



DXi-Series Configuration and Best Practices Guide for Veeam Backup & Replication

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DXi-Series Configuration and Best Practices Guide for Veeam Backup & Replication

This guide seeks to help Quantum customers who own DXi4000-Series and DXi9000-Series systems, and who also use Veeam Backup & Replication, get the most out of their investment. It is also intended to help Quantum field sales teams by providing guidance to enhance the installation and integration of Veeam Backup & Replication with Quantum DXi-Series systems. This guide includes advice and best practices for using Quantum DXi-Series systems with Veeam Backup & Replication.

How to Use This Guide

This document assumes that the reader has basic expertise with Veeam Backup & Replication, basic networking, SAN, and Hyper-V, and VMware experience. It also assumes that the reader has a Quantum DXi installed in a working Veeam Backup & Replication environment.

This document provides key recommendations and useful information for quickly setting up a DXi system with Veeam Backup & Replication. It then expands on these recommendations and discusses the features and performance tuning considerations relevant to NAS attached storage.

This document is organized by the NAS storage target access methods to be employed with Veeam Backup & Replication. Currently, Veeam does not support VTL, so the DXi will appear as a CIFS or Veeam Linux Repository.

Shortcuts to Quick Start Activities

To go directly to any of the following sections, click that section's name.

- » **[Online Documentation for Your Quantum Products](#)**
- » **[Summary of Performance Tuning Parameters for Veeam Backup & Replication](#)**
- » **[Best Practices Guide for Quantum Deduplicating Storage Appliance Repository, NFS, or CIFS, and/or NFS](#)**
- » **[Common Operational Considerations for Veeam Backup & Replication](#)**

Documentation and References

The following is a list of documents, references, and links where you can find additional information regarding specific activities and products. Access to many of the documents below requires a valid serial number or user login. Please have that available when following the hyperlinks to the documents.

Note: After you click some of the links below, you may find multiple versions of a given document. Verify your current software version, then choose the appropriate document for that software version.

Online Documentation for Your Quantum Products

[Quantum service and support for drivers, firmware, software, and all product documentation.](#)

DXi Product Planning Guides

The DXi Product Planning Guides help you configure and use your DXi storage solution correctly from the start. As a best practice, verify that the DXi has been successfully deployed in the infrastructure, using the Quantum site planning documentation:

Note: After clicking the links shown in the lists below, you may need to scroll down to find the linked documents. In some Documentation Centers, you may need to expand the **Previous Documentation** section to find one or more of the documents in these lists.

- [DXi9000 Site Planning Guide](#)
- [DXi6900 Site Planning Guide](#)
- [DXi4800 Site Planning Guide](#)
- [DXi4700 Site Planning Guide](#)

DXi User's Guide

Refer to the DXi user's guide for detailed information about all the configurations and functions available on the DXi, including Network Attached Storage (NAS) share setup and DXi-to-DXi Replication setup:

Note: Only DXi FW 3.4.0 (13857-59970 Build21) and later support VDMS.

- [DXi9000 User's Guide](#)
- [DXi6900 User's Guide](#)
- [DXi4800 User's Guide](#)
- [DXi4700 User's Guide](#)
- [DXi4000 User's Guide](#)

Veeam Installation

- [Quantum DXi Veeam Installation](#)

Quantum Service and Support

The knowledge base can help you quickly search for Quantum product articles:

- [Quantum Service and Support](#)

Veeam Backup & Replication Documentation

These direct documentation links require a Veeam [user account](#). Simply create a user account and remain logged in to use the following links. After a page opens in your browser, you may need to scroll down to find the documents that are linked to in the following list.

- [User Guide for Microsoft Hyper-V](#)
- [Veeam Universal Application Item Recovery User Guide](#)
- [Veeam PowerShell Reference](#)
- [Evaluator's Guide \(VMware VSphere\)](#)
- [Evaluator's Guide \(for Microsoft Hyper-V\)](#)
- [Veeam Knowledge Base](#)

Summary of Performance Tuning Parameters for Veeam Backup & Replication

For backup administrators who are well versed with Veeam Backup & Replication and Quantum DXi systems, the following table offers a summary of suggested parameters/values.

As with any modifications to a system that impact performance and/or tuning, your results may vary and are not guaranteed.

Configuration Recommendations for DXi as a Veeam Deduplicating Storage Appliance

The settings shown below are recommended, and present DXi as a Veeam Ready primary backup target.

Component	Parameter or Option	Setting
Repository	Repository Type	Deduplicating Storage Appliance Backup Repository
	Use fast clone on XFS Volumes	Enabled if using Veeam 10 and DXi SW revision 4.0.4 or above
	Align backup file data blocks	Enabled if using FastClone Disabled otherwise. FastClone requires Veeam 10 and DXi SW revision 4.0.4 or later to use.
	Decompress backup data blocks before storing	Enabled.
	Rotated drives	Disabled.
	Use per-VM backup files	Enabled.
	vPowerNFS	Recommend that vPowerNFS be kept on primary storage.
Task Limits	The DXi Deduplicating Storage Appliance Backup Repository supports the use of Veeam Data Mover Service, which optimizes performance between the DXi and the Veeam proxy server. This optimization uses DXi memory. To avoid oversubscribing memory we recommend that you run no more than 25 concurrent backups across all repositories defined on the DXi. For recovery jobs we recommend that you run no more than 15 concurrent full VM restores concurrently across all repositories, this is not a hard limit however. Another method to gauge system resource utilization is to use the DXi memory monitor, the DXi will monitor memory usage and produce an Admin Alert if memory consumption crosses the 85% of total memory budget. If you receive an admin alert, please consider reducing load on the DXi to avoid a potential job failure. You may use the memory monitor method to gauge how many active jobs can run in your environment. We have seen use-cases that run up to 40 jobs concurrently before reaching this threshold. All environments are different however and your performance may vary. Note on "performance" above: As each system's memory capacity varies, memory consumption, which drives the amount of concurrent jobs you can run will vary between systems.	
Proxy	Transport Method	Virtual Appliance or Direct SAN. These two methods allow for the fastest possible data retrieval from the source.
	Maximum Concurrent Tasks	Veeam recommends not to exceed one task per proxy server CPU cores.
Backup Copy job	Healthcheck	Disabled.
	Defragment and Compact full backup file	Disabled.
	Compression Level	If the decompress setting for the Repository is enabled, this value will not result in compressed data being sent to the DXi. As a result, Veeam recommends leaving this as either AUTO or OPTIMAL for the DXi as it will optimize overall processing.
	Inline data deduplication	No. (Veeam recommends disabling this option as this will enable background optimizations for deduplication appliances).
	Encryption	Do not enable Veeam's Encryption feature. Although Veeam Backup & Replication supports encryption, for best performance, use the data at rest hardware encryption provided by the DXi appliance.

	Read the entire restore point from source backup instead of synthesizing it from increments	Enabled. This setting increases performance of the backup copy job by copying the restore point from the source instead of synthesizing a full backup from incrementals resident on the copy target. The full copy is faster overall. This setting is located on the GFS retention configuration section in the backup copy configuration settings.
Backup job	Reverse Incremental	Not recommended.
	Incremental	Enabled.
	Synthetic Full	Enabled if FastClone is supported. DXi SW revisions 4.0.4 and later and Veeam Backup and Replication Version 10 and later support FastClone for DXi, this enables copy on write backup image synthesis and significantly reduces I/O load on the DXi. If FastClone is not supported, disable this setting as an Active Full Backup would likely perform better than a Synthetic full. See Backup Stream Considerations for best practices for managing restore points.
	Active Full	Disabled or Enabled – Enabled is recommended if Synthetic Full is not employed.
	Healthcheck	Disabled.
	Defragment and Compact full backup file	Disabled.
	Compression Level	Veeam recommends leaving this as either AUTO or OPTIMAL for the DXi as it will optimize overall processing.
	Inline data deduplication	Disabled (Veeam recommends disabling this option, because this will enable background optimizations for deduplication appliances).
	Exclude swap file blocks	Enabled.
	Exclude deleted file blocks	Enabled.
	Storage Optimization	Local target or Local+16TB Local+16TB produces a performance gain with synthetic full backups (up to 14%). Local+16TB causes a slightly slower full backup duration, and increased incremental data transferred per backup.
	Encryption	Do not enable Veeam’s Encryption feature. Although Veeam Backup & Replication supports encryption, for best performance, use the Data-at-Rest hardware encryption provided by the DXi appliance.
	Miscellaneous Options	Recommendations
Veeam Backup Server	Recommendations	
Backup Proxy Server	Recommendations	
Backup Enterprise Manager Server	Recommendations	
Server Name	Use only standard ANSI characters for the computer name of the computer on which you want to install Veeam Backup & Replication.	
Veeam Windows registry modification	When using the Veeam Quantum Deduplicating Storage Appliance, Quantum recommends increase the call execution timeout. See https://www.veeam.com/kb1176 for more details.	

[Configuration Recommendations for DXi as a Veeam CIFS \(Shared Folder\)](#)

The settings shown below are recommended and present the DXi as a secondary backup target for the Backup Copy Job.

Component	Parameter or Option	Setting
Repository	Repository Type	CIFS (Shared Folder)
	Align backup file data blocks	Disabled.
	Decompress backup data blocks before storing	Recommended to improve Dedupe ratio and backup performance.
	Rotated drives	Disabled; N/A with “Use per-VM backup files”.

	Use per-VM backup files	Enabled.
	vPowerNFS	Recommend that vPowerNFS be kept on primary storage.
	Task Limit	This value may need to be adjusted more than once to find the best number of concurrent backups to use for the specific environment. Start low (ie. 5) and increase incrementally to determine when performance starts to fall. There is a direct relation to the proxy maximum concurrent tasks.
Proxy	Transport Method	Virtual Appliance or Direct SAN. These two methods allow for the fastest possible data retrieval from the source.
	Maximum Concurrent Tasks	Veeam recommends that you not exceed one task per proxy server CPU cores.
Backup Copy Job	Healthcheck	Disabled.
	Defragment and Compact full backup file	Disabled.
	Compression Level	If the decompress setting for the Repository is enabled, this value will not result in compressed data being sent to the DXi. As a result, Veeam recommends leaving this as either AUTO or OPTIMAL for the DXi, because it will optimize overall processing.
	Inline data deduplication	No. (Veeam recommends disabling this option, because it will enable background optimizations for deduplication appliances.)
	Encryption	Do not enable Veeam's Encryption feature. Although Veeam Backup & Replication supports encryption, for best performance, use the hardware encryption provided by the DXi appliance.
	Read the entire restore point from source backup instead of synthesizing it from increments	Enabled. This setting increases performance of the backup copy job by copying the restore point from the source instead of synthesizing a full backup from incrementals resident on the copy target. The full copy is faster overall. This setting is located on the GFS retention configuration section in the backup copy configuration settings.
Backup job	Reverse Incremental	Not recommended.
	Incremental	Enabled.
	Synthetic Full	Not Recommended.
	Active Full	Enabled – Recommended.
	Healthcheck	Disabled.
	Defragment and Compact full backup file	Disabled.
	Compression Level	If the decompress setting for the Repository is enabled, this value will not result in compressed data being sent to the DXi. Veeam recommends leaving this as either AUTO or OPTIMAL for the DXi, because it will optimize overall processing.
	Inline data deduplication	No. (Veeam recommends disabling this option, because it will enable background optimizations for deduplication appliances).
	Exclude swap file blocks	Enabled
	Exclude deleted file blocks	Enabled
	Storage Optimization	Local target (16TB+ backup files) – Veeam recommends this setting on all DXi systems employing NAS shares to improve overall performance.
	Encryption	Do not enable Veeam's Encryption feature. Although Veeam Backup & Replication supports encryption, for best performance, use the Data-at-Rest hardware encryption provided by the DXi appliance.
	Miscellaneous Options	Recommendations
Veeam Backup Server	Recommendations	
Backup Proxy Server	Recommendations	
Backup Enterprise Manager Server	Recommendations	
Server Name	Use only standard ANSI characters for the computer name of the computer on which you want to install Veeam Backup & Replication.	

Windows OS Options	Recommendations
<p>Security</p>	<p>Disable SMB Server Signing (Server 2008/2012):</p> <p>SMB Server Signing is disabled by default on the DXi, but must also be disabled on the Veeam server. (This can be changed on the local machine through a Registry setting, but if the server is part of an AD environment, the group policy must be changed to disable SMB Server Signing for the Veeam server for the change to be permanent.)</p> <p>To disable Server Signing on the local server, disable (set to '0') the following Registry values:</p> <ul style="list-style-type: none"> • <i>HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\LanManServer\Parameters\RequireSecuritySignature</i> • <i>HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\LanManWorkstation\Parameters\RequireSecuritySignature</i> <p>If the Veeam server is part of an AD environment, the group policy must be changed as well:</p> <ul style="list-style-type: none"> • Open the Group Policy Editor, and right-click-and-edit Default Domain Controller Policy. • Go to Computer Configuration > Policies > Windows Settings > Security Settings > Local Policies > Security Options. • Set “<i>Domain member: Digitally encrypt or sign secure channel data (always)</i>” and “<i>Microsoft network server: Digitally sign communications (always)</i>” to Disabled. <p>For more information, see https://technet.microsoft.com/en-us/library/cc731957.aspx</p>
<p>Communication</p>	<p>SMB Timeouts:</p> <p>In the case of busy systems, some timeout defaults do not allow for enough time to process requests/responses. One such timeout value (“SESSTIMEOUT”) defines the amount of time the client waits for the server to respond to an outstanding request. Adjusting this value can keep SMB from timing out and requiring multiple retry attempts.</p> <p>To adjust, either modify the existing SessTimeout DWORD or create the DWORD within the following Registry location and set to a 600 value (10 minute timeout):</p> <ul style="list-style-type: none"> • <i>HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\LanManWorkstation\Parameters</i> <p>For more information, see https://blogs.msdn.microsoft.com/openspecification/2013/03/27/smb-2-x-and-smb-3-0-timeouts-in-windows/</p>

Network	<p>TcpMaxDataRetransmissions</p> <p>Adjusting the following TCP/IP setting by adding a subkey in the registry should reduce the number of timeouts, by allowing more time for the connection to complete. This setting is not present in the registry by default.</p> <ol style="list-style-type: none"> Start the Registry Editor (Regedt32.exe) and go to the following subkey: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters On the Edit menu, click Add Value, then add the following information: Value Name: TcpMaxDataRetransmissions Value Type: REG_DWORD – Number Valid Range: 0 – 0xFFFFFFFF Default Value: 5 Decimal New Value: 10 Decimal Click OK, then quit the Registry Editor. Reboot after registry change has been made.
	<p>On heavily utilized systems, consider increasing the TCP/IP timeout on Veeam Backup & Replication backup proxy.</p> <p>See the Microsoft Knowledge Base article at: http://support.microsoft.com/kb/q191143/</p>
	<p>For high TCP loopback latency and UDP latency, applying the following Microsoft Hot Fix may help: http://support.microsoft.com/kb/979612</p>
Server Disk	<p>If I/O performance issues are seen when the Windows (applicable to Windows 2008 R2) disk is under heavy I/O load, consider applying the following Windows Hot Fix: http://support.microsoft.com/kb/982383</p>

Network Switch Settings	Recommendations																
Cisco Nexus 7k-Series	<p>Disable Priority Flow Control for the DXi-connected ports:</p> <p>Procedure:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 70%;">Command or Action</th> <th style="width: 25%;">Purpose</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Step 1</td> <td>switch# configure terminal</td> <td>Enters global configuration mode.</td> </tr> <tr> <td style="text-align: center;">Step 2</td> <td>switch(config)# interface ethernet [slot/port-number]</td> <td>Enters interface mode on the interface specified.</td> </tr> <tr> <td style="text-align: center;">Step 3</td> <td>switch(config-if)# priority-flow-control mode off</td> <td>Sets the PFC to the auto, off, or on mode. By default, PFC mode is set to auto on all ports.</td> </tr> <tr> <td style="text-align: center;">Step 4</td> <td>switch(config-if)# show interface priority-flow-control</td> <td>(Optional) Displays the status of PFC on all interfaces.</td> </tr> </tbody> </table>			Command or Action	Purpose	Step 1	switch# configure terminal	Enters global configuration mode.	Step 2	switch(config)# interface ethernet [slot/port-number]	Enters interface mode on the interface specified.	Step 3	switch(config-if)# priority-flow-control mode off	Sets the PFC to the auto, off, or on mode. By default, PFC mode is set to auto on all ports.	Step 4	switch(config-if)# show interface priority-flow-control	(Optional) Displays the status of PFC on all interfaces.
	Command or Action	Purpose															
Step 1	switch# configure terminal	Enters global configuration mode.															
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Step 3	switch(config-if)# priority-flow-control mode off	Sets the PFC to the auto, off, or on mode. By default, PFC mode is set to auto on all ports.															
Step 4	switch(config-if)# show interface priority-flow-control	(Optional) Displays the status of PFC on all interfaces.															

	For more information, see: http://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus7000/sw/qos/config/cisco_nexus_7000_qos_config_guide_8x/configuring_priority_flow_control.html
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Additional CIFS considerations

If using Kerberos/LDAP please reference: <https://technet.microsoft.com/en-us/library/bb463167.aspx>

If problems are encountered when mapping a CIFS share with IP address, short name, and long name, reference the above link to standardize the configuration and help understand potential issues should they arise following configuration.

[Configuration Recommendations for DXi as a Veeam NFS \(Shared Folder\) \(Only available with Veeam 10\)](#)

Note: With Veeam 10, all DXi models are able to use a simple NFS share.

The settings shown below are recommended and present the DXi as a secondary backup target for the Backup Copy Job.

Component	Parameter or Option	Setting
Repository	Repository Type	NFS (Shared Folder)
	Align backup file data blocks	Disabled.
	Decompress backup data blocks before storing	Recommended to improve Dedupe ratio and backup performance.
	Rotated drives	Disabled; N/A with "Use per-VM backup files".
	Use per-VM backup files	Enabled.
	vPowerNFS	Recommend that vPowerNFS be kept on primary storage.
	Task Limit	This value may need to be adjusted more than once to find the best number of concurrent backups to use for the specific environment. Start low (ie. 5) and increase incrementally to determine when performance starts to fall. There is a direct relation to the proxy maximum concurrent tasks.
Proxy	Transport Method	Virtual Appliance or Direct SAN. These two methods allow for the fastest possible data retrieval from the source.
	Maximum Concurrent Tasks	Veeam recommends that you not exceed one task per proxy server CPU cores.
Backup Copy Job	Healthcheck	Disabled.
	Defragment and Compact full backup file	Disabled.
	Compression Level	If the decompress setting for the Repository is enabled, this value will not result in compressed data being sent to the DXi. As a result, Veeam recommends leaving this as either AUTO or OPTIMAL for the DXi, because it will optimize overall processing.
	Inline data deduplication	No. (Veeam recommends disabling this option, because it will enable background optimizations for deduplication appliances.)
	Encryption	Do not enable Veeam's Encryption feature. Although Veeam Backup & Replication supports encryption, for best performance, use the data at rest hardware encryption provided by the DXi appliance.
	Read the entire restore point from source backup instead of synthesizing it from increments	Enabled. This setting increases performance of the backup copy job by copying the restore point from the source instead of synthesizing a full backup from incrementals resident on the copy target. The full copy is faster overall. This setting is located on the GFS retention configuration section in the backup copy configuration settings.
Backup job	Reverse Incremental	Not recommended.

	Incremental	Enabled.
	Synthetic Full	Disable.
	Active Full	Enabled – Recommended.
	Healthcheck	Disabled.
	Defragment and Compact full backup file	Disabled.
	Compression Level	If the decompress setting for the Repository is enabled, this value will not result in compressed data being sent to the DXi. Veeam recommends leaving this as either AUTO or OPTIMAL for the DXi, because it will optimize overall processing.
	Inline data deduplication	No. (Veeam recommends disabling this option, because it will enable background optimizations for deduplication appliances).
	Exclude swap file blocks	EnabledEnabled
	Exclude deleted file blocks	EnabledEnabled
	Storage Optimization	Local target (16TB+ backup files) – Veeam recommends this setting on all DXi systems employing NAS shares to improve overall performance.
	Encryption	Do not enable Veeam’s Encryption feature. Although Veeam Backup & Replication supports encryption, for best performance, use the data at rest hardware encryption provided by the DXi appliance.
	Miscellaneous Options	Recommendations
Veeam Backup Server	Recommendations	
Backup Proxy Server	Recommendations	
Backup Enterprise Manager Server	Recommendations	
Server Name	Use only standard ANSI characters for the computer name of the computer on which you want to install Veeam Backup & Replication.	

[Configuration Recommendations for DXi as a Veeam Linux Repository using Quantum AccentFS](#)

The settings shown below are recommended and present the DXi as a primary backup target.

Note: All versions of Veeam support Linux backup repository (9.x and beyond). The Veeam Linux Proxy is only supported on Veeam 10 and later.

Supported Models and DXi SW Versions:

- DXi9000 – all software versions
- DXi4800 – all software versions
- DXi6900 – SW 3.4.0 and above
- DXi4700 – SW 3.4.0 and above
- Supporting Fast Clone:
 - Dxi9000 and Dxi4800 with software 4.0.4 and above

Component	Parameter or Option	Setting
Repository	Repository Type	Linux Backup Repository using AccentFS
	Use FastClone on XFS filesystems	Disabled (feature only available within Veeam 10 and later)
	Align backup file data blocks	Disabled.

	Decompress backup data blocks before storing	Disabled
	Rotated drives	Disabled; N/A with "Use per-VM backup files".
	Use per-VM backup files	Enabled.
	vPowerNFS	Recommend that vPowerNFS be kept on primary storage.
	Task Limit	This value may need to be adjusted more than once to find the best number of concurrent backups to use for the specific environment. Start low (i.e., 5) and increase incrementally to determine when performance starts to fall. There is a direct relation to the proxy maximum concurrent tasks.
Proxy	Transport Method	Virtual Appliance or Direct SAN. These two methods allow for the fastest possible data retrieval from the source.
	Maximum Concurrent Tasks	Veeam recommends that you not exceed one task per proxy server CPU cores.
Backup Copy Job (not recommended)	Healthcheck	Disabled.
	Defragment and Compact full backup file	Disabled.
	Compression Level	None
	Inline data deduplication	No. (Veeam recommends disabling this option, because it will enable background optimizations for deduplication appliances.)
	Encryption	Do not enable Veeam's Encryption feature. Although Veeam Backup & Replication supports encryption, for best performance, use the data at rest hardware encryption provided by the DXi appliance.
	Read the entire restore point from source backup instead of synthesizing it from increments	Enabled. This setting increases performance of the backup copy job by copying the restore point from the source instead of synthesizing a full backup from incrementals resident on the copy target. The full copy is faster overall. This setting is located on the GFS retention configuration section in the backup copy configuration settings.
Backup job	Reverse Incremental	Not recommended.
	Incremental	Enabled.
	Synthetic Full	Disabled
	Active Full	Enabled – Recommended.
	Healthcheck	Disabled.
	Defragment and Compact full backup file	Disabled.
	Compression Level	None
	Inline data deduplication	No. (Veeam recommends disabling this option, because it will enable background optimizations for deduplication appliances).
	Exclude swap file blocks	Enabled
	Exclude deleted file blocks	Enabled
	Storage Optimization	Local target (16TB+ backup files) – Veeam recommends this setting on all DXi systems employing NAS shares to improve overall performance.
	Encryption	Do not enable Veeam's Encryption feature. Although Veeam Backup & Replication supports encryption, for best performance, use the data at rest hardware encryption provided by the DXi appliance.
	Miscellaneous Options	Recommendations
Veeam Backup Server	Recommendations	
Backup Proxy Server	Must use AccentFS supported Linux operating system (see AccentFS Plug-in Installation, at https://qsupport.quantum.com/kb/flare/Content/dxi/DXi4800/default.htm#Series/AccentFS_Plugin_Install.htm)	
Backup Enterprise Manager Server	Recommendations	
Server Name	Use only standard ANSI characters for the computer name of the computer on which you want to install Veeam Backup & Replication.	

Considerations for employing AccentFS with Quantum DXi and a Veeam Linux Repository

If using Veeam 10 and later, the Quantum AccentFS plugin will be installed (see https://qsupport.quantum.com/kb/flare/Content/dxi/DXi4800/default.htm#Series/AccentFS_Plugin_Install.htm for your DXi4800 or https://qsupport.quantum.com/kb/flare/Content/dxi/DXi9000/Default.htm#Series/AccentFS_Plugin_Install.htm for your DXi9000) on a Veeam Linux Proxy (follow Veeam instructions on how to involve a Linux Proxy server) and a mount point created by following the AccentFS plugin install instructions.

If using Veeam 9.5, you will need to create an independent Linux VM on the hypervisor cluster. Then install AccentFS plugin. Follow instructions and mount AccentFS share on the Linux machine. Create a standard Veeam Linux repository directing backups to the AccentFS mount point.

During backup job setup, it is a good idea to manually set the proxy for the backup job to the proxy that has the AccentFS mountpoint. This way you guarantee the desired proxy server is employed, otherwise Veeam may choose an alternate proxy server to serve as the virtual disk mount and add an unnecessary hop in the datapath.

AccentFS should only be used if you wish to conserve network bandwidth. When using AccentFS, the backup will perform source side deduplication and only send unique blocks of data to the DXi target. The Veeam Linux Proxy will employ the “hotadd” or virtual appliance transport method. Compression, deduplication, and encryption should be disabled. Synthetic operations should be avoided if employing this storage method as FastClone is not supported currently. Performance is limited with this method currently, so careful consideration of job parameters is necessary. For example, AccentFS would not be a good candidate for secondary copy due to data path considerations. We recommend AccentFS be used for primary backup, yet understand the performance will not be optimum.

The network bandwidth conservation is the primary benefit of this feature, not all out performance. Once AccentFS is installed on the Linux proxy server, modifying the OS boot parameters to auto-mount the AccentFS filesystem is desirable, this way the data lands on the DXi and not a local directory on the proxy server in the event the proxy server is rebooted.

Configuration Recommendations for Veeam 10 File Share Backup (Veeam 10 only) for DXi

Note: All DXi models and software versions are supported.

	Parameter or Option	Setting
Backup job	ACL Handling	Folder level: yes
	Storage	Compression level: optimal
	Storage	Encryption: disabled
	Maintenance	Storage level corruption guard: disabled
	Secondary copy settings	
		Use custom data encryption settings: disabled

A new feature in Veeam 10 is file share backup. This allows the user to back up a primary storage NAS share to the DXi. The method in which data is stored on the DXi is very different from traditional VM backups. The file share backup is a forever forward incremental. This presents challenges as the

metadata is accessed frequently and results in increased random I/O (which can negatively impact performance). The DXi memory consumption increases when the file share being protected has many small files, the memory budget on the DXi can be exhausted quickly when using a VDMS repository as the storage target. If a share contains a large number of small files, you may wish to use a NAS share on the DXi in order to eliminate the memory consumption concerns. If you choose to back up to a Quantum Deduplicating Storage Appliance repository (VDMS) closely monitor the DXi Admin alerts to see if the memory consumed nears the maximum threshold (set to 85% of available memory, in normal cases maximum memory is 32GB).

Configuration Recommendations for Scale Out Backup Repository using the DXi as the performance extent

When configuring the object storage capacity tier, deselect the default gateway server to have the DXi directly send the backup data to the S3 repository. This is only applicable if the DXi has internet or intranet access to the S3 target repository and the DXi SW revision is 4.0.3 or later, DXi versions prior to 4.0.3 must contact Quantum Support and have a patch applied to achieve the same result. If the DXi does not have internet or intranet access, or the DXi Software requirements are not met, select the default gateway for the server that does have internet access to offload data to the capacity tier. It is desirable to avoid that extra data path hop and have the DXi send the data direct, however.

Consult any of the following resources on the **Help** menu if you have questions or difficulties:

- See the [Veeam Backup & Replication User Guide](#) for comprehensive information about Veeam Backup & Replication.
- See the Veeam Backup & Replication for searchable, topic-based documentation.
- See the Veeam Backup & Replication built-in help for access to offline searchable documentation.

Configuring Veeam Backup & Replication with the DXi-Series

Configuring Veeam Backup & Replication with DXi NAS

A Network Attached Storage (NAS) unit is essentially a self-contained computer connected to an Ethernet network, with the sole purpose of supplying data storage services to other devices on the network. Several DXi models can present themselves as a NAS or Veeam Linux Repository appliance for backup purposes. Before you can use a DXi system as a NAS or Veeam Linux Repository appliance, you must first configure a NAS or Veeam Linux Repository share on the DXi.

Important Note: The DXi is **NOT** a Network Attached Storage device to be used to store customer data. The DXi only emulates a NAS device for the sole purpose of being a Backup-to-Disk target for backup applications such as Veeam. Do **NOT** use the DXi NAS share as “Drag-and-Drop” file storage.

A DXi system can serve as a NAS backup system where the following protocols are supported:

CIFS Protocol -The CIFS (Common Internet File System) protocol defines a standard for remote file access using many computers at a time. This protocol allows users with different platforms to share files without installing additional software. This protocol is used with Windows networks.

NFS Protocol - The NFS (Network File System) protocol was originally designed by Sun Microsystems and allows all network users to access shared files stored on computers of different types. NFS provides access to shared files through an interface called the *Virtual File System* (VFS), which runs on top of TCP/IP. Users can manipulate shared files as if they were stored locally on the user's own hard disk.

With NFS, computers connected to a network operate as clients while accessing remote files, and as servers when providing remote users access to local shared files. This DXi NAS presentation is used with UNIX/Linux networks, and is used for the Veeam Linux Repository initial share creation. However, the Veeam Data Mover is employed to transfer data, rather than NFS.

NAS or Quantum Deduplicating Storage Appliance Device Path Considerations

Network segmentation is the process of splitting a single network into several sub-networks or segments. The advantages of a segmented network are improved performance and security. Performance is improved because there are fewer hosts on the segmented network, which in turn minimizes local traffic. Security is improved because the data traffic is contained on this segment and is not visible to the outside network.

Note: If you are using network segmentation and Automated Deployment Services (ADS), you must use the data segment IP information for ADS management, **NOT** the management segment. ADS uses the Server Message Block (SMB) data protocol to manage the NAS shares on your system, which requires that the management traffic use the data segment.

DXi systems allow you to configure your network for separate segment types. The three primary segments are defined by the type of network traffic that can be used on that segment. The three types of network traffic are:

- **Replication traffic** - This segment is used exclusively for replication data movement.
- **Management traffic** - This segment is used exclusively for DXi remote management (Web page access).
- **Data traffic** - This segment is used exclusively for NAS/VDMS data movement.

Each network segment has its own network interface (IP address, network mask, and default gateway). In this way, the segment is separated from other network segment traffic.

Note on Bonding:

When Bonding, whether or not Round Robin or LACP is used, the ports on the Ethernet switch that the DXi are connected to must be in a matching group type as the Bond group on the DXi.

The DXi also supports Mode 1 Bonding (active/backup), which does not require any special switch configuration. With a Mode 1 bond, only one interface in the bond is active. If that interface loses connectivity, the MAC address is moved to another interface in the bond, which then becomes active. Typically this is used when connections to the DXi are routed through two completely separate switches for redundancy / failover.

Veeam Backup & Replication seamlessly integrates with a DXi-Series disk backup system using the NAS (CIFS or NFS) interface. Once installed and configured, Veeam can manage backups through the DXi and take advantage of the system's capabilities, such as data deduplication and replication.

Installing and configuring the DXi and Veeam for NAS operation consists of the following major steps, which are discussed below:

1. Configure the DXi for NAS or Veeam Linux Repository
2. Configure the Veeam Backup & Replication NAS or Veeam Linux Repository

[Configure the DXi for NAS or Quantum Deduplicating Storage Appliance Repository](#)

The DXi system allows you to configure it to present its storage capacity as NAS shares that are compatible with Veeam Backup & Replication. You can create NAS shares for use with Windows or UNIX networks. You can also join the DXi to a Windows domain or workgroup and manage users.

In the DXi Remote Management Console (the GUI) the **Configuration** page allows you to configure many of the features of the DXi, including storage presentation. A NAS license must be installed on the DXi before you configure NAS shares. To enable the Veeam Linux Repository; you will need to install a Veeam Application Environment License. See [DXi4800 Veeam Installation](#) or [DXi9000 Veeam Installation](#) for more detail.

Configuring the DXi for NAS lets you choose which network protocol will be used as the transport method to the DXi. CIFS (Windows) and NFS (UNIX/Linux) are available on the **NAS > Summary** tab. After NAS Shares have been configured on the DXi, Veeam Backup & Replication can be configured to use these shares as storage resources.

[Configure DXi as a Quantum Deduplicating Storage Appliance Repository](#)

Refer to the [Quantum DXi Veeam Installation Guide](#) for details.

[Configure Veeam Backup & Replication for NAS or Quantum Deduplicating Storage Appliance Repository](#)

Refer to the "Veeam Backup & Replication" section of the [Veeam Help Center \(Technical Documentation\) website](#) for current configuration and related details.

Best Practices Guide for Quantum Deduplicating Storage Appliance Repository, NFS, or CIFS

Number of Shares Considerations

Quantum DXi systems support both CIFS (Windows-based) and NFS shares. Each system can support multiple NAS shares, with a maximum of 128 shares. It is recommended that users create only the required number of shares for each backup proxy.

When using CIFS shares on DXi systems, it is recommended that you create at least one share for each backup proxy to use. Backup proxies should not share the CIFS shares during normal backup operations.

Network CIFS Share Access Control Considerations

In Windows Active Directory environments, the share acts as the target for Veeam Backup & Replication. The share is not intended as primary storage or drag-and-drop storage. A best practice is to create a new account and workgroup, as opposed to joining the domain, to limit access and prevent accidental file deletion by another user. It is recommended that you **DO NOT** reconfigure or delete NAS shares while data is being written. There is no mechanism to detect the I/O and provide a warning to the user.

Network Considerations

Some network considerations include:

- Use a dedicated network for backup data or use QoS features that guarantee network bandwidth. Another option would be to use virtual networks (VLANs) to segregate backup from production network traffic.
- Configure network interface cards (NICs) in the server and clients and set routers to full duplex.
- Cabling:
 - Use only CAT5e or CAT6 cables (1Gb/s rated cables).
 - Use only OM3 or OM4 (Aqua) Fibre Optic cables (10Gb/s rated FC)
- If you are using a DNS server, verify that the DNS server configuration settings are correct by using **nslookup** on the host name, as well as the IP address.
- It is also a good idea to add the HOSTNAME and IP Address to the host file.
- Use multiple DXi ports when connecting to the network. The more DXi Ports used, the better the performance capability will be across the ports.
- Install and configure multiple network ports on the Backup Proxy servers. Dedicate multiple ports for the transfer of data to the DXi.
- For redundancy, connect at least two DXi ports to an Ethernet switch.
- Leverage the DXi system's ability to set up multiple networks. The DXi network configuration allows for integration into nearly any networked environment.
- Set each switch port used by the DXi to auto-negotiate/auto-sensing. The DXi network interface cards are preset to auto/auto and cannot be changed.
- When using network transport mode, ensure that the ESX management port is on a VMKernel that is attached to the 10gbe vSwitch.
- Change the Veeam Proxy server virtual NIC from E1000E to VMNEXT3 to improve performance.
- Veeam network configuration
 - Use the Veeam preferred network option to instruct Veeam on which network is preferred when attempting data transfer: https://helpcenter.veeam.com/docs/backup/hyperv/select_backup_network.html?ver=100 This does not restrict Veeam to using this network

explicitly however. If Veeam encounters a networking issue, they will attempt to use any network present to attempt to complete the backup job. This includes networks that are not optimized for data transfer. In the latter case, the backup will fail. If this occurs, please resolve the issue with the preferred network and re-attempt the backup job.

Additional Best Practice Considerations

Several operational considerations are common to the two access methods (CIFS and NFS). See the [Common Operational Considerations for Veeam Backup & Replication](#) section below for more information on deduplication, encryption, compression, backup streams, and replication.

A performance increase between releases has been observed. Be sure to have the latest patch installed for Veeam software.

When using a DXi for a backup repository, consider the following:

- Multiple concurrent small backup jobs aggregate for faster overall performance than one large backup.
- Select WAN for storage optimization if running remote backup. You may also want to consider using Quantum AccentFS in this case to reduce network bandwidth requirements.
- Quantum recommends that you use Veeam advanced deployments and distributed deployments.
- Use parallel processing (a Veeam global option). This will increase backup performance, at the cost of reduced restore performance.
- The DXi Quantum Deduplicating Storage Appliance Repository supports the use of the Veeam Data Mover Service, which optimizes performance between the DXi and the Veeam proxy server. This optimization uses DXi memory. One way to dynamically adjust for resources is to create and run jobs and ramp-p pressure on the Quantum DXi. The DXi has a memory monitor mechanism that will generate an Admin Alert once 85% of the DXi's Veeam memory resources have been used. Once this threshold is tripped, back off the number of concurrent jobs to avoid oversubscribing DXi resources. This feature was added in DXi SW revision 4.0.3 and later. If running an earlier version of DXi SW, we recommend you start at a maximum of 25 concurrent jobs and increment slowly. If the DXi memory resources are exhausted jobs will begin to fail. At that point, back off the number of concurrent jobs. Remember, memory resource consumption fluctuates, for example restore operations generally take more memory resources than backup, you will want to allow for some headroom to accommodate these memory usage fluctuations. There is a new Quantum DXi9000 configuration available that has expanded the Veeam resources and has been tested to 200 concurrent streams.

- If you need to determine if your DXi9000 can be enhanced for Veeam, open the **System Management (GUI) Status > Hardware > Firmware Version** and scroll until you see CPU information like the following:

Processor Core Speed	2.50 GHz
Processor Bus Speed	10.40 GT/s
Family-Model-Stepping	6-55-7
Brand	Intel(R) Xeon(R) Gold 6248 CPU @ 2.50GHz
Level 2 Cache	20x1 MB
Level 3 Cache	28160 KB
Number of Cores	20
Maximum Memory Capacity	1 TB
Microcode	0x5000029
Family-Model-Stepping	6-55-7
Brand	Intel(R) Xeon(R) Gold 6248 CPU @ 2.50GHz
Memory Settings	
System Memory Size	768 GB
System Memory Type	ECC DDR4
System Memory Speed	2666 Mhz
System Memory Voltage	1.20 V
Video Memory	16 MB
System Memory Testing	Disabled
Memory Operating Mode	Optimizer Mode
Node Interleaving	Disabled
ADDDC Setting	Enabled
Correctable Memory ECC SMI	Enabled
Opportunistic Self-Refresh	Disabled

If your DXi9000 comes with advanced CPU and memory (768 GB RAM), run the following syscli command:

syscli -- set veeam --cgroupslimit 416

This will allocate 416 GB RAM for Veeam usage. See [DXi-Series Command Line Interface \(CLI\)](#).

- VeeamONE and trigger-based replication.
 - If using trigger-based replication to an additional DXi for added data protection, it has been observed in the field when VeeamONE (versions earlier than VeeamOne 10) is also used to monitor the VMware and storage repository environments, that at times trigger based replication is sometimes delayed by the VeeamONE resource polling. If this is the case, please add the following registry keys to the VeeamONE server in order to fine tune the monitor polling interval. This will allow the files to close on the DXi to trigger replication to the target DXi. See registry keys below:
 - Veeam 9.5 (pre update4)

In the registry of the Veeam ONE server increase this value:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Veeam\Veeam ONE Monitor\Service\
CollIntBackup
600000
```

- Veeam 9.5 update4 and later

```
HKEY_LOCAL_MACHINE\SOFTWARE\Veeam\Veeam ONE Monitor\Service\Collector.Scheduler.Bit
```

This is a DWORD type and default value is 60000 (milliseconds) in decimal. Try to set it to 180000 or higher and check the results.

After modifying the registry key, you must restart the Veeam Monitor Service for the changes to take effect.

- VeeamOne 10, uses a new method of polling where system status is cached, and polling methodology has changed. In this case trigger-based replication was not impacted during normal usage. The above registry keys are ONLY relevant to Veeam 9.5 and earlier. For VeeamOne 10, at this point, modifications are NOT needed to registry keys to modify behavior.

Common Operational Considerations for Veeam Backup & Replication

Deduplication Data Considerations

Deduplication results can be negatively impacted by compression, encryption, software deduplication, and multiplexing. These functions all change the data stream in a way that obscures patterns in the data content. They will reduce the performance and deduplication from any downstream appliance, including DXi systems. To obtain effective deduplication rates, you should **NOT** encrypt, deduplicate, or compress your backup data before sending it to a DXi appliance.

Good Candidates for Data Deduplication

Data deduplication can work well with virtual machines, large databases, unstructured data such as Microsoft Office documents (PowerPoint presentations, Word documents, and Excel spreadsheets), SQL, Oracle, and Exchange databases, and source code.

Not So Good Candidates for Data Deduplication

Data deduplication does **NOT** work well with encrypted data, in-line compressed data, SQL with LiteSpeed (in-line compression), Oracle with multi-channel RMAN (in-line multiplex), and compressed or uncompressed music files or movies/videos.

For long-term archiving, it is recommended to vault the data to a physical tape device.

Replication Considerations

- The replication is only available to NAS shares with deduplication enabled.
- The DXi supports 256-bit AES encryption for replication.
- Data is only encrypted while in transit between the replication source and replication target.
- Data is unencrypted upon arrival at the replication target.
- Encryption may affect replication performance. You should disable encryption if your WAN is already secured.

For more information, please refer to the DXi User Guide for your DXi model, available from the [Quantum Documentation Portal](#).

Oversubscription of Space on the DXi

Deduplication will reduce the amount of space used on the physical system by virtual tapes. Users are advised to monitor for Low Space conditions on the DXi and free up virtual media before reaching this threshold. A best practice would be to trigger the Space Reclamation process *before* the DXi reaches approximately 80 percent full.

The **Disk Usage** overview on the **Home** page of the DXi Management GUI displays the following information about disk usage on the system:

Note: Values are displayed as an amount and as a percentage of the total capacity in the system. For more detail, see

https://qsupport.quantum.com/kb/flare/Content/dxi/DXi4800/Default.htm#Series/User_Guide/Disk_Usage_Overview.htm.

- **Disk Capacity** - The total usable disk capacity of the DXi.
- **Available Disk Space** - The disk space available for data storage (free space).

- **I/O Write Low Threshold state (Yellow)** - Free disk space is equal to or less than 500GB + [10GB * (Total system capacity in TB)].
- **Stop Write state (Red)** - Free disk space is equal to or less than 250GB.
- **Stop I/O state (Red)** - Free disk space is equal to or less than 10GB.

Note: For optimal system performance, Quantum recommends keeping the amount of Available Disk Space (free space) at 20% or more.

Note: When disk capacity is low, target replication to the system is paused. In addition, space reclamation is automatically started to free up disk space.

Space Reclamation

When data is deduplicated it is stored in the block pool—a pool of all unique data blocks that were captured during the data deduplication cycle. When subsequent backup jobs occur, the data deduplication engine searches for new data entering the DXi and uses a variable length compression algorithm to compare new data to existing data in the block pool. Unique blocks are added to the block pool, and known blocks are indexed.

The space reclamation function searches the blockpool for data blocks that are not referenced by any pointers (that is, the files associated with these blocks have been expired and removed). When such a data block is identified, it is removed to make the space reusable.

For correct system operation, space reclamation must be run at regular intervals (at least once a week). Quantum recommends creating a schedule to automatically run space reclamation during off-peak times.

It may be beneficial to schedule space reclamation for a time when other operations are not normally being carried out. Therefore, it is important to know when to schedule the space reclamation process. As a best practice, Quantum recommends that the process starts at least two hours after your backup job has completed, on a daily basis. It is far more efficient to process a day's worth of new data than a week's worth.

Refer to the DXi User Guide for your DXi model, available from the [Quantum Documentation Portal](#) for configuration details.

Backup Stream Considerations

Note: Click the following links to view the following topics in the Veeam Help Center.

- Limit the number of [Concurrent](#) backups, and the data ingestion rate, to help control the load on the repository and prevent possible timeouts.
- Use [Advanced Deployment](#) and [Distributed Deployment](#) to greatly relieve the load on the Veeam Backup Server.
- Use [Resource Scheduling](#) to automatically select and use optimal resources for configured jobs.
- Set up multiple networks where possible, so that each Veeam proxy will have its own data path to the DXi.
- When you are using the Quantum Deduplicating Storage Appliance Repository, 25 concurrent backup streams and 15 restore streams should be the maximum. Although it is possible to exceed these stream counts at times, the amount of DXi memory consumed by the Veeam data mover is dynamic and fluctuates. If the aggregate memory consumption exceeds 32GB jobs may fail. Another way to gauge the resource load on the DXi is to start concurrent jobs and monitor for an admin alert on the DXi (available in DXi SW revisions 4.0.3 and later). The DXi will generate an admin alert if the Veeam agent consumes more than 27GB of memory. This

equates to roughly 85% of maximum memory allotted for Veeam operations. Once that threshold is met, it would serve you well to reduce the load so as to not exceed the memory budget. That way you have some leeway if a job consumes more memory than usual. If the memory budget is exhausted, jobs will fail and must be retried with less load on the system. The Quantum DXi9000 has a configuration available for purchase with increased resources that has been tested internally and easily handled 200 concurrent backup streams. The memory threshold can be customized to an alternate value via syscli if you wish to change the threshold trigger point for the admin alert for tuning purposes. It may also be completely disabled if you wish.

DXi Backup I/O Guidance

The **Reverse Incremental Backup** first runs a full backup on the VM, after which all subsequent backups are incremental. This method allows you to perform a forever-incremental backup strategy. During a Reverse Incremental Backup, Veeam injects changes into the **.vbk** file and then rebuilds it to the most recent state of the VM. This will cause simultaneous read and write operation on the DXi.

These simultaneous operations can negatively impact performance, causing an I/O performance bottleneck on the DXi. To avoid this situation, if you are using a CIFS NAS repository, consider running a standard incremental backup and then using the Active Full Backup method, to prevent I/O bottlenecks within the storage device. Multiple Full Backups will not consume as much space on DXi storage, because all similar blocks will be deduplicated by the DXi. If you are using the Veeam Linux Repository, consider running standard incremental backups followed by a periodic synthetic full backup.

The **Synthetic Full Backup** is a method that synthesizes a backup from the first Full Backup and subsequent Incremental Backups. The underlying difference between an Active Full Backup and a Synthetic Full Backup is how the VM data is retrieved. With a Synthetic Full Backup, Veeam will not retrieve the VM data from the source, but will synthesize a full backup from the DXi Linux repository. This should only be attempted when the Quantum deduplication storage appliance (VDMS) Repository is employed on the DXi. The network overhead of transferring the data to the Veeam Backup and Replication server to synthesize is not necessary in this case, and the operation takes place entirely on the DXi. For this reason, this method is a good candidate for environments that have limited network bandwidth. It is not advisable to perform synthetic full backups when a CIFS Shared Folder repository is employed. Synthetic full backups should definitely be employed on Quantum DXi and Veeam Backup and Replication versions that support "FastClone." This is a clonerange operation that significantly reduces blockpool retrieves and is 15 – 20 times faster than traditional synthetic full backups. If FastClone is not available, active full backups are often faster than traditional synthetic full operations (depending on several factors). You may wish to try both methods to see which satisfies performance requirements.

Instant VM Recovery allows you to immediately restore a VM back into production from the DXi storage repository. This allows you to minimize recovery time and minimizes disruption from production downtime. Booting virtual machines from the DXi repository is similar in performance to the Reverse Incremental and Synthetic Full Backup methods. However, this restore method could negatively impact performance, causing an I/O bottleneck at the DXi. This should only be attempted when you are employing a Quantum deduplication storage appliance (VDMS) Repository on the DXi.

The DXi works well with the Instant VM Recovery method, although it is not designed as primary storage. Thus, Instant VM Recovery should be viewed only as a temporary solution, until primary storage is available. It's advisable to only start as many instant recovery sessions as necessary, because each session consumes memory on the DXi while active. Memory consumption varies, depending on what type of activity is present on the hosted virtual machine. It's also advisable to redirect written blocks to a local high speed datastore to take advantage of caching. We also suggest that you migrate instant recovered virtual machines to permanent storage after instant recovery is complete.

Sample Backup Workflow

When using the Quantum deduplication storage appliance (VDMS) Repository, consider using the following backup workflow:

- Active Full Backup (initial)
- Daily Forward Incremental Backup
- Weekly Synthetic Full Backup (if FastClone is utilized)
- Monthly Active-full Backup

Try to limit restore points to from 7 to 14 (Veeam default). In addition, no more than 30 restore points should be retained before a synthetic or full backup is performed.

Helpful Resources

The following is a list of documents, references, and links where you can find additional information regarding specific activities and products.

Veeam Online Resources:

- [Veeam Backup & Replication Documentation](#)
- [Veeam Help Center \(Technical Documentation\) -- Online Help Center](#)
- [Veeam Customer Support Portal](#)
- [Veeam Community Forums](#)
- [Veeam Online University](#)
- [Veeam Resource Library](#)
- [Veeam FAQs](#)

VMware Web Site

<http://www.vmware.com/>

Microsoft Web Site

<http://www.microsoft.com/en-us/default.aspx>

Quantum Web Site

<http://www.quantum.com>

StorageCare Guardian Web Site

<http://www.quantum.com/ServiceandSupport/Services/GuardianInformation/index.aspx>

StorageCare Vision Web Site

<http://www.quantum.com/products/Software/quantumvision/Index.aspx>

Contacting Quantum

More information about Quantum products is available on the Service and Support website at <https://www.quantum.com/serviceandsupport/get-help/index.aspx>. The Service and Support Website contains a collection of information, including answers to frequently asked questions (FAQs). You can also access software, firmware, and drivers through this site.

For further assistance, or if training is desired, contact the Quantum Customer Support Center:

Region	Support Contact
North America	1-800-284-5101 (toll free) +1-720-249-5700
EMEA	+800-7826-8888 (toll free) +49 6131 324 185
Asia Pacific	+800-7826-8887 (toll free) +603-7953-3010

For worldwide support:

<http://www.quantum.com/serviceandsupport/get-help/index.aspx#contact-support>