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DXi-Series Configuration and Best Practices Guide

For Commvault Software

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Table of Contents

DXi-Series Configuration & Best Practices Guide for Commvault Software.

This guide seeks to help Quantum customers who own DXi-Series systems (DXi4000-Series, DXi6000-Series, D8000-Series and DXi V-Series), and who also use Commvault software, 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 Commvault software with Quantum DXi-Series systems. This guide includes advice and best practices for using Quantum DXi-Series systems with Commvault software.

Note: For the sake of brevity, from here on, this guide will say "Commvault" instead of "Commvault software."

How to Use This Guide

This document assumes that the reader has basic expertise with Commvault, as well as basic networking and SAN experience. It also assumes that the reader has a Quantum DXi installed in a working Commvault environment.

This document provides key recommendations and useful information for quickly setting up a DXi system with Commvault. It expands on these recommendations and discusses the features and performance tuning considerations relevant to various storage access methods.

This document is organized according to the various storage target access methods to be employed with Simpana. Depending on the DXi model, the DXi can appear as a Virtual Tape Library (VTL) storage device over Fibre Channel (FC) or NAS device using CIFS or NFS. These access methods are discussed in the following order.

- DXi VTL
- DXi NAS – CIFS/NFS

Shortcuts to Quick Start Activities

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

- » **Online Documentation for Your Quantum Product**
- » **Summary of Tuning Parameters for**
- » **Configuring Commvault with DXi VTL**
- » **Best Practices Guide with DXi VTL**
- » **Configuring Commvault with DXi NAS**
- » **Best Practices Guide with DXi NAS**
- » **Common Operational Considerations for**

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. Please have that available when following the hyperlinks to the documents.

Online Documentation for Your Quantum Product

http://www.quantum.com/ServiceandSupport/SoftwareandDocumentationDownloads/Index.aspx#

In the lists below, If multiple versions of a manual for your DXi are listed on the linked page, scroll down and select the version for your hardware/software combination. Please note that on the linked pages, documents are not listed in alphabetical order, so two versions of the same manual will not necessarily be listed in consecutive lines.

DXi-Series Management Console & User's Guides

The DXi-Series Management console helps you configure and use your storage solution. Refer to the following documents for more information on DXi-Series Management:

- DXi8500 User's Guide
- DXi6900 / DXi6902 User's Guide (go to **Previous Documentation > DXi6902 User Guide -**same doc covers both models)
- DXi6800 User's Guide
- DXi6700 User's Guide
- DXi4700 User's Guide (go to DXi4700 Print Documentation > Previous Documentation > DXi470x User Guide)
- DXi4000 User's Guide
- DXi V-Series User's Guide

Virtual Tape Library Setup

Refer to the following documents for VTL setup:

- DXi8500 User's Guide
- DXi6900 / DXi6902 User's Guide (go to **Previous Documentation > DXi6902 User Guide -**same doc covers both models)
- DXi6800 User's Guide
- DXi6700 User's Guide
- DXi4700 User's Guide (go to DXi4700 Print Documentation > Previous Documentation > DXi470x User Guide)

Network Attached Storage

Refer to the following documents for NAS Share setup:

- DXi8500 User's Guide
- DXi6900 / DXi6902 User's Guide (go to **Previous Documentation > DXi6902 User Guide -**same doc covers both models)
- DXi6700 User's Guide

- DXi4700 User's Guide (go to **DXi4700 Print Documentation > Previous Documentation > DXi470x User Guide**)
- DXi4000 User's Guide
- DXi V-Series User's Guide

DXi Replication

Refer to the following documents for DXi-to-DXi Replication setup:
- DXi8500 User's Guide
- DXi6900 / DXi6902 User's Guide (go to **Previous Documentation > DXi6902 User Guide -**same doc covers both models)
- DXi6800 Installation and Configuration Guide
- DXi6700 User's Guide
- DXi4700 User's Guide (go to **DXi4700 Print Documentation > Previous Documentation > DXi470x User Guide**)
- DXi4000 User's Guide
- DXi V-Series User's Guide

DXi Knowledge Base

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

Online Documentation for Commvault

- http://documentation.commvault.com/commvault/

Commvault Installation Documentation

- Commvault installation documentation (Web page)

Summary of Tuning Parameters for Commvault

For backup administrators who are well versed on Commvault 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.

Parameter or Option	Settings
Compression	Although Commvault supports compression, to obtain effective deduplication rates, you should **NOT** compress your backup data before sending it to a DXi appliance. See this Commvault Web site for additional information: Software Compression.
Encryption	Although Commvault supports data encryption, to obtain optimal performance, you should **NOT** encrypt your backup data before sending it to a DXi appliance. See this Commvault Web site for additional information: Disable Encryption Overview.
Deduplication	To obtain effective deduplication rates, you should **NOT** deduplicate your backup data before sending it to a DXi appliance. See this Commvault Web site for additional information: Deduplication Overview.
VTL Options	**Settings**
VTL sign-on string	Use native DXi Inquiry. Emulated library sign-on strings can mislead support.
Data Path Properties	• See the discussion of "Default Chunk Size" in the "Improving Throughput to Storage Media" section of Commvault's CommCell Performance Tuning Web page. • See the discussion of "Default Block Size" in the "Increasing Block Size" section of Commvault's CommCell Performance Tuning Web page.
Miscellaneous Options	**Recommendations**
Server Resources	Set up no more than 1-2 drives per 3.x GHz CPU core. The server should have 2GB RAM, plus 1GB per drive. If performance per data stream seems low, disable CPU Hyperthreading on the CommServe or MeidaAgent, and verify whether this improves your speed per stream. You may need to keep Hyperthreading disabled for best throughput per stream.
Windows OS Options	**Recommendations**
Services	Disable the Removable Storage Manager (RSM) service. As shown in this Microsoft article, Removable Storage Manager is no longer available as of Windows 7 and Windows Server 2008 R2.

Configuring Commvault with the DXi-Series

Configuring Commvault with DXi VTL

Creating a backup image on a virtual tape is no different than creating a backup image on a physical tape. The backup functionality is unchanged.

The DXi VTL is viewed though Fibre Channel interfaces and appears as a virtual library with virtual drives and cartridges. During backups, the application creates a backup image on the virtual tape cartridges.

VTL Device Path Considerations

One of the key ways to ensure that SAN-connected physical and virtual tape libraries are detected properly by backup servers is *serialization*. Serialization provides a unique identifier for each device in a physical or virtual tape library, to automate device association from multiple backup servers. These identifiers, returned by the VTL devices, are separate from the *element addresses* that define the position of devices in the library. The element address is used by the library's robot or medium changer to manage the tape drives.

Serialization allows the servers running the CommServe to coordinate tape drive configuration by aligning the device serial number with the device's element address. This enables Commvault device wizard to align these two addresses, reducing the potential for improper configuration.

If the Device Configuration Manager does not serialize the devices listed, do not commit the changes, and be sure to check the VTL's online state. The DXi VTL partition must be online for this to function properly.

The Quantum recommended device identification for each DXi system is the native mode (in other words, use the DXi4700, DXi6700, DXi6800, DXi6900, or DXi8500 inquiry response string as the identification for each model, respectively). This allows product identification for the service teams at both Commvault and Quantum.

When using the native device mode, Windows environments will display the device in the Device Manager as an *unknown media changer*. This is normal and not an error, and does not create a problem for Commvault. If the customer environment has requirements for a specific changer device for compatibility, the Quantum DXi products support emulation of many popular devices to meet those requirements.

Always ensure that the latest drivers and firmware have been installed for the tape drive, robotic library, and HBA. For best performance, IHV drivers should be loaded for the tape drive or emulated tape library. The three IHV tape drive manufacture Quantum emulates are Quantum, IBM, and HP. The tape drivers may be found at the IHV's Web site.

OEM Tape Drivers and Commvault Hardware Compatibility List

- Quantum
- International Business Machines – support/fixcentral
  - Click on the Select product tab in the middle of the page.
  - In the Product Group box, select System Storage.
  - In the Select from System Storage box, select Tape Systems.
  - In the Select from Tape Systems box, select Tape drivers and software.
  - In the Select from Tape drivers and software box, select Tape device drivers.
  - In the Platform box, select your operating system.

- Hewlett Packard – Enterprise Support Center
- Commvault Hardware Compatibility List

Configuring Commvault with DXi VTL

Commvault seamlessly integrates with a DXi-Series disk backup system using the VTL interface. Once installed and configured, Commvault can manage the backups through the DXi and can take advantage of the DXi system's capabilities, such as data deduplication and replication. Installing and configuring the DXi and Commvault for VTL operation consists of the following major steps:

Configure the VTL on DXi

A virtual tape library (VTL) is a data storage virtualization technology used for backup and recovery. A VTL presents itself as a tape library with tape drives for use with existing backup software. Virtualizing disk storage as tape allows integration of VTLs with existing backup software and existing backup and recovery processes and policies. The benefits of such virtualization include storage consolidation and faster data restores.

In the Remote Management Console, under the **Configuration** tab, the **VTL** page allows you to configure a DXi to present its storage capacity as VTL (virtual tape library) partitions that are compatible with standard backup applications. You can add virtual tape drives and storage slots to VTL partitions, and you can create and work with virtual tape cartridges. You can also map partitions to hosts.

Partitioning lets you divide the DXi virtual tape drives and storage elements into separate partitions, usable by separate host computers. The **Partitions** page contains a list of assigned tape drives, as well as listing all user-defined partitions that are currently configured on the system. This page also lets you add, edit, and delete partitions.

The **Summary** page displays the maximum number of partitions, the total number of tape drives, and the number of assigned tape drives. The **Summary** page also provides a list of configured partitions on the system. Click the link in the **Name** column to edit the specific partition.

Note: If you are planning to replicate partitions to another DXi system, you must ensure that every partition name and barcode number on the system is unique. You can **NOT** have duplicate partition names or barcode numbers on a DXi system or on a system receiving a replicated partition.

The **Create Media** page allows you to create virtual media for a specific partition. Once created, these virtual cartridges are available for backing up data. You can configure the media type, capacity, starting barcode, and initial location on this page.

Note: It is possible to oversubscribe space on the DXi system. The sum total of capacity for all media could be more than the physical capacity of the system. See Oversubscription of Space on the DXi on p.16 for more information on this subject.

Configure Commvault with DXi VTL

To configure the VTL in Commvault, follow these steps:

1. Verify that the operating system can see the VTL and all VTD. For the detailed verification process by OS, see Commvault Driver Configurations page. If applicable, install the latest OEM Tape Drivers during this step.

2. After the operating system sees all VTLs and VTDs, Detect/Configure Devices from the CommCell Browser, expand to **Storage Resources**.

3. Right-click **Libraries**, and then click **Add | Tape Library**.

   The Add Tape Library dialog box appears.

4. Select the appropriate MediaAgent from the **MediaAgent** list.

5. Click **Scan Hardware**.

   The tape library that is associated with the selected MediaAgent is detected. It appears in the **Add Tape Library** dialog box as **Not configured**.

6. Right-click the detected library, and then click **Configure**.

   A message appears that tells you that the library was configured successfully.

7. Click **OK**.

   The new tape library is now configured.

8. Click **OK**.

   The new tape library appears in the CommCell Browser under **Storage Resources | Libraries**.

9. Run a full scan on the VTL and verify that it completes successfully in the Commvault event viewer. Visually verify that the Commvault CommServe media inventory matches that of the VTL.

10. Create a storage policy and associate it to the VTL.

11. After you have completed the configuration, test the configuration by performing a backup job. For this type of test, you may want to select a small folder, and not the entire client. Monitor the Commvault event viewer for any errors during the test backup.

Best Practices Guide with DXi VTL

GridStor Considerations

Commvault provides the ability to perform automated failover and load balancing type functionality through its GridStor feature. This lets applications automatically send backup data to alternate devices in the event of a MeidaAgent or other failure, as well as when all drives are in use, or in a simple round-robin method.

Quantum recommends that you exercise care when choosing to use any of these options, and that you consider the positive and possible negative impacts of each one.

With all of these options, Quantum advises caution when ingesting to multiple DXis, because this can cause unique data to be stored on multiple DXis, which can increase overall storage needs. Repeatedly sending the same data to the same DXi will result in optimal deduplication ratios. Because of this, Quantum recommends that you send the same backups to the same DXi each time, except temporarily during critical production-down scenarios..

Considerations for some of the options include:

- **Failover when resources are offline** – The ability to move backups from one MeidaAgent to another in the event of a failure is often critical to ensuring the highest possible number of successful backups. You can use this option in most environments with multiple MeidaAgents, to achieve a level of redundancy.

- **Failover when resources are busy** – This option can help you ensure that backup jobs do not remain queued for a long time, which can decrease the overall backup window. However, in some situations, simply adding more virtual tape drives or identifying other bottlenecks in the backup path may be a better solution.

- **Round-robin** – This method can be effective when there are multiple network-limited MeidaAgents attached to a single DXi VTL. It allows you to point backups to a single source and effectively use all MeidaAgents, lowering network management needs. However, this method is **NOT** recommended for sending to multiple DXis.

See the Commvault website for more information on Copy Properties and Troubleshooting Alternate Data Paths.

Virtual Tape Drive Device Description and Recommendation

Quantum DXi products support multiple tape drive emulations and allow user-definable capacities of tape cartridges to support the drive type. The drive type selection does not internally impose any throttling of the ingest rate. The host system uses tape device drivers to communicate with the virtual tape drives and the Commvault application.

Quantum follows Commvault's recommendation to use the OEM tape drive drivers for backup. The complete tape drive driver recommendations from Commvault are available in their hardware compatibility list.

Quantum recommends against using the Windows update function to get the latest tape drive drivers, as it is possible that Windows Update can find unexpected driver matches for a tape drive. These unexpected matches often are not the same as the ones supplied by the tape drive manufacturer and may introduce unexpected incompatibilities. This can result in a change to the device in the Windows Device Manager.

Number of Concurrent Tape Drives in Use

Each DXi model has a maximum number of virtual tape drives that can be configured. Each model also has a maximum aggregate throughput rate, which will be divided relatively equally between the virtual tape drives in use. This does not prohibit a single tape drive from using all available bandwidth. The MeidaAgents typically determine individual tape drive performance.

It is not a good idea to configure the maximum number of virtual tape drives and perform I/O through all of them concurrently. Better performance can be achieved by using a subset of those virtual tape drives at the same time. Quantum expects the customer configuration to distribute those virtual tape drives among multiple MeidaAgents, to simplify initial installation by providing dedicated resources to each MeidaAgent.

Quantum also recommends that backups be staggered, so that only a subset of drives is in use at one time. During a backup, the data transfer rate is primarily controlled by the MeidaAgent, because the DXi system does not restrict the ingest data rate. This creates the opportunity for one or more MeidaAgents to burst data at a higher rate, leaving less bandwidth for the remaining virtual tape drives. Conversely, it supports the coexistence of fast data streams with slow streams, for maximum use of the available bandwidth.

Keep in mind that increasing the number of concurrently active virtual tape drives does not increase the aggregate DXi bandwidth. It could also result in a failed backup job due to a timeout from a bandwidth-starved operation.

The recommended maximum number of concurrently active virtual tape drives for various maximum aggregate bandwidths is listed in the table below.

DXi Model	Max VTDs*	Max # of Concurrently Active VTDs	Max Aggregate Bandwidth
DXi470x	64	32	1,650 MB/s (5.9 TB/Hr)
DXi6700	80	80	972 MB/s (3.5 TB/Hr)
DXi6701 / DXi6702	256	80	1,580 MB/s (5.7 TB/Hr)
DXi6802	256	80	3,299 MB/s (11.9 TB/Hr)
DXi690x 256GB	512	256 **	6,277 MB/s (22.6 TB/Hr)
DXi690x-S 256GB	512	512 **	9,722 MB/s (35.0 TB/Hr)
DXi8500***	160	160	1,777MB/s (6.4 TB/Hr)
DXi8500****	512	160	3,047MB/s (11.0 TB/Hr)

*Virtual Tape Drives; max # defined in the system
**Quantum suggests that you contact Commvault about possible limitations or other considerations related to the maximum num-
ber of concurrently active VTDs
***DXi8500 w/64GB RAM & 2TB drives
****DXi8500 w/128 GB RAM & 3TB drives

Tape Cartridge Capacity Considerations

Space on a given tape cartridge cannot be reused until after all backup data on that cartridge has expired. The greater the capacity of a cartridge, the longer it will typically take for all data on that cartridge to expire. Expired data continues to take up space on the virtual tape cartridge, as well as on the DXi, until that cartridge is overwritten, relabeled, or erased. This means that lower cartridge capacities are more desirable, so that tapes will be returned to the default scratch pool for reuse and overwritten soon er.

There is virtually no relationship between the configured capacity of a virtual tape cartridge and the tape drive emulation that has been configured for the partition:

- Backup/restore operations will span the number of tapes required, ignoring the configured capacity.

- Vaulting/duplicating operations performed by the backup application will ignore the virtual capacity when writing to another cartridge, whether virtual or physical.

- DXi-Series devices limit the maximum capacity permitted by the tape drive emulation; the minimum is 5GB.

- The capacity utilization is tracked in UNCOMPRESSED GB, and the data is stored in deduplicated form. That is, 100GB of data that is 2:1 compressible will be reported as occupying 50GB of virtual tape cartridge space.

Quantum's general guidance is to specify a smaller virtual tape cartridge capacity, such as 50GB to 100GB, for the reasons mentioned above.

Tape Drive LUN Mapping

Quantum recommends the following:

- Map the device starting with LUN 0 on each port, and **DO NOT** skip any LUNs.
- As a best practice, zone the VTL devices together with the Commvault MeidaAgents to prevent other servers from taking control of the VTL resources.
- Additionally, Quantum recommends that you configure the HBA driver to use *persistent binding* to fix the devices to specific addresses. This will keep devices in the same order after a reboot.
- Set the **WWNN = WWPN** for DXi systems. This allows for the HBA to use either WWNN or WWPN.

VTL Fibre Channel Performance Tuning

To enhance performance for Commvault environments, consider using the tuning parameters indicated by the article mentioned below to eliminate interference from the Host System.

According to the Microsoft knowledgebase article "Windows Server 2003 cannot perform backup jobs to tape devices on a storage area network" (http://support.microsoft.com/kb/842411/en-us), you may encounter the following problem:

> "A conflict in Windows Server 2003 causes a Test Unit Ready (TUR) request issue on SCSI-attached and fiber-attached devices. When this issue occurs, an overflow of TUR requests causes the storage unit not to respond or to respond slowly to SCSI commands. In a SAN environment, any Windows Server 2003-based computer that is zoned to detect the Tape Backup Unit hardware can send TUR requests."

The article referenced above lists the cause of the problem, and a workaround for it.

Considerations for the Handling of Expired Media within Commvault

When a tape is expired by Commvault, the event is not directly communicated to the DXi-series device. The result is that a tape may be displayed as empty or SCRATCH to the CommCell console GUI, but the same tape will display in the DXi-series GUI as containing data. This indicates that the data on the expired tape is still using space on the DXi-Series library.

To solve this problem, configure Commvault scratch pools to use recycled media first. With this option set, the recycled media will be overwritten before new media, which uses space more efficiently.

For Commvault, it's important to thoroughly understand both the retention rules and the backup history, to know if backup jobs meet the rules. A given Commvault installation may be using cycles, days, or a combination of the two, for the retention rules. This may cause some tapes to be retained longer than expected, if they do not meet the retention rules for expiration. To ensure that tapes are properly returned to the scratch pool, make sure that Commvault data aging is configured and is running successfully on a scheduled basis.

Additional Best Practice Considerations

Several operational considerations are common to all three access methods (VTL, CIFS and NFS). See the Common Operational Considerations for Commvault section on p.16 for more information on Deduplication, Encryption, Compression, Backup Streams, and Replication.

Configuring Commvault with DXi NAS

A NAS (Network Attached Storage) 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 appliance for backup purposes. Before you can use a DXi system as a NAS appliance, you must first configure a NAS 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 Networker. 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) that 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 protocol is used with UNIX/Linux networks. The Quantum Network Attached Storage (NAS) appliance is intended to act as a target for backup applications.

NAS 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 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: If you are using the Round Robin (Mode 0) option, and you have either a Dell or CISCO switch, the ports that connect to the DXi must be bonded.

Commvault seamlessly integrates with a DXi-Series disk backup system using the NAS (CIFS or NFS) interface. Once installed and configured, Commvault 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 Commvault for NAS operation consists of the following major steps, which are discussed below:

1. Configure the DXi for NAS (p.13)
2. Configure Commvault with DXi NAS (p.13)

Configure the DXi for NAS

The DXi system allows you to configure it to present its storage capacity as NAS shares that are compatible with Commvault. 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 prior to configuring NAS shares.

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, Commvault can be configured to use these shares as storage resources.

Configure Commvault with DXi NAS

1. Verify that the Commvault MeidaAgent has access to the DXi NAS share through the network.

   - For UNIX, you will need to mount the NFS share into the UNIX file system.
   - For Windows, just verify that the MeidaAgent can network browse the CIFS share.

2. Configure the NAS share as a disk library in the Commvault MeidaAgent.

3. Configure a storage policy for the newly added disk library.

4. After you have completed the configuration, test the configuration by performing a backup job. For this type of test, you may want to select a small folder, and not the entire client. Monitor the Commvault event viewer for any errors during the test backup.

Note: When creating the storage policy for a disk library, select **No** for enabling deduplication. Using software deduplication with a hardware deduplication appliance can negatively impact hardware deduplication and performance.

Best Practices Guide with DXi NAS

Number of Shares Considerations

Quantum DXi systems support both CIFS (Windows-based) and NFS (UNIX/Linux) shares. Each system can support multiple NAS shares, with a maximum of 128 shares. Quantum recommends that users create only the required number of shares for each MeidaAgent. DXi systems can support concurrent NFS and CIFS shares, and can support Fibre Channel VTLs concurrently with those NFS and CIFS shares.

When using NAS shares on DXi systems, Quantum recommends that you create at least one share for each MeidaAgent to use. MeidaAgents should not share the NAS shares during normal backup operations. Root access to an NFS share is not allowed, and the access rights will be changed to **nfsnobody** as a security precaution. This does not impact the access to the share from the backup application.

Network Share Access Control Considerations

In Windows Active Directory environments, the share acts as the target for Commvault. 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. Quantum recommends 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:

1. 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 traffic from production network traffic.

2. Configure network interface cards (NICs) in the server and clients, and set routers to full duplex.

3. Use only CAT5e or CAT6 cables for 1Gb/s networks and SFP+ Optical or TwinAx for 10 GbE networks.

4. 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.

5. Use multiple DXi ports when connecting to the network. The more DXi ports used, the better the performance capability will be across the ports.

6. Install and configure multiple network ports on the MeidaAgents. Dedicate multiple ports for the transfer of data to and from the DXi.

7. Install and configure multiple network ports on the MeidaAgents. Dedicate multiple ports for the transfer of data from Backup Clients to the MeidaAgents.

8. Set up multiple networks and segregate traffic from the Backup Clients to the MeidaAgents such that the client traffic does not interfere with the MeidaAgents to DXi traffic.

9. Leverage Commvault's ability to set up Alternate Data Paths. This can help ensure the success of data protection if using multiple Ethernet ports between MeidaAgent and DXi.

10. Leverage the DXi's ability to set up multiple networks. The DXi network configuration allows for integration into nearly any networked environment.

11. For redundancy, connect at least two DXi ports to an Ethernet switch.

12. 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.

Commvault Storage Settings and Tuning Considerations

When using a DXi as NAS for Commvault, consider the following when you create a disk library:

- If using NAS as an NFS mount, set the client NFS mount time-out to 1200.

- If the Windows server is using SMB file sharing, the time out setting session should be set to 120 seconds. (http://technet.microsoft.com/en-us/library/cc938292.aspx).

- If using a Windows MeidaAgent, disable mount path fragmentation by navigating **to Storage Resources > Libraries > DXi CIFS NAS share > Properties > Allocation Policy** on the Commcell Console. Uncheck the **Minimize fragmentation by allocating write blocks of 128 MB** option, and click **OK** to save settings.

Additional Best Practice Considerations

Several operational considerations are common to all three access methods (VTL, CIFS, and NFS). See the Common Operational Considerations for Commvault section on p.16 for more information on Deduplication, Encryption, Compression, Backup Streams, and Replication.

Common Operational Considerations for Commvault

Data Deduplication 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, compress, or multiplex your backup data before sending it to a DXi appliance.

The use of multiplexing was intended for slow source data, and for the minimum transfer rate required by physical tape drives. Multiplexing backup streams was intended to provide more efficient use of a limited number of physical tape drives. Since the virtual tape drives in DXi systems are not susceptible to performance losses from slow data transfer rates, the number of virtual tape drives can easily be increased without any time penalty for repositioning. It is not necessary to use multiplexing with the DXi systems. Additionally, multiplexing adds additional header information to the data and reduces the deduplication ratio.

Good Candidates for Data Deduplication

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

Not So Good Candidates for Data Deduplication

Data deduplication does **NOT** work well with in-line compressed data, SQL with LiteSpeed (in-line compression), Oracle with multi-channel RMAN (in-line multiplex), Exchange 2010, compressed video, compressed audio, and compressed JPG images.

For long-term archiving, Quantum recommends that you vault the data to a physical tape device.

Replication Considerations

For first-time replication setups, it is important to manually replicate the name space once the target system is configured and is online. This facilitates the first replication following the first backup to that share/partition.

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 *Quantum DXi-Series Best Practices for Data Replication*.

Oversubscription of Space on the DXi

Deduplication will reduce the amount of space used on the physical system by the 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):

- **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

Space management involves two processes: data reconciliation and data reclamation.

- **Data reconciliation** is used to create a list of what can be removed. It runs automatically every twelve hours, at noon and midnight, unless data reclamation is running.

- **Data reclamation** is the process of deleting the data on the data reconciliation list. It can be scheduled, or run manually.

  o There is significant overhead associated with this process, and therefore, it should not be run during periods of high appliance use.

  o In addition, replication, reclamation, and backup stream ingest all consume system resources and should not all be done at the same time.

Quantum recommends that you schedule daily reconciliation and reclamation, to manage the available space. The scheduled time should be configured to start the data reclamation process after daily backups are complete. The default schedule is weekly, and the default time for the data reclamation is set to 12:00 AM on Sunday. These parameters are user configurable; you should configure them for your backup window.

DXi Multiprotocol Guidance - NFS/VTL Scenario

The NFS **Synchronous** setting requires all data written to be committed to physical storage. This means that protocol "stable writes" and "commits" require all data to be written to disk for before the command is complete. This ensures that when a backup completes, all the data resides on disk. The default setting is **Synchronous**. You can change this setting through the CLI.

Asynchronous mode allows the system to acknowledge receipt of "stable write" or "commit" commands without having the data (and related metadata) fully written to disk. This allows backups to be completed faster (from the Commvault point of view), but it creates the possibility of having an incomplete backup if the system fails (e.g., power is lost) before all the data gets flushed to disk.

Simultaneous inline deduplication of VTL *and* NFS traffic represents the mixing of a heavy, intensive I/O payload with an out-of-order, bursty and response time sensitive protocol.

In a mixed VTL and NFS environment, you should change the DXi 2.1 configuration for NAS shares settings from the default mode of **synchronous** to run in **asynchronous** mode. You can do this from the Command Line Interface: **syscli --nfscommit async {--share <sharename>} | --all**.

Additional notes:

- All other multi-protocol combinations work well together.
- The recommendation above applies to all operating systems and applications.
- As a general rule of thumb, reduced VTL traffic may lessen the frequency of NFS timeouts.

Helpful Resources

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

- *Commvault Documentation*: Commvault Documentation
- *CommCell Performance & Tuning Guide*: CommCell Performance Tuning

Quantum Web Site
http://www.quantum.com

StorageCare Guardian Web Site
http://www.quantum.com/products/software/quantumvision/index.aspx

Quantum Vision Reporting Software Web Site
http://www.quantum.com/products/software/quantumvision/index.aspx

Quantum Service Web Site
http://www.quantum.com/ServiceandSupport/Index.aspx

- For **telephone support numbers**, see the Web site listed above.
- Hours of operation (subject to change without notice): 7 days a week, 24 hours a day with valid contract
- 7x24x4 or 7x24x2 coverage available.
- Users with all other contracts can contact Quantum during normal business days from 5 a.m. to 5 p.m. U.S. Pacific Time.

View Quantum's Service-Level Objective:

http://www.quantum.com/ServiceandSupport/ServiceLevelAgreement/Index.aspx

Appendix A

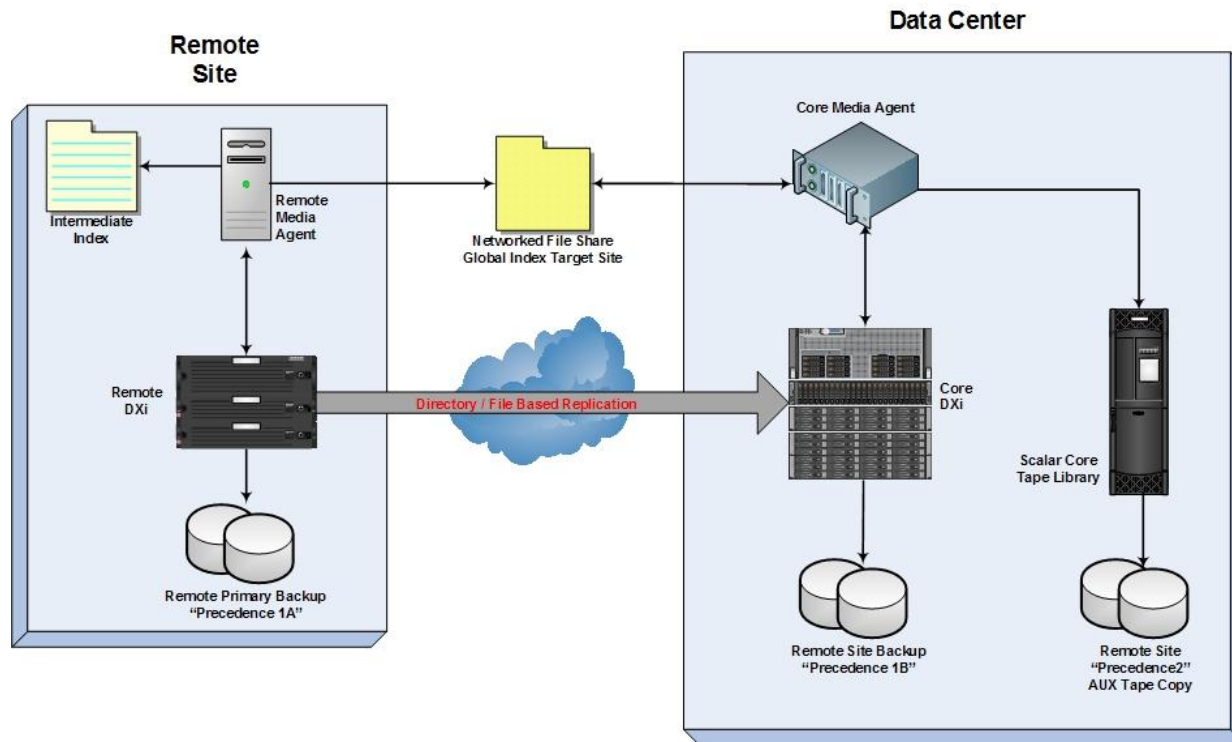## Integration of the DXi with Commvault Continuous Data Replication (CDR)

The following section discusses DXi integration with Commvault Disk Library Replication, also referred to as Continuous Data Replication (CDR), to replicate data from a Remote office to a Data Center, where it provides redundancy for rapid recovery, and where tapes can be created for offsite compliance, archive, and DR purposes. This scenario is commonly referred to as *Edge-to-Core with tape creation.*

Solution Overview

This solution leverages DXi Directory and File Replication and Commvault CDR to provide application awareness of the replicated data set, so that the Remote location can be recovered from the Data Center copy.

In this solution, the CommCell manages both the Remote and Data Center MeidaAgents. It is aware of replication between locations, which is actually executed by DXi Directory and File Replication. The storage policy defined for the Remote site is replicated to the Data Center, so that both locations have the same storage policy. When AUX Copy is used to create tapes, a new storage policy will be defined, which allows for independent expiration and location tracking. In the case of a disaster recovery, the Remote site can be restored either from the Data Center DXi, or from tape.

CommVault Simpana 9
EDGE-TO-CORE PROTECTION
WITH CENTRALIZED TAPE CREATION

Key Elements and Requirements of the DXi / CDR Solution

When integrating a DXi system with Commvault's CDR solution, keep the following in mind:

- Requires Commvault 9 with latest Service Packs installed.

- Continuous Data Replicator must be enabled (Deduplication turned off / CDR replication turned off, which invokes 3rd party replication).

- A Global Index must be defined, using a Network Shared Folder.

- An Intermediate Index must be defined for the Remote MeidaAgent, using a local disk folder or network shared folder.

- The DXi must be defined as a Magnetic Tape Library.

- Multiple DXi systems can be configured using DXi Directory and File replication, as supported in Galaxy version 2.x and above.

- A Scalar Library must be configured with the Data Center MeidaAgent, for tape creation.

- Commvault will not create the index on the Data Center DXi until tapes are created or recovery from the DXi is initiated, unless Global Index Sharing is configured

- The Remote and Data Center DXi must share the same storage policy, so that data expiration is the same for both locations.

- When data is removed from the Remote DXi, a manual sync from the GUI is required to remove data from the Data Center DXi.

- The following Commvault licenses are required:
  - MeidaAgent
  - Continuous Data Replication (CDR)
  - Disk Libraries
  - AUX Copy

For additional information on licensing, see Commvault's License Administration page.

Implementation

Once the above requirements have been met, you can configure the storage policies to manage the duplicate backup images known as *Precedence copies.* These include the replication image of the primary backup, and the tape duplicate images called *Auxiliary copies.*

The primary backup to the remote device is known as "Precedence 1" and the Auxiliary copy is known as "Precedence 2." The replicated image creates a second copy of Precedence 1 at the core DXi, so that when a browse and recover is performed, there are three copies available as an aggregate, although only two Precedences are displayed. Each Precedence (1 and 2) can have a different retention policy.

To eliminate the need to import an index at the core site for tape creation, CDR enables the use of a network shared folder to create a Global Index. The Global Index is defined at the core site, and an Intermediate Index is defined at each remote site. The core MeidaAgent can now restore and move data to tape with both replicated images and core images using the Global Index, and the remote MeidaAgent can use the Intermediate Index to restore locally.