or Fibre Channel (FC) drives for speeds of up to 113.4 TB/hour (assuming 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 improve capacity utilization while delivering high service levels

HPE 3PAR StoreServ Storage is a family of storage systems that range from tier 1 mission-critical solutions with the highest performance and scalability to support cloud and IT as a 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 percent—guaranteed.⁴

- **Autonomic**

Simplify, automate, and expedite storage management by handling storage provisioning, tiering, and change management autonomically—intelligently, at a subsystem 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 reduces the cost, complexity, and the time it takes to effectively store, retain, protect, manage, access, and extract value from expanding archives—increasing your return on information, infrastructure, and individuals.

Ideal for both traditional and the new generation of private and hybrid cloud archive applications—from content depots and enterprise user sync or share repositories to general archives, compliance archives, and backup repositories—HPE StoreAll is hyperscale, harnessed, instant, economic storage that supports file and object in a single converged platform. The basic StoreAll architecture consists of a couplet, which represents the physical foundation of the HPE StoreAll Storage architecture.

A couplet is composed of a pair of nodes combined with shared storage. Multiple couplets are bound together into a scale-out cluster with a distributed file engine. HPE StoreAll Storage gives you the flexibility to create either a single file system or multiple file systems to host shares that can be made available to clients via file and object modes using a broad range of data access protocols, and a rich set of data services are built on its robust and massively scalable foundation.

⁴ Requires the use of HPE 3PAR Thin Conversion software and HPE 3PAR Thin Provisioning software. For details, refer to the HPE 3PAR Get Thin Guarantee terms and conditions. More information is available at: hp.com/storage/getthin

Veeam Backup & Replication

Veeam Backup & Replication is a data protection and disaster recovery solution for VMware® vSphere and Hyper-V virtual environments of any size and complexity. Combining all of the necessary functions in one intuitive interface, Veeam Backup & Replication serves to solve the most critical problems of virtualized infrastructure management and protects mission-critical virtual machines (VMs) from both hardware and software failures.

Primary backups

HPE and Veeam Software offer VMware vSphere and Microsoft® Hyper-V-optimized protection solutions for virtual data center administrators. HPE and Veeam have teamed up to solve the problems inherent in the traditional agent-based backup model with a solution that is simple to license and implement at a low price point. The HPE and Veeam solution has been tested and proven to optimize VM backup when used in conjunction with HPE Storage disk arrays and the HPE StoreOnce Backup System family of disk-to-disk backup appliances. The HPE and Veeam data protection solution is complementary to existing physical system backup tools. For more information, visit: go.veeam.com/hp-and-veeam.html.

Archiving to tape

With Veeam Backup & Replication, both backup files stored in backup repositories and regular files you might want to write to tape (such as Windows® and Linux® files) can be archived to tape. Veeam Backup & Replication supports file backup from any Windows or Linux server that has been added as a managed server to the Veeam backup console—including physical servers. You can also archive files residing on NAS devices.

Integrating HPE StoreEver Tape with Veeam Backup & Replication

Installation and configuration

Hewlett Packard Enterprise has joined with leading software companies to develop a comprehensive approach to making sure 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: hp.com/go/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: hp.com/go/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 independent software vendor (ISV) partner compatibility.
- [HPE SAN Design Reference guide](#)—This guide 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, host bus adapters (HBAs), Fibre Channel switches, Command View for Tape Libraries, 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 partitions online?
- Is the Veeam backup server HBA 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?
- Is the Veeam backup server HBA, tape, and robotic devices in the same switch zones? See the note on page 6.
- Does Veeam backup server detect all of the tape and robotic devices intended to be used?

- Are all HPE StoreEver Storage devices seen by HP Command View for Tape Libraries?
- Has connectivity been verified using HP Library and Tape Tools or OS-specific tools (for example, the sg utility in Linux)?
- Is the primary disk-based Veeam backup environment correctly configured? (For setup of the primary backup environment with Veeam Backup & Replication, refer to the following documentation: go.veeam.com/hp-and-veeam.html and [Veeam Backup & Replication product guide](#).)

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: hp.com/go/buracompatibility.

Discovering the tape library with Veeam Backup & Replication

After the devices are properly zoned and logged into the SAN, start Veeam Backup & Replication on the backup server. Veeam will perform auto-discovery of the tape devices and tape media. After initial discovery, the auto-discovery process will be performed every 30 seconds.

In the event that traditional backup software is also installed on the SAN to manage backups to the tape library, Hewlett Packard Enterprise recommends simplifying the management of complex environments with library partitioning.

Important

If the Veeam Backup & Replication backup server has SAN access to HPE tape storage, but Veeam is not being used for tape integration purposes, you may want to modify the rescan interval to ensure that Veeam Backup & Replication does not interfere with other data protection software.

To modify the rescan interval, first make sure that Veeam Backup & Replication is at patch level #2 and then refer to the [Veeam Backup & Replication product guide](#) for recommended registry edits to your Veeam backup server.

Configuring Veeam Backup & Replication software

With Veeam, backups occur by moving VM data to a disk-based backup repository. Backups can then be copied to another disk-based storage device or to a tape-based storage device for data copy purposes. The next sections of this document will discuss the backup-to-tape portion of the backup stream.

For the purpose of this document, the following components were manually installed and configured in the order listed on a single, physical Windows host.

Veeam backup server: The Veeam backup server is a Windows-based physical or virtual machine on which Veeam Backup & Replication is installed. It is the core component in the backup infrastructure that fills the role of the “configuration and control center.”

Veeam proxy server: A backup proxy is an architecture component that sits between the data source and target and is used to process jobs and deliver backup traffic. The role of a backup proxy can be assigned to a dedicated Windows server (physical or virtual) in your virtual environment. The primary role of the backup proxy is to provide an optimal route for backup traffic and enable efficient data transfer.

Veeam backup repository: A backup repository is a location used by Veeam Backup & Replication jobs to store backup files, copies of VMs, and metadata for replicated VMs. Technically, a backup repository is a folder on the backup storage. The following repository types are supported: Windows server with local or directly attached storage such as a disk array, Linux server with local, directly attached storage, or mounted NFS and Common Internet File System (CIFS) share.

Figure 1 illustrates the Veeam Backup & Replication architecture with data movement as follows:⁵

1. The Veeam backup server sends a request to the Veeam proxy server, which in turn requests a VM snapshot from the hypervisor.
2. Veeam integration with HPE StoreServ Storage allows the backup server to directly communicate with the production storage to request a snapshot, which is performed by the StoreServ production storage.
3. Veeam backup server retrieves snapshots from production storage. Once the backup server receives the snapshot, it deletes the original snapshot from the hypervisor.
4. VM data is copied from the production storage snapshot and stored to a Veeam backup file on the primary backup tier, according to the policy of the backup job.
5. The backup is sent to HPE tape storage according to backup policies set by the administrator.

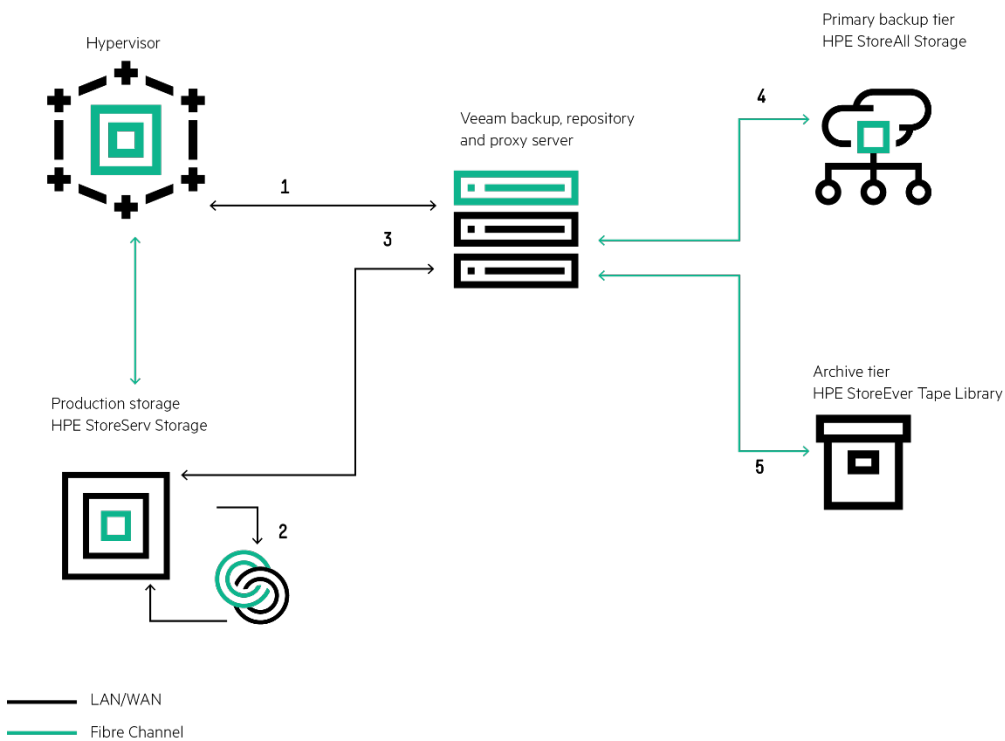


Figure 1. Veeam Backup & Replication data flow to HPE storage tiers

Initial setup

Before it's possible to configure a backup-to-tape job, you must first create a primary backup to a disk-based repository. For initial setup and configuration of the software for Hyper-V and VMware environments, refer to the [Veeam user guide for Hyper-V](#) or the [Veeam user guide for VMware](#).

Tape library discovery is automatic when you start the Veeam Backup & Replication software as long as the backup server is attached to the HPE StoreEver tape library via SAS or Fibre Channel SAN. Refer to the "Installation Checklist" section of this document for tape library connectivity recommendations.

⁵ Figure 1 depicts data flow for a VMware vSphere environment. Storage tiers remain the same in a Hyper-V environment, but the Veeam transport methods differ. See the Veeam user guide for Hyper-V for details on Hyper-V data flow

Tape libraries and drives will be displayed under the **Tape** node in the **Backup Infrastructure** view, as illustrated in the left pane of figure 2. From the right pane of the same view, several configuration wizards can be initiated as illustrated in figure 2. Later sections of this document will discuss each of these options in more detail.

- The **File to Tape** wizard
- The **Backup to Tape** wizard
- The **Restore File from Tape** wizard
- The **Restore Virtual Machine from Tape** wizard

Note

The **Add Tape Device** heading is for information only, and does not initiate a configuration wizard.

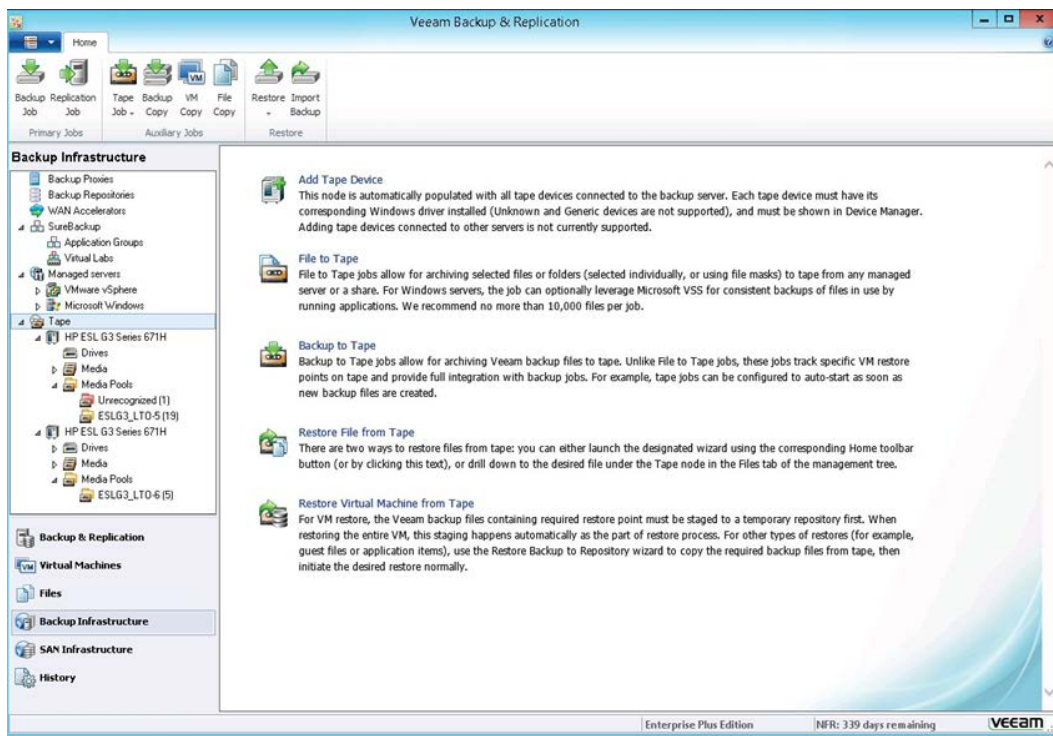


Figure 2. Veeam auto-discovers tape devices (left) and provides configuration wizards (right)

Media management

Before setting up individual tape jobs, it's necessary to review media management and media pools. Media will be initially discovered by Veeam and will be displayed under the **Tape** node in the **Backup Infrastructure** view, when you expand the **Tape>Media** node.

When the devices and tapes are first discovered, or when new tapes are loaded into the tape library, they will be presented as **Unrecognized**. Use the tape inventory feature to identify unrecognized tapes. After inventory, tapes will be displayed in a **Free** media pool.

Custom media pools

Moving tapes to a custom media pool can make it easier to track tapes and their usage.

1. To create a custom media pool, go to the **Tape** node in the **Backup Infrastructure** view and navigate to **Media>Media Pools**. Alternatively, you can select tapes from the **Media>Online** view and right-click to move them to another pool.
2. Right-click on **Media Pools** and select the **Add Media Pool** wizard to set up a custom pool and its attributes.
 - a. When adding media to the custom media pool, only tapes in the Free media pool can be moved to a custom pool using the wizard, as shown in figure 3.
 - b. After adding tapes to the pool, name the **Media Set** and set a **Retention Policy** according to administrator requirements to complete setup.
 - c. Once the custom media pool is set up, it will be located in the **Tape** node in the **Backup Infrastructure** view. Navigate to **Media>Media Pools**, as shown in the left pane of figure 3.

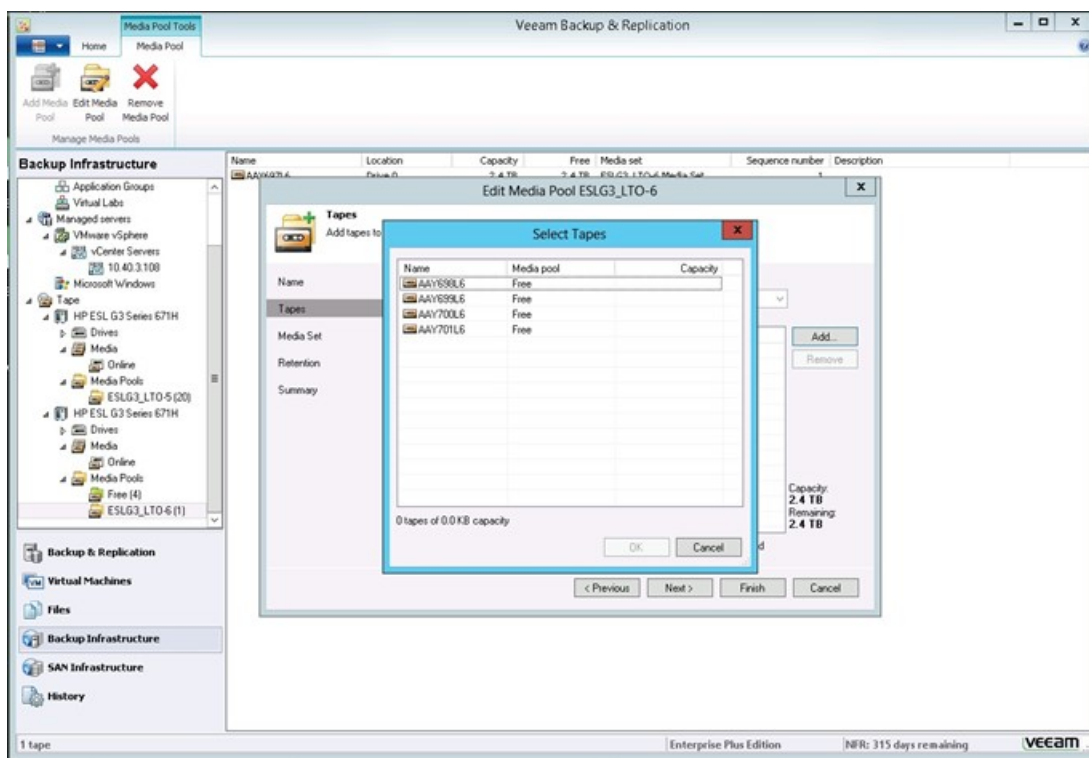


Figure 3. Select tapes from Free media pool for custom pool

Back up to tape

Data protection using Veeam Backup & Replication software is a method of moving existing primary backups to tape. Both Veeam backup jobs and entire Veeam backup repositories can be selected for copy to tape.

There are two options in Veeam for performing a copy to tape. Performing a new backup to tape allows the user to manually configure jobs for copying existing backups or repositories. **Linking backups** to tape allows the user to set a secondary target for archiving purposes during the initial backup configuration, thus automating the backup and archive workflow.

New backup-to-tape job

1. Run the **Backup to Tape Job** wizard; from the **Home** tab, click **Tape Job** and select **Backups**.
2. Specify the **Name** of the job and an optional description.
3. Choose **backups** or **backup repositories** to copy.
4. Choose **Media Pool**. If you've already created custom media pools as described earlier in this document, they will appear as an option at this stage of the wizard.
5. Specify **Options**.

Note

If using a tape library for any type of backup-to-tape job, be sure to check the **Eject media once the job finishes** check box in the Options window. This box must be checked to ensure that Veeam sends a command to unload the tape from the tape drive and replace it in the media slot.

Linking backup jobs to backup-to-tape jobs

A tape copy can be linked to a primary backup in Veeam Backup & Replication by creating a secondary destination for the primary backup job setup as shown in figure 4.

Important

Using this option allows the administrator to automate both the primary backup to disk and the secondary copy to tape functions.

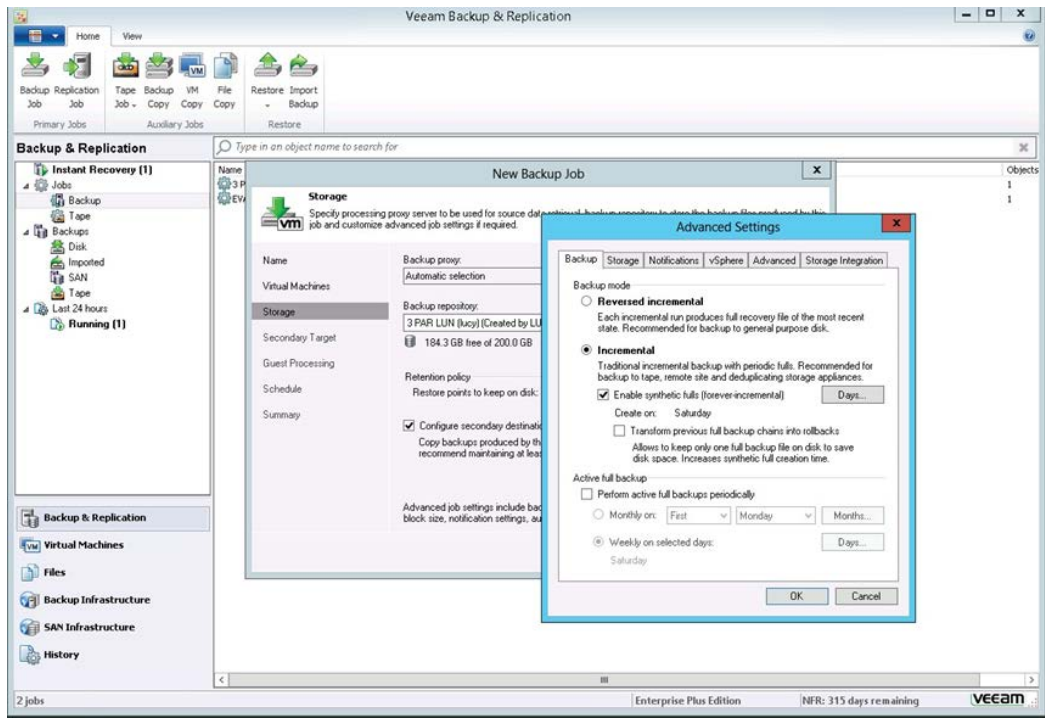


Figure 4. Linking primary disk backups to tape copy in the Veeam backup-to-tape policy

1. From the **Backup & Replication** view, select a backup job from the right navigation pane, right-click, and select **Edit** to open the **Edit Backup Job** wizard. Alternatively, when setting up a **New Backup Job**, the same settings described below will be available.
2. Choose **Storage** from the left navigation pane in the dialog box. Select and check the check box labeled **Configure secondary destinations for this job**. Select the button on the lower right labeled **Advanced** reduce the time required to move backups to tape to open the **Advanced Settings** dialog box.
 - a. Ensure that the **Incremental** radio button is selected. Veeam recommends that incremental backup be used for disk-to-disk-to-tape to reduce the time required to move backups to tape.
 - b. Other settings are available as well. During the testing done for writing this document, all settings were left as default.

New file to tape

File to tape jobs allow the administrator to either copy specific files from the Veeam backup server to tape, or send files from Windows and Linux servers that can be accessed by the Veeam backup server to tape, much like a traditional backup application. However, the movement of files occurs first across the LAN to the Veeam backup server, and then to SAS or SAN-attached tape.

Note

File to tape backup speeds will be throttled by the movement of data over the LAN to the backup server. This may cause extended backup times.

To launch the **New File to Tape Job wizard**, do either of the following:

1. On the **Home** tab, click **Tape Job** and select **Files**.
2. Open the **Backup & Replication** view, right-click the **Jobs** node and select **Tape Job > Files**.

Or, use the following alternative route:

1. Open the **Files** view, browse to the necessary files, select the files, and choose **Add to Tape Job > New job** from the ribbon menu.
2. Open the **Files** view, browse to the required files, right-click the necessary files, and choose **Add to Tape Job > New job**.

Restores from tape

For this guide, the following options for restoring VMs or files from tape with Veeam Backup & Replication are outlined:

- Restoring full backups or backup chains from a tape copy to disk
- Performing full VM recovery from a tape copy to the virtual infrastructure
- Restoring files and folders to their original location or any folder of your choice

Restore backup from tape copy to disk

1. Run the **Restore Backup from Tape to Repository** wizard; from the **Home** tab, click **Restore** and choose **Tape > Restore Backups**.
2. Choose **VMs to restore** from the prepopulated list of VMs copied to tape in the wizard.
3. Select a **restore point**. If you choose a full backup point in the list, Veeam will restore only this full backup. If you choose an increment, Veeam will restore a chain consisting of full backup and forward increments necessary to restore VMs to the required point in time. You can make different choices for each VM you choose to restore during a specific session.
4. Choose a **backup destination**. Because you are restoring from a tape copy, Veeam will send your data to this intermediate storage destination. The wizard allows you to put the data on an existing **backup repository**, to a **server** that can be accessed by the Veeam backup server, or to a **network share**.
5. Once the backup is restored from tape copy to a disk destination, it will be displayed as an "imported backup" in the **Backup & Replication > Backups > Imported** view. From this point, you can choose various data recovery methods described in the appropriate Veeam Backup & Replication user guide for your hypervisor.

Restore virtual machine from tape copy to the virtual infrastructure

There is a two-stage process for restoring full VMs from tape copy. During the first stage, copied VMs are restored to an intermediate staging destination. The destination can be a backup repository or a folder. The second stage restores the VM into the virtual infrastructure. After stage two is complete, the backup is deleted from the staging destination.

Stage 1

1. Run the **Full VM Restore** wizard by using one of two methods. You can open the **Backup & Replication** view and expand the **Backups > Tapes** node. Select the necessary VMs in backup and click **Restore entire VM** on the **Backup on Tape** on the ribbon. Or, open the **Backup & Replication** view and expand the **Backups > Tapes** node. Right-click the necessary VMs in backup and choose **Restore entire VM**.
2. Follow the wizard. The same steps defined in the section above labeled **Restore backup to disk from tape** will apply.

Stage 2

1. VMware:
 - a. Launch the **Restore** wizard, by opening the **Backup & Replication** view; expand the **Backups > Tapes** node. Right-click the necessary VMs in backup and choose **Restore entire VM**.
 - b. Refer to the **Performing Full VM Restore** section of the Veeam Backup & Replication user guide for VMware for instructions on how to use the wizard to complete the restore to the virtual infrastructure.

2. Hyper-V:

Launch the **Restore** wizard, do one of the following:

- a. On the **Home** tab, click **Restore** and select **Hyper-V**. In the **Restore from backup** section, select **Entire VM (including registration)**.
- b. Or, open the **Backup & Replication** view and select the **Backups** node. In the working area, expand the necessary backup job, select the VMs you want to restore, and click **Entire VM** on the ribbon.
- c. Refer to the **Performing Full VM Restore** section of the Veeam Backup & Replication user guide for Hyper-V for instructions on how to use the wizard to complete the restore to the virtual infrastructure.

Restore files from tape

Restoring files from tape works more like a traditional backup application in that you choose a file for restore and destination. That file is then restored to the destination directly from tape. As in the case of backing up files to tape, the file movement first takes place over the LAN to the Veeam backup server. Long restore times are possible due to LAN bottlenecks.

1. Run the Files from Tape wizard; from the Home tab, click **Restore**, then choose **Tape > Restore Files**.
2. Use the wizard to choose objects to restore, specify a destination, and specify restore options.

Note

When using the Restore files from tape option, restore speeds will be throttled by the movement of data over the LAN to the backup server. This may cause extended restore times.

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 (BURA) Solutions with HPE StoreEver Tape Libraries, this is the Fibre Channel connection.
- **File (data) compression ratio**—The amount of compression has a direct impact on the rate at which a tape drive can read or write data.
- **Source disk and file systems**—Data source, local disk, RAID array storage, file system type, and volume type.
- **Tape drive**—In BURA Solutions, these are the various types of tape drives in HPE StoreEver storage.

Note

To achieve the most beneficial results, first optimize your environment by installing the latest drivers and firmware, optimize your network, and so on. Refer to the **installation checklist** located near the beginning of this document.

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 1 shows typical compression ratios of various applications

Table 1. Typical file compression ratios

DATA TYPE	TYPICAL COMPRESSION
CAD	3.8:1
Spreadsheet/Word processing	2.5:1
Typical file/print server	2.0:1
Lotus Notes databases	1.6:1
Microsoft Exchange/SQL Server databases	1.4:1
Oracle/SAP® databases	1.2:1

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 file 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 drive 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 affect system performance. Data interleaving during backup also affects restore performance. Table 2 shows performance information for various HPE StoreEver tape drives.

Table 2. Tape drive throughput speed [native]

TAPE DRIVE	NATIVE THROUGHPUT MB/s
Ultrium 15750 (LTO-7 FH)	300
Ultrium 15000 (LTO-7 HH)	300
Ultrium 6650 (LTO-6 FH)	160
Ultrium 6250 (LTO-6 HH)	160
Ultrium 3280 (LTO-5 FH)	140
Ultrium 3000 (LTO-5 HH)	140
Ultrium 1760 (LTO-4 HH)	80
Ultrium 920 (LTO-3 HH)	60

Conclusion

Enterprise server customers demand an efficient, reliable virtual data backup and archiving solution while keeping costs under control. HPE Storage provides a variety of reliable data storage solutions that address such requirements.

HPE StoreEver Storage with Veeam Backup & Replication can provide a complete 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 Tape systems integrate easily with Veeam Backup & Replication and are a critical component for comprehensive data protection and archiving of mission-critical applications.

Useful links

[HPE Storage products](#)

[HPE Data Agile BURA Solutions and Compatibility matrices](#)

[Veeam and HPE](#)

[Veeam Backup & Replication](#)

[VMware vSphere](#)

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Learn more at

hp.com/go/StoreEver

veeam.com/vm-backup-recovery-replication-software.html



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