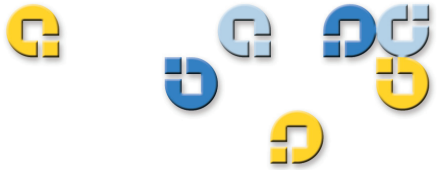
Quantum



User's Guide User's Guide User's Guide User's Guide

Quantum DX*i*4500

DX*i*-Series

6-66904-01 Rev C

DXi4500 User's Guide, 6-66904-01 Rev C, August 2010, Product of USA.

Contents

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Preface

This manual introduces the Quantum DXi4500 enhanced data protection system and discusses:

- System operations
- Configuration
- Web interface
- Basic troubleshooting

Audience

This manual is written for DXi4500 system administrators and field service engineers.

Note: It is useful for the audience to have a basic understanding of UNIX® and backup/recovery systems.

Document Organization

Following is a brief description of chapter contents.

- Chapter 1, DXi4500 System Description provides an overview of the DXi4500 system.
- Chapter 2, Basic Operations provides basic operating instructions for the DXi4500 system.

- Chapter 3, DXi4500 Concepts discusses key concepts and terminology used in the DXi4500.
- Chapter 4, DXi4500 Remote Management discusses using the DXi4500 system management pages to control the system remotely.
- Chapter 5, DXi4500 Configuration discusses the configuration of the DXi4500 system.
- Chapter 6, DXi4500 Status discusses DXi4500 status information.
- Chapter 7, DXi4500 Alerts discusses the DXi4500 alert information and service tickets.
- Chapter 8, DXi4500 Data Services discusses the DXi4500 data services such as space reclamation and remote replication.
- Chapter 9, DXi4500 Utilities discusses DXi4500 utilities such as diagnostic tools and rebooting the system.
- Chapter 10, Troubleshooting discusses problems you may encounter during the setup and operation of the DXi4500 system.
- Chapter 11, Implementing a Data Replication Plan discusses the common ways to implement a data replication plan.
- Appendix A, DXi4500 System Specifications provides system specifications for the DXi4500.
- Glossary provides definitions of terms used in this guide.

Notational Conventions

This manual uses the following conventions:

Note: Note emphasizes important information related to the main topic.

Caution: Caution indicates potential hazards to equipment or data.

WARNING: Warning indicates potential hazards to personal safety.

- Right side of the system - Refers to the right side as you face the component being described.
- Left side of the system - Refers to the left side as you face the component being described.

- Data sizes are reported in base 1000 rather than base 1024. For example:
  - 1 MB = 1,000,000 bytes
  - 1 GB = 1,000,000,000 bytes
  - 1 TB = 1,000,000,000,000 bytes

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ADVERSAL	Læs alle instruktioner og advarsler i dette dokument og i *Vejledning om system-sikkerheds- og lovgivningsoplysninger*, før produktet betjenes.

AVERTISSEMENT	Avant d'utiliser ce produit, lisez la totalité des instructions et avertissements de ce document et du *Guide d'informations sur le système, la sécurité et la réglementation*.

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경고	이 제품을 작동하기 전에 이 문서 및 시스템, 안전, 및 규제 정보 안내서에 수록된 모든 지침과 경고 표지를 숙지하십시오.

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ADVERTENCIA	Antes de utilizar este producto, lea todas las instrucciones y advertencias en este documento y en la Guia informativa sobre sistema, seguridad y normas.

VARNING	Läs alla anvisningar och varningar i detta dokument och i *System, säkerhet och krav från myndigheter - Informationshandbok* innan denna produkt tas i bruk.

Related Documents

The following Quantum documents are also available for DXi4500 systems:

Document No.	Document Title	Document Description
6-00618	*System Safety and Regulatory Information - Quantum Products*	Lists all safety and regulatory information for all Quantum products.
6-66909	*DXi4500 Site Planning Guide*	Provides site planning information for the DXi4500.
6-66910	*Symantec Veritas Backup Exec OST Configuration Guide*	Provides information for setting up the DXi4500 for OST operation
6-66770	*DXi4500 Command Line Interface (CLI) Guide*	Provides information on the DXi4500 command line interface.

For the most up to date information on the DXi4500, see:

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

Contacts

Quantum company contacts are listed below.

Quantum Corporate Headquarters

To order documentation on the DXi4500 or other products contact:

Quantum Corporation *(Corporate Headquarters)*
1650 Technology Drive, Suite 700
San Jose, CA 95110-1382

Technical Publications

To comment on existing documentation send e-mail to:

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http://www.quantum.com/pdf/QuantumWarranty.pdf

Chapter 1

DXi4500 System Description

This chapter describes the DXi4500 system and its components. The chapter consists of:

Overview

The DXi4500 is Quantum's entry level disk backup solution that integrates data deduplication and replication technology to connect backup and DR (disaster recovery) protection across distributed corporate environments. The DXi4500 disk-based backup appliance uses

Quantum's patented data deduplication technology to increase disk capacities by 10 to 50 times, and make WAN replication a practical, cost-effective part of disaster recovery planning. With 2.2 TB to 4.4 TB usable capacity, the DXi4500 is designed for departmental and medium business customers.

Major features of the DXi4500 include:

- Data deduplication and multi-site remote replication compatible with DXi2500-D, DXi3500, DXi4500, DXi5500, DXi6500, and DXi7500 models
- Performance of up to 370–1900 GB/hr ingest rate in adaptive-deduplication mode with NAS attachment (depending on configuration and assuming sufficient network bandwidth and minimal network latency).

Advanced Data Deduplication Increasing Disk Retention for Backup Data

The DXi4500 leverages Quantum's patented data deduplication technology (U.S. Pat. No. 5,990,810) to dramatically increase the role that disk can play in the protection of critical data. With the DXi4500 solution, users can retain 10 to 50 times more backup data on fast recovery disk than with conventional arrays.

Remote Replication of Backup Data Providing Automated Disaster Recovery Protection

With the DXi4500, users can transmit backup data from a remote site to a central, secure location to reduce or eliminate media handling. DXi™-Series replication is asynchronous, automated, and operates as a background process.

Enterprise Features Provide Secure Repository

The DXi4500 features up to 4.4TB usable capacity and up to 400 GB/hr ingest performance (depending on configuration). Policy-based data deduplication lets users select either in-line or post-processing techniques. Presents storage as NAS shares (CIFS and NFS) or OST storage servers.

Features and Benefits

The DXi4500 system provides the following features and benefits:

- Industry-unique, policy-based data deduplication matches different data deduplication methods to different backup tasks
- NAS or OST presentation layer
- 10 source to one target LAN/WAN replication
- OST Optimized Duplication support with Symantec Backup Exec.
- Supported by every major backup software vendor
- Rack space requirements: 2U
- Installs in a standard rack with a minimum depth of 24.09 in (61 cm)

Note: Quantum recommends installing the DXi4500 system in a controlled or restricted area to prevent access by untrained personnel. In addition, Quantum recommends that system installation be performed only by qualified IT personnel.

Data Reduction

Data reduction is the process of reducing the amount of storage capacity required to store your data. The DXi4500 systems provide two techniques to optimize the storage space required on your system:

- Data Deduplication
- Compression

Data Deduplication

The DXi-Series disk backup and replication systems use Quantum's patented data deduplication technology to dramatically increase the role that disk can play in data protection. With DXi-Series solutions, users can retain 10 to 50 times more backup data on fast recovery disk

than with conventional arrays. This advantage allows IT departments to cost-effectively retain months of backup data on disk for faster, more reliable restores and more data recovery points. Quantum's innovative implementation of this core technology means that users do not have to compromise on performance to take advantage of extended retention capability. DXi solutions support both in-line and post-processing data deduplication methodologies—allowing users to realize optimal use of disk resources and achieve the performance needed to complete critical jobs during short backup windows.

The DXi4500 system can reduce the amount of storage capacity required through a data deduplication process. The term data deduplication refers to the elimination of redundant data. Data deduplication works by recognizing repeated variable-length blocks of data in a stream of data. Only a single instance of each blocklet is stored and references (tags) are made for all of the duplicate variable-length blocks of data. These references or tags are stored in an index for use later to reconstitute the deduplicated data. By only storing one instance of the blocklet, a great deal of capacity is saved. For a NAS share, the DXi system waits for 60 seconds of inactivity before a file can be deduplicated. For more information on enabling data deduplication, see NAS Configuration on page 54.

Compression

The DXi4500 systems use compression technology after duplicate blocks have been identified and replaced as part of the deduplication process. With compression, unique data that has been through the data deduplication process can be compressed at a typical ratio of approximately 2:1. This enables you to maximize the storage capacity of your system.

Space Reclamation

The space reclamation process performs multiple functions on the DXi4500.

When data is deduplicated it is stored in what we refer to as a 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 type algorithm" to compare this 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 the block have been expired and removed). Once such a data block is identified, the index count is decremented, and the block is removed to make the space reusable.

Note that the space reclamation process can use a significant amount of CPU processing and disk I/O. Therefore it is important to know when to schedule the space reclamation process. By default the process will commence every Sunday at 12:00pm. However, to maximize performance and capacity utilization, it is highly recommended that this process is performed on a daily basis. As best practice it is recommended that this process commences 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.

Remote Replication

Today most backup occurs on isolated devices, making it difficult to deploy disk backup when disaster recovery protection is required. DXi-Series solutions use data deduplication and replication to decrease by up to 100 times the bandwidth required to move backup data over networks and between sites. This dramatic gain makes it practical and cost-effective for users to replicate backup data over WANs for secure, network-based disaster recovery protection, and it lets users combine rapid, local restores with sound disaster recovery protection.

With DXi-Series replication, users can transmit data from a single site or multiple sites to a central location using any DXi model. DXi-Series replication is an asynchronous, automated background process that includes encryption of data in transit. This model for protecting the distributed enterprise allows users to combine disk, replication, and tape for an optimal combination of performance, simplicity, and security.

For more information on implementing a replication plan, see Chapter 11, Implementing a Data Replication Plan.

DXi4500 System

This configuration provides a base amount of connectivity and data storage. It includes the following features:

- 1 system with 24GB RAM
- 1 RAID controller card
- 4 x 1GbE ports
- 2.2 TB to 4.4 TB depending on model

Figure 1 DXi4500 System

Hard Drive Storage

The DXi4500 system is based upon high speed disk drives instead of tape drives. The usable capacity is 2.2–4.4TB. The drive storage area is

presented as NAS shares or OST LSUs (Logical Storage Units) (see Network Attached Storage (NAS) on page 8).

By making use of high speed drives, the DXi4500 greatly reduces the time required for backup/restore functions and improves confidence in completing the backup in the time allowed.

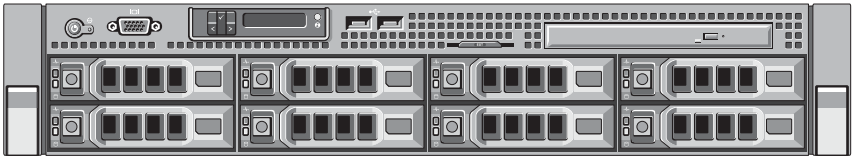
HDDs

To optimize performance, the DXi4500 uses hard disk drives (HDDs).

The DXi4500 supports eight hard disks (Figure 2 and Figure 3):

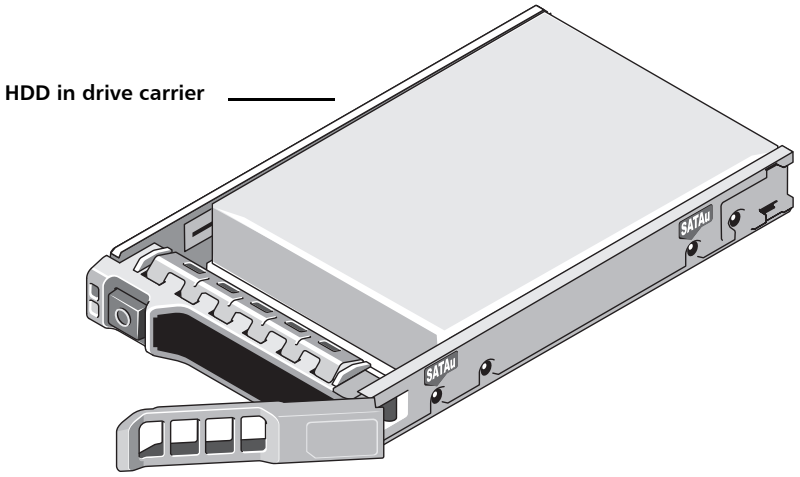
- **HDDs** - High capacity (500 GB or 1 TB) hard disk drives are used for data storage, the operating system, and system software.

Figure 2 DXi4500 Drive Slot Numbering



HDD Slot 0	**HDD Slot 2**	**HDD Slot 4**	**HDD Slot 6**
HDD Slot 1	**HDD Slot 3**	**HDD Slot 5**	**HDD Slot 7**

Figure 3 DXi4500 Drive Carrier



Network Attached Storage (NAS)

The DXi4500 system has the ability to serve as a NAS backup system (see Figure 4) where the following protocols are supported:

- CIFS Protocol
- NFS Protocol

CIFS Protocol

The CIFS (Common Internet File System) protocol defines a standard for remote file access from 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.

Active Directory Support

The DXi4500 supports ADS (Active Directory Services) as well as ACLs (Access Control Lists). This provides the following benefits:

- **Compatibility with CIFS domains** - NAS shares are able to join CIFS domains and use domain authentication.
- **Precise control of file system permissions** - Administrators can specify which users and groups can perform what actions.

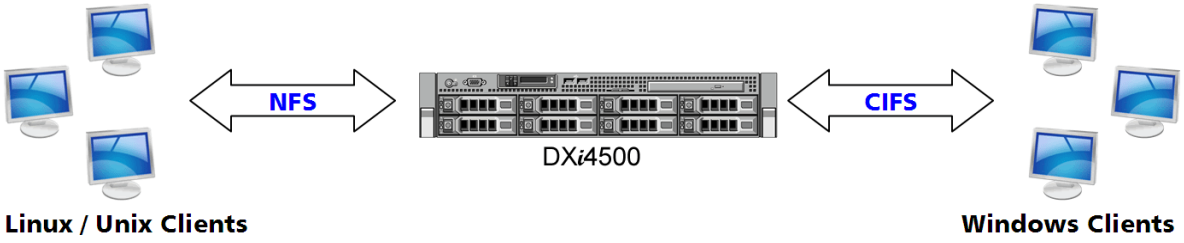
- **Robust administrative support** - Administrators have the same implicit permissions as they do in Windows operating systems.

Note: When you create a CIFS share, the initial permissions are the same as the default permissions for a Windows 2003 share with the addition of an ACE (Access Control Entry) that permits full access to the share for all authenticated users. Administrators can choose to remove this full access ACE, set up custom permissions, or leave the ACL (Access Control List) as is if the server is set up in a fully trusted environment.

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 while providing remote users access to local shared files. This protocol is used with UNIX and Linux networks. It can also be used with Windows networks.

Figure 4 NAS Backup using CIFS and NFS



Note: In the DXi4500, NAS shares are optimized for backup rather than file sharing.

Supported RAID Configurations

RAID is short for Redundant Array of Independent (or Inexpensive) Disks, which is a category of storage that employs two or more drives in combination for fault tolerance and performance. There are a number of RAID levels in use today such as 0, 1, 3, 5, 6 and 10.

The DXi4500 uses the following RAID level:

- RAID 6 Configuration

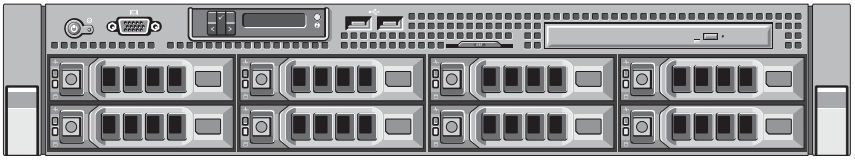
RAID 6 Configuration

RAID 6 uses block-level striping with two parity blocks distributed across all member disks. Dual parity provided by a RAID 6 configuration ensures that your data retains full integrity even in the event of two hard drive failures. Since single parity RAID levels are vulnerable to data loss until the failed drive is rebuilt: the larger the hard drive, the longer the rebuild will take and the longer the system is vulnerable to possible data loss.

The DXi4500 uses RAID 6 volumes for data storage.

- The system contains the following RAID 6 set (Figure 5):
  - **DATA** - HDD slots 1–8 (data storage)

Figure 5 DXi4500 RAID Sets



HDD Slot 0	**HDD Slot 2**	**HDD Slot 4**	**HDD Slot 6**
HDD Slot 1	**HDD Slot 3**	**HDD Slot 5**	**HDD Slot 7**

DXi Advanced Reporting

Quantum DXi Advanced Reporting works with all DXi-Series disk backup systems. DXi Advanced Reporting combines comprehensive performance data logging with powerful visual reporting and analysis tools to help you identify potential problems and optimize system operation. For more information, refer to the *DXi Advanced Reporting Software and Documentation CD* included with your system.

Chapter 2
Basic Operations

Most DXi4500 system operations are performed using the remote management pages (see Chapter 4, DXi4500 Remote Management). This chapter describes the features and basic operation of the DXi4500 hardware, including:

- DXi4500 System
- Hard Drive Carrier Indicators
- Ethernet Port Indicators
- Power Supply Indicators
- Turning On and Shutting Down the System

DXi4500 System

The DXi4500 system is a computer server that provides control for the DXi4500 software (host OS and software applications). The system also provide storage (backup data storage) for the DXi4500 system. The system contains 8 drive carriers.

System Front Panel Features and Indicators

Figure 6 shows the controls, indicators, and connectors located behind the optional rack bezel on the front panel of the system. Table 1 describes each item.

Figure 6 DXi4500 System Front View

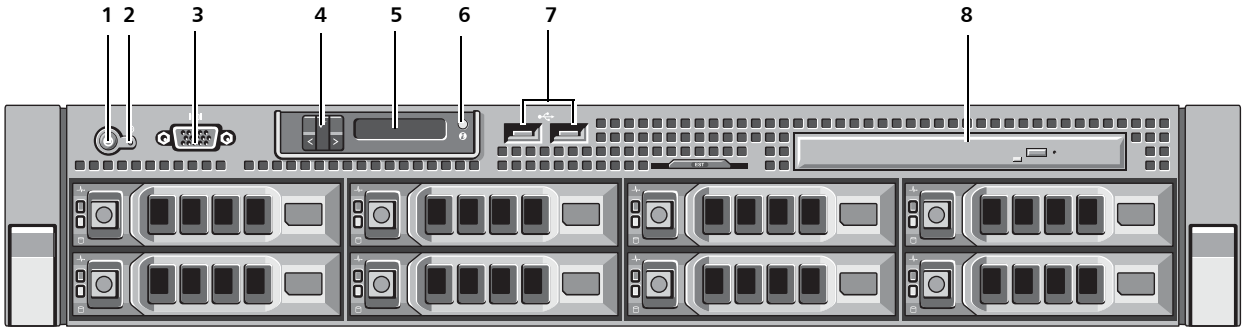


Table 1 DXi4500 System - Front Panel LED Indicators, Buttons, and Connectors

Item	Indicator, Button, or Connector	Icon	Description
1	Power button		Turns the system on or off. **Warning:** Turning off the power removes the main power but keeps standby power supplied to the system. Because of this, you must unplug the system before servicing. **Caution:** Turning off the power without properly shutting down the system may result in loss of data (see Turning On and Shutting Down the System on page 21). **Caution:** To shut down the system in the event of an emergency, press and hold the power button for 4 seconds. This may result in data loss and may cause a delay on next startup due to a block pool verify operation.
2	NMI button		Used to troubleshoot software and device driver errors. This button can be pressed using the end of a paper clip. Use this button only if directed to do so by qualified support personnel.
3	Video connector		Not used.
4	LCD menu buttons		Not used.
5	LCD panel		The LCD lights blue during normal system operation.

Item	Indicator, Button, or Connector	Icon	Description
6	System identification button		The identification buttons on the front and back panels can be used to locate a particular system within a rack. When one of these buttons is pushed, the LCD panel on the front and the blue system status indicator on the back blink until one of the buttons is pushed again.
7	USB connectors (2)		Connects USB 2.0 compliant devices to the system.
8	DVD-ROM		DVD-ROM drive.

System Back Panel Connectors

See the following subsections for information about the back panel connectors available in each possible configuration:

Note: Refer to the port numbering label on the back of the system to help you determine the correct port connections.

Figure 7 shows the connectors located on the rear panel of the system. Table 2 describes each item.

Figure 7 System Rear View

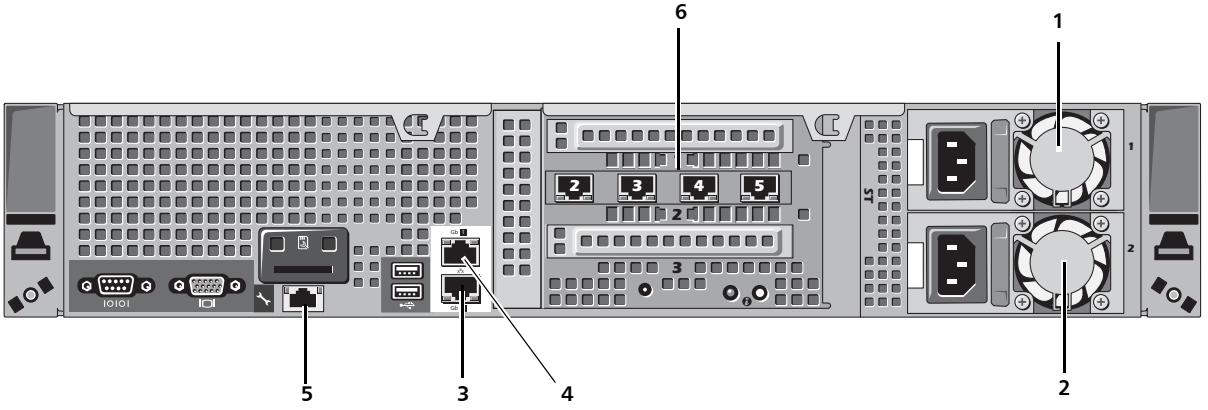


Table 2 Rear Panel Connectors

Item	Description
1	Power supply 1
2	Power supply 2
3	Service port (for Quantum use only)
4	IPMI port (not used)
5	IPMI port (not used)
6	Ethernet ports

Hard Drive Carrier Indicators

Each hard drive carrier has two LED indicators (see Figure 8):

- **Drive activity indicator (green)**
  - **Flashing** - Indicates hard disk drive activity.
- **Drive failure indicator (green and amber)**
  - **Off** - Drive ready for insertion or removal

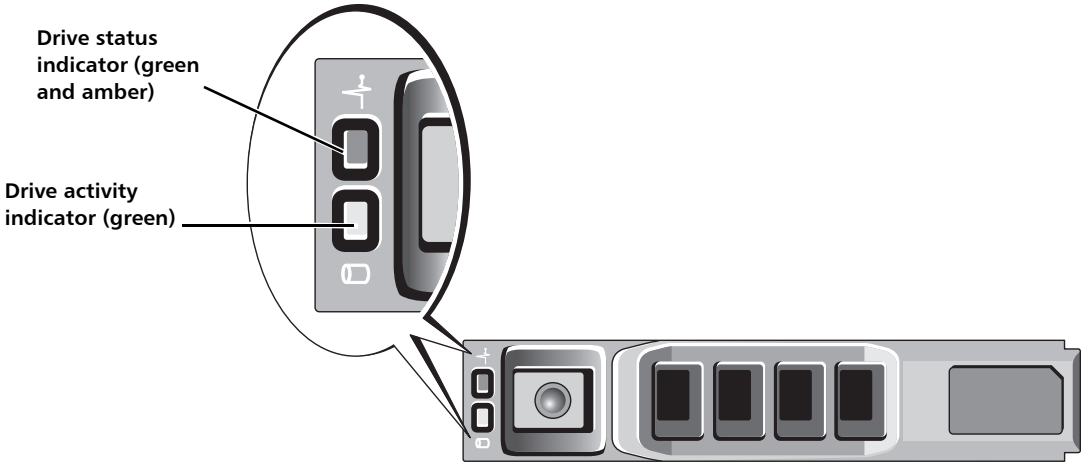
    Note: The drive status indicator remains off until all hard drives are initialized after system power is applied. Drives are not ready for insertion or removal during this time.

  - **Blinks green two times per second** - Identify drive/preparing for removal
  - **Blinks green, amber, and off** - Drive predicted failure
  - **Blinks amber four times per second** - Drive failed
  - **Blinks green slowly** - Drive rebuilding
  - **Steady green** - Drive online
  - **Blinks green three seconds, off three seconds, amber three seconds, and off three seconds** - Rebuild aborted

Note: If a drive fails, you will be notified by an admin alert in the remote management pages (see Admin Alerts on page 125).

Caution: All drives are hot swappable. When replacing drives, never remove more than one drive at a time from a RAID set. After removing a drive, first wait one minute. Then insert a working drive and wait for the RAID set to finish rebuilding (red indicator light is off) before removing another drive. For information about RAID sets, see Supported RAID Configurations on page 10.

Figure 8 Hard Drive Carrier LEDs

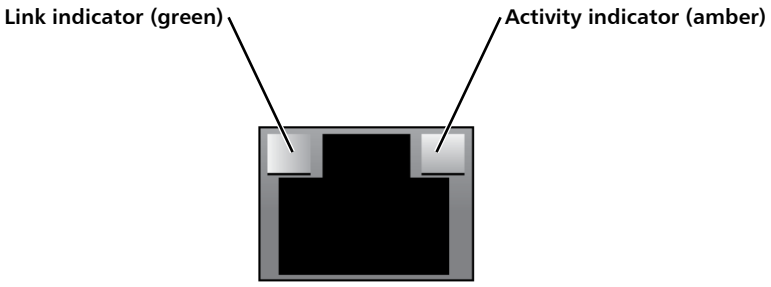


Ethernet Port Indicators

Each Ethernet port on the back panel has two LED indicators (see Figure 9):

- **Link Indicator (green)**
  - **Continuously lit** - Indicates the port is connected to the network.
  - **Off** - Indicates the port is not connected to the network.
- **Activity indicator (amber)**
  - **Blinking** - Indicates network data is being sent or received.

Figure 9 Ethernet Port LEDs



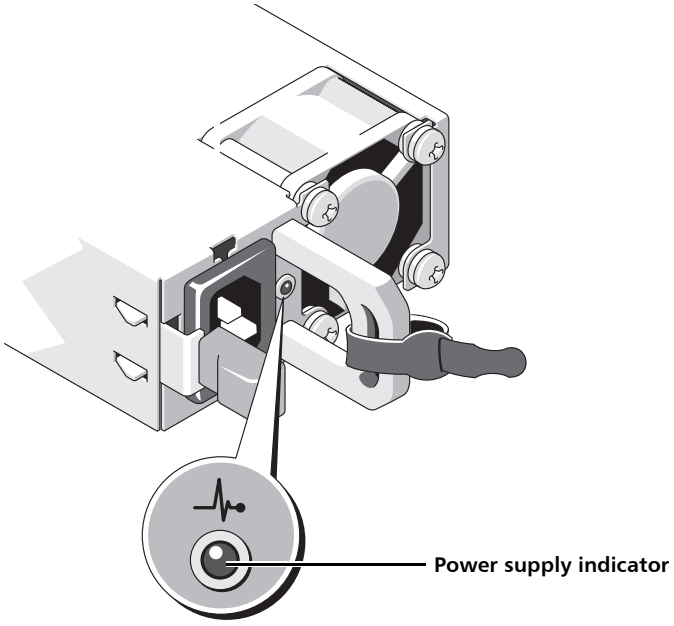
Power Supply Indicators

Each power supply has one LED indicator (see Figure 10):

- **Not lit -** the power supply is not plugged in
- **Green** - Indicates the power supply is turned on and operating correctly.
- **Amber** - Indicates power supply failure.
- **Alternating green and amber** - When hot-adding a power supply, this indicates that the power supply is mismatched with the other power supply. Replace the power supply that has the flashing indicator with a power supply that matches the capacity of the other installed power supply.

Caution: All power supplies are hot swappable. When replacing power supplies, never remove more than one power supply at a time from the system. Also, before you remove one power supply, make sure the other power supply is operating correctly (indicator LED is green).

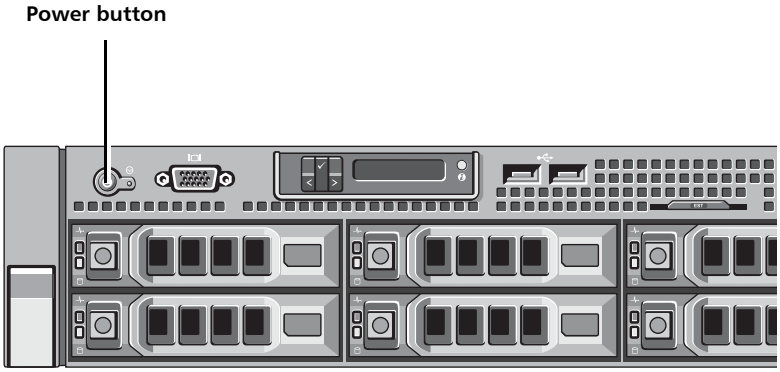
Figure 10 Power Supply LED



Turning On and Shutting Down the System

To turn on the system, press the power button located on the front panel of the system (see Figure 11).

Figure 11 Power Buttons



To shut down the DXi4500, you must use the remote management pages (see Node Management on page 164). Shutting down the system can take up to 15 minutes.

Locating Serial Numbers

You will need the system serial number at various times:

- **System Serial Number** - You need this number to contact Quantum Support or to add a licensed feature.

You can locate the system serial number on the **Home** page of the remote management pages. It is located in the **System Details** section.

Chapter 3

DXi4500 Concepts

This chapter provides detailed explanations for several DXi4500 concepts such as:

- Data Storage Presentation
- Data Deduplication Policy
- Data Replication
- Recovering Data
- Network Segmentation

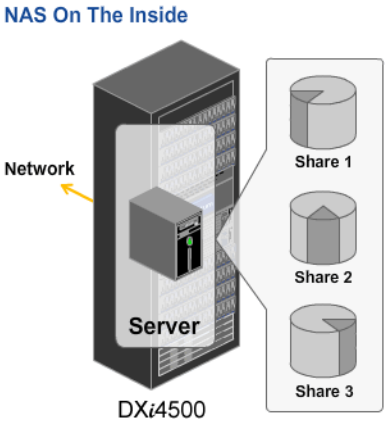
Data Storage Presentation

The DXi4500 can present itself to your host computers in two ways:

- Network Attached Storage (NAS)
- OpenStorage (OST)

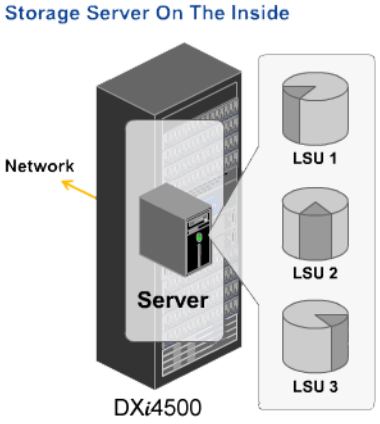
Network Attached Storage (NAS)

The DXi4500 can present itself to your host computers as Network Attached Storage (NAS). A NAS share can be configured on the DXi4500 so it can be used as a NAS appliance for backup purposes.



OpenStorage (OST)

For Symantec NetBackup users, another replication option is available for DXi4500 models through the Symantec Open Storage (OST) API. Specific versions of NetBackup are required. For more details, refer to the *Quantum DXi4500: Symantec Veritas NetBackup OST Configuration Guide*.



Data Deduplication Policy

To enable data deduplication when you create a NAS share, select the **Enable Data Deduplication** check box on the **Add NAS Share** page. (The check box is selected by default.) After the NAS share is created, you cannot disable data deduplication for the share.

When data deduplication is enabled for a NAS share, there are two data deduplication policies to consider:

- Adaptive In-line Data Deduplication (Backup Window Not Defined)
- Deferred Processing Data Deduplication (Backup Window Defined)

Adaptive In-line Data Deduplication (Backup Window Not Defined)

If you do not define a backup window for the NAS share, data deduplication is running all of the time. Backup data is sent to the DXi4500 and deduplication is performed on data as it is ingested. Data deduplication begins when the backup begins.

To use adaptive in-line data deduplication, clear the **Enable Backup Window** check box on the **Add NAS Share** page.

Note: The data deduplication setting for OST storage servers is not configurable. It is always adaptive in-line data deduplication.

Advantages - The advantage of selecting adaptive in-line data deduplication is that there is no need to reserve any extra disk space for the backup, minimizing disk requirements, and replication of new blocks takes place while the backup is in progress.

Disadvantages - Because the system resources are always performing data deduplication while ingest is going on, there are situations in which the backup window can be negatively affected.

Deferred Processing Data Deduplication (Backup Window Defined)

If you define a backup window for the NAS share, data deduplication is disabled for a specific time period which can boost ingest speeds and shorten the backup window. All of the backup data is sent to the DXi4500 immediately in its raw form without deduplication. After the backup window is closed and data deduplication is re-enabled, the data

that was moved during the backup windows is now deduplicated on the DXi4500.

To use deferred processing data deduplication, select the **Enable Backup Window** check box on the **Add NAS Share** page, then specify the start and end times for the backup window.

Advantages - When all the system resources are dedicated to ingest, and data deduplication is deferred, ingest speeds can be boosted.

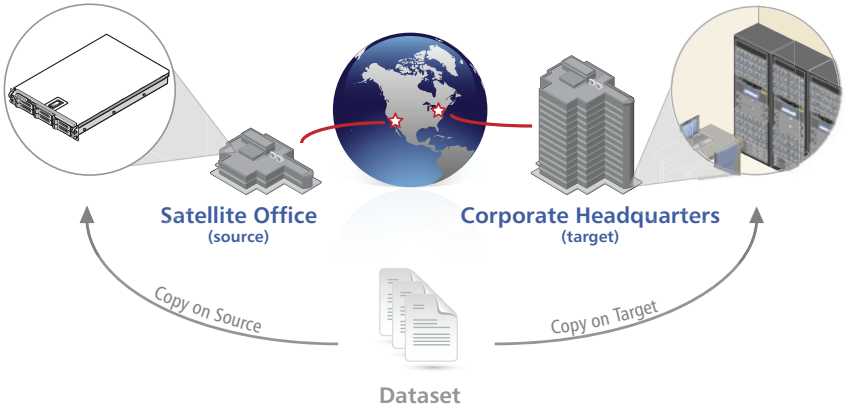
Disadvantages - The downside to any post processing approach is that some disk space must be reserved to hold the backup, and the replication of unique blocks will be delayed until data deduplication is begun.

Since the DXi4500 allows users to select either mode on a share-by-share basis, it allows them to match the right data deduplication approach to specific jobs. For most user share and e-mail backup, for example, the adaptive approach makes the most sense, but when backing up a large, active database where the primary concern is the shortest possible backup window, the deferred approach makes more sense.

Data Replication

Note: The information in this section applies to native DXi4500 replication. OST optimized duplication using NetBackup is described separately (see OST Optimized Replication on page 70).

Data replication is the process of creating and managing duplicate versions of your data. The replication process not only copies the data but also allows you to schedule the replication process so it can run automatically. For optimization purposes, the underlying data is continuously updated and will become available when the replication is either run manually or via a scheduled replication. When replication is configured on the DXi4500, copies of data in a NAS share can be copied to a remote DXi system (see Data Replication on page 137).



The data replication concept consists of the following sections:

- Data Replication Requirements
- Data Replication Processes
- New DXi4500 Installations
- Directory/File Based Replication
- OpenStorage (OST)

Data Replication Requirements

For data replication to operate:

- Only NAS shares or OST storage servers with data deduplication enabled can be replicated to another DXi system.
- Multiple source DXi systems can replicate to a single target; however, a source DXi system cannot replicate to multiple targets.

Data Replication Processes

Data replication consists of two processes:

- Continuous Replication
- Namespace Replication

Continuous Replication

Continuous Replication is the process of replicating deduplicated, unique data. Once configured, when backup data is ingested into the system, it is automatically (and continuously) replicated from the source to the target system.

Namespace Replication

Namespace Replication is the process of sending the metadata associated with data at the start of each replication. The metadata is what is used to retrieve the data if its ever needed for a restore operation. Namespace replication begins when a replication is started either manually or during a scheduled replication. It is NOT automatic or part of the **Continuous Replication** process.

Caution: Restoring replicated data is dependant on the metadata stored in the namespace file. This file is updated after each replication that is completed successfully. You must schedule replication to occur regularly and often or manually run replication often enough to keep the namespace file up to date.

New DXi4500 Installations

For a new DXi4500 installation, or immediately after a new share has been created, be sure to replicate the namespace (via the on-demand **Replicate Now** function) for each share as soon as it is created and before any data is written to it.

This action establishes the namespace file on the target. Establishing the namespace file before any data is written will expedite the first replication that occurs after the first backup.

Failure to replicate the empty namespace is not fatal, but the speed of the first replication after the first backup will be up to twice as fast if you did replicate the empty namespace. This could be especially important when backing up a significant amount of data.

Directory/File Based Replication

Directory/File Based Replication, when configured, automatically replicates file data without user intervention or a schedule. The replication is "triggered" by a CLI command for file data (NAS share). This greatly enhances replication performance since only the file or directory specifically mentioned in the command is replicated.

After a **Directory/File Based Replication**, NAS share files are automatically **Recovered** on the target system. You may also initiate a synchronization from the **Source** system to the **Target** system on NAS shares that have been configured for **Directory/File Based Replication**. This will replace all files on the **Target** NAS share with the most up-to-date files on the **Source** system.

Directory/File Based Replication Process

The process for directory/file based replication is as follows:

1. **Directory/File Based Replication** is configured on both the **Source** and **Target**. Configuring the directory/file based replication consists of enabling **Directory/File Based Replication** on both the source and target systems and setting the Sync ID. The Sync ID is used to identify the corresponding target share that will receive the data replicated from this source share (see Source Role NAS Directory/File Based Replication Configuration on page 145 for more information).
2. Data is backed up to the NAS share.
3. A post backup script is executed that triggers the replication of specified files or directories in the NAS share.

Note: For examples of post backup scripts, see Directory/File Based Replication Post Backup Scripts on page 153

OpenStorage (OST)

For Symantec NetBackup and Backup Exec users with specific versions of the software, another replication option is available for DXi4500 models through the Symantec OpenStorage (OST) API. For more details, refer to the *Quantum DXi-Series: Symantec Veritas NetBackup OST Configuration Guide* (PN 6-66???) and *Quantum DXi-Series: Symantec Backup Exec OST Configuration Guide* (PN 6-66910).

Note: For more information, see OST Optimized Replication on page 70.

Recovering Data

When replication is enabled and configured, two copies of the data exist, the original on the source system and a copy on the target system. If the data on the source is destroyed or corrupted, the replicated copy on the target system can be accessed through the **Recover** process or through the **Failback** and **Recover** process (for more detailed information on data recovery, see Recovering Replicated Data on page 185).

This section is divided into the following sections:

- Recovery Processes
- Recovery Requirements
- Recovery Features

Recovery Processes

The differences between these two data recovery processes are explained in the following sections:

- Recover Process
- Failback and Recover Process

Recover Process

The **Recover** process is used when the source system where the original data stored is unavailable or the original data is corrupted. The **Recover** process takes the metadata on the target system and creates a copy of this data in a new NAS share. This new NAS share will now be accessible for use on the Target system.

Failback and Recover Process

The **Failback** and **Recover** process is used when the source system has been replaced or the original data on the source system has been corrupted or destroyed. This process takes the data from the target system and copies it back to the source system. This data once copied to the source system must be recovered before it can be accessible.

Recovery Requirements

The following items are required for recovering data:

- CIFS NAS shares can only be recovered to identical CIFS shares.
- NFS NAS shares can only be recovered to identical NFS shares.

Recovery Features

Up to 24 replicated versions of a NAS share can exist on the target system.

- The 24 versions represent the 24 most recent replications.
- You can selectively delete versions to keep some longer than the default 24 replications.
- You can failback and recover any one of those 24 versions.

Note: Replication of VTL partitions to DXi4500 is not supported.

Network Segmentation

Network segmentation provides the ability to split your network into subnetworks or segments. There are two main purposes for segmenting your network:

- **Separate Physical Interfaces**: if your network is physically partitioned with no connectivity between the partitions, the DXi4500 needs the ability to communicate with each partition individually.

- **Combine or Separate Network Traffic**: Network traffic is either separated according to specific network needs or combined on a single IP address for simplicity. The DXi4500 has the capability of separating data traffic, replication traffic, and management traffic. Each traffic type can have its own IP address or they can be combined on a single IP address.

DXi4500 Segmentation Options

The DXi4500 allows the user to select one of the following network segmentation options:

DXi4500 - (4 x 1GbE ports)

- **BOND ALL (Not segmented)** - Both ports (ETH2, ETH3, ETH4, and ETH5) are bonded together and require a single set of network settings on the **IP** page.
- **BOND ALL (Replication/Management/Data)** - All ports (ETH2, ETH3, ETH4, and ETH5) are bonded together for all traffic types. Each segment (Data, Management, and Replication) requires a set of network settings on the **IP** page.
- **ETH2 (Replication), BOND ALL-1 (Management/Data)** - All Replication traffic takes place on port ETH2. Data and Management traffic take place on ports ETH3, ETH4 and ETH5. Each segment (Data, Management, and Replication) requires a set of network settings on the **IP** page.
- **ETH2 (Management), BOND ALL-1 (Replication/Data)** - All Management traffic takes place on port ETH2. Data and Replication traffic take place on ports ETH3, ETH4 and ETH5. Each segment (Data, Management, and Replication) requires a set of network settings on the **IP** page.
- **BOND ALL-1 (Data), ETH2 (Replication/Management)** - All Data traffic takes place on ports ETH3, ETH4 and ETH5. Management and Replication traffic take place on port ETH2. Each segment (Data, Management, and Replication) requires a set of network settings on the **IP** page.

Network Segmentation Scenarios

The following scenarios provide common examples of network segmentation.

- Un-Segmented Network
- Data and Replication Separate from Management
- Data and Management Separate from Replication

Un-Segmented Network

This is the most common network configuration (and also the default setting for DXi4500). In this example, the user has no need to separate network traffic types. All traffic will occur on a single IP address.

Segmentation and Bonding page selection:

- Select **BOND ALL (Not segmented)**

Data and Replication Separate from Management

In this example, the user has a dedicated low bandwidth wide area network (WAN) that is used to manage network resources. This network does not have the capacity for data and replication traffic. Replication is between two DXi systems that are in the same location with a dedicated network connection.

Segmentation and Bonding page selection:

- Select **ETH2 (Management), ETH3, ETH4, and ETH5 (Replication/ Data)**

Data and Management Separate from Replication

In this example, the user has a dedicated local high bandwidth network used for data ingest and resource management. The user also has high bandwidth WAN used for offsite data movement. Data and management traffic can share the local network and replication traffic between DXi systems in two locations uses a dedicated WAN.

Segmentation and Bonding page selection:

- Select **ETH2 (Replication), ETH3, ETH4, and ETH5 (Management/ Data)**

Chapter 4
DXi4500 Remote Management

The DXi4500 system utilizes a Web-based interface which allows you to configure and manage the system from a remote workstation on the same network. The DXi4500 system is managed through the following Web pages (accessible using Internet browser software installed on the host computer):

- Chapter 4, DXi4500 Remote Management allows you to configure and view the status of all system components.
- Chapter 5, DXi4500 Configuration allows you to set up information about the DXi4500 system such as NAS shares, network configuration, date and time settings, and passwords.
- Chapter 6, DXi4500 Status allows you to view the status of the hardware components and system performance.
- Chapter 7, DXi4500 Alerts allows you to view admin alerts, required actions, and service tickets.
- Chapter 8, DXi4500 Data Services allows you to view and configure the space management options replication services.
- Chapter 9, DXi4500 Utilities allows you to upload software, download diagnostic files, and shutdown or restart the system.

DXi4500 Web Pages

The Internet browser software is not supplied with the DXi4500 system; you must obtain and install it independently. The DXi4500 system supports the following Internet browsers:

Note: For correct operation of the software, disable any pop-up blockers and enable JavaScript in your Web browser.

Windows

- IE 6.x or later
- Firefox 2.x or later

Linux

- Firefox 2.x or later

Solaris

- Firefox 2.x or later

DXi4500 Web Page Menu Items

Table 3 lists the menu items, commands, and information available from the DXi4500 Web pages.

Table 3 DXi4500 Web Page Menu Items

Home Menu	
System Details	Version
	Serial Number
	Model Number

	Data Reduction Statistics	Total Data Reduced
		Total Reduction Ratio
		Reduced Size
	Cumulative Replication Statistics	Total Data Sent
		Total Bytes Sent
		Average Send Rate
		Total Bytes Received
		Average Receive Rate
Quick Status	Hostname	
	IP Address	
	Capacity	
	Available	
	Used	
Data reduced by		
NAS Data Services	Total shares	
	Data Deduplication	Status
		Enabled on
		Disabled on
	Replication	Status
		Scheduled on
		Not scheduled on
Configuration Menu		
NAS & OST	NAS	Summary
		Add

	Edit	
	Delete	
OST	Storage Servers	Summary
		Add
		Edit
		Delete
	LSU	Summary
		Add
		Edit
		Delete
	OST Client Plug-In	
Windows Domain	Domain Type	Active Directory
		Workgroup
	Domain/Workgroup Name	
	Primary Domain Controller	
	Organizational Unit	
	Administrator Name	
	Administrator Password	
Access Control	Summary	
	Add	
	Edit	
	Delete	
Advanced Setting	Enable Opportunistic Locking	

Network	General	Hostname
		Domain Search Path
	IP	IP Address
		Netmask
		Default Gateway IP Address
		Primary DNS IP Address
		Secondary DNS IP Address
		Tertiary DNS IP Address
	Segmentation and Bonding	Segmentation
		Bonding
Date & Time	Manual	
	Use NTP	
	Timezone	
	Time Format	
Security	Passwords	Monitor Password
		Administrator Password
		CLI Monitor Account
		CLI Administrator Account
	SSL	Properties
		Certificate
	Login Session	Session Configuration
Email	Recipients	Summary
		Add

		Edit	
		Delete	
	Server	Host Name or IP Address	
		From Email Address	
	Test	Send	
	Email Home	Schedule	
		On Demand	
SNMP	Destinations	Summary	
		Add	
		Edit	
		Delete	
	Community	Summary	
		Add	
		Edit	
		Delete	
	Test	Send	
Contacts	Company	Company Information	
	Primary	Primary Contact Information	
	Secondary	Secondary Contact Information	
Status Menu			
Hardware	Summary	System 1	System Board
			Network Ports
		Common	Storage Arrays
	Details	System 1	System Board

			Network Adapters
		Common	Storage Arrays
	Firmware		
System	CPU		
	RAID		
	Ethernet		
	Data Deduplication		
	Ingest		
	Disk Usage		
Alerts Menu			
Alerts	Admin Alerts		
	Service Tickets		
Data Services Menu			
Space Management	General	Start	
		Stop	
		Refresh	
	Schedule	No Schedule	
		Daily at	
		Weekly on	
Replication	Source Role	General	Host Name or IP Address
		NAS	Edit
			Replicate/Abort
			Synchronize/Abort
			File Based Queue
		Actions	Replication Service

			Replication State
			Replication Performance
	Target Role	General	Host Name or IP Address
			Replicated Snapshots
		NAS	Replicated Shares
			Recovery Jobs
			Failback Jobs
			Directory/File Based Targets
		Actions	Replication Performance
	Reports	Replication Report	
Utilities Menu			
Software	Browse		
	Upload		
	Activate		
Diagnostics	System		
	DSET		
	Healthchecks	General	
		Status	
		Schedule	
Analyzer	Network	Performance	
		Settings	
	Disk		
Node Management	Reboot		

	Shutdown
	Reset Diagnostic State
License Keys	

Accessing DXi4500 Web Pages

To access the DXi4500 web pages:

Note: If the DXi4500 system web pages are idle for more than 30 minutes (default setting), the system logs off the user.

1. On the host computer, open the Internet browser software.
2. In the **Address** field, type **http://IPaddress/** where **IPaddress** is the IP address for the system.

   The default IP address is: **10.1.1.1**. This IP address can be changed during installation using the Setup Wizard.

   The **Login** page displays (see Figure 12):

Figure 12 Login Page

3 Select the login type and enter the appropriate password.

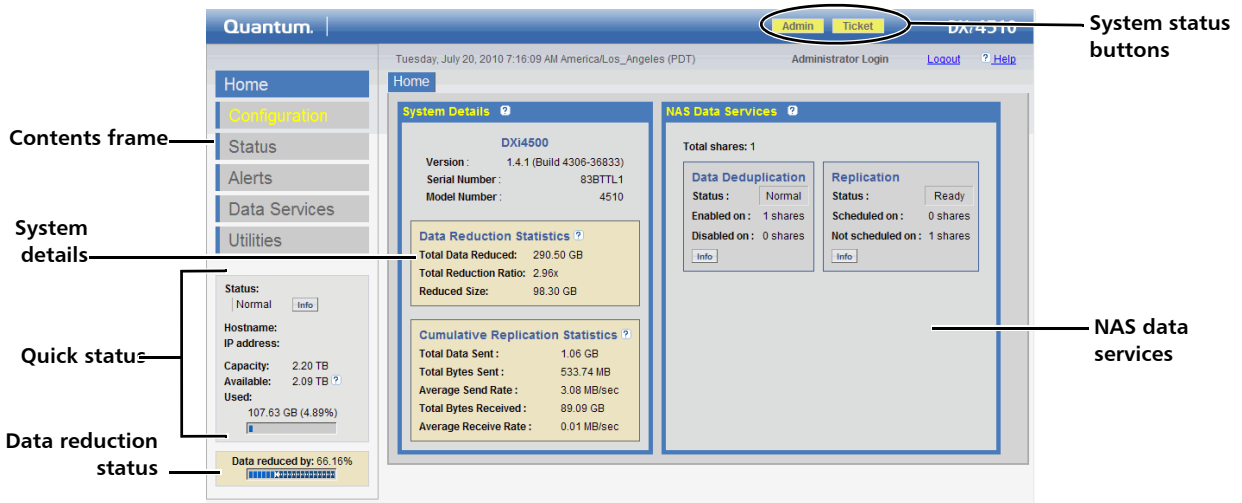
Login Type	Default Password	Description
Monitor	password	The monitor user is allowed to view the DXi4500 system management pages, but cannot change them.
Administrator	password	The administrator user can both view and change the management pages. Multiple administrators can log on to the system at the same time, so it is possible for the actions of one administrator to overwrite the actions of another.

Note: The passwords are limited to 15 characters. All alpha numeric characters, _ and - are allowed.

4 Click **Login**.

The **Home** page displays (see Figure 13):

Figure 13 Home Page



Using the DXi4500 Web Pages

The first page that displays after you login to the DXi4500 web pages is the system **Home** page (see Figure 13).

Note: Disk statistics are not maintained on a "moment-to-moment" basis and should be used for planning purposes only.

Caution: When using the remote management pages, never double-click the **Apply**, **OK**, or any other button.

The **Home** page contains the following sections:

- Contents Section
- Quick Status Section
- Data Reduced By Section
- System Details Section
- NAS Data Services Section
- System Status Information

Table 4 Contents Section

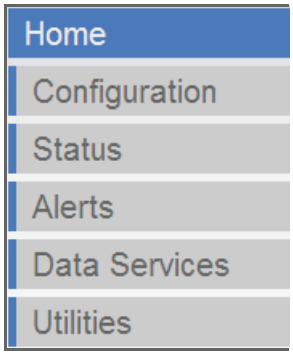
Contents Section	
	The contents frame displays the DXi4500 main menu. Click a menu item to display the corresponding management pages.

Table 5 Quick Status Section

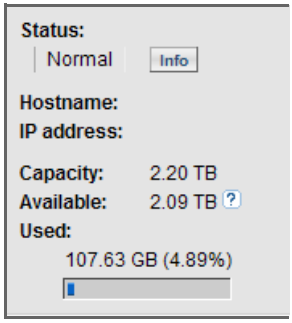
Quick Status Section	
	The quick status section displays the system status, hostname, IP address, and provides storage capacity information (see Disk Usage on page 48). The **Status** information describes the current state of the system. Clicking the **Info** button links you to the **Hardware Status** page.

Table 6 Data Reduced By Section

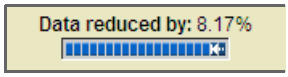
Data Reduced By Section	
	The data reduced by section displays the current data reduction status. The percentage reduced indicates the total amount of data reduction through both compression and data deduplication.

Table 7 System Details Section

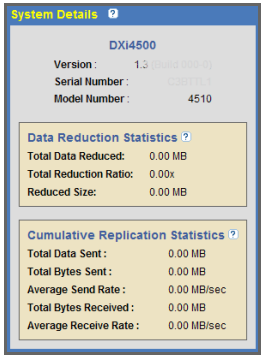
System Details Section	
	The **System Details** section displays general system information such as the software version, serial number, and model number (see Model Number on page 49) **Note:** Disk statistics are not maintained on a "moment-to-moment" basis and should be used for planning purposes only. The **Data Reduction Statistics** area displays the amount of data ingested before reduction and after reduction, as well as the reduction ratio (see Data Reduction Statistics on page 50). The **Cumulative Replication Statistics** area displays the total data sent and received, as well as the average send and receive rates (see Cumulative Replication Statistics on page 50).

Table 8 NAS Data Services Section

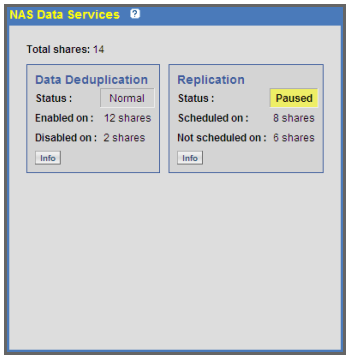
NAS Data Services Section	
	The **NAS Data Services** section displays NAS data deduplication and replication status. Clicking the **Info** button in the **NAS Data Deduplication** area displays the **NAS Configuration** page. Clicking the **Info** button in the **NAS Replication** area displays the **NAS Replication** page.

Table 9 System Status Information

System Status Buttons	
	The system status buttons display at the top of the **Home** page. • **Admin** - The **Admin** button turns yellow when an administrator alert has occurred. The administrator alert description displays on the **Alerts** page. • **Ticket** - The **Ticket** button turns yellow when open service tickets are present. The service ticket description displays on the **Alerts** page.

Disk Usage

The quick status section displays the following disk usage information:

- **Capacity** - Total raw storage minus space reserved for system use.

- **Used** - Total space occupied by all of the following:
  - Deduplicated data
  - Data waiting to be deduplicated
  - Data not intended for deduplication
  - Data eligible for reclamation
  - System metadata
- **Available** - **Capacity** minus **Used** space.

Note: Note that the **Used** space includes data eligible for reclamation. Therefore, it may appear that your system is using more space than expected. Space is only reclaimed as necessary to allow for optimal performance in the event you need to restore your data.

Model Number

The **Model Number** displays in the **System Details** section on the **Home** page. The model number indicates the specific hardware configuration of the DXi4500.

Table 10 describes the DX4500 hardware configuration that is indicated by each model number.

Table 10 DXi4500 Model Number

DXi4500 Model Number	DXi4500 Configuration
4510	2.2 TB, 4 x 1GbE Ethernet ports
4520	4.4 TB, 4 x 1GbE Ethernet ports

Data Reduction Statistics

The **Data Reduction Statistics** area displays the following information:

- **Total Data Reduced** - The original, native size of all existing data that has been processed by the data deduplication and compression engines.
- **Total Reduction Ratio** - The total reduction ratio of all existing data that has been processed by the data deduplication and compression engines (**Total Data Reduced** by **Reduced Size**).
- **Reduced Size** - The final, reduced size of all existing data that has been processed by the data deduplication and compression engines.

Note: Because these values are calculated as data is deduplicated and compressed, they will not be completely up-to-date until all data that is eligible for deduplication is processed by the data deduplication and compression engines.

Cumulative Replication Statistics

The **Cumulative Replication Statistics** area displays the following information:

- **Total Data Sent** - The original, native size of the data transferred during replication or failback. This value does not indicate the amount of bytes that actually crossed the network during replication or failback.
- **Total Bytes Sent**, **Total Bytes Received** - The number of bytes actually transferred over the network during replication or failback. These values are usually much less than the native size due to the benefits of data deduplication.
- **Average Send Rate**, **Average Receive Rate** - The average number of bytes actually transferred over the network during replication or failback. These values are calculated as the total number of bytes

sent or received (in MB/ second) divided by the amount of time required to complete replication or failback.

Note: The Cumulative Replication Statistics can be cleared on the **Source Role Actions** and the **Target Role Actions** pages (see Source Role Actions on page 146 and Target Role Actions Page on page 153).

Chapter 5

DXi4500 Configuration

Use the **Configuration** pages to set or configure the following areas of the DXi4500:

- NAS & OST Configuration
- Network Configuration
- Date and Time Configuration
- Security Configuration
- Email Configuration
- SNMP Configuration
- Contacts Configuration

To access the **Configuration** pages, from the contents frame, click the **Configuration** menu.

NAS & OST Configuration

The DXi4500 has the ability to serve as a NAS appliance or OST storage server for backup purposes. Use the **NAS & OST** page to configure NAS shares as well as OST storage servers.

The **NAS & OST** page contains the following tabs:

- NAS Configuration
- OST Configuration
- Windows Domain Configuration
- Access Control Configuration
- Advanced Setting

To access the **NAS & OST** page, from the **Configuration** menu, click the **NAS & OST** tab.

NAS Configuration

The DXi4500 has the ability to serve as a NAS appliance for backup purposes. Use the **NAS** page to add, edit, or delete NAS shares.

Note: If this is a Windows NAS share, you must configure the Windows domain (see Windows Domain Configuration on page 72) prior to creating your NAS share.

Caution: Filenames on NAS shares are limited to a length of 256 bytes. If a filename uses Japanese characters, the filename can be no longer than 85 characters. This is because each Japanese character is represented by 3 bytes.

To access the **NAS** page:

1 From the **NAS & OST** page, click the **NAS** tab.

Note: Ensure that the system is online before continuing with the NAS configuration.

The **NAS** page contains the following tabs:

- Summary Page
- Add NAS Share
- Edit NAS Share
- Delete NAS Share

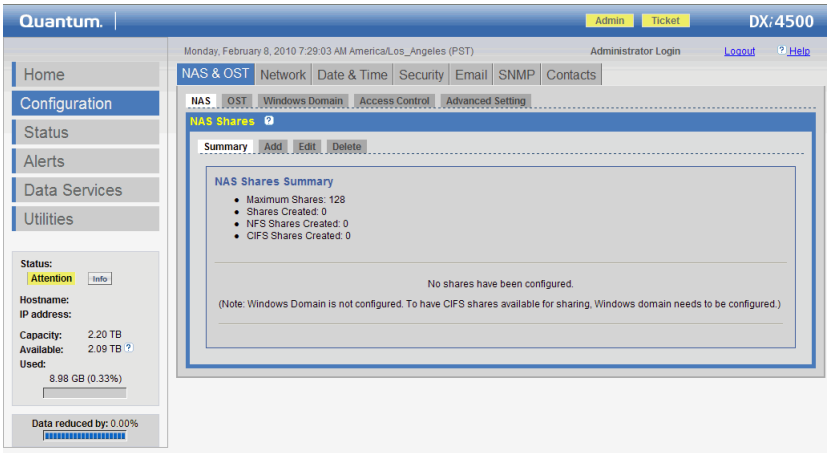
Summary Page

To access the **NAS** share **Summary** page:

1 On the **NAS** page, click the **Summary** tab.

The **NAS Shares Summary** page displays (see Figure 14).

Figure 14 NAS Shares Summary Page



The **Summary** page lists the information described in Table 11.

Note: You can click the **Share Name**, **Protocol**, **Export Path**, **Data deduplication**, **Backup Window**, **Permissions**, **Access**, and **Description** column headings to sort the rows in the media by the data in the respective column. Click the column heading again to invert the sorting sequence from ascending order to descending order.

Table 11 NAS Shares Summary Information

Column	Description
Share Name	This column lists the NAS share name.
Protocol	This column lists the NAS protocol (**CIFS** or **NFS**) in use on the NAS share.
Export Path	This column lists the location of the export path for this NAS share.

Column	Description
Data Deduplication	This column displays the data deduplication setting (**Enabled** or **Disabled**) for the NAS share.
Backup Window	This column displays (if enabled) the time window where data deduplication will not be used.
Permissions	This column displays the permission (**Read & Write** or **Read Only**) for the NAS share.
Access	This column lists the access type (**All Users** or **specific users**) for this NAS share.
Description	This column lists the description for the NAS share (if available).

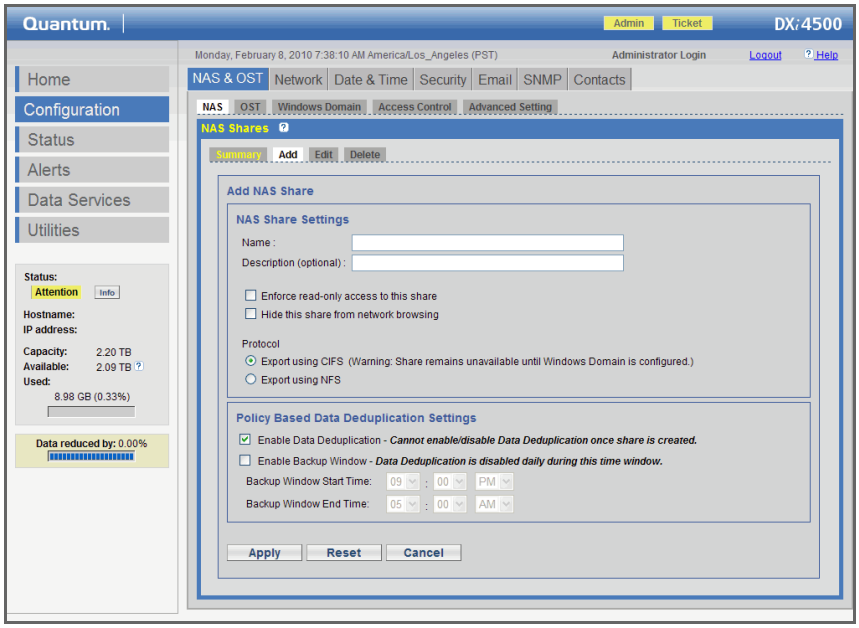
Add NAS Share

To add a NAS share:

1 On the **NAS** page, click the **Add** tab.

The **Add NAS Share** page displays (see Figure 15).

Figure 15 Add NAS Share Page



2 Edit the **NAS** share information as desired (see Table 12 for a description of the fields).

3 Click **Apply**.

Note: When you create a CIFS share, the initial permissions are the same as the default permissions for a Windows 2003 share with the addition of an ACE (Access Control Entry) that permits full access to the share for all authenticated users. Administrators can choose to remove this full access ACE, set up custom permissions, or leave the ACL (Access Control List) as is if the server is set up in a fully trusted environment.

Note: When using NAS shares with network segmentation, I/O must be performed on the data segment, NOT the management or replication segment.

Table 12 Add NAS Share Fields

Field	Description
Name	Enter a name for the NAS share.
Description (optional)	Enter a desciption for this NAS share (optional).
Enforce read-only access to this share	Select this option to make this NAS share read only. If selected, the share is locked and you will not be able to write to it. Clear the check box to unlock the share.
Hide this share from network browsing	Select this option to hide this network share from network browsing. (CIFS shares only.)
Export using CIFS	Select CIFS protocol for use on a Windows network.
Export using NFS	Select NFS protocol for use on a Linux network.
Enable Data Deduplication	Enable data deduplication to optimize disk usage. Data deduplication can only be enabled or disabled while a share is being created. **Note:** Data deduplication is enabled by default.
Enable Backup Window	Select **Enable Backup Window** to enable data deduplication for a particular time period. By default, **Enable Backup Window** is not enabled. • Using the drop down boxes, select the start time for the backup window. • Using the drop down boxes, select the end time for the backup window.

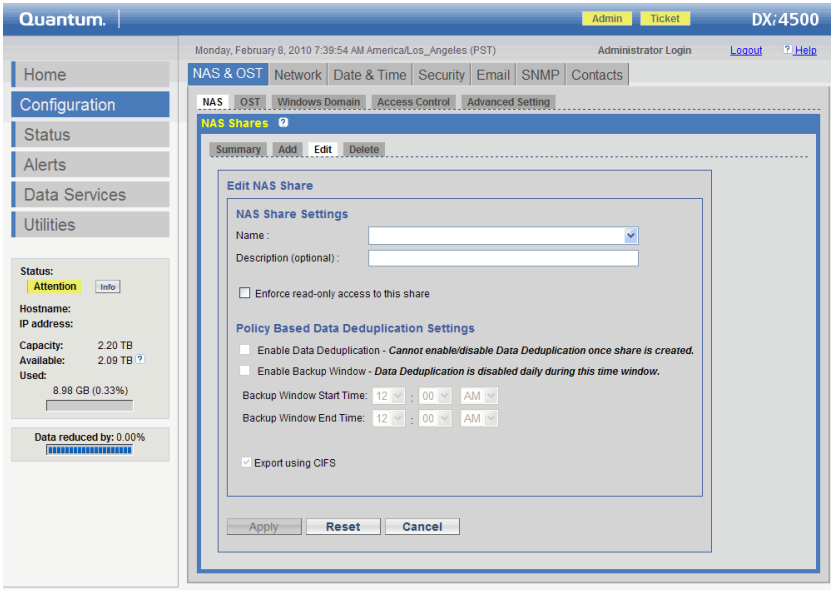
Edit NAS Share

To edit a NAS share:

1 On the **NAS** page, click the **Edit** tab.

The **Edit NAS Share** page displays (see Figure 16).

Figure 16 Edit NAS Share Page



2 Select the NAS share to edit in the Name drop down box.

3 Edit the **NAS** share information as desired (see Table 12 for a description of the fields).

Note: If you are editing a share, only the **Description**, **Enforce read-only access to this share**, **Hide this share from network browsing** (CIFS shares only), **Enable Backup Window**, and **Allow all hosts to access this share** options can be edited.

4 Click **Apply**.

Note: If you modify a NAS share that uses the CIFS protocol, a message displays stating that the CIFS service must be restarted for the changes to take effect. Click **Yes** to restart the CIFS service. Restarting the CIFS service will close all active connections to the NAS share. Most Windows workstations will automatically reconnect, but some applications may be affected.

Table 13 Edit NAS Share Fields

Field	Description
Description (optional)	Enter a desciption for this NAS share (optional).
Enforce read-only access to this share	Select this option to make this NAS share read only. If selected, the share is locked and you will not be able to write to it. Clear the check box to unlock the share.
Hide this share from network browsing	Select this option to hide this network share from network browsing. (CIFS shares only.)
Enable Backup Window	Select **Enable Backup Window** to enable data deduplication for a particular time period. By default, **Enable Backup Window** is not enabled.
Allow all hosts to access this share	If this is selected, all users (hosts) can access this share. If not selected, you can click the **Add** button to specify a user to access the share. Once a user is added, permissions for that user cannot be changed. In order to change the permissions, you must delete the user from the list and add it as a new user with updated permissions.

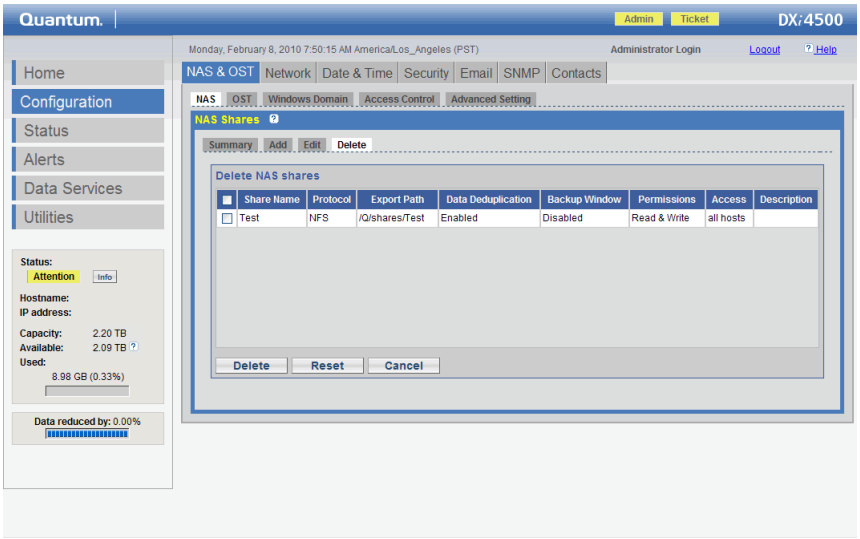
Delete NAS Share

To delete a NAS share:

1 On the **NAS** page, click the **Delete** tab.

The **Delete NAS Shares** page displays (see Figure 17).

Figure 17 Delete NAS Shares Page



2 Select the NAS share to delete.

3 Click **Apply** to delete the selected NAS share.

The NAS share is deleted.

OST Configuration

Use the OST (Open Storage Technology) page to configure storage servers and also LSUs (Logical Storage Units).

To access the **OST** page:

1 From the **NAS & OST** page, click the **OST** tab.

Note: Ensure that the system is online before continuing with the OST configuration

The **OST** page contains the following tabs:

- Storage Servers
- LSUs
- OST Client Plug-In

Storage Servers

Use the **Storage Servers** page to add, edit, or delete OST storage servers.

Note: The connections of a storage server that are used equals the data streams plus one for each LSU polling. A backup job may generate more than one data stream if the data can be read in parallel. For example, a policy that is backing up A, B, C, and D, drives of a Windows system can generate four data streams in parallel.

To access the **Storage Servers** page:

1 From the **OST** page, click the **Storage Servers** tab.

The **Storage Servers Summary** page displays (see Figure 18).

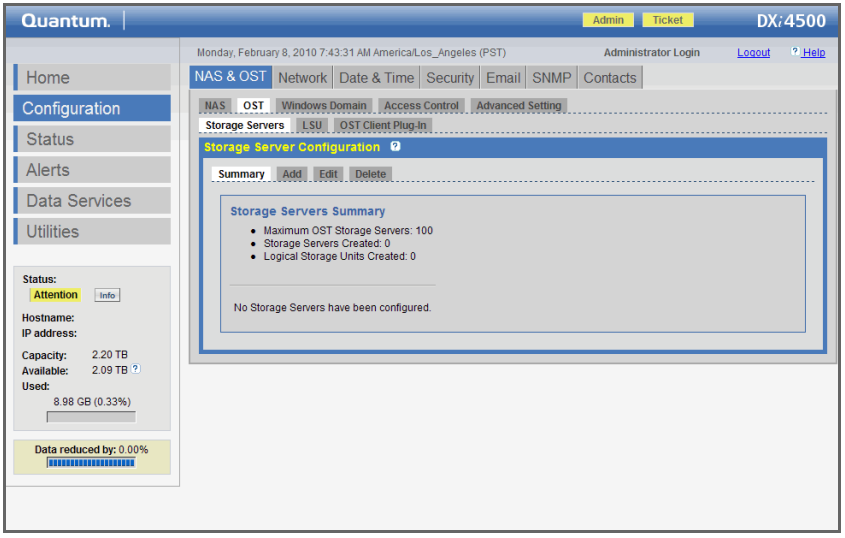


Figure 18 Storage Servers Summary Page

The **Storage Servers Summary** page lists the configured storage servers on the system as well as the maximum number of OST storage servers allowed (100), number of storage servers created, and number of logical storage units created (LSUs).

Adding or Editing a Storage Server

To add or edit a storage server:

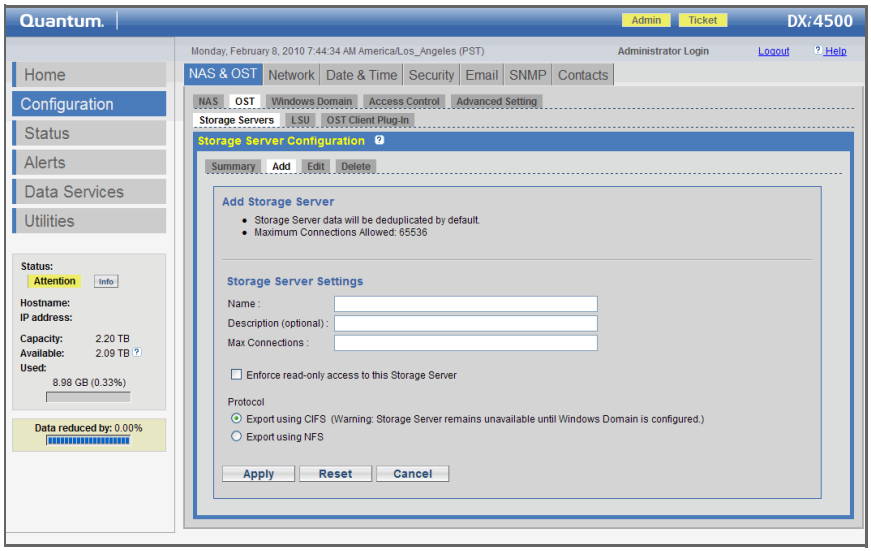
Note: If this is a Windows storage server, you must configure the Windows domain (see Windows Domain Configuration on page 72) prior to creating your storage server.

1 From the **Storage Servers** page, click the **Add** tab.

The **Add Storage Server** page displays (see Figure 19).

Note: To edit a **Storage Server**, click the storage server name link on the **Summary** page, or click the **Edit** tab.

Figure 19 Add Storage Server Page



2 Edit the **Storage Server** information as desired (see Table 14 for a description of the fields).

Note: If you are editing a storage server, only the **Description**, **Max Connections**, **Enforce read-only access to this Storage Server**, and **Allow all hosts to access this share** options can be edited. The maximum connections cannot be edited if the storage server has non zero current connections (see the **Summary** page for the current connections).

3 Click **Apply**.

Note: If you modify a storage server that uses the CIFS protocol, a message displays stating that the CIFS service must be restarted for the changes to take effect. Click **Yes** to restart the CIFS service. Restarting the CIFS service will close all active connections to the storage server. Most Windows workstations will automatically reconnect, but some applications may be affected.

Note: When using OST with network segmentation, I/O must be performed on the data segment, NOT the management or replication segment.

Table 14 Storage Server Fields

Field	Description
Name	Enter a name for the storage server. **Note:** Storage server names must be unique and not used again on other DXi4500 systems.
Description (optional)	Enter a description for the storage server (optional).
Max Connections	Enter the maximum number of connections to the storage server. This is an integer field.
Enforce read-only access to this Storage Server	Select this option to make this storage server read only. If selected, the storage server is locked and you will not be able to write to it. Clear the check box to unlock the storage server.

Field	Description
Export using CIFS	Select CIFS protocol for use on a Windows network.
Export using NFS	Select NFS protocol for use on a Linux network.
Allow all users to access this share	If this is selected, all users (hosts) can access this share. If not selected, you can click the **Add** button to specify a user to access the storage server. Once a user is added, permissions for that user cannot be changed. In order to change the permissions, you must delete the user from the list and add it as a new user with updated permissions.

Deleting a Storage Server

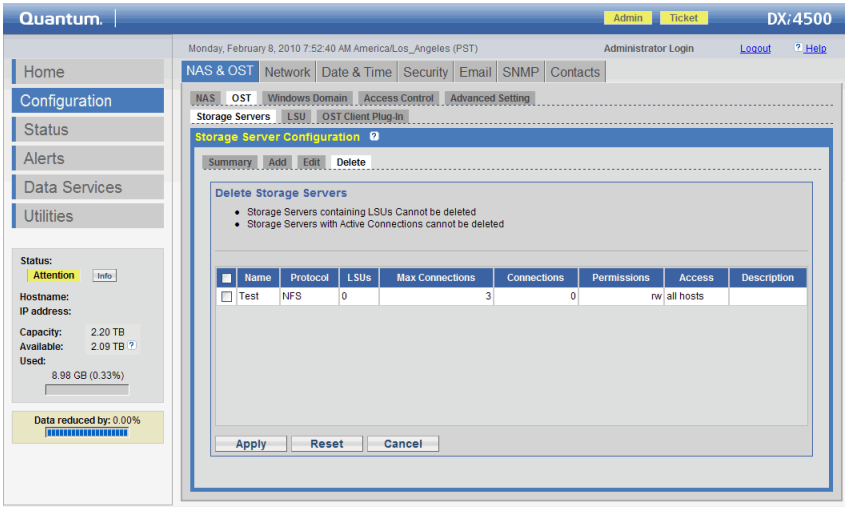
Note: If you have deleted the storage server from NetBackup, you must wait several minutes before deleting the storage server from the DXi4500.

To delete a storage server:

1 From the **Storage Servers** page, click the **Delete** tab.

The **Delete Storage Servers** page displays (see Figure 20).

Figure 20 Delete Storage Servers Page



2 Select the storage server to delete.

Note: Storage servers containing active connections (non zero current connections) and storage servers containing LSUs cannot be deleted.

3 Click **Apply** to delete the selected storage server.

The storage server is deleted.

LSUs

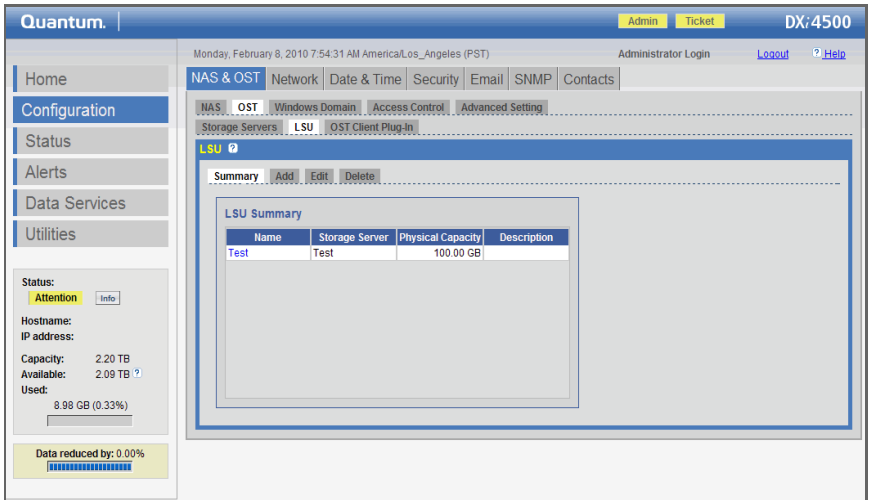
Use the **LSU** (Logical Storage Units) page to add, edit, or delete LSUs.

To access the LSU page:

1 From the **OST** page, click the **LSU** tab.

The **LSU Summary** page displays (see Figure 21).

Figure 21 LSU Summary Page



Adding or Editing a LSU

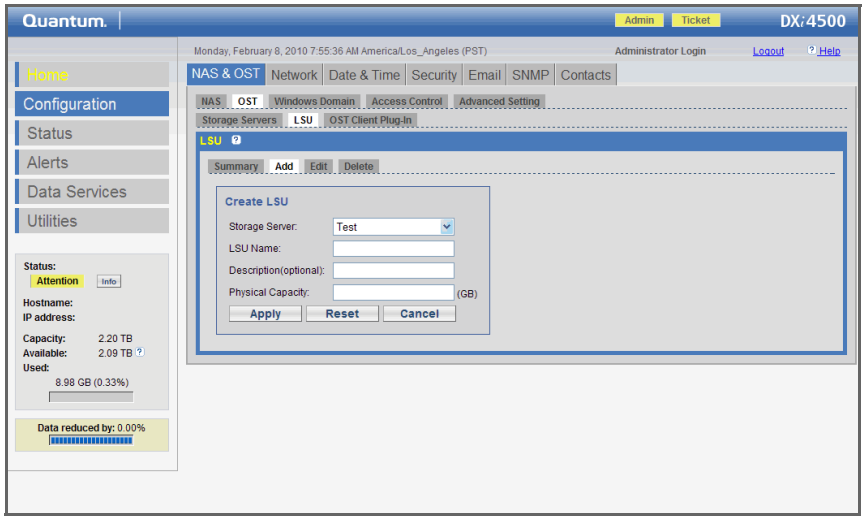
To add or edit an LSU:

1 From the **LSU** page, click the **Add** tab.

The **Create LSU** page displays (see Figure 22).

Note: To edit an **LSU**, click the LSU name link on the **Summary** page, or click the **Edit** tab.

Figure 22 Create LSU Page



2 Edit the **LSU** information as desired (see Table 15 for a description of the fields).

Note: If you are editing an LSU, only the **Description** and **Physical Capacity** options can be edited. **Physical Capacity** cannot be edited when the storage server in which this LSU is created has active connections.

3 Click **Apply**.

Note: When using OST with network segmentation, I/O must be performed on the data segment, NOT the management or replication segment.

Table 15 LSU Fields

Field	Description
Storage Server	Select the **Storage Server** in which the LSU has to be created.
LSU Name	Enter a name for the LSU.
Description (optional)	Enter a description for this LSU.

Field	Description
Physical Capacity	Enter a physical capacity for the LSU. The maximum capacity is 1 PB.

Deleting an LSU

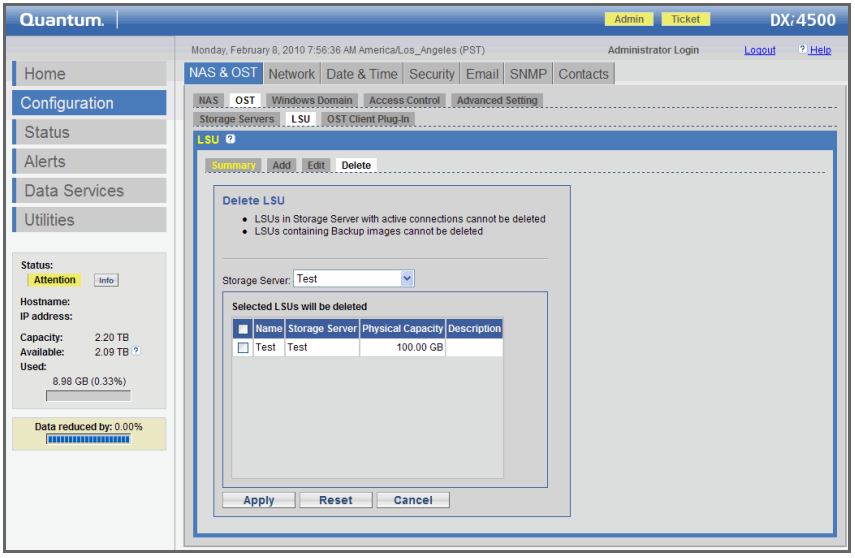
Note: If you have deleted a logical storage unit from NetBackup, you must wait several minutes before deleting the LSU from the DXi4500.

To delete an LSU:

1 From the **LSU** page, click the **Delete** tab.

The **Delete LSU** page displays (see Figure 23).

Figure 23 Delete LSU Page



2 Select the **Storage Server**.

3 Select the LSUs in the selected storage server to delete.

4 Click **Apply**.

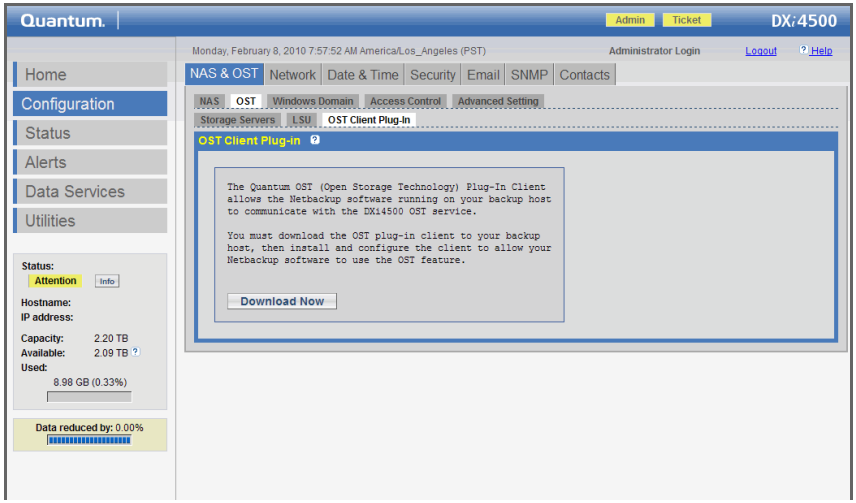
The LSU is deleted.

Note: LSUs in the storage server with active connections (non-zero current connections) cannot be deleted.

OST Client Plug-In

The **OST Client Plug-In** (see Figure 24) allows the NetBackup software running on your backup host to communicate with the DXi4500 OST service. You must download the OST Plug-in client to your backup host, then install and configure the client to allow your NetBackup software to use the OST feature.

Figure 24 OST Client Plug-In Page



OST Optimized Replication

The Quantum DXi4500 has the capability to copy data from one appliance to another appliance. NetBackup uses this capability to initiate optimized data mover copy of backup images between these appliances. The duplicate operation of NetBackup triggers the replication function in OST if both the source and destination volumes for the copy are OST disk volumes. OST optimized off host replication reduces the workload on the NetBackup media server because the copy process does not require host resources. Replication can be done in the background very quickly as it uses Quantum's data deduplication capabilities to reduce the copy bandwidth. Replication is still initiated,

managed, and controlled by the NetBackup media server while the actual copy process is off-loaded to get the maximum benefits from the DXi4500 replication capabilities.

Requirements

For NetBackup to use OST off host optimized replication when image duplication is attempted, the following items are required:

- The source and destination storage units used for the copy are OST disk volumes created from OST shares on the DXi4500. Source and destination storage units could be created from the same DXi4500 or they could be located on different DXi systems.
- The DXi4500 is running in a normal state.
- The source image is deduplicated completely and tags are generated for this file before optimized duplication is attempted.
- The target system must be configured to enable replication using NetBackup OST optimized copy (see Chapter 8, DXi4500 Data Services).

Initiating Optimized Copy

The source and target storage units could be on the same DXi-Series system or on a different DXi system. If the copy is to a different DXi, ensure that there is connectivity from the source DXi to the destination DXi.

The following steps assume that the storage units are located on different DXi systems, though the same steps can be applied even for storage units on the same DXi.

1. Ensure that the source and target DXi systems are running the latest DXi software and NetBackup 6.5.2 or higher is running on the media server.
2. At the NetBackup media server (refer to the NetBackup Documentation):
   a. Configure NetBackup media server for OST.
   b. Install OST plug-ins on the media server.
3. At the source and target DXi systems:
   a. Configure OST storage servers.

Note: If you are using Network Segmentation, you must use the Data IP address when registering a storage server.

b Configure logical storage units.

4 Register source and target storage servers with NetBackup.

5 Configure source and target disk pools respectively from the storage servers registered in **step 4** above.

6 Backup the required data set (refer to the NetBackup documentation for more information).

7 Once the backup is successfully completed, wait for the backup image to be completely deduplicated at the source DXi system.

8 Select the backup image from the Catalog in the NetBackup Administration console > NetBackup Management. Right-click the image and start a "duplicate" operation. This will open a duplication window showing the default target storage units and other options. Change the target storage unit appropriately and continue with the copy. Repeat this for all the images to be replicated by searching for the required images using the search criteria in the Catalog.

   To check the status of the duplicate operation, read job details in Activity Monitor from the NetBackup Administration Console.

Windows Domain Configuration

Use the **Windows Domain** page to join a Samba server to a Windows workgroup or a Windows domain.

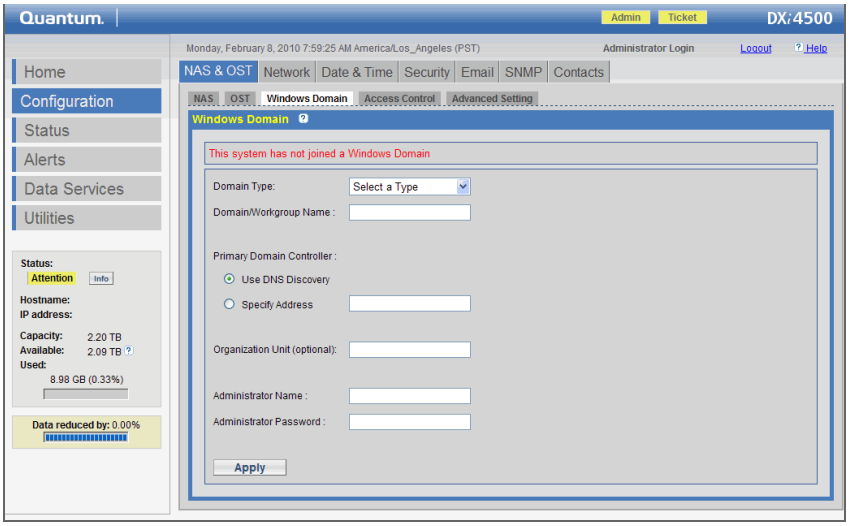
Note: Ensure that your system has the date and time set correctly and is in sync with your domain controller.

To configure Windows domain information:

1 From the **NAS & OST** page, click the **Windows Domain** tab.

   The **Windows Domain** page displays (see Figure 25).

Figure 25 Windows Domain Page



2 Edit the **Windows Domain** information to join a workgroup or an Active Directory domain.

Note: You must disjoin a domain before you can delete a domain.

For detailed information, see the following sections:

- Joining a Windows Workgroup
- Joining a Windows Domain
- Joining a Domain Using a Domain User Credential
- Troubleshooting ADS Join Issues

Joining a Windows Workgroup

1 Edit the page information as follows:

- **Domain Type** - Select **Workgroup**.
- **Domain/Workgroup Name** - Enter the **Workgroup** name. This can be the name of an existing workgroup or a new workgroup (for example, **Workgroup** or **Sales**).

2 Click **Apply**.

Note: When a Samba server is joined to a workgroup, the share security is managed directly from the remote management pages. For a CIFS share, security is provided through the read only or read/write access to the share. By default, when a CIFS share is created the default security setting is to allow access for all users. Further access restrictions on individual users can be managed from the following page: **NAS > Edit**.

Joining a Windows Domain

It is necessary to synchronize the server clock and the ADS (Active Directory Services) server so that the time difference is less than 300 seconds. This can be done by having both servers use the same NTP server. Once the clocks have been verified:

1 Edit the **Windows Domain** information as desired (see below):

- **Domain Type** - Select **Active Directory**.
- **Domain/Workgroup Name** - Enter the domain name.
- **Primary Domain Controller** - Enter the fully qualified name of the Primary Domain Controller (PDC). Choose one of these options:
  - **Use DNS discovery** - Let the PDC be discovered automatically.
  - **Specify Address** - Enter the fully qualified name, or the IP address, of the PDC.
- **Organization Unit** (optional) - Enter the name of the organizational unit in the domain. This is the organization of which the DXi4500 will become a member.
- **Administrator Name** - Enter **Administrator** or any user who has the right to join a domain. By default any user belonging to the **Administrators** group or the **Domain Admins** group has the right to join the domain. In addition, any domain user can join the domain if he is specifically delegated this right by a member of the **Administrators** group. See Joining a Domain Using a Domain User Credential for an example.
- **Administrator Password** - Enter the **Administrator Password**.

2 Click **Apply**.

Note: When the system is joined to the **Active Directory** domain all the share security is managed by the **MMC** (Microsoft Management Console) that is running on the domain controller. By default, when a CIFS share is created the default security setting is to allow access for all users. Any access restriction on individual users will have to be managed from the **MMC**.

Joining a Domain Using a Domain User Credential

Many large companies do not want to use the Administrator account to join the ADS domain. They prefer to delegate a normal domain user account with special rights to join the domain. The purpose of this section is to provide an example of delegating a normal domain user account with special rights to join the domain.

To facilitate this example, the following information is assumed:

- The ADS is running on a Windows 2003 Server system.
- ADS domain name: abc.def.xyz.com
- **user1** is a normal domain user that has basically no administrative privileges.
- The server host name is DX1.
- DNS domain name: abc.def.xyz.com
- DNS IP address: 10.20.30.40

1 Steps to complete on the Windows 2003 MMC:

   a Delegate the right to join the domain:

      - Select the domain name **abc.def.xyz.com**.
      - Right-click and choose: **Delegate Control | Next | Add**
      - Type the username: `user1`
      - **OK | Next**

   b Delegate the following common tasks:

      - Join a computer to the domain.
      - **Next | Finish**

c Delegate the right to read/write dNSHostname and servicePrincipalName:

- Select the organizational unit **Computers** or the appropriate name. This is the folder that contains individual computers that belong to the domain.
- Right-click and choose: **Delegate control | Next | Add**
- Type the username: `user1`
- **OK | Next | Create a custom task to delegate**
- **Next | Only the following objects in the folder:**

  Check the box: **Computer objects**

  Check the box: **Create selected objects in this folder**
- **Next** | Check box: **Property-specific**
- Scroll down the list and check the boxes for:
- **Read dNSHostName**
- **Write dNSHostName**
- **Read servicePrincipalName**
- **Write servicePrincipalName**
- **Next | Finish**

2 Steps to complete on the GUI:

a **Network** page:

Note on these fields:

- Hostname: DX1
- Domain name: Enter abc.def.xyz.com.

This is the DNS domain name. The DNS domain name is usually, but not necessarily, identical with the ADS domain name.

- Domain name server IP address: Enter 10.20.30.40.

This is the IP address of the domain name server that can resolve the domain name abc.def.xyz.com that you are trying to join to.

b **Windows Domain** page:

- **Domain type**: Active Directory
- **Domain name**: abc.def.xyz.com

Note: You must use a fully qualified domain name; character case is not important.

- **Primary Domain Controller**:

  Preferred option if DNS is working: Use DNS discovery

  If DNS is not working well or if you cannot ping abc.def.xyz.com, then use the IP address of the PDC explicitly.

  If you cannot ping the domain name abc.def.xyz.com, you may not join successfully unless you can resolve abc.def.xyz.com using the command:

  # host abc.def.xyz.com ip_address

  where the **ip_address** is the IP address of DNS as specified at the bottom of the network page.

- **Organizational Unit**:

  This is optional. There is usually a default organizational unit such as **Computers**. If you want to join to an organizational unit that is different from the default, then enter the name of that organizational unit as seen in MMC.

- **Administrator Name** - user1
- **Password** - <enter password>

Troubleshooting ADS Join Issues

For troubleshooting purposes we will assume the sample settings in Joining a Domain Using a Domain User Credential were used to join the domain **abc.def.xyz.com** through the remote management pages, but the operation failed. This assumption is important in that all the necessary settings were already written in relevant files and you can log on the server to perform a number of tests to determine the root cause.

1. Is the DNS server specified on the Network page capable of resolving the domain name?

   # nslookup abc.def.xyz.com

   or

   # host abc.def.xyz.com 10.20.30.40

to see if the DNS server 10.20.30.40 can resolve abc.def.xyz.com. If it cannot, change to a different DNS server IP address on the **Network** page.

2 Specify the fully qualified domain name on the **Windows Domain** page.

Do not specify the short name abc. Must specify abc.def.xyz.com.

3 Check the **Primary Domain Controller.**

To avoid any DNS issue, enter the IP address of the PDC on the **Windows Domai**n page. Make sure you can ping the PDC successfully.

4 Check the clock time difference:

Time on the ADS server:

 # net time -S abc.def.xyz.com

Time on the local server:

 # date

Make sure the time difference is less than 300 seconds.

5 Make sure the username exists in the ADS.

Test by logging in the Kerberos server:

kinit user1@ABC.DEF.XYZ.COM

Note that the name after '@' must be all capitalized. If the command fails, it should tell what happened. Again, must make sure ABC.DEF.XYZ.COM can be resolved by the DNS. If the command succeeds, you should run the next two commands:

 # klist

This command is to list all the Kerberos tickets just issued to user1.

 # kdestroy

This command is to destroy all the Kerberos tickets issued to user1.

6 If the username is not a member of the Administrator or Domain Admins group, then check to make sure he has the correct rights to join a domain:

 # net ads status -U user1@ABC.DEF.XYZ.COM

Make sure you see the following lines in the output:

```
dNSHostName: dx1.abc.def.xyz.com
servicePrincipalName: HOST/ dx1.abc.def.xyz.com
servicePrincipalName: HOST/DX1
```

7 Finally, the errors from joining ADS domain are logged in:

/tmp/nas/cifs.ads.join

The contents are overwritten each time you join the domain either from the GUI or by running an appropriate CLI command. The CLI command is not officially supported. You can run

 # nastool

without options to show the syntax. Note that certain subcommands require a password. If you do not type the password option, you will be prompted interactively and the password entered will not be echoed on screen.

Access Control Configuration

Use the **Access Control** page to add, edit, or workgroup users.

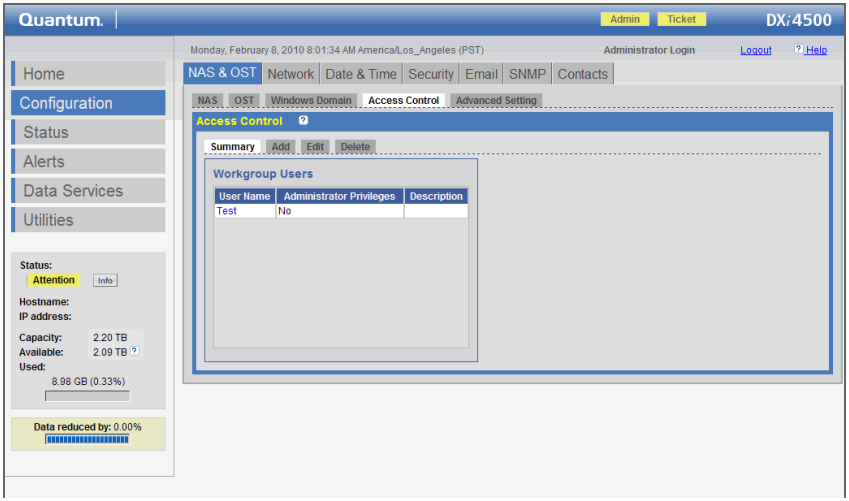
Note: For an ADS CIFS configuration there is no need to configure workgroup users.

To configure access control information:

1 From the **NAS & OST** page, click the **Access Control** tab.

The **Access Control** page displays (see Figure 26).

Figure 26 Access Control Page

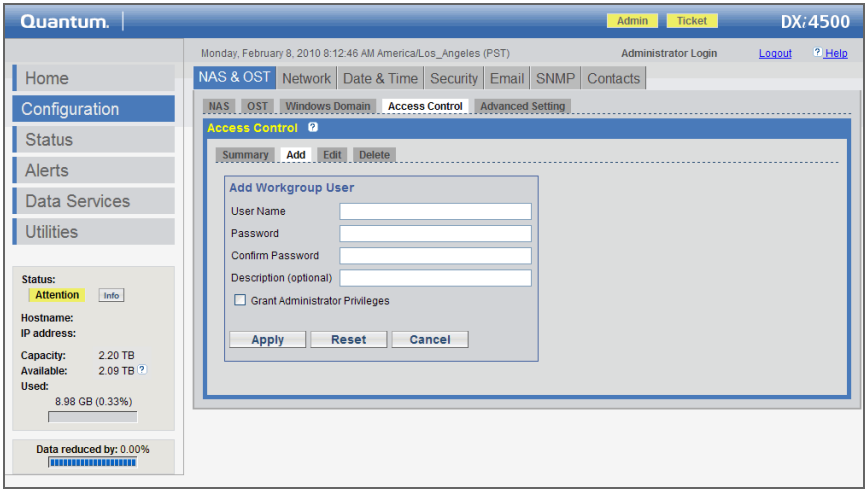


2 Click **Add** to add a workgroup user.

Note: To edit a workgroup user, click the user name link on the **Summary** page, or click the **Edit** tab.

The **Add Workgroup User** page displays (see Figure 27).

Figure 27 Add Workgroup User Page



3 Edit the **Workgroup Users** information as desired (see Table 16 for a description of the fields).

Note: If you are editing a workgroup user, you cannot change the **User Name**.

4 Click **Apply**.

Note: To delete a workgroup user, click the **Delete** tab. Select the user and click **Delete**.

Table 16 Workgroup User Fields

Field	Description
User Name	Enter a user name for the workgroup user.
Password	Enter a password for the workgroup user.
Confirm Password	Enter the password again to confirm it.
Description (optional)	Enter a description for the workgroup user (optional).
Grant Administrator Privileges	Select this check box to add the workgroup user to the Windows Administrators group. This allows the workgroup user to override certain permissions settings and prevents the workgroup user from being locked out of shares or directories.

ADS Share Permissions

To set the ADS (Active Directory Service) share permissions:

1 Log into the primary domain controller as an administrator.

2 From the **Administrative Tools**, select the **MMC Computer Management** tool.

3 Access the DXi4500 system from the **Action** menu. Enter the system hostname and click **Enter**.

4 In the lower left field, expand **System Tools** and **Shared Folders** to access the **Shares**.

5 Right-click the share in the lower right field and select **Properties**.

6 Select the **Share Permissions** tab.

7 Select **Add/Remove Share** users/groups. Adding a user/group will display a dialog. You can enter a user/group to select and then click **OK**.

8 Set permissions for each user.

9 Click **Apply/OK.**

Note: In some cases, when you view file permissions on a Windows system, you will not see the user and group information. Instead you will see the SID (security ID) which appears as a series of numbers. This occurs when you move files (for example, using a backup utility or DOS xcopy) from one system to another system, and the user and group from the source system do not exist on the target system.

Often users and groups are unique to a particular scope, such as a Windows system or an ADS domain. As a result, some assigned permissions might not be available on the target system because the associated user and group do not exist there. However, common groups (for example, Administrators, Users, and Everyone) are recognized on most Windows systems and domains.

Advanced Setting

Use the **Advanced Setting** page to adjust the Samba settings.

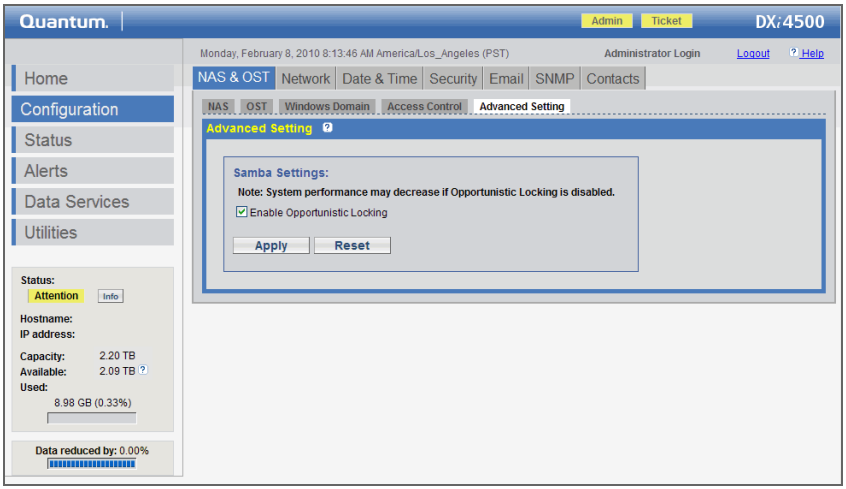
Opportunistic locking lets clients lock files and locally cache information without the risk of another user changing the file. This increases performance for many file operations but may decrease performance in other operations because the server that grants the opportunistic lock must manage the breaking of that lock when another user requests access to the file.

To access the **Advanced Setting** page:

1 From the **NAS & OST** page, click the **Advanced Setting** tab.

The **Advanced Setting** page displays (see Figure 28).

Figure 28 Advanced Setting Page



2 To enable opportunistic locking, select the **Enable Opportunistic Locking** check box. To disable opportunistic locking, clear the check box.

3 Click **Apply**.

Network Configuration

The network configuration information was entered during the initial setup of the DXi4500. Consult your network administrator prior to changing any of the information.

Use the **Network** page to view and edit the network configuration information.

To access the **Network** page:

1 From the **Configuration** menu, click the **Network** tab.

The **Network** page contains the following tabs:

- General
- IP
- Segmentation and Bonding

Caution: Changing the network configuration requires a system reboot in order for all system services to function correctly. The system automatically reboots immediately after changes are applied.

Note: Rebooting the system can take several minutes. After the network configuration is saved, close your Web browser and wait 15 minutes before logging in again. If the IP address that you use to log in to the system is changed, you will temporarily lose your connection to the remote management pages. Because of this, you might not see a confirmation page informing you that settings have been saved.

General

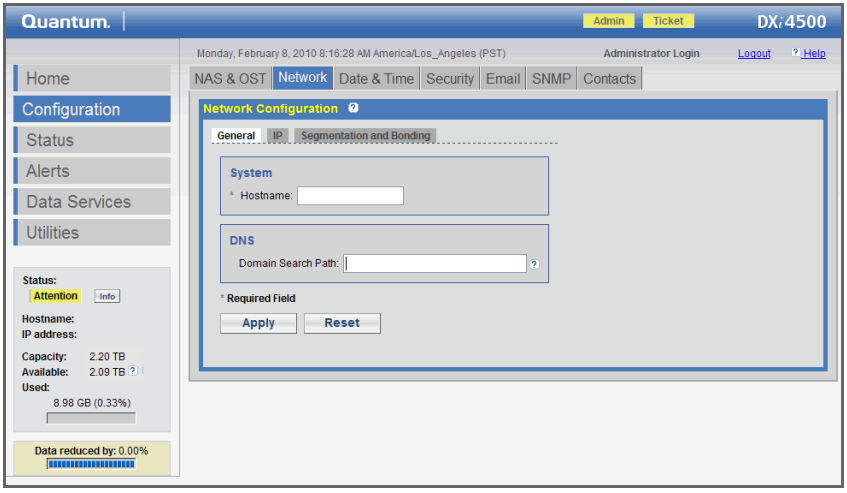
Use the **General** tab to specify the hostname and domain name server (DNS) search path.

To specify the hostname and domain search path:

1 From the **Network** page, click the **General** tab.

The **Network General** page displays (see Figure 29).

Figure 29 Network General Page



2 Under **System**, enter the **Hostname** for the DXi4500.

3 (Optional) Under **DNS**, enter a **Domain Search Path**. This is either a single domain name or a comma separated list (no spaces) of up to 6 domain names

The first domain name listed is used as the local domain. Domain names must contain only letters (A-Z or a-z), numbers (0-9), dots (.), and hyphens (-).

4 Click **Apply**.

IP

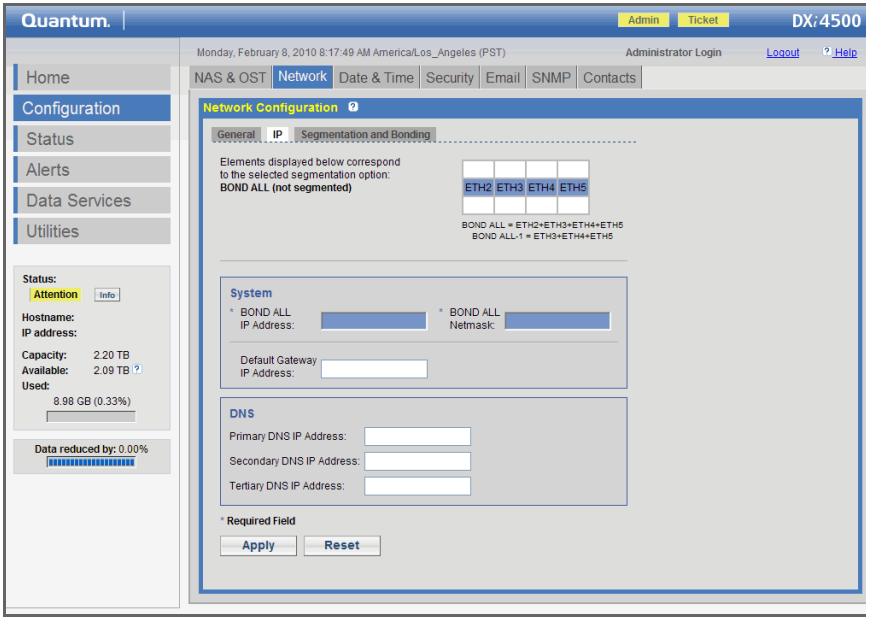
Use the **IP** tab to set the network IP addresses for the DXi4500.

To configure the network on a DXi4500:

1 From the **Network** page, click the **IP** tab.

The **Network IP** page displays (see Figure 29).

Figure 30 Network IP Page



2 Under **System**, enter the IP address and netmask information for the DXi4500.

The information you must enter varies depending on the segmentation option selected on the **Segmentation and Bonding** page.

3 (Optional) Under **System**, enter the **Default Gateway IP Address** for the DXi4500.

4 (Optional) Under **DNS**, enter the IP address of up to three servers where the domain name is resolved or translated into an IP address.

Note: If you are using network segmentation, you must specify a DNS server for the **Data** IP address to enable NAS access.

5 Click **Apply**.

Segmentation and Bonding

Network segmentation is the process of splitting a single network into several **subnetworks** 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 not visible to the outside network.

Note: If your system is configured using network segmentation, you must use the data segment IP address, NOT the management segment IP address OR hostname, to map CIFS shares or manage the system. If the system is joined to an Active Directory domain, you can use the Microsoft Management Console (MMC) tool to manage shares and user or group access. To do this, right-click the server name in MMC and click **Manage**. The Computer Management console displays and your system is connected for management. If your system uses network segmentation, the connection will fail because the system name is not resolved into the data segment IP address. In this case you must specify the system using its data segment IP address, not the hostname, by selecting the following option in the Computer Management console: **Action > Connect to another computer > Another computer**.

The DXi4500 allows 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 be used exclusively for replication data movement
- **Management traffic** - This segment is be used exclusively for DXi4500 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: Print out Table 17 on page 91 to gather the network configuration information for your configuration.

Using Round Robin (Mode 0) With a Dell or CISCO Switch

If you are using the **Round Robin (Mode 0)** option and you have a Dell or CISCO switch, then the ports that connect to the DXi4500 must be bonded.

For example, specify the following settings from the switch CLI:

- **Interface Ethernet** - If both ports connect to the same switch, set to 1/g*X* where *X* is the port number. If there two or more switches, replace "1" with the correct ID number (2 or 3).
- **Switchport mode** - Set to **trunk**.
- **Channel-group 1 mode** - Set to **on**.

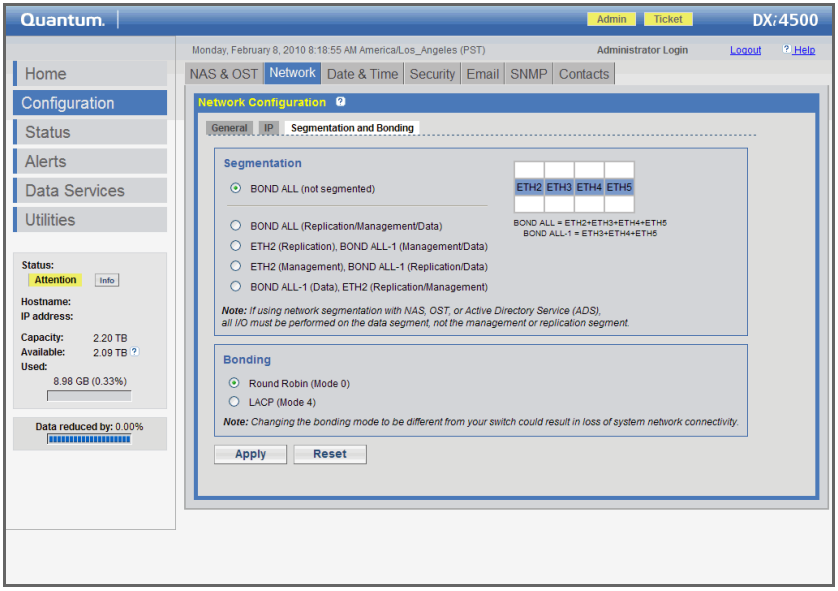
Configuring the Network on a DXi4500

To configure the network on the DXi4500:

1. From the **Network** page, click the **Segmentation and Bonding** tab.

   The **Network Segmentation and Bonding** page displays (see Figure 29).

Figure 31 Network Segmentation and Bonding Page



This page lists the network segmentation options that are available for your configuration. The grid shows a graphical representation of the Ethernet ports as they appear on the rear of the system. The grid also indicates how the ports are currently bonded.

Physical Ethernet ports that are bonded together act as a single logical port. That is, multiple ports that are bonded together behave like a single port and require one set of network settings. Ports that are bonded together in the currently selected segmentation option are shaded the same color in the grid. For example:

- If you select **BOND ALL (not segmented)**, all Ethernet ports are bonded together into a single logical port and are shaded blue in the grid.

For diagrams that show how the port numbering used in the grid corresponds to the physical ports on the rear of the DXi4500, see System Back Panel Connectors on page 17.

2 Under **Segmentation**, select the type of network segmentation for your system:

DXi4500 - 4510/4520 (4 x 1GbE ports)

- **BOND ALL (Not segmented)** - All ports (ETH2, ETH3, ETH4, and ETH5) are bonded together and require a single set of network settings on the **IP** page.
- **BOND ALL (Replication/Management/Data)** - All ports (ETH2, ETH3, ETH4, and ETH5) are bonded together for all traffic types. Each traffic type (Data, Management, and Replication) requires a set of network settings on the **IP** page.
- **ETH2 (Replication), BOND ALL-1 (Management/Data)** - All Replication traffic takes place on port ETH2. Data and Management traffic take place on ports ETH3, ETH4, and ETH5. Each traffic type (Data, Management, and Replication) requires a set of network settings on the **IP** page.
- **ETH2 (Management), BOND ALL-1 (Replication/Data)** - All Management traffic takes place on port ETH2. Data and Replication traffic take place on ports ETH3, ETH4, and ETH5. Each traffic type (Data, Management, and Replication) requires a set of network settings on the **IP** page.
- **BOND ALL-1 (Data), ETH2 (Replication/Management)** - All Data traffic takes place on ports ETH3, ETH4, and ETH5. Management and Replication traffic take place on port ETH2. Each traffic type (Data, Management, and Replication) requires a set of network settings on the **IP** page.

3 Under **Bonding**, select a bonding option:

- **Round Robin (Mode 0)** - This option sends Ethernet frames using the bonded Ethernet ports with a valid MII link. Frames are sent in a round-robin fashion, starting with the first slave device and then the rest of the devices. This only applies to the traffic sent from the DXi4500. Your Ethernet switch needs to aggregate the ports, so the connected ports are treated as a logical port. The frame reception is completely dependent on the transmission algorithm of your Ethernet switch. The bonding mechanism does not balance the frame reception.
- **LACP (Mode 4)** - This option (Link Aggregation Control Protocol) is based on the 802.3ad IEEE standard for aggregating Ethernet ports. If the bonding algorithm is set to LACP, your Ethernet switch ports need to be configured in a 802.3ad based Link Aggregation group (LAG) in LACP mode. The frame reception and transmission is controlled by the LACP between the bonded ports and your Ethernet switch ports.

Note: Note: In order to maintain network connectivity to your system, you must reconfigure the switch that is connected to your system to use the same bonding mode. The best time for you to change the bonding mode on your switch will be during the next reboot of your system, after you have saved the new network settings. Changing the bonding mode on your switch before saving these settings and rebooting may result in the loss of network connectivity to your system.

4 Click **Apply**.

Table 17 Network Configuration Information (4 x 1GbE Configuration)

Segmentation Option	**Network Information**		
BOND ALL (Not Segmented)	Bond All IP Address:		
	Bond All Netmask:		
	Replication Network Information	**Management Network Information**	**Data Network Information**
BOND ALL (Replication/ Management/ Data)	IP Address: Netmask: Gateway:	IP Address: Netmask: Gateway:	IP Address: Netmask: Gateway:
ETH2 (Replication), ETH3, ETH4, ETH5 (Management/ Data)	**ETH 2** IP Address: Netmask: Gateway:	**ETH3, ETH4, ETH5** IP Address: Netmask: Gateway:	**ETH3, ETH4, ETH5** IP Address: Netmask: Gateway:
ETH2 (Management), ETH3, ETH4, ETH5 (Replication/Data)	**ETH3, ETH4, ETH5** IP Address: Netmask: Gateway:	**ETH2** IP Address: Netmask: Gateway:	**ETH3, ETH4, ETH5** IP Address: Netmask: Gateway:
ETH3, ETH4, ETH5 (Data), ETH2 (Replication/ Management)	**ETH 2** IP Address: Netmask: Gateway:	**ETH 2** IP Address: Netmask: Gateway:	**ETH3, ETH4, ETH5** IP Address: Netmask: Gateway:

Date and Time Configuration

The date and time can be set from the DXi4500 pages. Setting the correct date and time allows the system to provide accurate reports when events occur on the system.

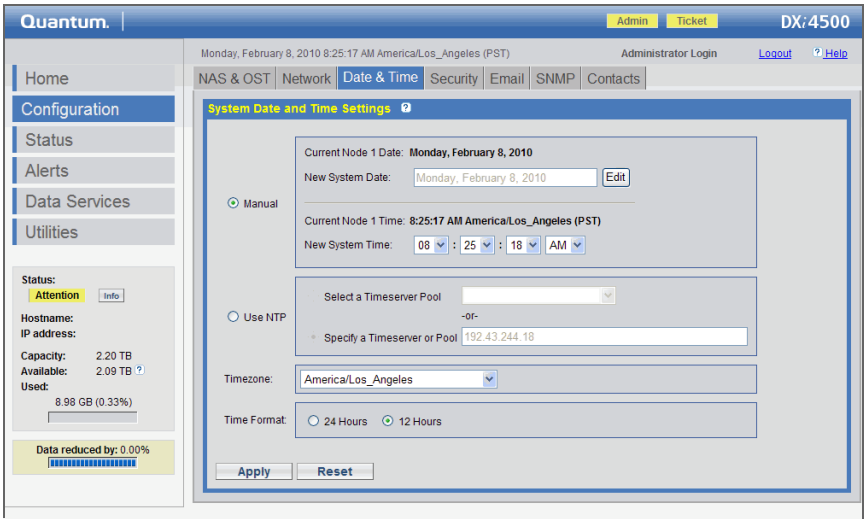
Use the **Date & Time** page to set the system date and time.

To access the **Date & Time** page:

1 From the **Configuration** menu, click the **Date & Time** tab.

The **System Date and Time Settings** page displays (see Figure 32).

Figure 32 System Date and Time Settings Page



2 There are two options for setting the system date and time (select one):

- (Recommended) Select **Use NTP** (Network Time Protocol) to synchronize the DXi4500 to an NTP timeserver or timeserver pool.

  The **Select a Timeserver Pool** drop down box provides a list of well-known, geographically-based, NTP timeserver pools. This option is recommended if you configured at least one DNS IP address during network configuration.

The **Specify a Timeserver or Pool** box lets you type the name or IP address of any desired NTP server/pool. (See http://support.ntp.org for information on publicly available NTP servers)

- Select **Manual** to manually set the system date and time. Click **Edit** to specify the system date. Use the drop down boxes to specify the system time.

3 Select the **Timezone**.

4 Select the desired time format (**24 hours** or **12 hours**).

5 Click **Apply**.

Security Configuration

To access the **Security** page, from the **Configuration** menu, click the **Security** tab.

The **Security** page contains the following tabs:

- Passwords
- SSL
- Login Session

Passwords

The DXi4500 has two levels of security built into the system:

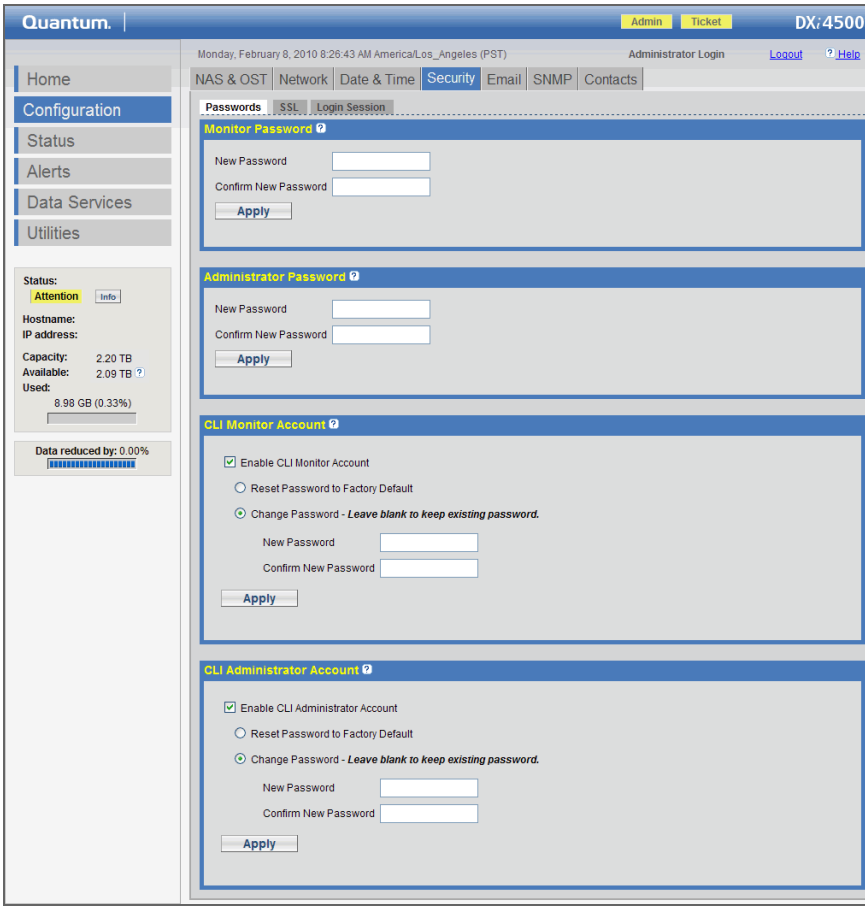
- The **Monitor** user is allowed to view the DXi4500 management pages, but not change them.
- The **Administrator** user can view and edit the management pages.

To set the monitor and administrator passwords:

1 From the **Security** page, click the **Passwords** tab.

The **Passwords** page displays (see Figure 33).

Figure 33 Passwords Page



2 Under **Monitor Password**, enter the desired password in the **New Password** field and again in the **Confirm New Password** field.

Note: The passwords are limited to 15 characters.

3 Click **Apply**.

4 Under **Administrator Password**, enter the desired password in the **New Password** field and again in the **Confirm New Password** field.

Note: The passwords are limited to 15 characters.

5 Click **Apply**.

6 To reset the CLI (command line interface) monitor or administrator password to factory default, select **Reset Password to Factory Default** and click **Apply**.

   The password is returned to the factory default.

7 To set the CLI monitor or administrator passwords, select **Change Password**, enter the new password, confirm the new password, and click **Apply**.

8 To enable or disable the CLI monitor or administrator account, select or clear the **Enable CLI Monitor Account** check box or the **Enable CLI Administrator Account** check box, and click **Apply**.

SSL

SSL (Secure Sockets Layer) is a protocol that provides security and privacy over the Internet by negotiating encryption keys before transmitting data between a client and a server.

To establish a secure SSL connection, your DXi4500 must have an encryption key assigned to it by a Certification Authority in the form of a certificate file, private key file, and pass phrase. Once you install these components, you can establish a secure connection using the SSL protocol. The DXi4500 comes with a SSL certificate. In addition, you can purchase other certificates and add them to the DXi4500 SSL configuration.

Server Authentication Warnings

Enabling SSL with the default Quantum certificate allows you to securely communicate with the DXi4500 Web-based interface using SSL encryption. However, you may receive a warning from your Web browser stating that the server you are attempting to connect to does not match the server embedded within the certificate. This is expected behavior since the default certificate can only be used for encryption and not server authentication. You may install your own custom certificate in order to take advantage of server authentication in addition to encrypted communication.

To suppress server authentication warnings for the default certificate:

- **Internet Explorer** - If a dialog box displays warning you of a possible certificate error, add the IP address for your DXi4500 to the **Trusted Sites** list (**Tools > Internet Options > Security > Trusted Sites**). If you receive subsequent warning pages and the option to

close the browser or continue to the Web site, click **Continue**. This suppresses the warnings until you restart the browser.

- **Firefox** - If the **Secure Connection Failed** dialog box displays, click the link at the bottom of the dialog box and follow the instructions to add an exception for your DXi4500.

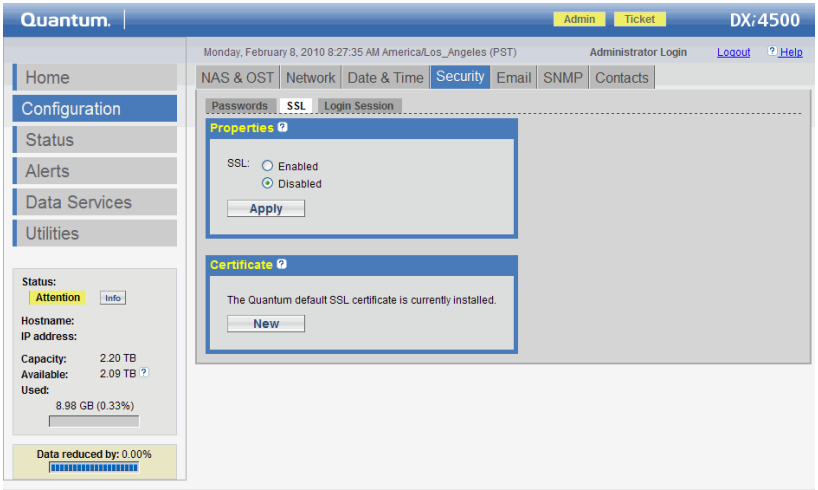
Configuring SSL

To access the **SSL** page:

1 From the **Security** page, click the **SSL** tab.

The **SSL** page displays (see Figure 34).

Figure 34 SSL Page



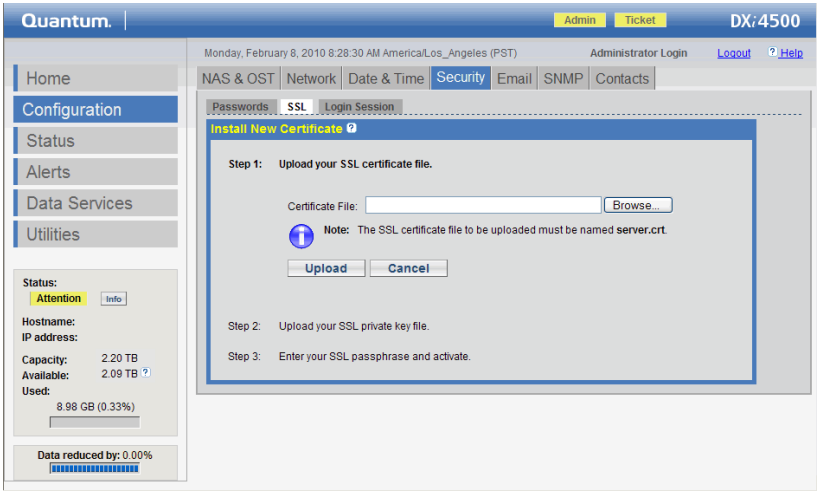
2 To enable **SSL**, select **Enabled** and click **Apply**.

Note: The default setting for **SSL** is **Disabled**.

3 To add an SSL certificate, click **New**.

The **Install New Certificate** page displays (see Figure 35).

Figure 35 Install New Certificate Page



4 Under **Upload your SSL certificate file**, type the location and filename of the new SSL certificate file.

> **Note:** Use the **Browse** button to browse the system and locate the desired SSL certificate file. The SSL certificate file must be named **server.crt**.

5 Click **Upload** to install the SSL certificate file.

6 Type your private key and press **Enter**.

7 Type your pass phrase and press **Enter**.

A **Successful Upload** page displays indicating that the SSL certificate file has been installed on the system.

8 Click **OK** to continue.

The certificate displays in the certificate area on the **SSL** page.

Login Session

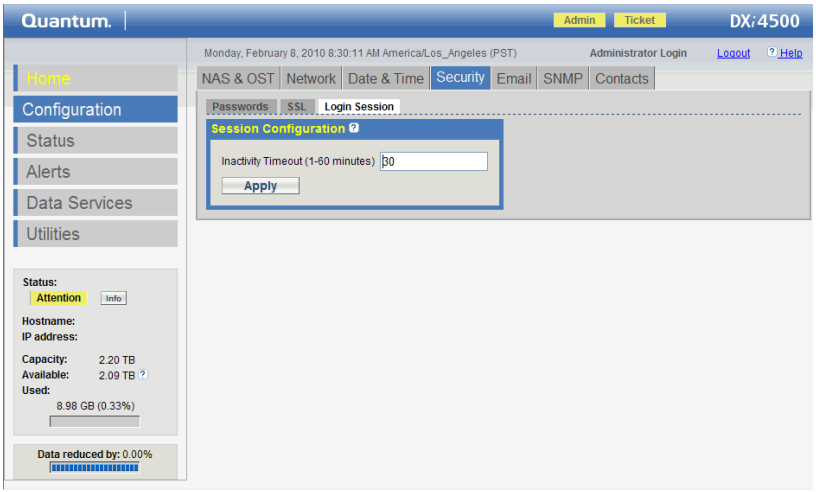
Use the **Login Session** page to specify an inactivity time-out value from 1 to 60 minutes. The default setting is 30 minutes. When the remote management pages are inactive for this period of time, the user is automatically logged out of the session and must log back in to continue.

To access the **Login Session** page:

1 From the **Security** page, click the **Login Session** tab.

The **Session Configuration** page displays (see Figure 36).

Figure 36 Session Configuration Page



2 Enter an **Inactivity Timeout** (1 to 60 minutes) and click **Apply**.

The inactivity timeout value is set.

Email Configuration

Use the **Email** page to specify e-mail server settings as well as recipients who should be contacted when service tickets or administrator alerts occur. You can specify e-mail recipients, notification levels, and information about your e-mail configuration.

To access the **Email** page, from the **Configuration** menu, click the **Email** tab.

The **Email** page contains the following tabs:

- Recipients
- Server

- Test
- Email Home

Recipients

Use the **Recipients** page to add, edit, and delete e-mail recipients.

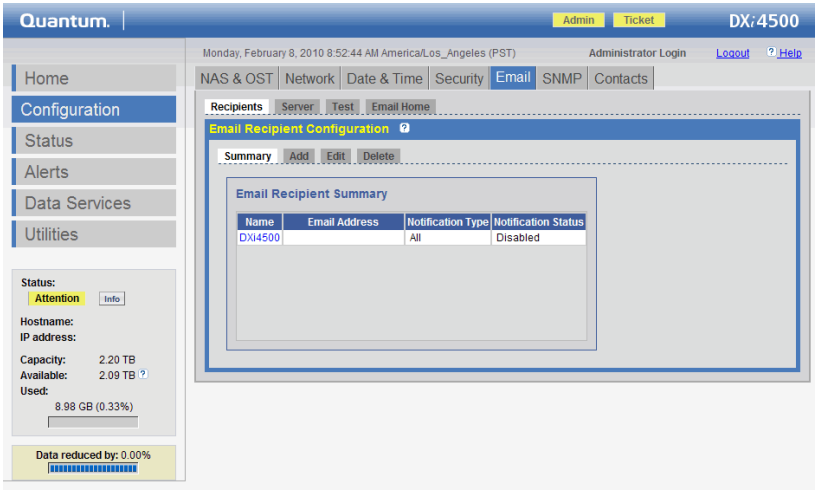
Note: To enable the DXi4500 to send notifications to recipients, you must configure the e-mail server settings (see Server on page 101).

To access the **Recipients** page:

1 From the **Email** page, click the **Recipients** tab.

The **Email Recipient Configuration** page displays (see Figure 37).

Figure 37 Email Recipient Configuration Page



The **Recipients** page contains the following tabs:

- Summary
- Add
- Edit
- Delete

Summary

The **Summary** page lists all configured e-mail recipients.

To edit information for an e-mail recipient, click the **Name** link.

Add

Use the **Add** page to configure an e-mail recipient.

To add an e-mail recipient:

1. From the **Recipients** page, click the **Add** tab.
2. Enter the **Name** of the recipient.
3. Enter the e-mail address of the recipient.
4. Select a notification type:
   - **High** - Send e-mail notifications for High service tickets (see Service Tickets on page 127 for more information).

     High service tickets indicate that a critical event has occurred which needs to be resolved immediately. The operation and performance of the DXi4500 is degraded and there is a risk of impending system failure or data loss
   - **High and Medium -** Send e-mail notifications for High and Medium service tickets.

     Medium service tickets indicate that a more serious event has occurred which needs to be resolved, but it does not necessarily need to be fixed immediately. The operation and performance of the DXi4500 may be degraded.
   - **All -** Send e-mail notifications for High, Middle, and Low service tickets as well as any administrator alerts (see Admin Alerts on page 125 for more information).

     Low service tickets indicate that an event has occurred which needs to be resolved, but it generally does not affect the operation or performance of the DXi4500.
5. Select the **Notification Enabled** check box. When notifications are enabled, the recipient receives notifications.
6. Click **Apply**.

   The e-mail recipient is added.

Edit

Use the **Edit** page to edit the e-mail recipient information for a specific recipient.

To access the **Edit** page, from the **Recipients** page, click the **Edit** tab.

Delete

Use the **Delete** page to delete a previously configured e-mail recipient.

To delete an e-mail recipient:

1. From the **Recipients** page, click the **Delete** tab.
2. Select the e-mail recipient.
3. Click **Delete**.

   The e-mail recipient is deleted.

Server

Use the **Server** page to edit the outgoing e-mail server information.

1. From the **Email** page, click the **Server** tab.
2. Enter the **Host Name or IP Address** for the outgoing e-mail server (for example, the DNS name).
3. Enter the return e-mail address in the **From Email Address** box.

   Specify a return address that lets you easily identify the system that generated the e-mail (for example, `DXi-systemname@any-domain.com`). The return address must contain an @ symbol and a valid domain name including a period.
4. Click **Apply**.

Test

Use the **Test** page to send a test e-mail to verify the e-mail configuration.

To access the **Test** page, from the **Email** page, click the **Test** tab. To send a test e-mail, select a recipient from the list and click **Send**.

Email Home

Use the **Email Home** page to configure the DXi4500 to automatically send XML-based reports to e-mail recipients.

The report represents a snapshot of the system information at the time the report is generated. Quantum recommends generating and saving a report before performing a software upgrade or reconfiguring the system.

The system can generate two types of reports:

- **Status Data** - System status information
- **Configuration Data** - System configuration data

The report is contained in an e-mail that also includes the following information:

- System serial number
- Date and time
- A message with the e-mail origin that informs the user it is an automated e-mail and that they should not respond to it.

To access the **Email Home** page, from the **Email** page, click the **Email Home** tab.

The **Email Home** page contains the following tabs:

- Schedule
- On Demand

Schedule

Use the **Schedule** page to enable the Email Home Scheduler, set the day and time when the Status Data or Configuration Data reports are sent, and configure up to three e-mail recipients.

The Email Home Scheduler feature automatically sends an e-mail to the configured recipients once a week.

To configure the Email Home Scheduler:

1. From the **Email Home** page, click the **Schedule** tab.
2. To enable the Email Home Scheduler, select the **Enable Email Home Scheduler** check box.
   - The Email Home Scheduler is enabled by default.

- To disable the Email Home Scheduler, clear the **Enable Email Home Scheduler** check box.

3 Specify the day and hour of the week when reports are sent.

4 Specify up to four e-mail recipients.

5 Click **Apply**.

On Demand

Use the **On Demand** page to immediately send a Status Data or Configuration Data report to a recipient.

1 From the **Email Home** page, click the **On Demand** tab.

2 Select the type of report to send (**Status Data** or **Configuration Data**).

3 In the **Send To** box, specify the e-mail address where you want to send the report.

4 Click **Send**.

SNMP Configuration

SNMP is short for Simple Network Management Protocol, a set of protocols for managing complex networks. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters.

To access the **SNMP** page, from the **Configuration** menu, click the **SNMP** tab.

The **SNMP** page contains the following tabs:

- Destinations
- Community
- Test

Destinations

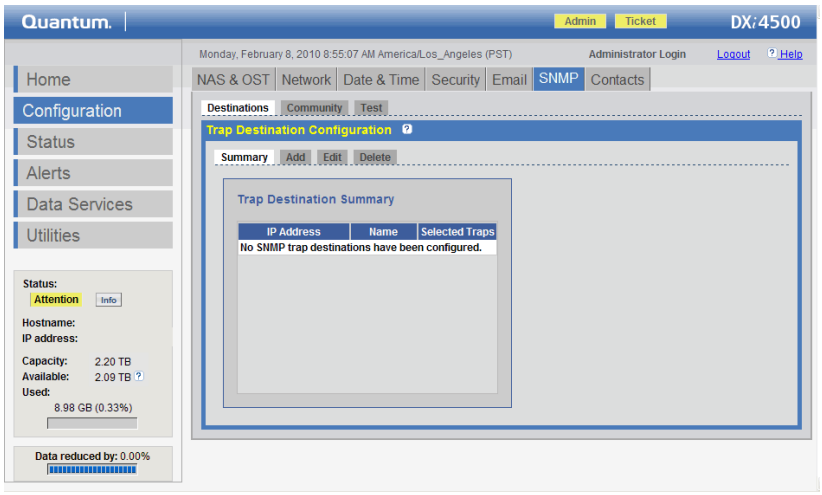
Use the **Destinations** page to add, edit, or delete SNMP destinations.

To access the **Destinations** page:

1 From the **SNMP** page, click the **Destinations** tab.

The **Trap Destination Configuration** page displays (see Figure 38).

Figure 38 Trap Destination Configuration Page



To add an SNMP destination:

1 From the **Destinations** page, click the **Add** tab.

2 Enter the **IP Address** that will receive the traps generated by the DXi4500 (for example, 12.34.56.78).

3 Enter a **Name** for the SNMP destination.

4 Select the traps to be reported (see Table 18):

Table 18 SNMP Trap Selections

Field	Description
Failure	If selected, **Failure Traps** are enabled.
Warning	If selected, **Warning Traps** are enabled.
Informational	If selected, **Informational Traps** are enabled.

Field	Description
Available	If selected, a trap is generated every time the system transitions from an unavailable to an available state.
Unavailable	If selected, a trap is generated every time the system transitions from an available to an unavailable state.

5 Click **Apply**.

Community

Use the **Community** page to add, edit, and delete the SNMP community information.

To access the **Community** page:

1 From the **SNMP** page, click the **Community** tab.

The **SNMP Community Configuration** page displays (see Figure 39).

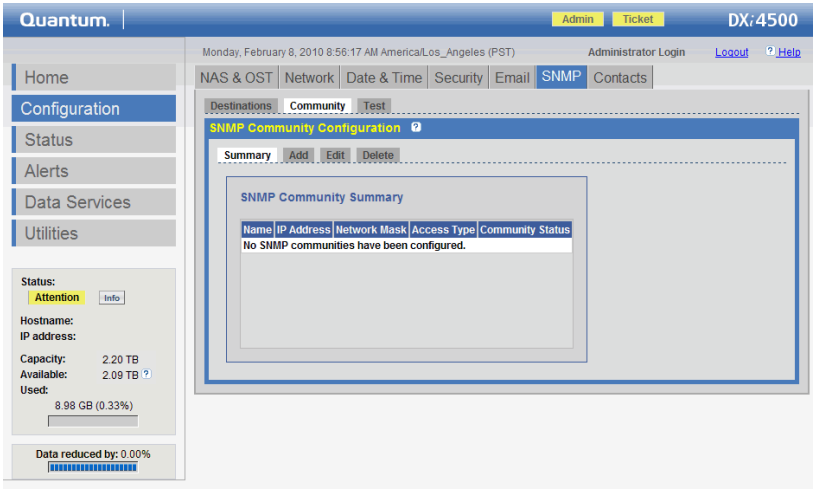


Figure 39 SNMP Community Configuration Page

To add a community:

1 From the **Community** page, click the **Add** tab.

2 Enter a unique **Name** (up to 20 characters). Valid characters are letters, numbers, hyphens, and underscores.

Caution: If no communities are defined, the SNMP agent is not accessible.

3 Enter a valid **IP Address** and **Network Mask** pair.

A pair is valid if performing a logical bitwise **AND** operation on the IP address and the network mask results in the IP address. See the following table for examples:

IP Address / Network Mask	Result
10.40.166.87 255.255.255.255	Allows access only from 10.40.166.87
10.40.166.87 10.40.166.87	Allows access only from 10.40.166.87
10.40.166.87 10.40.166.0	Invalid because the logical bitwise operation (address **AND** mask) is not equal to the address
10.40.166.87 255.255.0.0	Invalid because the logical bitwise operation (address **AND** mask) is not equal to the address
10.40.0.0 255.255.0.0	Allows access from any client with address 10.40.*xx.xx*

Note: If you define a single community and set both the IP address and network mask to 0.0.0.0 (or leave both blank), then IP address-based access control is disabled. In this case, the SNMP agent is accessible from any IP address.

4 Select the **Access Type** for the new community:

- **Get** allows SNMP **get** operations.
- **Get/Set** allows both SNMP **get** and **put** operations.

5 Select the **Community Status** check box to enable this SNMP community.

6 Click **Apply**.

An **Information** page displays indicating the community has been added.

Test

Use the **Test** page to send a test SNMP trap.

To send a test SNMP trap:

1 From the **SNMP** page, click the **Test** tab.

2 Select an **SNMP** destination.

3 Click **Send** to send a test SNMP trap.

The test trap is sent. Verify the destination to ensure the SNMP trap was sent.

Contacts Configuration

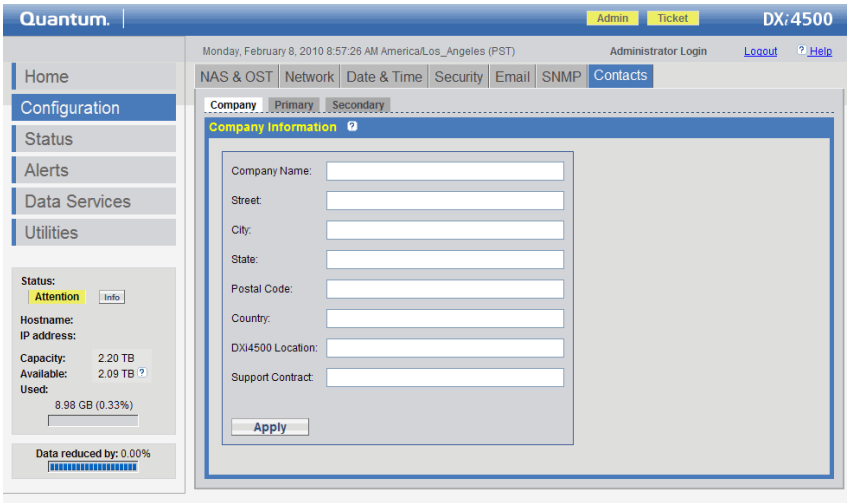
Use the **Contacts** page to enter company contact information.

To access the **Contacts** page:

1 From the **Configuration** menu, click the **Contacts** tab.

The **Company Information** page displays (see Figure 40).

Figure 40 Company Information Page



The **Contacts** page contains the following tabs:

- Company
- Primary and Secondary

Company

Use the **Company** page to enter company specific information.

1. From the **Contacts** page, click the **Company** tab.
2. Edit the company information as desired (see Table 19 for a description of the fields).
3. Click **Apply**.

Table 19 Company Information

Field	Description
Company Name	View or edit the company name where theDXi6500 system resides.
Street	View or edit the street name where the company is located.
City	View or edit the city where the company is located.

Field	Description
State	View or edit the state where the company is located.
Postal Code	View or edit the postal code.
Country	View or edit the country where the company is located.
DXi4500 Location	View or edit the physical location of the DXi4500 system (for example, data center).
Support Contract	View or edit the support contract number.

Primary and Secondary

Use the **Primary** and **Secondary** pages to enter primary and secondary contact information.

1. From the **Contacts** page, click the **Primary** or **Secondary** tab.
2. Edit the primary or secondary contact information as desired (see Table 20 for a description of the fields).
3. Click **Apply**.

Table 20 Primary and Secondary Contact Information

Field	Description
Name	View or edit the primary/secondary contact name.
Email Address	View or edit the primary/secondary contact e-mail address.
Phone	View or edit the primary/secondary contact phone number.
Fax	View or edit the primary/secondary contact fax number.
Pager	View or edit the primary/secondary contact pager number, if available.

Field	Description
Street	View or edit the primary/secondary contact street address.
City	View or edit the primary/secondary contact city location.
State	View or edit the primary/secondary contact state location.
Postal Code	View or edit the primary/secondary contact postal code.
Country	View or edit the primary/secondary contact country location.

Chapter 6
DXi4500 Status

The **Status** pages allow you to view information on the DXi4500 hardware as well as performance information. The status information is polled by the system every two minutes.

To access the **Status** pages, from the contents frame, click the **Status** menu.

Use the **Status** pages to view the following status information:

- Hardware
  - Summary
  - Details
- System
  - CPU
  - RAID
  - Ethernet
  - Data Deduplication
  - Ingest
  - Disk Usage

Hardware

The DXi4500 provides a variety of hardware information from the **Hardware** page. The **Hardware** page gives the current status of the system and command components such as the hard drives, power supplies, fan modules, and temperature of the system.

To access the **Hardware** page, from the **Status** menu, click the **Hardware** tab.

The **Hardware Status** page contains the following tabs:

- Summary
- Details
- Firmware Version

Summary

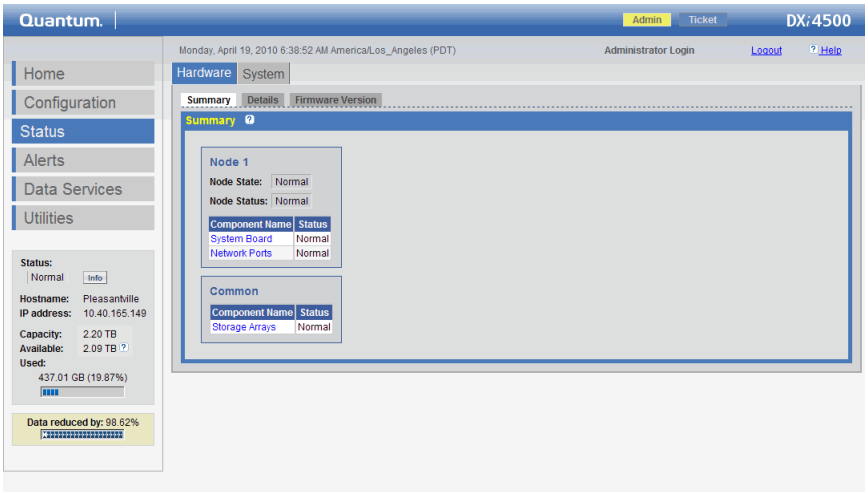
The **Summary** page displays the status of the system and also all shared components. The overall status information for each component is reported as **Normal**, **Attention**, or **Failed**.

To access the **Summary** page:

1 From the **Hardware** page, click the **Summary** tab.

The **Summary** page displays (see Figure 41):

Figure 41 Summary Page



2 Click a component link to display detailed information for that component.

Details

Use the **Details** page to view detailed information for each component. To access the **Details** page, from the **Hardware** page, click the **Details** tab.

The **Details** page contains the following tabs:

- **System 1** - View hardware details for the following components:
  - System Board
  - Network Ports
- **Common** - View hardware details for the following components:
  - Storage Arrays

To view hardware details for a component, click the appropriate tab on the **System 1** or **Common** page.

System Board

The system contains a system board that provides the following types of information:

- System temperature

- CPU temperature
- System voltages
- Fan status
- Power supply status

The status for each component is shown in the **Status** column:

- **Normal** - The component is operating within normal operating parameters.
- **Attention** - The component passed the attention threshold. Action may be required on the system.
- **Warning** - The component has passed the warning threshold and requires attention.
- **Failure** - The component has failed.
- **NA** - The system has been removed.
- **Down** - The system is not connected.

Network Ports

Each system contains four Ethernet ports. Each Ethernet port is shown in the **Name** column. The speed of the port is shown in the **Value** column. The status for each port is shown in the **Status** column.

- **Up** - The port is connected.
- **Down** - The port is not connected.

Storage Arrays

All storage arrays, components, and controllers in the system appear in the **Name** column. The status for each array is shown in the **Status** column.

- **Normal** - The array is operating within normal operating parameters.
- **Failure** - The array has failed and requires attention.
- **Missing** - The array has been removed.
- **Attention** - The array is operable but performance is degraded.

Click an array link to display the components for that array. Click a component link to display the status for that component.

Firmware Version

The **Firmware Version** page displays information about hardware components installed in the DXi4500, such as the firmware version, hardware revision, and manufacturer.

To access the **Firmware Version** page:

1 From the **Hardware** page, click the **Firmware Version** tab.

The table displays the following columns:

- **Name** - Displays a hardware component or a property of the component (for example, Manufacturer, Version, or Release Date).

  Note: The properties that are listed vary depending on the hardware component.

- **Firmware Version** - The value of the corresponding item in the Name column (for example, the specific manufacturer, version number, or release date for the item).

System

To access the **System** page, from the **Status** menu, click the **System** tab.

The **System** page provides performance information for the following components:

- CPU
- RAID
- Ethernet
- Data Deduplication
- Ingest

- Disk Usage

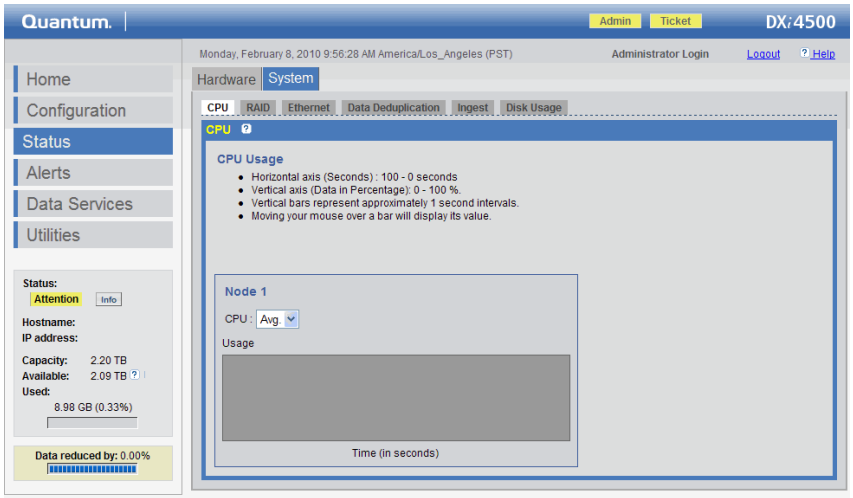
CPU

To access the **CPU** performance page:

1 From the **System** page, click the **CPU** tab.

The **CPU** page displays (see Figure 42):

Figure 42 CPU Page



The **CPU** page displays the system CPU performance in a dynamic graph.

- Horizontal axis (Seconds): 100 - 0 seconds
- Vertical axis (Data in Percentage): 0 - 100%.
- Vertical bars represent approximately 1 second intervals.
- Moving your mouse over a bar will display its value.

You can monitor a specific CPU or an average of CPUs by selecting an option in the **CPU** drop down box.

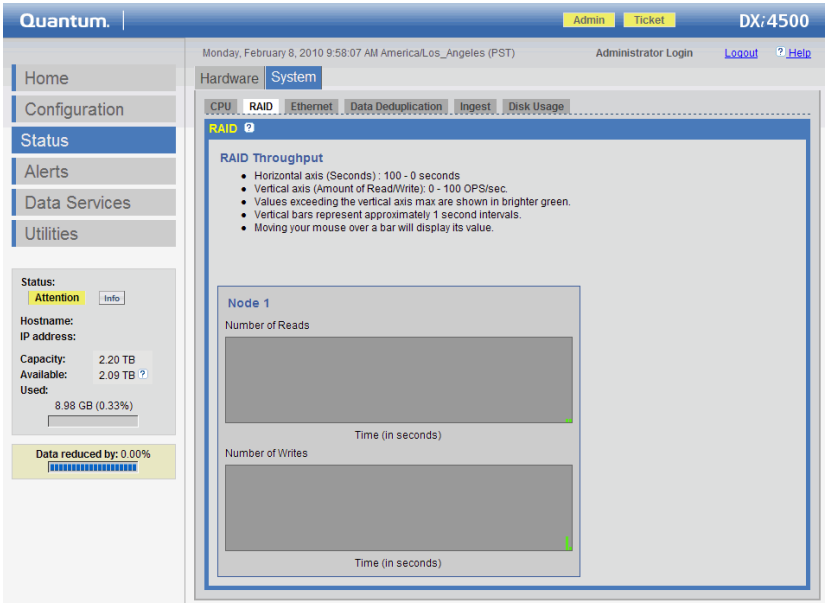
RAID

To access the **RAID** performance page:

1 From the **System** page, click the **RAID** tab.

The **RAID** page displays (see Figure 43):

Figure 43 RAID Page



The **RAID** page displays the system RAID performance in a dynamic graph.

- Horizontal axis (Seconds): 100 - 0 seconds
- Vertical axis (Amount of Read/Write): 0 - 100 OPS/sec.
- Values exceeding the vertical axis max are shown in brighter green.
- Vertical bars represent approximately 1 second intervals.
- Moving your mouse over a bar will display its value.

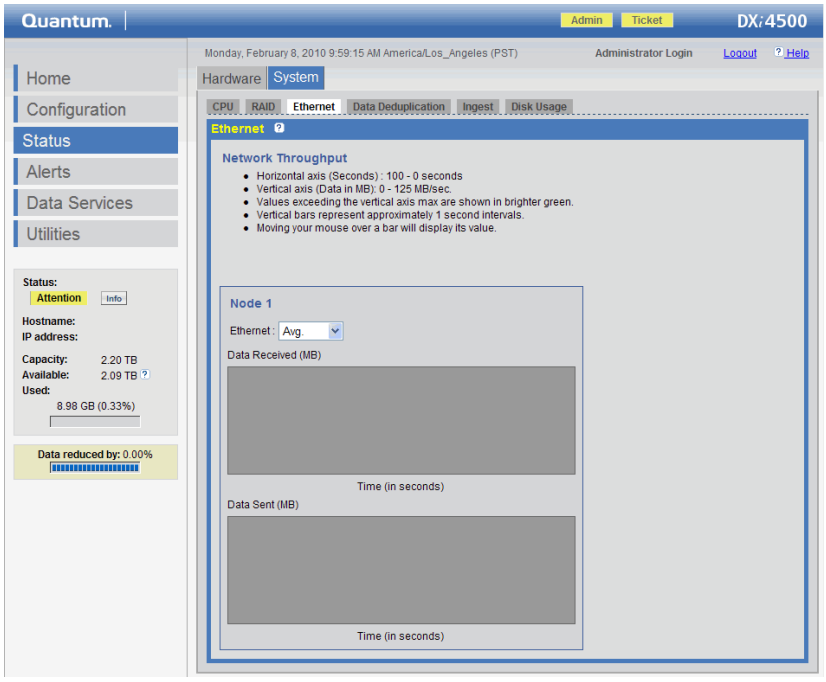
Ethernet

To access the **Ethernet** performance page:

1 From the **System** page, click the **Ethernet** tab.

The **Ethernet** page displays (see Figure 44):

Figure 44 Ethernet Page



The **Ethernet** page displays the system Ethernet performance in a dynamic graph.

- Horizontal axis (Seconds): 100 - 0 seconds
- Vertical axis (Data in MB): 0 - 125 MB/sec.
- Values exceeding the vertical axis max are shown in brighter green.
- Vertical bars represent approximately 1 second intervals.
- Moving your mouse over a bar will display its value.

You can monitor a specific port or an average of all ports by selecting an option in the **Ethernet** drop down box.

Data Deduplication

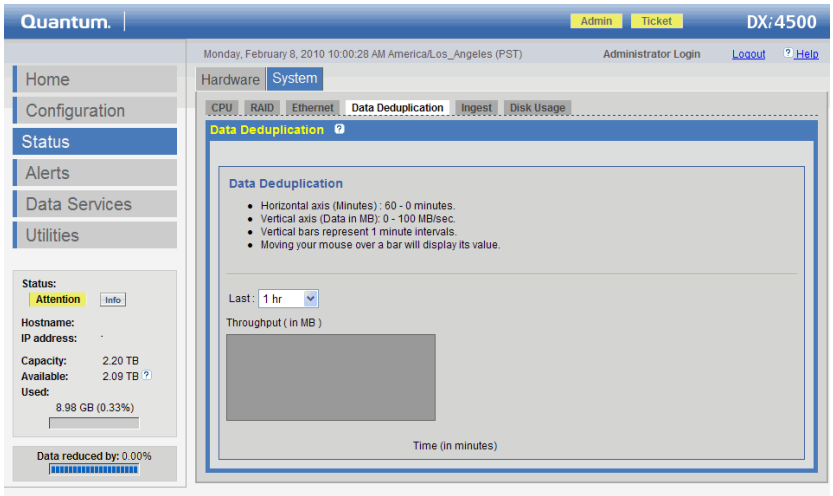
The **Data Deduplication** page displays the data deduplication performance for the system

To access the **Data Deduplication** performance page:

1 From the **System** page, click the **Data Deduplication** tab.

The **Data Deduplication** page displays (see Figure 45):

Figure 45 Data Deduplication Page



The **Data Deduplication** page displays the system data deduplication performance in a dynamic graph.

- Horizontal axis (Minutes): 60 - 0 minutes.
- Vertical axis (Data in MB)
- Vertical bars represent 1 minute intervals.
- Moving your mouse over a bar will display its value.

You can select the time period to view from the **Last** drop down box.

Ingest

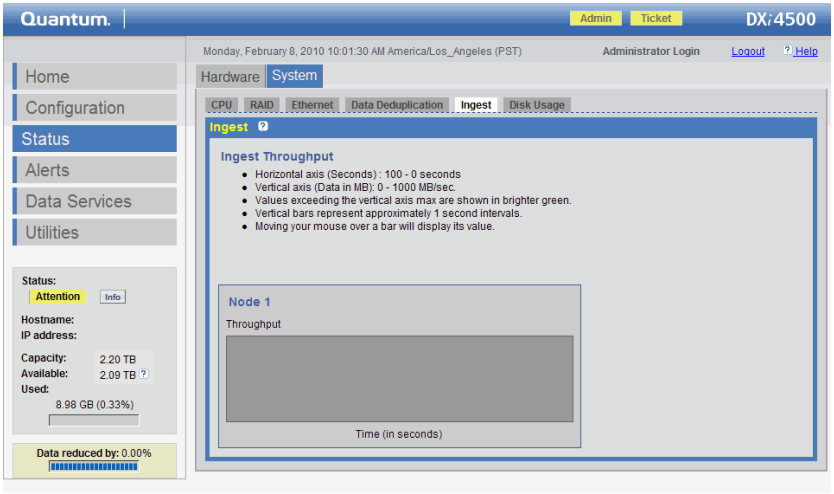
The **Ingest** page displays the throughput performance for the system.

To access the **Ingest** performance page:

1 From the **System** page, click the **Ingest** tab.

The **Ingest** page displays (see Figure 46):

Figure 46 Ingest Page



The **Ingest** performance page provides the following information for the system:

- Horizontal axis (Seconds): 100 - 0 seconds
- Vertical axis (Data in MB): 0 - 1000 MB/sec.
- Values exceeding the vertical axis max are shown in brighter green.
- Vertical bars represent approximately 1 second intervals.
- Moving your mouse over a bar will display its value.

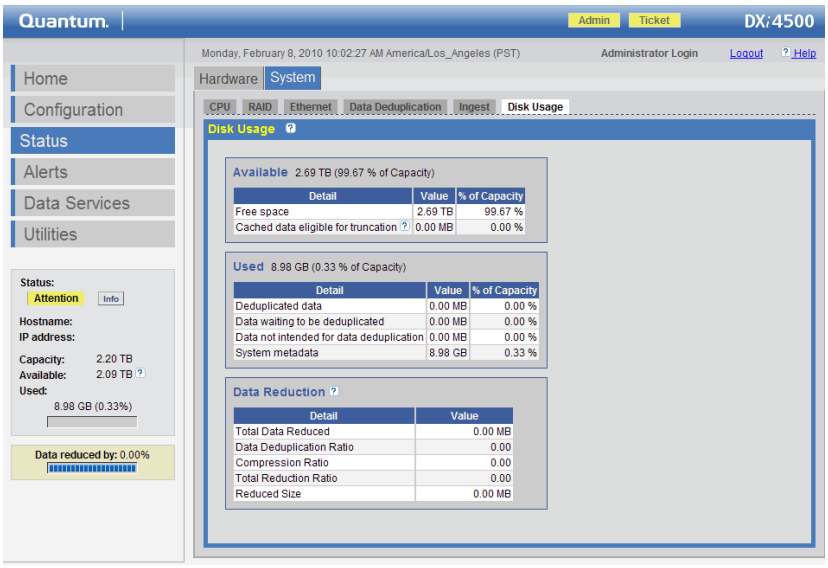
Disk Usage

To access the **Disk Usage** performance page:

1 From the **System** page, click the **Disk Usage** tab.

The **Disk Usage** page displays (see Figure 47):

Figure 47 Disk Usage Page



The **Disk Usage** page provides the following information for the system:

- Available (System Capacity)
- Used (System Capacity)
- Data Reduction

Available (System Capacity)

Available space is the area that is available for data storage. The **Available** value is displayed as an amount and as a percentage of the total capacity in the system.

Available space is divided into the following categories:

Note: The value for each category is displayed as an amount and as a percentage of the total capacity in the system.

- **Free Space** - This area is available for data storage.
- **Cached data eligible for truncation** - After data is deduplicated, the native format is cached to allow for higher performance should you need to read the data back. When necessary, the system will automatically begin to delete some of this cached data in order to increase free space. The process of

deleting this cached data is called truncation (see Space Management on page 133).

Used (System Capacity)

Used space is the area that already holds data. The **Used** value is displayed as an amount and as a percentage of the total capacity in the system.

Used space is divided into the following categories:

Note: The value for each category is displayed as an amount and as a percentage of the total capacity in the system.

- **Deduplicated data** - The amount of data that has already been deduplicated.
- **Data waiting to be deduplicated** - The amount of data that is waiting to be deduplicated.
- **Data not intended for data deduplication** - The amount of data that will NOT be deduplicated.
- **System metadata** - The area on the system that is occupied by the system metadata.

Data Reduction

The data reduction area displays the data reduction performance for the system. Data reduction is divided into the following categories:

Note: Since these values are calculated as data is deduplicated and compressed, they will not be completely up-to-date until all data that is eligible for deduplication is processed by the data deduplication and compression engines.

- **Total Data Reduced** - The original, native size of all existing data that has been processed by the data deduplication and compression engines.
- **Data Deduplication Ratio** - The deduplication ratio of all existing data that has been processed by the data deduplication engine.

- **Compression Ratio** - The compression ratio of all existing data that has been processed by the data deduplication and compression engines.
- **Total Reduction Ratio -** The total reduction ratio of all existing data that has been processed by the data deduplication and compression engines (calculated by dividing **Total Data Reduced** by **Reduced Size**).
- **Reduced Size** - The final, reduced size of all existing data that has been processed by the data deduplication and compression engines.

Chapter 7

DXi4500 Alerts

Use the **Alerts** page to view administrator alerts (admin alerts) and service tickets. These alerts are generated by the system when hardware or software events have occurred.

To access the **Alerts** page, from the contents frame, click the **Alerts** menu.

The **Alerts** page contains the following tabs:

- Admin Alerts
- Service Tickets

Admin Alerts

Admin alerts are generated by the system when the condition of the system has changed, such as going from the offline state to the online state.

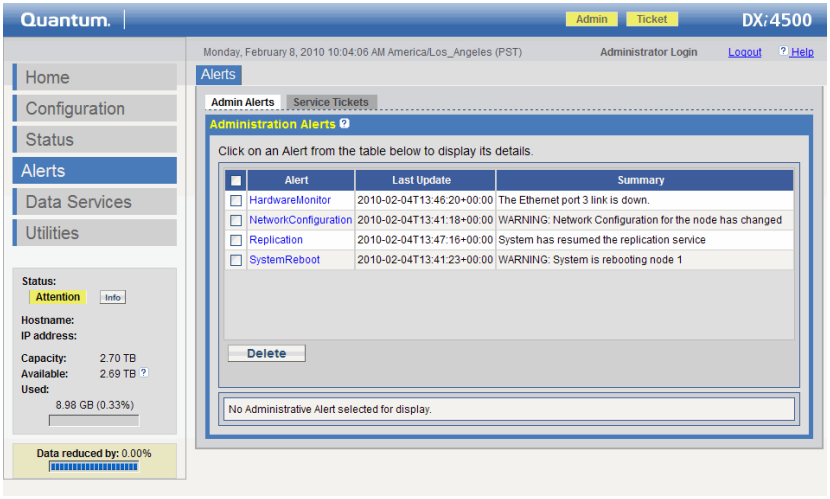
Note: You must complete e-mail configuration (see Email Configuration on page 98) before administrator alerts can be sent.

To access the **Admin Alerts** page:

1 From the **Alerts** page, click the **Admin Alerts** tab.

The **Administration Alerts** page displays (see Figure 48):

Figure 48 Administration Alerts Page



The **Administration Alerts** page displays administration alerts for the DXi4500 (see Table 21).

Note: You can click the **Alert**, **Last Update**, and **Summary** column headings to sort the rows in the report by the data in the respective column. Click the column heading again to invert the sorting sequence from ascending order to descending order.

Table 21 Administration Alerts Columns

Column	Description
Alert	Name of the admin alert. Click the link to see the activity status history for the admin alert.
Last Updated	Date when the admin alert was last opened or closed.
Summary	Summary description of the admin alert.
Delete	Click to delete the selected admin alert.

Service Tickets

When an event in the DXi4500 is detected, and localized isolation and recovery is attempted, the event is reported to one of the monitoring daemons. The monitoring daemon reports the event to the service daemon. The service daemon then logs the event and applies additional logic to determine whether the event warrants a service ticket.

If the event is not critical, the process for the event is completed. If the event is critical, the service daemon creates and logs a service ticket and notifies the user interface that a new service event needs attention. If the DXi4500 detects that the problem is resolved, the ticket is closed. If the user indicates that the problem has been resolved, the ticket can be closed manually. At this point, the service daemon updates the ticket database and notifies the DXi4500 Web pages.

Note: Tickets that are not resolved are generated again after 24 hours.

Note: You must complete e-mail configuration (see Email Configuration on page 98) before service tickets can be sent.

To help users determine the criticality of events occurring in the DXi4500, service tickets grade events as **Low**, **Middle**, or **High** severity.

- **Low (green)** - An event has occurred which needs to be resolved, but it generally does not affect the operation or performance of the DXi4500.
- **Middle (yellow)** - A more serious event has occurred which needs to be resolved, but it does not necessarily need to be fixed immediately. The operation and performance of the DXi4500 may be degraded.
- **High (red)** - A critical event has occurred which needs to be resolved immediately. The operation and performance of the DXi4500 is degraded and there is a risk of impending system failure or data loss.

Service tickets or recommended action tickets (RAS) provide guidance to users on how to resolve certain events in the DXi4500. Some service tickets (and associated recommended actions files) guide users through

a series of steps that may resolve the problem prior to contacting Quantum customer support.

The procedures described in system status tickets are intended to be performed by users who are familiar with the DXi4500. At any time, a user may contact Quantum customer support for assistance or if the user is concerned about what specific actions to take.

Viewing Service Tickets

Viewing service tickets can be performed by users with the following access privilege:

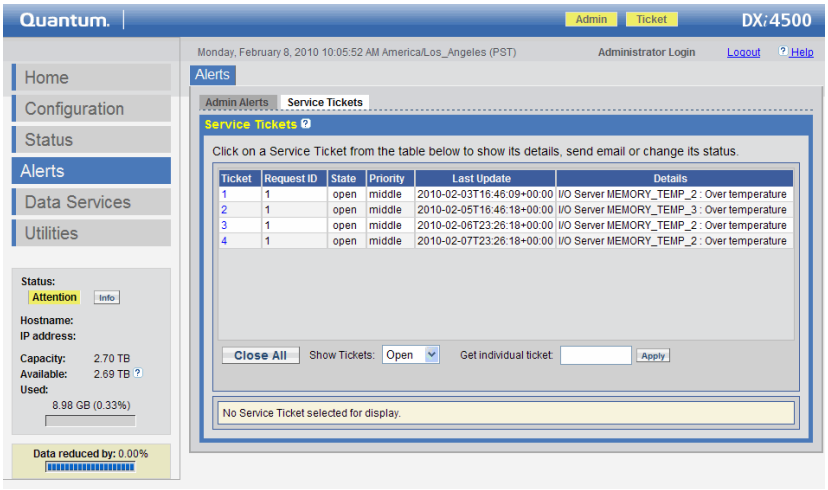
- Monitor
- Administrator

To view service tickets:

1 From the **Alerts** page, click the **Service Tickets** tab.

The **Service Tickets** page displays (see Figure 49):

Figure 49 Service Tickets Page



The **Service Tickets** page lists the information described in Table 22.

Note: You can click the **Ticket**, **Request ID**, **State**, **Priority**, **Last Update**, and **Details** column headings to sort the rows in the report by the data in the respective column. Click the column heading again to invert the sorting sequence from ascending order to descending order.

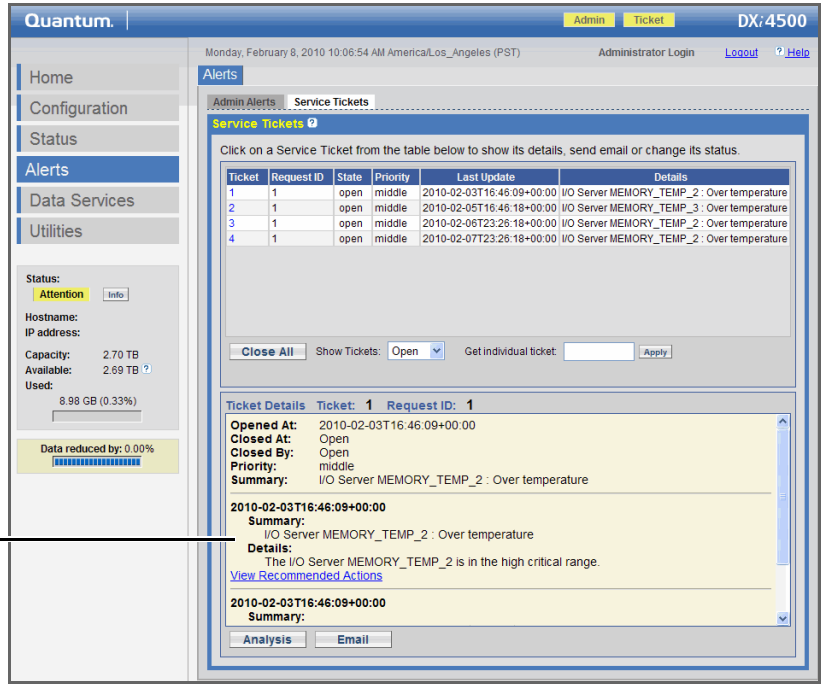
Table 22 Service Tickets

Column	Description
Ticket	Service ticket numbers.
Request ID	Request ID for the ticket.
State	Current status of the service ticket (**Open** or **Closed**).
Priority	Severity level of the problem described in the service ticket (**Low**, **Middle**, or **High**).
Last Updated	Date when the service ticket was last opened or closed.
Details	Summary description of the problem reported by the DXi4500.

2 To view details for a ticket, click the ticket number.

The **Ticket Details** display at the bottom of the screen (see Figure 50).

Figure 50 Ticket Details



The **Ticket Details** area lists the service ticket number, date and time when the ticket was last accessed (either opened or closed), ticket status (open or closed), a summary of the problem, and detailed information about the problem.

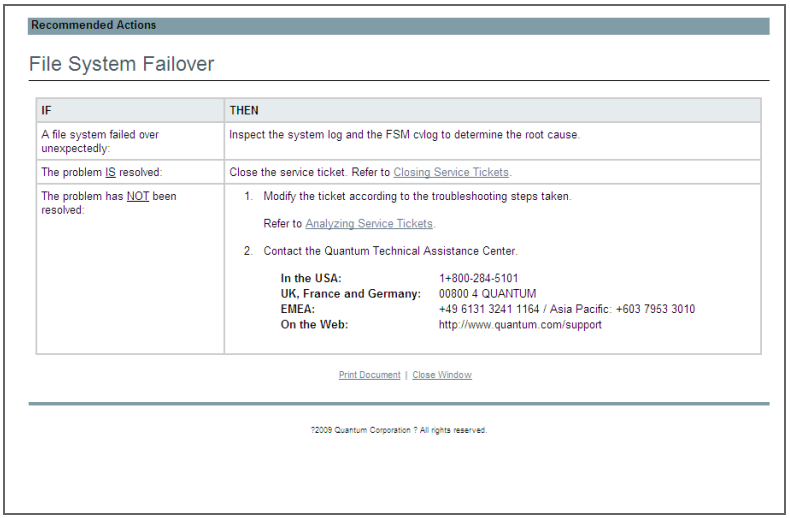
Note: The time indicated in the service ticket may not match the DXi4500 system time.

Most service tickets also include a **View Recommended Actions** link. Click the link opens a separate window with recommended steps to resolve the problem. To close the window, click **x** in the upper right corner.

Note: For information on analyzing service tickets and obtaining additional information about a reported problem, see Modifying Service Tickets.

Figure 51 shows a sample **Recommended Actions** window.

Figure 51 Recommended Actions Window



Modifying Service Tickets

Modifying service tickets can be performed by users with this access privilege:

- Administrator

Use this procedure to add information to a service ticket related to system troubleshooting and to view the current status of a problem reported by the DXi4500. All modified entries are kept with the ticket number and ticket summary when the service ticket is closed.

1 View a service ticket and show the ticket details.

See Viewing Service Tickets on page 128.

2 Click **Analysis**.

The **Ticket Analysis** page displays.

3 Enter all relevant information regarding actions taken to resolve the issue and click **Apply**.

Sending Service Tickets by E-mail

Sending service tickets by e-mail can be performed by users with this access privilege:

- Administrator

DXi4500 service tickets can be sent to a designated recipient via e-mail. Optionally, the sender can include a comment about the service ticket with the e-mail message.

1 View a service ticket and show the ticket details.

   See Viewing Service Tickets on page 128.

2 Select a service ticket to send by e-mail and click **Email**.

   a In the **Email Recipient** box, enter an e-mail address where the service ticket should be sent.

   b (Optional) In the **Comment** box, enter a comment to send with the service ticket.

   c Click **Send**.

Closing Service Tickets

Closing service tickets can be performed by users with this access privilege:

- Administrator

Use this procedure to close a service ticket.

Note: You can analyze a service ticket after it has been closed (see Modifying Service Tickets on page 131).

---

1 View a service ticket and show the ticket details.

   See Viewing Service Tickets on page 128.

2 Click **Analysis**.

   The **Ticket Analysis** page appears.

3 Select the **Close Ticket** check box.

4 Click **Apply** to close the service ticket.

Chapter 8

DXi4500 Data Services

Use the **Data Services** pages to configure space management and configure the system replication capability.

To access the **Data Services** pages, from the contents frame, click the **Data Services** menu.

The **Data Services** pages contain the following tabs:

- Space Management
- Data Replication

Space Management

When data deduplication is enabled on the DXi4500, it is not possible to accurately predict the amount of storage space required because the data deduplication process depends on the type of data being stored. This makes it necessary to define storage space thresholds so the user can be notified when storage space begins to run low. Space management provides the ability to monitor the storage space available on the system and notify the user if storage space begins to run low.

Note: When a "low-disk-space" condition occurs on a system, the current system will pause its replication activity and any source systems that are currently replicating to this system are paused. When the "low-disk-space" condition ends, the current system will resume its replication activity and the source systems that were replicating to this system resume.

To access the **Space Management** page, from the **Data Services** menu, click the **Space Management** tab.

The **Space Management** page contains the following tabs:

- General
- Schedule

General

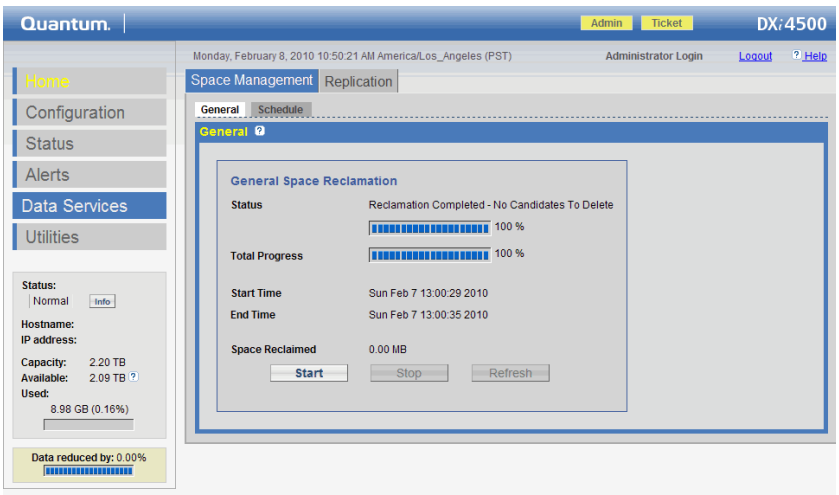
Use the **General** page to start or stop space reclamation and to monitor the progress of space reclamation.

To run space reclamation:

1 From the **Space Management** page, click the **General** tab.

The **General** page displays (see Figure 52).

Figure 52 General Page



2 To run space reclamation immediately, click **Start**.

The space reclamation process begins immediately. The **Status** section displays the space reclamation status.

The **Space Reclaimed** value indicates the amount of space that has been reclaimed so far during the active space reclamation process. If space reclamation is not running, the **Space Reclaimed** value indicates the amount of space reclaimed by the previous space reclamation.

Note: The space reclamation process will effect system performance. If possible, ensure that space reclamation occurs when the system is idle.

---

3 To stop a reclamation in process, click **Stop**.

The status of space reclamation can be:

- **Reclamation Completed** - Space reclamation has completed without errors.
- **Reclamation Started by User** - Space reclamation has been started manually by a user.
- **Reclamation Interrupted** - Space reclamation has been interrupted. Space reclamation must be restarted.
- **Reclamation Interrupted by User** - Space reclamation has been interrupted by a user. Space reclamation must be restarted.
- **Reclamation Interrupted - Error Encountered** - Space reclamation has been interrupted because an error was encountered. Space reclamation must be restarted.
- **Reclamation Completed - No Candidates To Delete** = Space reclamation completed, but there were no candidates for reclamation.
- **Reclaim Existing Blockpool Freed space** - The existing blockpool space has been reclaimed for use.
- **Stage 1 of 4 - Delete Existing Candidates**
- **Stage 2 of 4 - Calculating Deletion Candidates**
- **Stage 3 of 4 - Delete New Candidates**
- **Stage 4 of 4 - Reclaim disk space**

Schedule

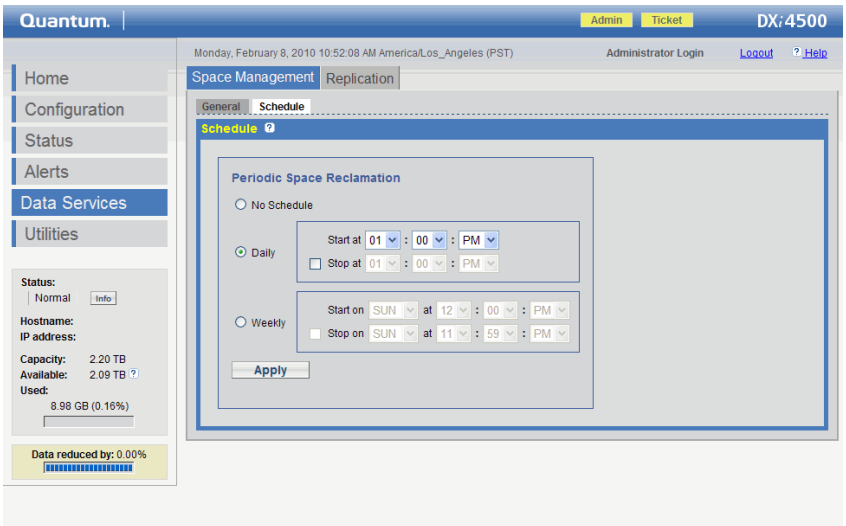
The block pool data area of the DXi4500 is used to store tags that reference deduplicated and replicated data. Tags are used to rebuild a deduplicated file if it needs to be recovered. If this deduplicated or replicated data has been deleted from the system, the tags need to be removed from the block pool so the space can be used for additional reference tags.

To schedule space reclamation:

1 From the **Space Management** page, click the **Schedule** tab.

The **Schedule** page displays (see Figure 53).

Figure 53 Schedule



Use the **Schedule** page to schedule periodic space reclamation either daily or weekly.

2 To schedule periodic space reclamation:

a Select **Daily** or **Weekly** and set the day and time information.

Or to disable periodic space reclamation, select **No Schedule**.

b Click **Apply**.

The schedule information is set.

Data Replication

Note: The information in this section applies to native DXi4500 replication. OST optimized duplication using NetBackup is described separately (see OST Optimized Replication on page 70).

The DXi4500 can be configured to automatically replicate data on another DXi-Series system as part of a disaster recovery plan. Replication is the process of sending replicated data from a source NAS share to a target NAS share. This process is configurable on a per NAS share basis. The source system must have replication enabled. The target system can store replicated NAS share data for one or more source systems. A system can be both a source (NAS share sending replicated data) and target (receiving replicated data).

Configuring Replication for the First Time

For a new DXi4500 installation, or immediately after a new share has been created, be sure to replicate the namespace (using the on demand **Replicate Now** function) for each share as soon as it is created and before any data is written to it.

This action establishes the namespace structure on the target. Establishing the namespace structure before any data is written will expedite the first replication that occurs after the first backup.

Failure to replicate the empty namespace is not fatal, but the speed of the first replication after the first backup will be up to twice as fast if you did replicate the empty namespace. This could be especially important when backing up a significant amount of data.

Replication Configuration Steps

Configuring Replication consists of the following steps:

1 Before data can be replicated from a source system to a target system, the target must be authorized to receive data from a specific source. To authorize a target system to receive data from a source, you must add the source host name or IP address to the **Source Host List** on the target system (see Target Role Configuration on page 148).

2 Once you have added the source system hostname or IP address to the target system, you must add the target system hostname or IP address to the source system. The source system can only replicate data to one target (see Source Role Configuration on page 140).

3 Now that both the target and source systems are setup for replication, you can enable replication and either schedule the replication process or manually replicate a share (see Source Role NAS Configuration on page 142).

Directory/File Based Replication

Directory/File Based Replication, when configured, automatically replicates file data without user intervention or a schedule. The replication is triggered by a CLI command for file data (NAS share). This greatly enhances replication performance since only the file data in a NAS share that has changed will be replicated instead of the entire NAS share.

After Directory/File Based Replication, NAS share files are automatically recovered on the **Target** system. You may also initiate a synchronization from the **Source** system to the **Target** system on NAS shares that have been configured for Directory/File Based Replication. This will replace all files on the **Target** NAS share with the most up to date files on the **Source** system.

Directory/File Based Replication NAS Configuration Steps

Configuring Directory/File Based Replication consists of the following steps:

- On the **Target** system, create a new NAS share.
- On the **Target** system, access the **Directory/File Based Targets** page and set the share **Sync ID**. The **Sync ID** is used to synchronize the Source Role NAS share with the Target Role NAS share (see Target Role NAS Directory/File Target Configuration on page 152).
- On the **Source** system, edit the NAS share that is enabled for replication and enter the **Sync ID** previously configured on the **Target** system (see Source Role NAS Configuration on page 142).
- Your system is configured for NAS Directory/File Based Replication.

Replication Requirements

The following list provides requirements for replication:

- Only NAS shares with data deduplication enabled can be replicated.
- One to one replication only (a NAS share cannot be replicated to more than one target NAS share).
- All source NAS shares must replicate to the same target system.
- All files that are in use in a NAS share during replication are skipped.
- The **Target** system must specify which **Source** systems (up to 10) it will accept replicated data from.

Note: For optimization purposes, the underlying data is continuously updated and will become available when the replication is either run manually or using a scheduled replication.

Data Transmission

Once a data set has been deduplicated, it may be replicated (non-redundant data is transmitted from a source system to a target). Data deduplication tags representing files with a high probability of being replicated (for example, NAS shares marked for replication) are queued for replication after data deduplication is complete without regard to the replication schedule. This continuous transmission of data is an optimization allowing replication to be used with low bandwidth networks.

Replication Set Transmission and Accounting

When a replication set is scheduled for transmission, the system scans the files comprising the replication set and a **namespace** file is created. A **namespace** file contains the complete set of data deduplication tags for the replication set. Data that is active (a NAS file that is open) or data that is not yet deduplicated is not included in the **namespace** file. The **namespace** file is then deduplicated and transmitted to the target system after the data transmission of the replication set is complete. Once both the replication set and **namespace** file have been transmitted to the target system, the replication can be recovered.

Accessing Replication

To access the **Replication** page, from the **Data Services** menu, click the **Replication** tab.

The **Replication** page contains the following tabs:

- Source Role Configuration
  - Source Role NAS Directory/File Based Replication Configuration
- Target Role Configuration
  - Target Role NAS Directory/File Target Configuration
- Reports

Source Role Configuration

Use the **Source Role** page to define the NAS shares that will be replicated and the target that will receive the replicated data.

Note: You must configure the target system prior to configuring the source. If the target system is not configured first, you will not be able to designate the replication target.

Note: You MUST have at least one NAS share created on the source before you can configure it for replication.

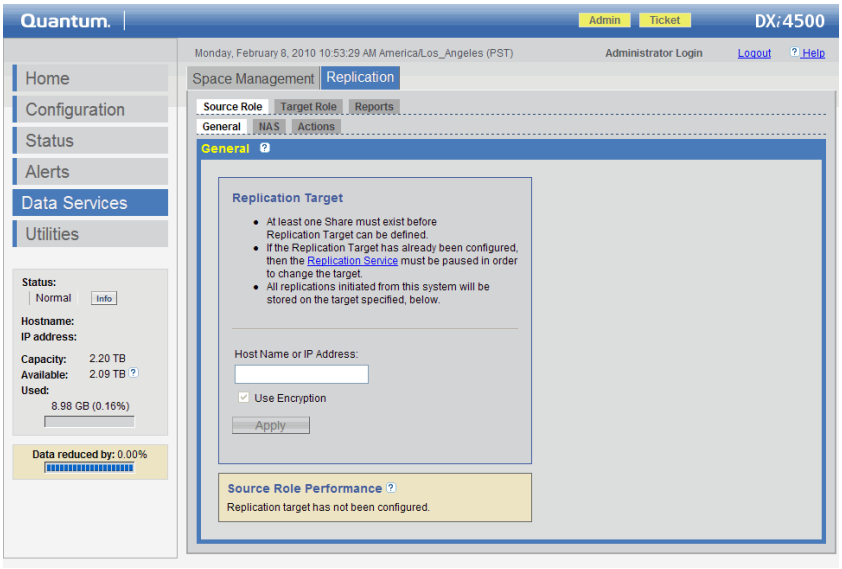
To configure the source system for replication:

Note: If you need to add, delete, or change a replication target, you must first pause replication from the **Source Role Actions** page. After the replication target has been changed, you must resume replication from the **Source Role Actions** page.

1 From the **Replication** page, click the **Source Role** tab.

The **Source Role General** page displays (see Figure 54).

Figure 54 Source Role General Page



2 Enter the **Host Name or IP Address** for the replication target and click **Apply**.

Use Encryption is selected by default. When **Use Encryption** is enabled, data that is replicated is encrypted before it is replicated to another system. If your data network is already secured, disable **Use Encryption** for increased replication performance.

Source Role Performance

The **Source Role Performance** information displays the following statistics:

- **Total Data Sent** - This field indicates the original, native size of the data transferred during replication or failback. This does not indicate the actual number of bytes sent over the network during replication or failback.
- **Total Bytes Sent** - This field indicates the actual number of bytes transferred over the network during replication or failback, and is usually much less than the native size due to the benefits of data deduplication.
- **Average Send Rate** - This field is based on the actual number of bytes transferred over the network during replication or failback. They are a measure of the total, number of bytes sent (in MB/sec)

divided by the amount of time required to complete the replication or failback job(s).

Source Role NAS Configuration

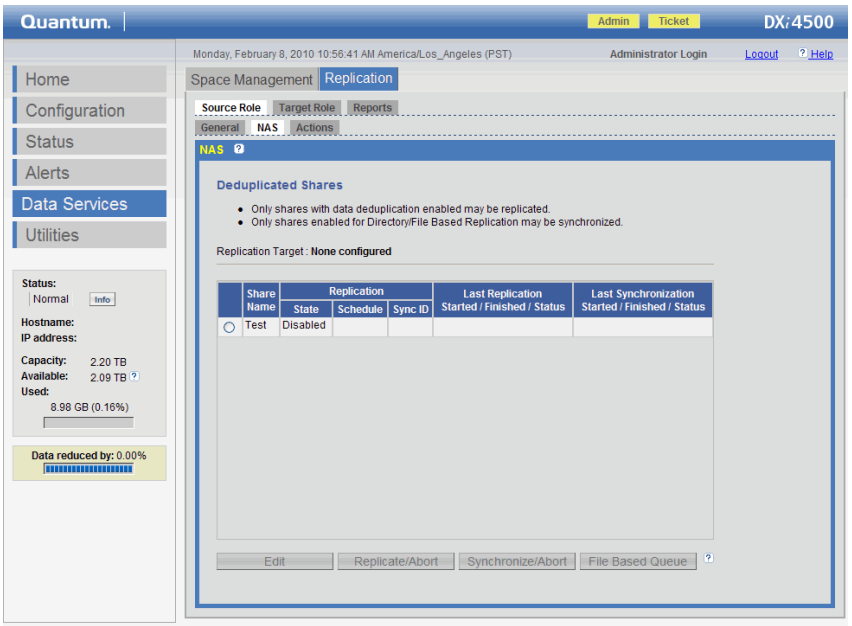
Use the **Source Role NAS** page to select and configure NAS shares for replication.

To replicate NAS shares:

1 From the **Source Role** page, click the **NAS** tab.

The **Source Role NAS** page displays (see Figure 55).

Figure 55 Source Role NAS Page



The **Source Role NAS** page displays the available NAS shares that have been deduplicated. The page also displays the current replication status for the share and information on the most recent replication that was run.

Note: The **Last Replication** and **Last Synchronization** columns display status information only for the most recent manual replication or synchronization. To view status information for Directory/File Based Replication, use the **File Based Queue** page (see Source Role NAS File Based Queue on page 144). To view complete replication history, generate a replication report (see Reports on page 154).

The replication status can display the following states:

- **In Progress** - The replication job is in progress.
- **Partial** - The replication job was partially completed. Refer to the log file to view the files that were not replicated.
- **Queued and Waiting** - The replication job is queued and waiting for another job to complete before beginning.
- **Success** - The replication job was completed successfully.
- **Failure** - The replication job was not completed.

The synchronization status can display the following states:

- **Queued** - Synchronization has been queued and will continue when ready.
- **Success** - Synchronization has completed successfully.
- **Recovering** - The recover operation is in process.
- **Replicating** - The replication operation is in process.
- **Failed** - Synchronization has failed.

The **Information** page displays during a replication in progress or a replication successfully completed. The **Information** page displays the amount of data transferred as well as the average MB/sec for a replication job.

2 To enable or disable replication on the share, or to schedule a replication time, select the share and click **Edit**.

   a Select the **Enable Replication** check box to enable replication.

   Or clear the **Enable Replication** check box to disable replication.

b To schedule a replication time, select **Enable scheduled replication** and enter the date and time to run the replication process.

Note: Replication should be scheduled to run after backups are complete. If you do not enable scheduled replication, replication will only occur if you manually run it or if you configure Directory/File Based Replication (see Source Role NAS Directory/File Based Replication Configuration on page 145).

c Click **Apply**.

3 To manually run the replication process, select the share and click **Replicate/Abort**.

Caution: If a system fails during a replication job, the replication job must be restarted.

The NAS share replication process begins. The status of the current replication displays in the **Status** area.

4 To abort the replication, click the **Replicate/Abort** button.

5 To synchronize the NAS share configured for Directory/File Based Replication, click **Synchronize/Abort**. The system will update all files in the share.

Note: Only NAS shares enabled for Directory/File Based Replication may be synchronized.

6 To abort the synchronization, click **Synchronize/Abort**.

Source Role NAS File Based Queue

To access the **File Based Queue** page:

1 Select a share and click **File Based Queue** at the bottom of the **Source Role NAS** page.

The system displays Directory/File Based Replication statistics for data sent to the target system.

Note: The contents of the File Based Queue are dynamic, so the estimated time for completion and the list of files are subject to change if items are added.

Source Role NAS Directory/File Based Replication Configuration

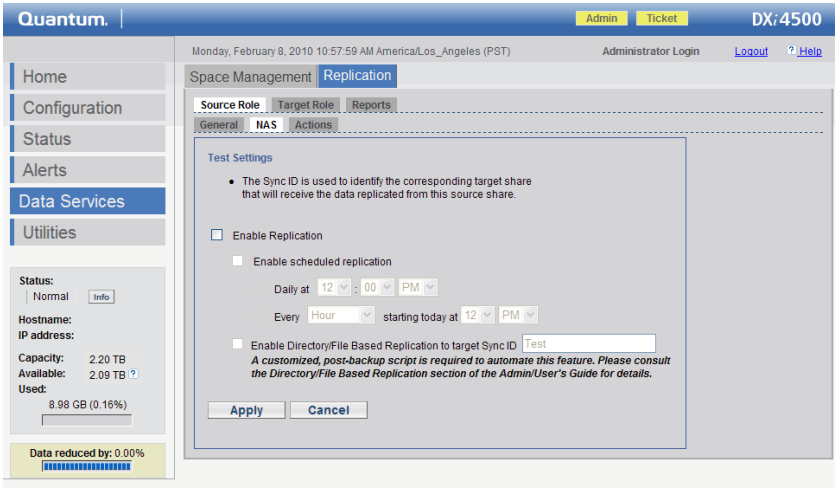
Before you can execute a Directory/File Based Replication, you must assign the NAS share on the **Source** system a Sync ID so it can be replicated automatically to the **Target** system.

To assign the NAS share a Sync ID:

1 Select the NAS share from the **Source Role NAS** page and click **Edit**.

The **Source Role NAS Settings** page displays (see Figure 56).

Figure 56 Source Role NAS Settings



2 Select **Enable Directory/File Based Replication** and enter a **Sync ID** in the box. The Sync ID for this NAS share MUST match the Sync ID configured for this NAS share on the **Target** system.

3 Click **Apply**.

The NAS share is now configured for Directory/File Based Replication.

Note: The replication can ONLY be executed by a post backup script run on an external host (see Directory/File Based Replication Post Backup Scripts on page 153).

Source Role Actions

Use the **Source Role Actions** page to pause or resume the replication service and enable or disable the replication state.

If you need to add, delete, or change a replication **Target**, you must first pause replication service from the **Source Role Actions** page.

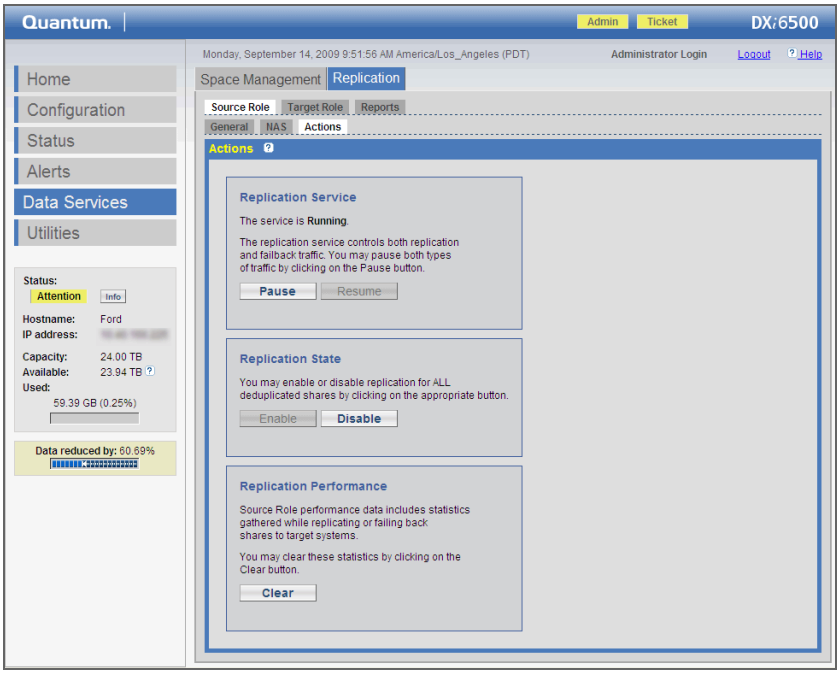
Note: After the replication **Target** has been changed, you must resume the replication service from the **Source Role Actions** page.

To access the **Source Role Actions** page:

1 From the **Source Role** page, click the **Actions** tab.

The **Source Role Actions** page displays (see Figure 57).

Figure 57 Source Role Actions Page



The replication service controls both replication and failback traffic.

- Click **Pause** to pause both replication and failback traffic for a replication in process. When you click **Pause**, the system will continue to replicate the current block of information in process. Since the block can be as large as 250 MB, the process of completing the current block replication can take up to 15 minutes to complete. Once that block has completed replication the system will pause and wait to resume.

  Note: If you pause a replication in process, an **Alert** will be generated on the **Replication Events** page. When the replication is resumed, the replication process will continue.

- Click **Resume** to resume replication and failback traffic.

You may enable or disable replication for all deduplicated NAS shares by clicking the appropriate button.

- Click **Enable** to enable replication for all deduplicated NAS shares.

- Click **Disable** to disable replication for all deduplicated NAS shares.

Note: If you click **Disable** during a replication in process, the system will complete the entire replication and then disable replication on the system. The system will be unable to replicate until you click **Enable**.

Note: To disable replication for a single share, select the share on the **Source Role NAS** page and click **Edit**. Clear the **Enable Replication** and the **Enable scheduled replication** check boxes, then click **Apply**. For more information, see Source Role NAS Configuration on page 142.

Source role performance data includes statistics gathered while replicating or failing back shares to target systems.

- To clear these statistics, click **Clear**.

Target Role Configuration

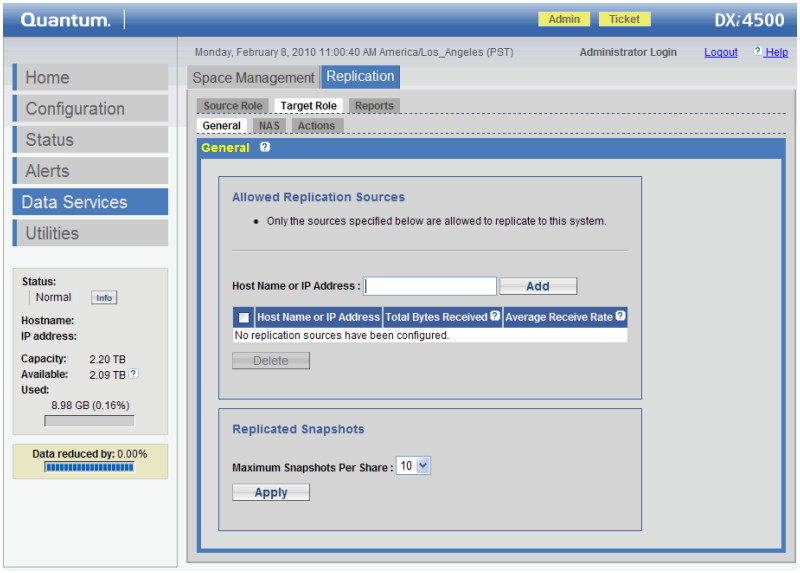
Use the **Target Role** page to define up to 10 source systems that the target can accept replicated data from. The **Target Role** page is also used to perform actions upon replicated NAS shares that have been received. The source systems must be defined in the **Target Role** page prior to defining the target systems in the **Source Role** page.

To configure the target system for replication:

1 From the **Replication** page, click the **Target Role** tab.

The **Target Role General** page displays (see Figure 58).

Figure 58 Target Role General Page



The **Target Role General** page displays the following information for each replication source.

- **Host Name or IP Address** - The source system replicating to the target system
- **Total Bytes Received** - The actual number of bytes received over the network from the corresponding **Allowed Replication Source**.
- **Average Receive Rate** - The average rate at which actual bytes are being received over the network from the corresponding **Allowed Replication Source**.

2 Enter the **Host Names or IP Address** for the replication source and click **Add**. Up to 10 sources can be defined.

3 To delete a host name or IP address, select the appropriate check box and click **Delete**.

Replicated Snapshots

Use the **Replicated Snapshots** area to configure the number of saved replicated snapshots on the **Target**. A snapshot is a NAS share that has been replicated to the **Target** system. Up to 24 snapshots for each NAS share can be saved on the target.

Having snapshots configured allows you to return to a previously replicated NAS share if necessary.

To configure the number of replicated snapshots:

1 From the **Target Role** page, click the **General** tab.

2 Under **Replicated Snapshots**, select the **Maximum Snapshots Per Share** from the drop down box.

3 Click **Apply**.

Target Role NAS Configuration

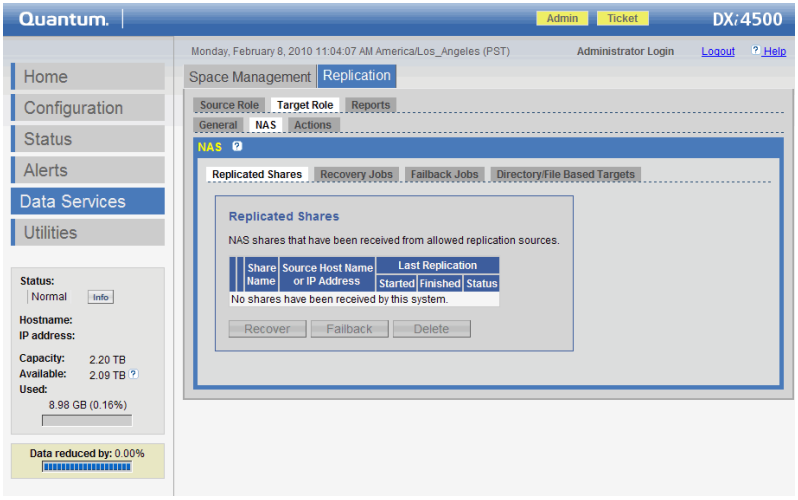
Use the **Target Role NAS** page to select and perform actions on replicated NAS shares such as **Recover**, **Failback**, or **Delete** replicated NAS shares.

To display replicated NAS shares:

1 From the **Target Role** page, click the **NAS** tab.

The **Target Role NAS** page displays (see Figure 59).

Figure 59 Target Role NAS Page



The **Target Role NAS** page displays the available NAS shares that have been replicated. The page also displays information on failback jobs.

2 To recover a NAS share, select the share and click **Recover**.

The NAS share is recreated on the target system and is ready for use.

You can view details about previously completed recovery jobs on the **Recovery Jobs** tab.

Note: If the source share is an NFS share, then the target NFS share is restored as an NFS share. If the source share is a CIFS share, then the target CIFS share is restored as a CIFS share.

3 To failback a NAS share:

   a Select the share and click **Failback**.

   b Enter the **Host Name or IP Address** for the source system where you want the replicated share to failback and click **Apply**.

   The NAS share is failed back to the source system. On the source system, select the recovered NAS share from the replicated share list and click Recover. The NAS share is recreated on the source system.

You can view details about previously completed failback jobs, or abort a failback job that is in progress, on the **Failback Jobs** tab.

Caution: If a system fails during a recover job, the recover job must be restarted.

4 To delete a replicated share, select the share and click **Delete**.

Before you can delete a replicated share, you must take one of the following actions:

- Change the replication state of the share on the source system to **Disabled** (see Source Role NAS Configuration on page 142).
- Delete the source system from the list of allowed replication sources on the **Target Role > General** page (see Target Role Configuration on page 148).

Also, you cannot delete a share if a failback is in progress for the share. Wait for the failback to complete, or abort the failback job on the **Failback Jobs** tab.

Target Role NAS Directory/File Target Configuration

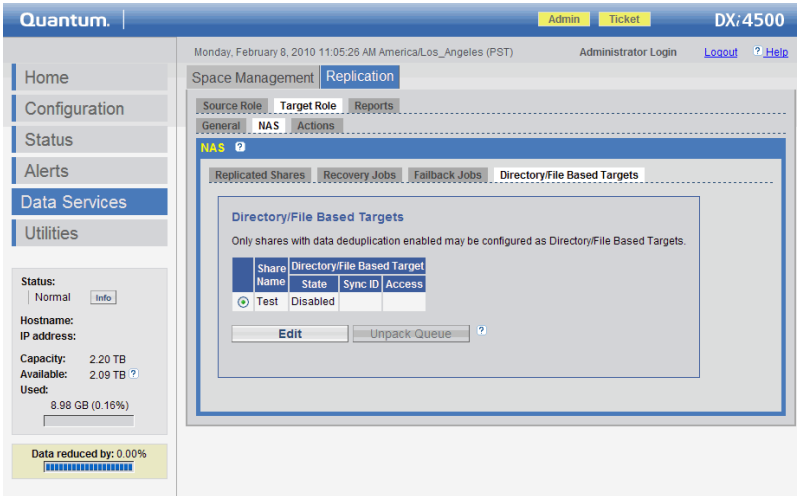
To configure the Directory/File Based **Target**, you must first create a NAS share on the **Target** system that matches the NAS share on the **Source** system (name of NAS share). See NAS Configuration on page 54 for more information on creating a NAS share. Once the NAS share has been created on the **Target** system, it will display in the **Directory/File Based Targets** page.

To configure the Directory/File Based **Target**:

1 From the **Target Role NAS** page, click the **Directory/File Based Targets** tab.

The **Directory/File Based Targets** page displays (see Figure 60).

Figure 60 Directory/File Based Targets Page



2 Select the **Share Name** and click **Edit**.

3 Select **Enable Directory/File Based Replication** and enter a **Sync ID** in the box.

4 Select **Unlocked** to allow this NAS share to be used as a Directory/File Based Replication target. Select **Locked** to deny use of this NAS share as a Directory/File Based Replication target.

5 Click **Apply**.

The NAS Share Directory/File Based Replication configuration is complete.

Unpack Queue

Click **Unpack Queue** to view Directory/File Based Replication statistics for data received from the source system.

Directory/File Based Replication Post Backup Scripts

After the NAS shares are configured for Directory/File Based Replication (with Sync IDs), the replication can ONLY be executed by a post backup script run on an external host. The following post backup scripts are provided as examples only. Your specific post backup script may differ from the examples below.

Note: You will be prompted for a password on the remote host. Alternately you can copy the **authorized_keys** generated from the remote host to the cliadmin user home directory to remove the password login requirement.

- **Directory Replication Script**:

  ssh cliadmin@10.40.164.70 syscli --replicate nas --name /nas/path/

- **File Replication Script:**

  ssh cliadmin@10.40.164.70 syscli --replicate nas --name /nas/path/file

Target Role Actions Page

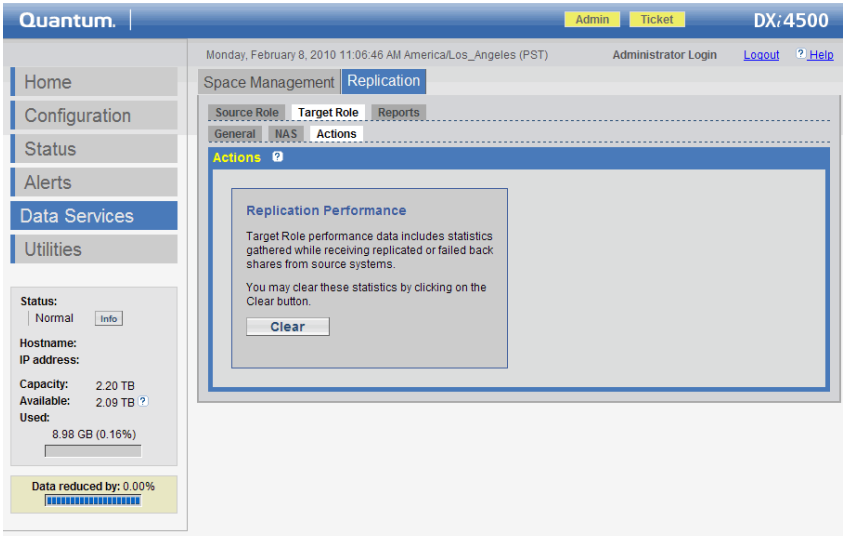
Use the **Target Role Actions** page to display the replication performance.

To view replication performance:

1 From the **Target Role** page, click the **Actions** tab.

The **Target Role Actions** page displays (see Figure 61).

Figure 61 Target Role Actions Page



Target role performance data includes statistics gathered while receiving replicated or failed back shares from source systems.

- To clear these statistics, click **Clear**.

Reports

Use the **Reports** page to generate and download a zip file containing **.csv** (comma separated value) files suitable for importing into a spreadsheet. The replication report contains a namespace replication summary and details as well as a Directory/File based replication summary and details.

To create and download a new replication report:

1. From the **Replication** page, click the **Reports** tab.
2. Click **Generate New** to generate a new replication report.
3. Click **Download Current** to download the current replication report.

Chapter 9
DXi4500 Utilities

Use the **Utilities** pages to perform maintenance functions on the DXi4500, including uploading and activating software images as well as generating and downloading diagnostic files. The **Utilities** pages also allow you to reboot or shut down the DXi4500.

To access the **Utilities** pages, in the contents frame, click the **Utilities** menu.

The **Utilities** pages contain the following tabs:

- Software
- Diagnostics
- Analyzer
- Node Management
- License Keys

Software

Use the **Software** page to upload a new software image to the DXi4500.

Uploading Software

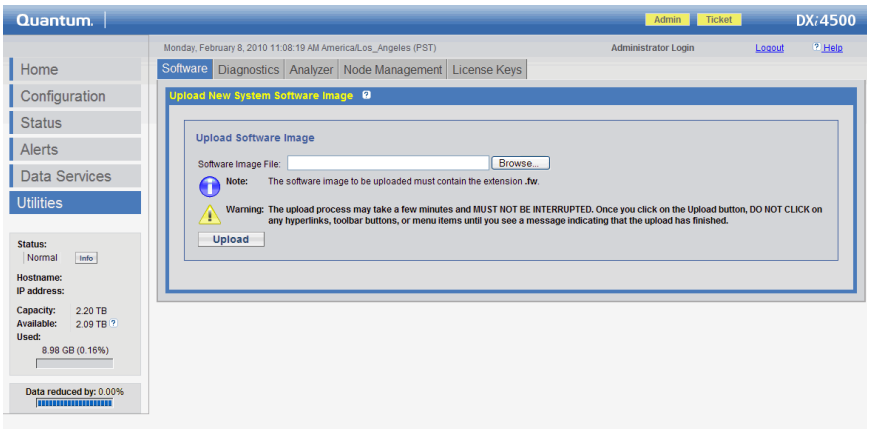
Note: The system should be scheduled for downtime during a software upgrade. Before you start the upgrade, ensure that all replication and backup jobs are completed, all space management tasks are completed, and all hardware statuses on the system are Normal (see Hardware on page 112).

To upload a new software image:

1 From the **Utilities** menu, click the **Software** tab.

The **Software** page displays (see Figure 62).

Figure 62 Software Page



2 Type the location and filename of the new software image, or click the **Browse** button and locate the new software image.

3 Click **Upload** to place the new software image in a temporary area of the system.

A **Successful Upload** page displays indicating that the software has been uploaded. Click **OK** to continue.

4 Click **Activate** to activate the new software image or **Remove** to remove the software image from the system.

An **Information** page indicates the software has been either activated or removed. If activated, the system enters limited mode and displays activation progress until the system reboots.

Caution: The system reboots automatically following the software activation. After the reboot process begins, wait at least 15 minutes before attempting to log in to the system.

Diagnostics

The DXi4500 allows you to download diagnostic files to your local host. These diagnostic files are helpful when troubleshooting problems on the system. Have the diagnostic files available prior to contacting Quantum customer support.

To access the **Diagnostics** page:

1 From the **Utilities** menu, click the **Diagnostics** tab.

The **Diagnostics** page contains the following tabs:

- System Diagnostics File
- DSET
- Healthchecks

System Diagnostics File

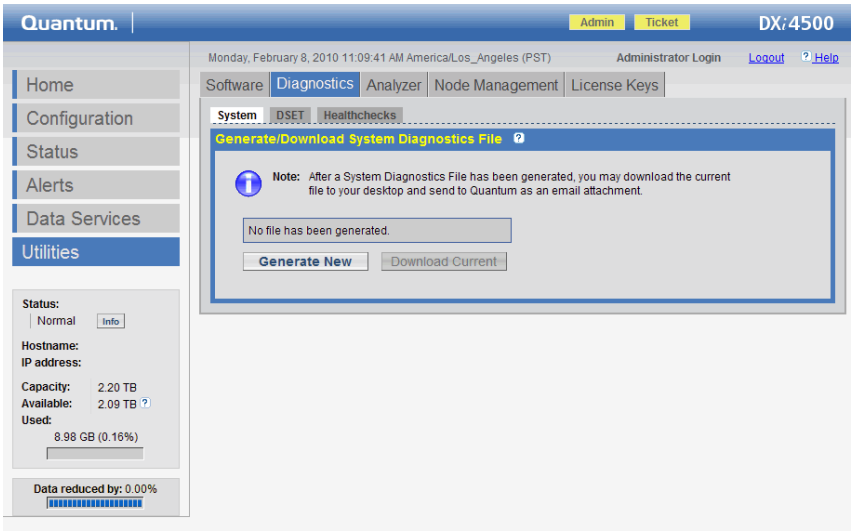
The **System Diagnostics** file contains the diagnostic logs for all of the system components.

To generate and download a system diagnostics file:

1 On the **Diagnostics** page, click the **System** tab.

The **System Diagnostics** page displays (see Figure 63).

Figure 63 System Diagnostics Page



2 Click **Generate New** to generate a new system diagnostics file.

   The system generates a new diagnostics file. This can take several minutes.

3 After the report finishes generating, refresh the Web browser to enable the **Download Current** button.

4 To download the newly generated diagnostics file, click **Download Current**.

   A dialog box displays asking if you want to open or save the file.

5 Click **Save** or **OK** to download the file.

DSET

DSET is a hardware diagnostic utility included with the DXi4500. Use the DSET utility to generate a DSET report. A DSET report contains an array of status information about the DXi4500 hardware. A Quantum customer support representative can use this information to help identify and diagnose problems.

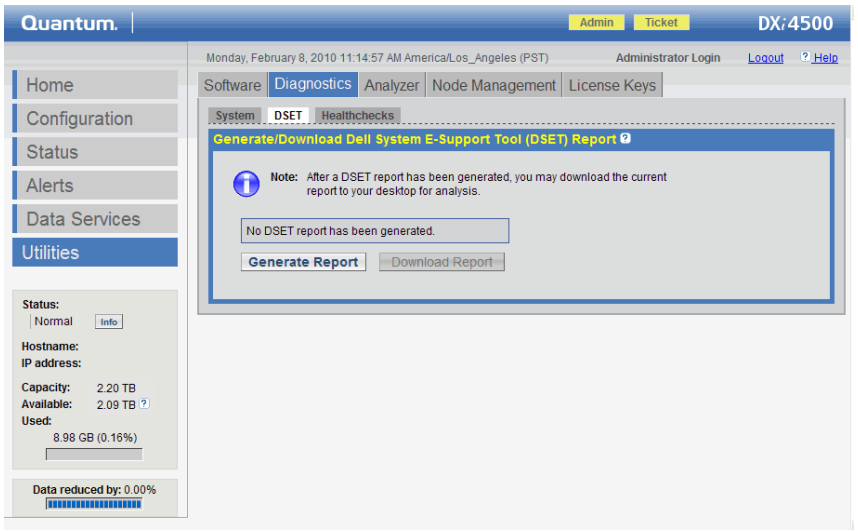
Note: Generate a DSET report only if directed to do so by a Quantum customer support representative.

To generate a DSET report file:

1 On the **Diagnostics** page, click the **DSET** tab.

The **DSET** page displays (see figure 64).

Figure 64 DSET Page



2 Click **Generate Report** to generate a new DSET report file.

Click **OK** to continue. The system generates a new DSET report file. This can take several minutes.

3 To download the newly generated DSET report file, click **Download Report**.

A dialog box displays asking if you want to open or save the file.

4 Click **Save** or **OK** to download the file.

The DSET report file is saved as a compressed zip file to the specified location.

5 Locate the DSET report file you downloaded and send it to the e-mail address provided by Quantum Customer Support.

Healthchecks

Use the **Healthchecks** page to configure the automatic healthcheck function on the DXi4500. When configured, the system periodically runs

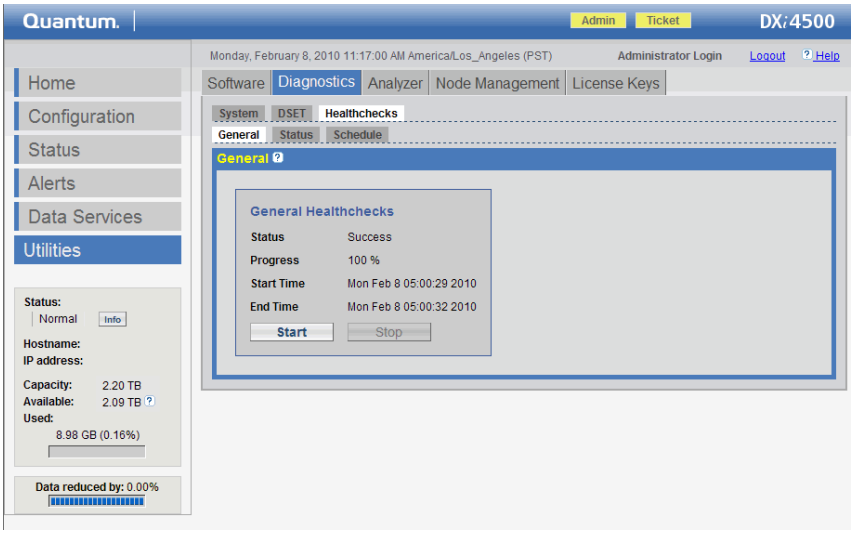
a system-wide healthcheck that determines the status of the overall DXi4500.

To access the **Healthchecks** page:

1 From the **Utilities** menu, click the **Healthchecks** tab.

The **Healthchecks** page displays (see Figure 65).

Figure 65 Healthchecks Page



The **Healthchecks** page contains the following tabs:

- General
- Healthchecks Status
- Healthchecks Schedule

General

The **General** page displays the overall status of all the healthchecks as they are being run. Use this page to run healthchecks on demand or to stop them if they are already running. When healthchecks are started, only those healthchecks that are enabled are run. The progress of the healthcheck is displayed as well as the start and completion time.

- To start a healthcheck, click **Start**.
- To stop a healthcheck in progress, click **Stop**.

Healthchecks Status

The **Healthchecks Status** page displays a list of recently completed healthcheck tests. The outcome of each healthcheck is displayed as well as when the healthcheck was last run and the status.

This page also shows the state of the healthcheck (enabled or disabled). To enable a specific healthcheck, select the test and then click **Edit**. Select the **Enable** check box, and then click **Apply**.

Healthchecks Schedule

Use the **Healthchecks Schedule** page to configure the DXi4500 to automatically run a healthcheck. This allows users to control the frequency at which the healthchecks are run. The schedule applies to all healthchecks. Healthchecks can be scheduled to run daily, weekly, or not at all.

- To set a healthchecks schedule, select **Daily** or **Weekly**. Use the drop down boxes to select a start time, and click **Apply**.
- To disable running healthchecks on an automatic schedule, select **Never**, and click **Apply**.

Analyzer

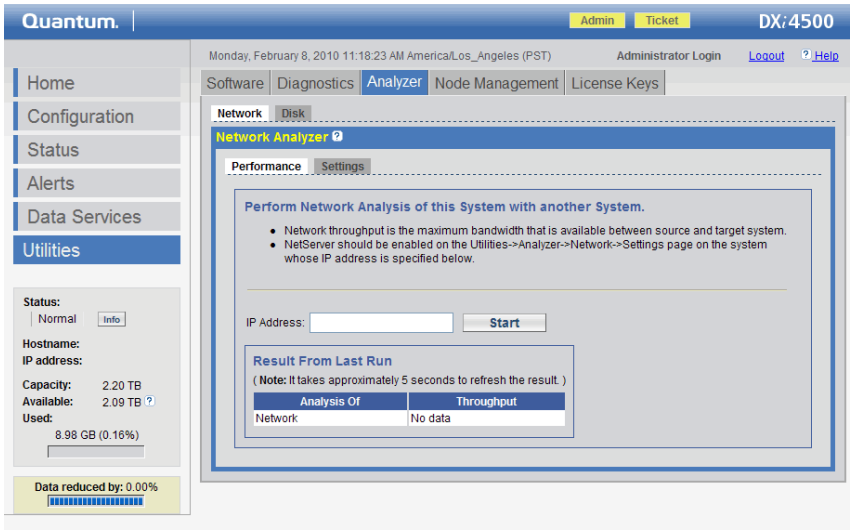
Use the **Analyzer** page to analyze network information and disk information.

To access the **Analyzer** page:

1 From the **Utilities** menu, click the **Analyzer** tab.

The **Analyzer** page displays (see Figure 67).

Figure 66 Analyzer Page



The **Analyzer** page contains the following tabs:

- Network Analysis
- Disk Analysis

Network Analysis

Use the **Network** page to measure network performance with another system.

To access the **Network** page, from the **Analyzer** page, click the **Network** tab.

The **Network** page contains the following tabs:

- Performance
- Settings

Performance

Use the **Performance** page to perform network analysis with another system.

To perform network analysis:

1 From the **Network** page, click the **Performance** tab.

2 Enter the **IP Address** of another system.

The system you specify in the **IP Address** box should have NetServer enabled (see Settings on page 163).

3 Click **Start** to begin the analysis.

Note: It takes approximately 5 seconds to refresh the results.

The throughput result is displayed below in MB/sec.

Settings

The network performance monitor tests the network performance between the DXi4500 and your network. You must have a network performance client installed on a local host to use this feature.

Note: Network performance clients such as *NetPerf* for Windows and Linux are available from the Internet.

To enable or disable NetServer:

1 From the **Network** page, click the **Settings** tab.

2 Select **Enabled** or **Disabled** and click **Apply**.

3 When you are done testing the network performance, disable the network performance monitor.

Disk Analysis

Disk analysis measures the hard disk performance (disk read and write performance) on the system.

To perform hard disk analysis:

1 From the **Analyzer** page, click the **Disk** tab.

2 Click **Start** to begin the analysis.

Note: It takes approximately 5 seconds to refresh the results.

The throughput result is displayed below in KB/sec.

Node Management

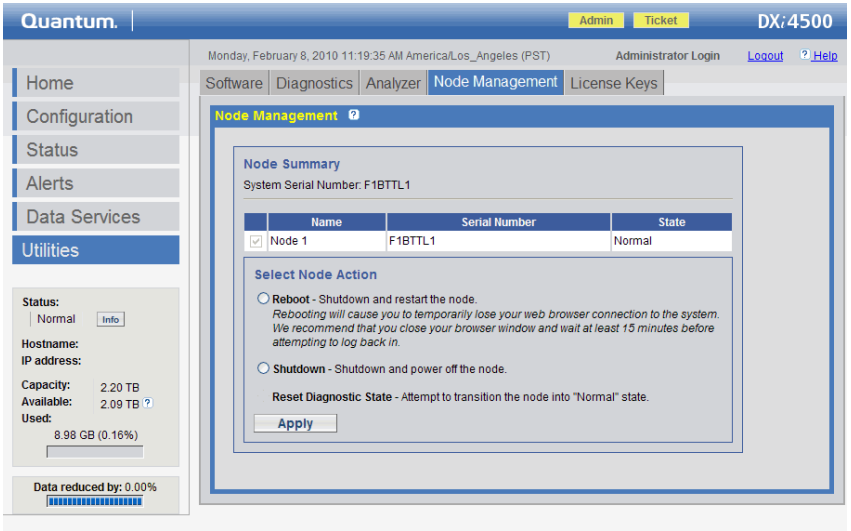
Use the **Node Management** page to reboot or shut down the DXi4500.

To reboot or shutdown the DXi4500:

1 From the **Utilities** menu, click the **Node Management** tab.

The **Node Management** page displays (see Figure 67).

Figure 67 Node Management Page



2 Under **Select Node Action**, select an action:

- **Reboot** - This action restarts the DXi4500. Rebooting the system closes the Web browser connection. You must log on again after the system has rebooted.
- **Shutdown** - This action shuts down the DXi4500.

Note: Shutting down the system can take up to 15 minutes.

- **Reset Diagnostic State** - If the system is degraded, this action restarts the services on the system without rebooting the system.

3 Click **Apply**.

Note: Shutting down the system can take up to 15 minutes. Only the system will completely shut down.To completely shut down all components, see Turning On and Shutting Down the System on page 21.

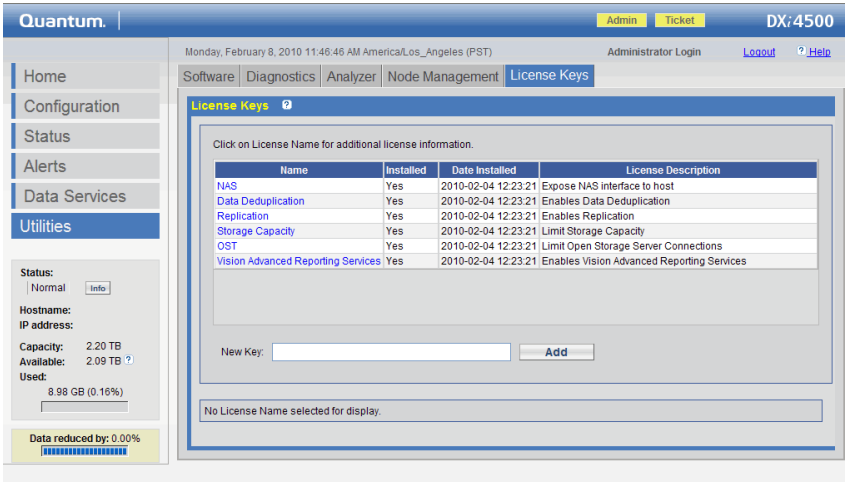
License Keys

Use the **License Keys** page to display the license keys installed on the system.

1 From the **Utilities** menu, click the **License Keys** tab.

The **License Keys** page displays (see Figure 68).

Figure 68 License Keys Page



Licenses

The following licenses are included with the DXi4500.

- **NAS** - Exposes NAS interface to host (License key is pre-installed on all DXi4500 models.)

- **Data Deduplication** - Enables data deduplication capability (License key is pre-installed on all DXi4500 models.)
- **Replication** - Enables replication capability (License key is pre-installed on all DXi4500 models.)
- **OST** - Enables the Open Storage Technology (OST) connection. (License key is pre-installed on all DXi4500 models.)
- **Dxi Advanced Reporting** - Enables the DXi Advanced Reporting capability (License key is pre-installed on all DXi4500 models.)

Chapter 10
Troubleshooting

This chapter describes problems you may encounter during the setup and operation of the DXi4500 system. Corrective information is provided to help you resolve the problems.

This chapter consists of the following sections:

DXi4500 Problem Reporting

The DXi4500 reports status information through the remote management pages (see DXi4500 Remote Management on page 35). The following actions are performed by the DXi4500 remote management pages:

- Monitors both the system software and hardware components.
- Detects system problems.

- Attempts to isolate each problem to a specific field replaceable component.
- Attempts to recover from the problem.
- Logs the problem.
- If the problem requires service, the system reports the problem in a service ticket associated with the field replaceable component.

Service tickets include time and date information, status (open or closed), information about each error, and links to recommended troubleshooting procedures. The DXi4500 generates service tickets according to the following scenarios:

- If the component associated with the problem does not have an open service ticket, the DXi4500 opens a service ticket for the component and reports the problem in a service ticket.
- If the problem reoccurs, the DXi4500 logs the number of times that it detects the problem in the existing report.
- If a different problem occurs with the same component, the DXi4500 adds a new report to the same service ticket.
- If a problem occurs with a different component, the DXi4500 uses the above scenario to open a new service ticket for the component or report the problem in an existing service ticket associated with the component.

Using DXi4500 Status Page for Troubleshooting

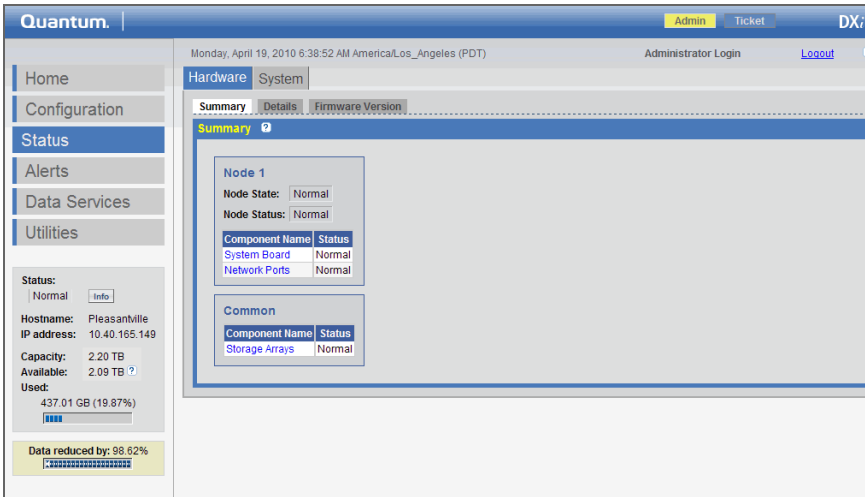
The DXi4500 **Status** page can be used to verify the overall status of the DXi4500 system. A failed status indicator can help troubleshoot a problem in the DXi4500.

To view the hardware status:

1 From the **Status** menu, click the **Hardware** tab.

The **Hardware Summary** page displays (see Figure 69):

Figure 69 Hardware Summary Page



The **Hardware Summary** page displays the overall health status of the DXi4500 system. All components are listed as links on this page. Click a link to see detailed information on specific component status.

Downloading the System Diagnostics File

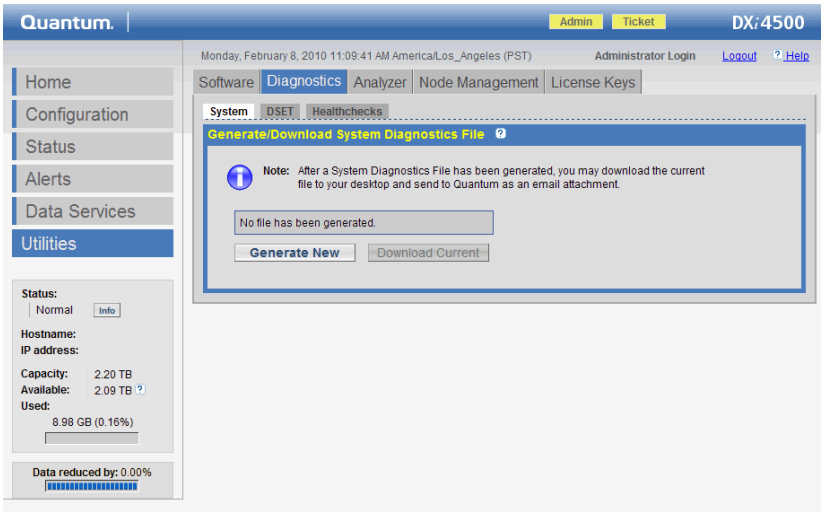
The DXi4500 system allows you to download a system diagnostics file to your local host. This file is helpful when troubleshooting problems on the system. Have this file available prior to contacting Quantum customer support.

To generate and download a system diagnostics file:

1 On the **Diagnostics** page, click the **System** tab.

The **System Diagnostics** page displays (see Figure 70).

Figure 70 System Diagnostics Page



2 Click **Generate New** to generate a new system diagnostics file.

The system generates a new diagnostics file. This can take several minutes.

3 To download the newly generated diagnostics file, click **Download Current**.

A dialog box displays asking if you want to open or save the file.

4 Click **Save** or **OK** to download the file.

Common Problems and Solutions

The troubleshooting information in this section covers the following topics:

Start-up Problems

Table 23 describes problems that can occur during system start-up.

Table 23 Start-up Problems

Problem	Corrective Action
FATAL ERROR Unable to start SNFS! Message displays.	Contact your Quantum Customer Support representative (see Getting More Information or Help on page xx).
FATAL ERROR Unable to start blockpool! Message displays.	Contact your Quantum Customer Support representative (see Getting More Information or Help on page xx).

Hardware Problems

Table 24 describes corrective actions for problems occurring with the system hardware.

Table 24 Hardware Problems

Problem	Corrective Action
The system does not power on.	Make sure the power cords are connected to a grounded electrical outlet and the power switches located on the back of the power supplies are on. If the problem persists, contact your Quantum Customer Support representative to arrange for service (see Getting More Information or Help on page xx).
One power supply is not functioning.	Determine which power supply has failed by observing the red fault LED on the power supply. Contact your Quantum Customer Support representative to arrange for service (see Getting More Information or Help on page xx).

Problem	Corrective Action
Both power supplies are not functioning.	Determine which power supply has failed by observing the red fault LED on the power supply. Contact your Quantum Customer Support representative to arrange for service (see Getting More Information or Help on page xx).
One fan is not operating.	Determine which fan has failed by reading the service ticket generated by the system. Contact your Quantum Customer Support representative to arrange for service (see Getting More Information or Help on page xx).
Multiple fans are not operating.	**Caution:** Turn the system off immediately! The system will overheat with multiple fans not operating. Contact your Quantum Customer Support representative to arrange for service (see Getting More Information or Help on page xx).
A hard drive is not responding	Determine which drive has failed by observing the red fault LED on the drive carrier. Contact your Quantum Customer Support representative for a drive carrier replacement (see Getting More Information or Help on page xx).

Ethernet Network Problems

Table 25 describes corrective actions for problems occurring with the Ethernet network.

Table 25 Ethernet Network Problems

Problem	Corrective Action
The Ethernet link light on the DXi4500 is not lit when a cable is connected to a hub or switch.	Check to make sure the Ethernet cable is not a cross-over cable. Use only "straight" CAT-6 Ethernet cables. Port on the hub or switch is not active or damaged. Port on the DXi4500 is damaged. Contact the Quantum Customer Support department (see Getting More Information or Help on page xx).
The Ethernet link light on the switch or hub is not lit when a cable is connected to DXi4500 system.	Check to make sure the Ethernet cable is not a cross-over cable. Use only "straight" CAT-6 Ethernet cables. Port on the hub or switch is not active or damaged. Port on the DXi4500 is damaged. Contact the Quantum Customer Support department (see Getting More Information or Help on page xx).
DXi4500 system is not visible on the Ethernet network.	Try to ping the DXi4500 system IP address from a host on the same network. If the ping reports round trip times, the DXi4500 system is active. If not, check the cables, switches, or hubs for damaged components. If everything checks out, contact the Quantum Customer Support department (see Getting More Information or Help on page xx).

Problem	Corrective Action
DXi4500 remote management pages are not visible.	IF you cannot connect to the DXi4500 remote management pages, verify that the following network settings for the DXi4500 are correct: • Hostname • IP addresses • Default gateway • Subnet mask • Domain name (optional)
An Ethernet cable is removed during normal operation.	The system will discontinue use of the associated Ethernet port. A Service ticket will be issued. The possibility of errors exist; data corruption will not occur. Reconnect the cable as soon as possible. It is not necessary to power the system off. Depending on the state of the system when the Ethernet cable was removed, replication, system management, or ingest may need to be restarted.

Replication Problems

Table 26 describes corrective actions for problems occurring with the replication.

Table 26 Replication Problems

Problem	Explanation/Corrective Action
The replication was paused, but the replication is still in process.	When you click **Pause**, the system will continue to replicate the current tag or block of information in process. The process of completing the current tag replication can take up to 15 minutes to complete. Once that tag has completed replication the system will pause and wait to resume.

Problem	Explanation/Corrective Action
The replication was paused and an **Alert** event was generated in the **Replication Events** page.	This is normal. When a replication is paused, an alert is generated on the **Replication Events** page. They system will continue the replication when you click **Resume**.
Replication was disabled while a replication was in process and the replication completed.	If you click **Disable** during a replication in process, the system will complete the entire replication and then disable replication on the system. The system will be unable to replicate until you click **Enable**.
Enabled replication on a NAS share and received the following Event: `No destination host is specified for replication.`	You must configure the target system prior to configuring the source. If the target system is not configured first, you will not be able to designate the replication target.
Able to enable and schedule replication for NAS even though no target IP configured.	It is possible to enable and schedule a replication when a target system has not been configured. The replication will not start until a target system is configured.

Temperature Problems

Temperature problems are generally caused by incorrect room temperature, poor air circulation inside the DXi4500 rack or components, or a malfunctioning cooling fan (see Environmental Specifications on page 193).

Use the following procedure if a temperature problem is reported:

1. Check the ambient temperature of the room containing the DXi4500 system to verify that the temperature falls within the specified range.
2. Inspect for adequate air circulation inside the rack. Some racks may provide additional fans to improve air circulations. Check the fan for proper operation. Clean or replace any air filter as necessary.

3 If a component reports a temperature problem, verify that the associated fan is operating correctly. If necessary, contact Quantum customer support to replace the fan (see Getting More Information or Help on page xx).

Service Tickets

The DXi4500 system can generate service tickets which can be used to resolve a problem.

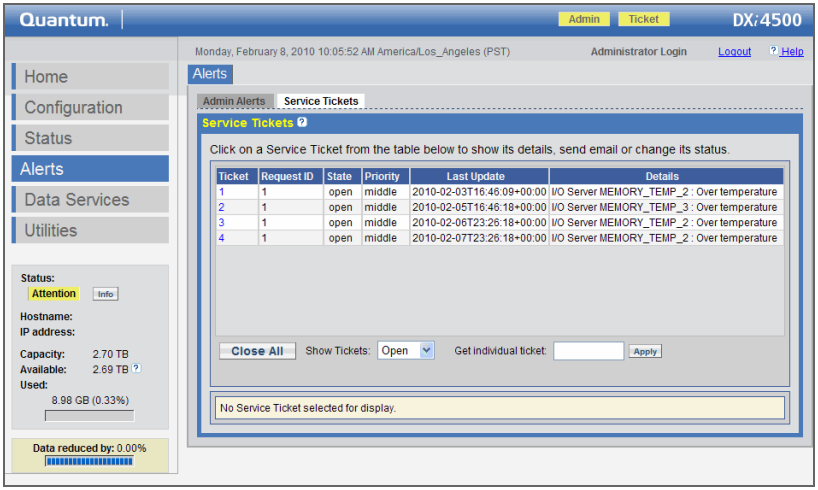
To access the **Service Tickets** page:

1 Access the DXi4500 remote management pages (see Accessing DXi4500 Web Pages on page 43), and log onto the system as an administrator.

2 From the **Home** page, click the **Ticket** button located at the top of the page.

The **Service Tickets** page displays (see Figure 71).

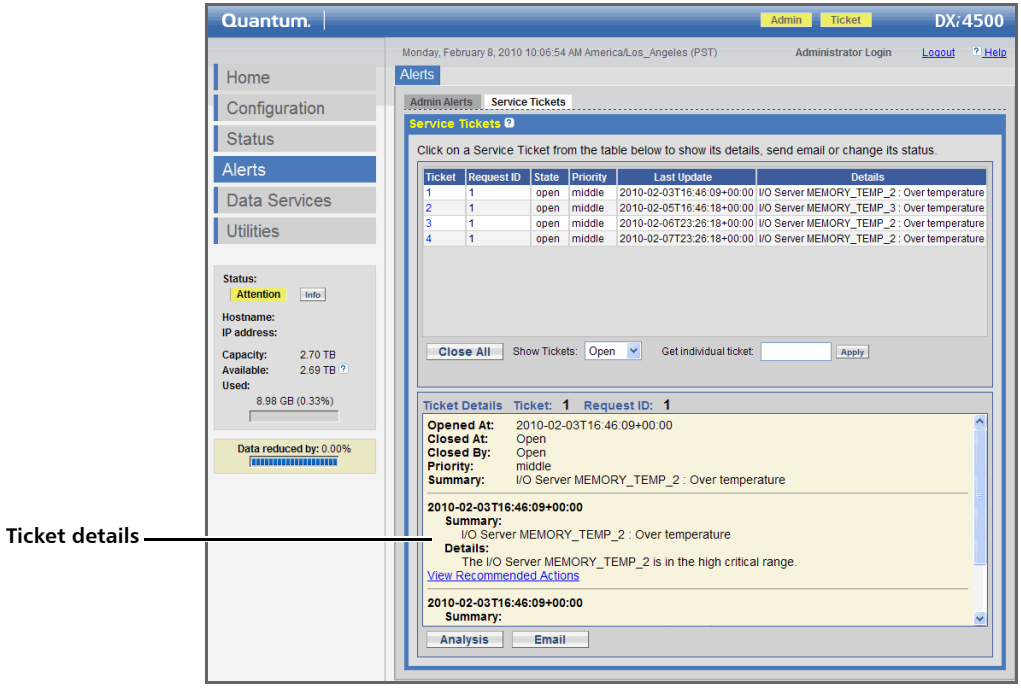
Figure 71 Service Tickets Page



3 To view details for a ticket, click the ticket number.

The **Ticket Details** display at the bottom of the screen (see Figure 72).

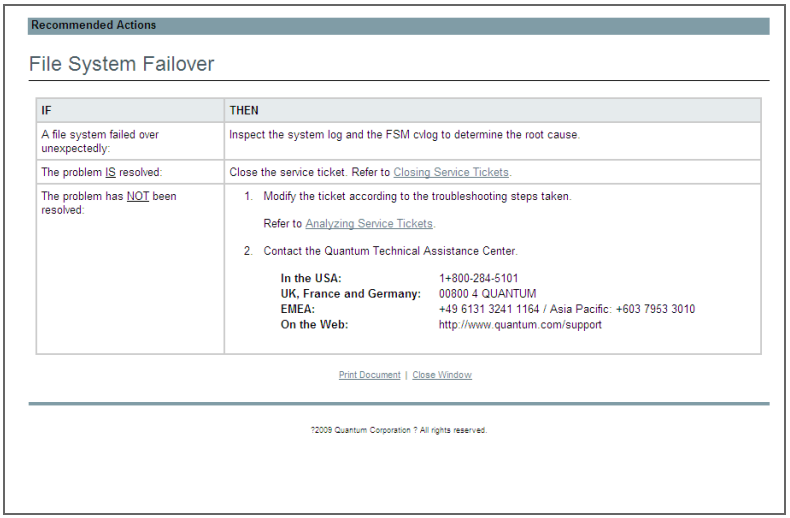
Figure 72 Ticket Details



4 To see information about the actions you can to take to resolve the ticket, click the **View Recommended Actions** link.

The **Recommended Actions** window displays (Figure 73).

Figure 73 Recommended Actions Window



5 Follow the instructions on the **Recommended Actions** window to resolve the problem.

Chapter 11

Implementing a Data Replication Plan

The DXi4500 can be used as part of your disaster recovery plan through its built-in data replication capability. Data replication is used to create another copy of your data on a remote DXi4500 system. In the event of a disaster where the original data was lost, the replicated data can be quickly recovered from the remote system allowing your business to resume normal operations.

The following sections provide information on setting up data replication and also recovering replicated data:

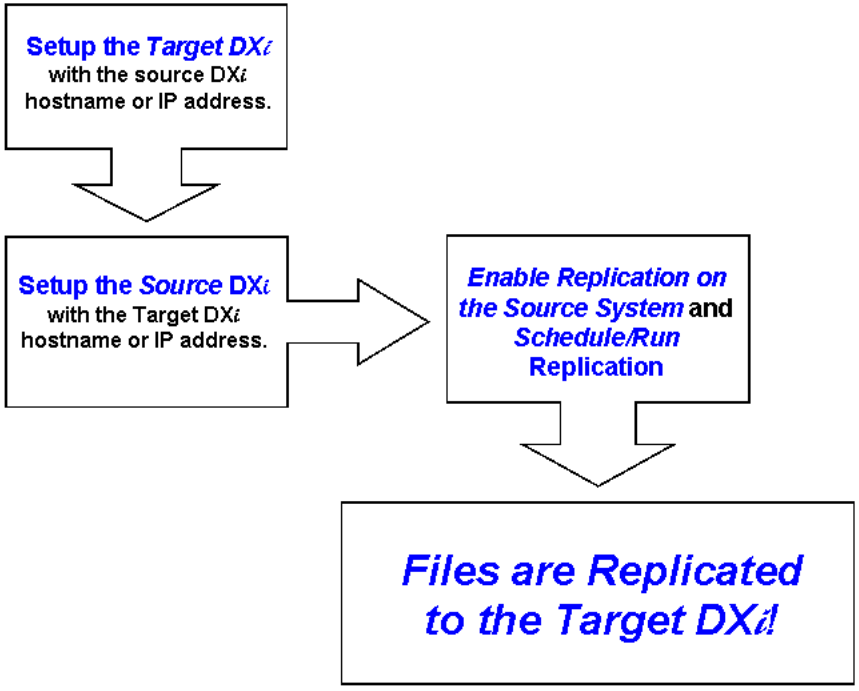
Setting Up Data Replication

Note: The information in this section applies to native DXi4500 replication. OST optimized duplication using NetBackup is described separately (see OST Optimized Replication on page 70).

Setting up data replication on the DXi4500 consists of the following steps (see Figure 74):

- Setting Up the Target DXi System
- Setting Up the Source DXi System
- Enabling and Running Replication

Figure 74 Major Replication Setup Steps



Setting Up the Target DXi System

Before data can be replicated from a source system to a target system, the target must be authorized to receive data from a specific source. To authorize a target system to receive data from a source, you must add the source hostname or IP address to the **Source Host List** on the target system.

To add a source hostname or IP Address on the target system:

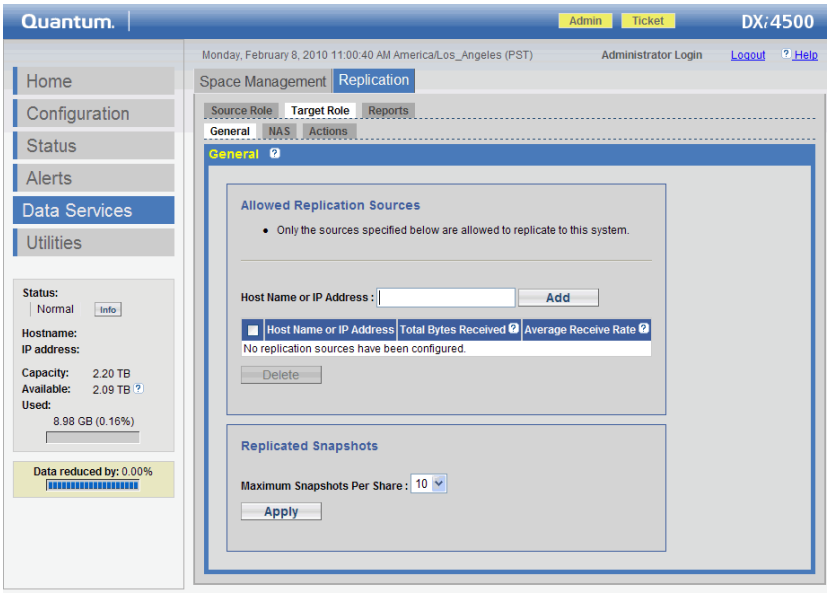
1 Access the remote management pages on the target system.

Note: For more information on accessing the remote management pages, see Chapter 3, DXi4500 Concepts.

2 From the **Replication** page, click the **Target Role** tab.

The **Target Role General** page displays (see Figure 75).

Figure 75 Target Role General Page



3 Enter the **Host Names or IP Address** for the replication source and click **Add**. Up to 10 sources can be defined.

Entering the host names or IP addresses of the replication source systems on the target system allows the target to receive replicated data from these sources.

Setting Up the Source DXi System

Once you have added the source system hostname or IP address to the target system, you must add the target system hostname or IP address to the source system. The source system can only replicate data to one target.

Note: You must configure the target system prior to configuring the source. If the target system is not configured first, you will not be able to designate the replication target.

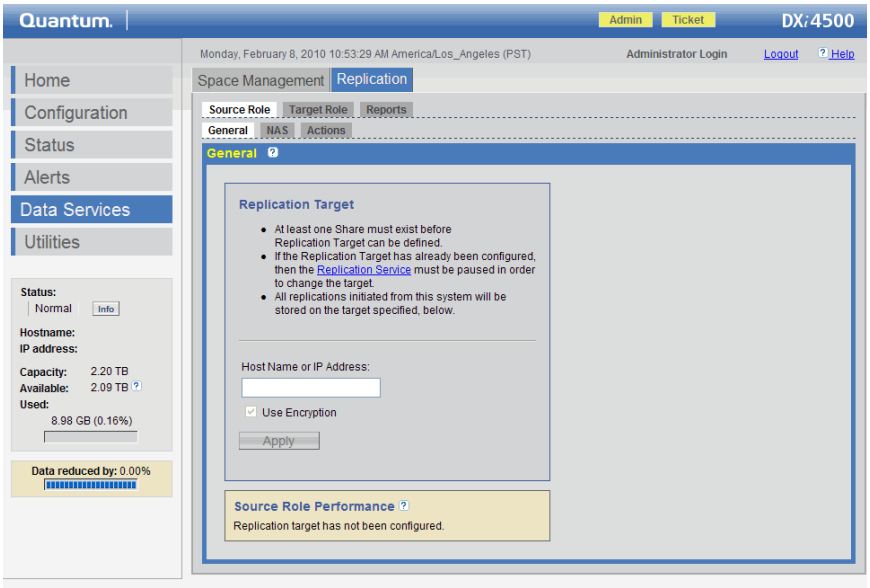
1 Access the remote management pages on the source system.

Note: For more information on accessing the remote management pages, see Chapter 3, DXi4500 Concepts.

2 From the **Replication** page, click the **Source Role** tab.

The **Source Role General** page displays (see Figure 76).

Figure 76 Source Role General Page



3 Enter the **Host Name or IP Address** for the replication target and click **Apply**.

The source system can now replicate data to a target system.

Enabling and Running Replication

Now that both the target and source systems are setup for replication, you can enable replication and either schedule the replication process or manually replicate a share.

Note: For optimization purposes, the underlying data is continuously updated. The data will become available when the replication is either run manually or using a scheduled replication.

To enable replication and replicate a NAS share:

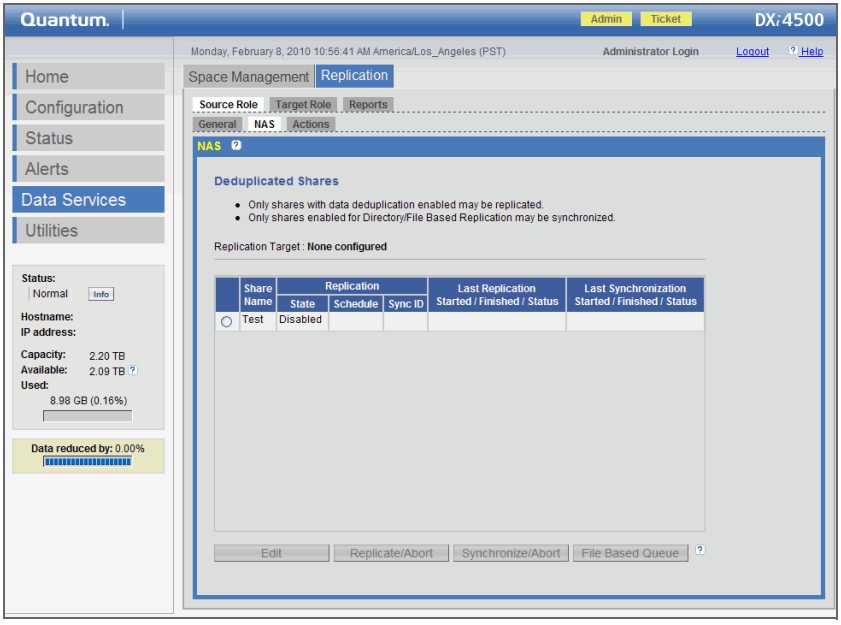
1 Access the remote management pages on the source system.

Note: For more information on accessing the remote management pages, see Chapter 3, DXi4500 Concepts.

2 From the **Source Role** page, click the **NAS** tab.

The **Source Role NAS** page displays (see Figure 77).

Figure 77 Source Role NAS Page

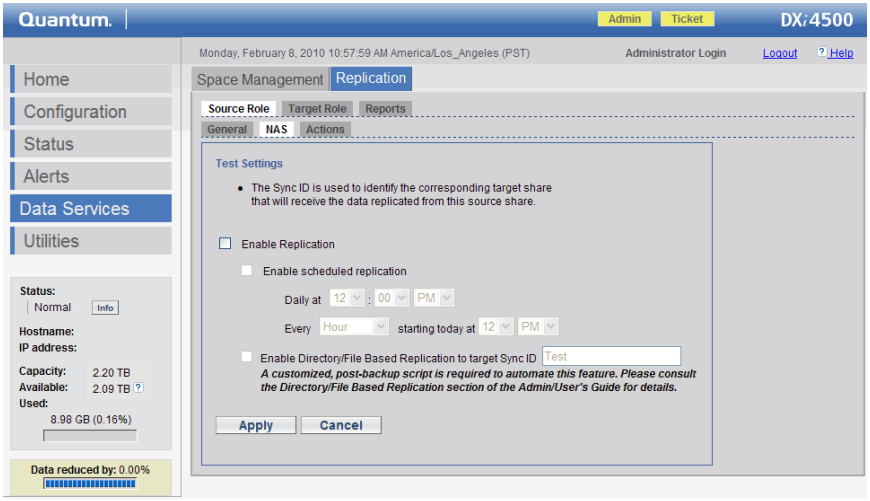


The **Source Role NAS** page displays the available NAS shares that have been deduplicated. The page also displays the current replication status for the share and information on the most recent replication that was run.

3 Select the NAS share to replicate and click **Edit**.

The **Source Role NAS Settings** page displays (see Figure 78).

Figure 78 Source Role NAS Settings Page



4 Select **Enable Replication** to enable replication.

5 To schedule a replication time, select **Enable scheduled replication** and enter the date and time to run the replication process.

Note: Replication should be scheduled to run after backups are complete. If you do not enable scheduled replication, replication will only occur if you manually run it or if you configure Directory/File Based Replication (see Source Role NAS Directory/File Based Replication Configuration on page 145).

6 Click **Apply**.

The **Source Role NAS** page displays (see Figure 77).

7 To manually run the replication process, select the NAS share and click **Replicate Now**.

The NAS share is replicated from the source system to the target system. To pause or resume the replication process, see Source Role Configuration on page 140.

Recovering Replicated Data

There are two ways to recover replicated data:

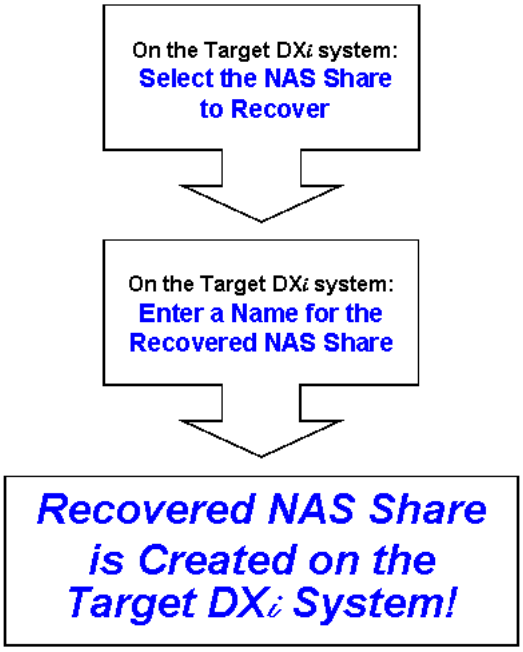
- Data Recovery
- Data Failback

Data Recovery

In the event that a NAS share has been destroyed or corrupted on the original source system, the data recovery option recreates the share on a target system that contained the replicated data. Once recovered, the share is available for use on the target system.

For a list of major steps for recovering a NAS share, see Figure 79.

Figure 79 Major Steps for Recovering a NAS Share



To recover a NAS share:

1 Access the remote management pages on the target system.

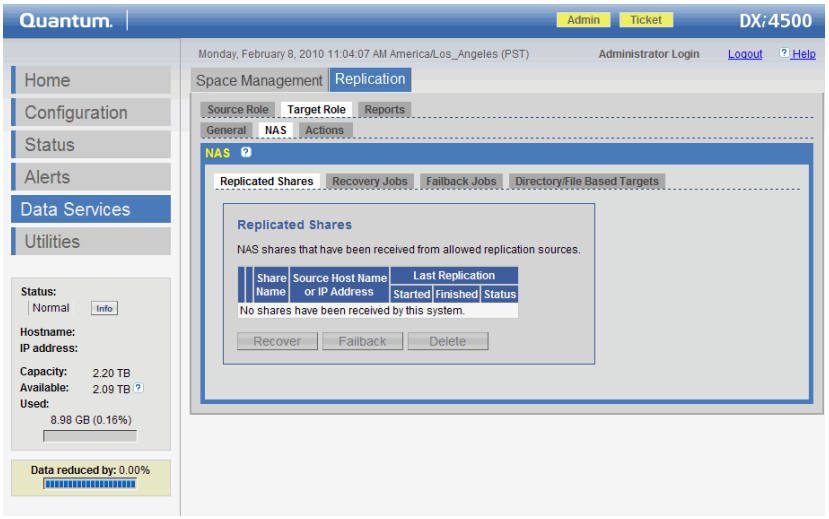
Note: For more information on accessing the remote management pages, see Chapter 3, DXi4500 Concepts.

2 From the **Replication** page, click the **Target Role** tab.

3 From the **Target Role** page, click the **NAS** tab.

The **Target Role NAS** page displays (see Figure 80).

Figure 80 Target Role NAS Page



The **Target Role NAS** page displays the available NAS shares that have been replicated. The page also displays information on failback jobs.

4 To recover a NAS share, select the NAS share and click **Recover**.

5 The system prompts you to enter a name for the recovered NAS share. This name must be unique on the target system.

The NAS share is recreated on the target system and is ready for use.

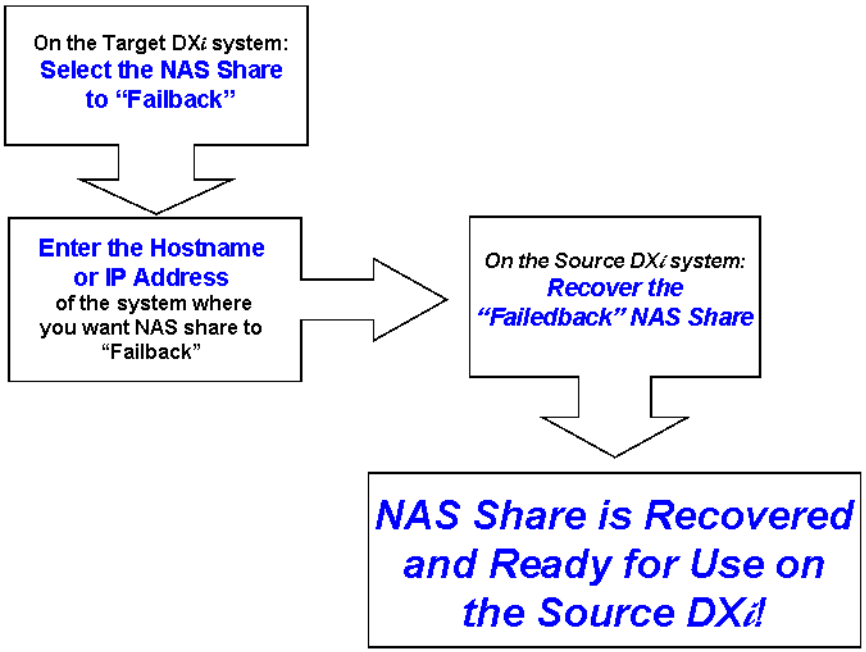
Note: If the source share is an NFS share, then the target NFS share must be restored as an NFS share. If the source share is a CIFS share, then the target CIFS share must be restored as a CIFS share.

Data Failback

In the event that a NAS share has been destroyed or corrupted on the original source system, the data failback option copies the replicated share from the target system to the source system. Once the replicated share is copied to the source system, it can be recovered on the source system and returned to normal operation.

For a list of major steps for failing back a NAS share, see Figure 81.

Figure 81 Major Steps for Failing Back a NAS Share



To failback a NAS share:

1 Access the remote management pages on the target system.

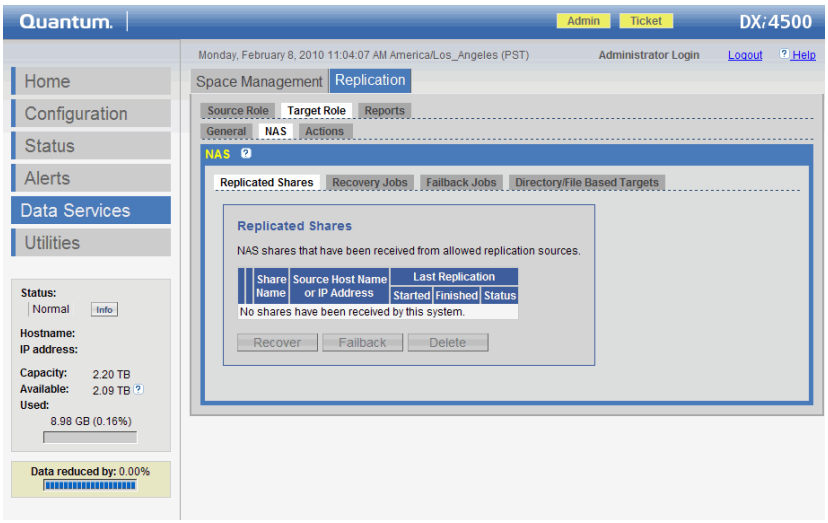
Note: For more information on accessing the remote management pages, see Chapter 3, DXi4500 Concepts.

2 From the **Replication** page, click the **Target Role** tab.

3 From the **Target Role** page, click the **NAS** tab.

The **Target Role NAS** page displays (see Figure 82).

Figure 82 Target Role NAS Page



The **Target Role NAS** page displays the available NAS shares that have been replicated. The page also displays information on failback jobs.

4 To failback a NAS share, select the share and click **Failback**.

The system prompts you for a hostname or IP address of the source system.

Note: A hostname is allowed ONLY if DNS is configured with valid system names. If DNS is not configured with valid system names, use the IP address of the source system.

5 Enter the hostname or IP address for the source system where you want the replicated share to failback and click **Apply**.

6 Open a new Web browser and access the remote management pages on the **Source** system.

7 From the **Data Services** menu, click the **Replication** tab.

8 From the **Target Role** page, click the **NAS** tab.

9 On the source system, select the recovered NAS share from the replicated share list and click **Recover**.

The NAS share is recreated on the source system.

Appendix A
DXi4500 System Specifications

This appendix lists characteristics and specifications the DXi4500. These characteristics and specifications are categorized as follows:

- Physical Characteristics
- Performance Characteristics
- Environmental Specifications

Note: For hard drive specifications see the appropriate hard drive product manual.

Physical Characteristics

The following tables provide dimensions and other physical characteristics of the DXi4500 system components:

- Table 27 - Physical Characteristics
- Table 28 - Storage Capacity
- Table 29 - Cable Drops
- Table 30 - Interfaces
- Table 31 - Software Capabilities
- Table 32 - Power Requirements

Table 27 Physical Characteristics

	System
Height	3.40 in (8 6 cm)
Width (side to side)	17.19 in (43.6 cm)
Depth (front to back)	24.09 in (61 cm)
Weight (stand alone)	49.5 lbs (22.5 Kg)
Rack Space Required	2u
Air clearance	Open 4 in (10.2 cm) behind unit for proper air flow

Table 28 Storage Capacity

DXi4500 Storage Capacity	
Usable capacity	2.2 TB to 4.4 TB

Table 29 Cable Drops

DXi4500 Cable Drops	
Ethernet Cable Drops	**Model 4510/4520 (4 x 1GbE ports) -** 1 to 4 1GbE Ethernet connections for NAS or OST connectivity, replication, and remote management
Power Outlets	**System** - 2 USA type 3-prong power outlets or 2 Continental Europe type 2-prong power outlets

Table 30 Interfaces

DXi4500 Interfaces	
Interfaces	**NAS backup target:** 128 shares maximum (NFS or CIFS) **OST backup target:** 100 storage servers maximum
Hardware	**Model 4510/4520** 4 ports 10/100/1000 BaseT Ethernet (RJ45 connector)

Table 31 Software Capabilities

DXi™ Software Capabilities	
Policy based data deduplication options	**Adaptive In-line Data Deduplication**: Data is deduplicated on ingest. **Deferred Processing Data Deduplication**: Data is ingested to disk first, then deduplicated in a separate process at a time set by the user. **Note:** Both methodologies may be enabled for different data sets in the same DXi4500.
Replication	DXi4500 models offer support for remote replication. Replication is asynchronous, one-to-one or multiple-to-one configurations; shares in same unit act as replication source or target; units with shares acting as replication targets can also support local backup.

Table 32 Power Requirements

DXi4500 Power Requirements		
Power Supplies and Cords (Voltage)	**System**	100–240 VAC
Frequency	**System**	50–60Hz

DXi4510	**Inrush**	2.2A @ 100V 0.92A @ 240V 220W
	Typical	2.0A @100V 0.83A @240V 200W 683 BTU/Hr
	Maximum	7.5A @100V 4.0A @ 240V 750W
DXi4520	**Inrush**	3.0A @ 100V 1.3A @ 240V 300W
	Typical	2.0A @100V 0.83A @240V 200W 683 BTU/Hr
	Maximum	7.5A @100V 4.0A @ 240V 750W

Caution: To safeguard backups in the event of a power outage, Quantum recommends that you connect the DXi4500 to a UPS (uninterruptable power supply).

Performance Characteristics

Table 33 lists the performance characteristics of the DXi4500 system.

Table 33 Performance Characteristics

Performance Characteristics	
DXi4500 Product family	Adaptive ingest performance of up to 400 GB/hour (depending on model)

Environmental Specifications

Table 34 provides various DXi4500 environmental specifications.

Table 34 Environmental Specifications

Climatic Environment		
Temperature and Altitude	Operating	10 to 35 °C (50 to 95 °F) 35 °C Max, Altitude = 900 m or 2952.75 ft (28 °C Max, Altitude = 3048 m or 10,000 ft)
	Shipping and storage	-40 to 65 °C (-40 to 149 °F) up 12,000m (39,370 ft)
Relative humidity	Operating	20% to 80% (non-condensing)
	Shipping and storage	5% to 95% (non-condensing)
Vibration and Shock		
Operational Shock	Peak Acceleration	31G
	Duration	2.6 milliseconds
	Wave Shape	½ Sine
Operational Vibration	Mode	Random Vibration
	Frequency Range	5Hz–350Hz
	Amplitude	0.26Grms
	Application	Operational Orientations

Shipping and Storage	Mode	Random Vibration
	Frequency Range	10Hz–250Hz
	Amplitude	1.54 Grms
	Rate/Duration	(PSD can be provided) 15 minutes all operational orientations
Acoustic		
Acoustic output	Operating	< 67 dBA at 1 meter, room temperature (20C)
Agency Approvals		
Safety	IEC 60950-1 (ed. 1), CSA 60950-1-03/UL 60950-1 1st Edition	
Emissions	EN55022 Class A, FCC Part 15 Class A, ICES-003 Class A, VCCI Class A, CISPR 22 Class A, CNS13438 Class A, KN22 Class A	
Immunity	EN55024/KN24: EN 61000-3-2 - Harmonic current emissions test EN 61000-3-3 - Voltage fluctuations and flicker in low-voltage supply systems test EN 55024:1998 - Information technology equipment - Immunity characteristics - Limits and methods of measurements EN 61000-4-2 - Electrostatic discharge immunity test EN 61000-4-3 - Radiated, radio-frequency, electromagnetic field immunity test EN 61000-4-4 - Electrical fast transient/burst immunity test EN 61000-4-5 - Surge immunity test EN 61000-4-6 - Immunity to conducted disturbances, induced by radio-frequency fields EN 61000-4-8 - Power frequency magnetic field immunity test EN 61000-4-11 - Voltage dips, short interruptions and voltage variations immunity test	

Caution: The DXi4500 system is designed to be installed in a rack enclosure. Ensure that the operating temperature inside the rack enclosure does not exceed the maximum rated ambient temperature. Do not restrict air flow to the DXi4500 components.

Glossary

A

Adaptive In-line Data Deduplication When you select **Enable Data Deduplication** for the NAS share, data deduplication is running all of the time and cannot be disabled. Backup data is sent to the DXi4500 and data deduplication is performed on data as it is ingested. Data deduplication begins when the backup begins. The advantage of selecting adaptive in-line data deduplication is that disk space is saved immediately.

B

Block Pool A pool of all unique data blocks that were captured during the data deduplication cycle. When backup jobs occur, the data deduplication engine searches for new data entering the DXi4500 and uses a variable length compression type algorithm to compare this to existing data in the block pool. Unique blocks are added to the block pool and all known blocks are indexed.

Byte The basic unit of computer memory which is large enough to hold one character.

C

Compress A process of removing fine-grained redundancy from data prior to storing or transmitting it. The granularity may vary, but generally compression deals with redundancy in grains of a few bytes.

D

Data Deduplication A process of removing coarse-grained redundancy from data prior to storing or transmitting it. The granularity may vary, but generally data deduplication deals with redundancy in grains of several kilobytes.

Deferred Processing Data Deduplication When you select **Enable Backup Window** for the NAS share, data deduplication is disabled for a specific time period allowing better throughput performance during this period of time. All of the backup data is sent to the DXi4500 immediately in its raw form without data deduplication. After the backup window is closed and data deduplication is re-enabled, the data that was moved during the backup windows is now deduplicated on the DXi4500. The advantage of deferred processing data deduplication is that backups will complete faster with system resources dedicated for incoming backup data.

Disk A fixed set of sectors with sequential numbers starting from zero, directly and independently accessible and mutable by those numbers without affecting any other sector.

F

Filesystem An abstraction layered over storage devices (typically disks) obscuring the physical details of the storage devices it supports n favor of a presentation oriented at storing and organizing files.

H

Host The device or devices to which the system is connected.

I

Ingest The throughput performance of data writes to the system.

L

LSU Logical Storage Unit

N

NAS Network Attached Storage is file-level computer data storage connected to a computer network providing data access to network clients.

NDMP Network Data Management Protocol is a protocol meant to transport data between NAS devices, also known as filers, and backup devices. This removes the need for transporting the data through the backup server itself, thus enhancing speed and removing load from the backup server.

O

OST Open Storage Technology

R

RAID Redundant Array of Independent Disks is a technology through which several physical storage disks are grouped into an array that appears to an operating system as one or more physical devices.

S

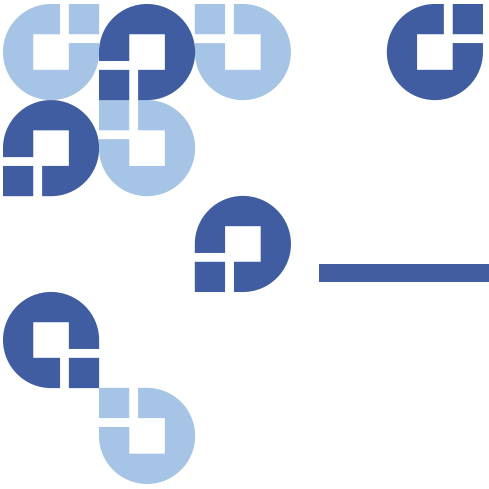
SNFS StorNext® File System

SNMP Short for *Simple Network Management Protocol*, a set of protocols for managing complex networks.

T

Terabyte A unit of measure for digital data equal to approximately 1,000 gigabytes, or 1,099,511,627,776 bytes.

Truncation As long as free disk space is available, the DXi4500 retains native format data on disk to provide accelerated reads from cache. As disk space is required, the native format data is truncated and reads come from the data deduplication blockpool.



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