Nexsan BEAST and E-Series
User Guide

Part Number: P0450147, Rev. E

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About this manual

This user guide provides detailed procedures for setting up, configuring, and running Nexsan E-Series and Nexsan BEAST Storage Systems, using the Web-based graphical user interface and Nexsan Storage Tools.

Note While Nexsan makes every effort to ensure the accuracy of technical documentation, screen images and procedures may change after publication. In case of discrepancy, please check for the latest updates on the E-Series and BEAST Documents and Downloads page. Also, refer to the latest Release Notes.

Conventions

Here is a list of text conventions used in this document:

Convention	Description
underlined blue	Cross-references, hyperlinks, URLs, and email addresses.
boldface	Labels on the physical Nexsan Storage System or interactive items in the graphical user interface (GUI).
italics	System messages and non-interactive items in the GUI. References to software user guides.
`monospace`	Command-line interface (CLI) text or text that refers to file or directory names.
`monospace bold`	Text strings that must be entered by the user in the CLI or in text fields in the GUI.

Notes, tips, cautions, and warnings

Note Notes contain important information, present alternative procedures, or call attention to certain items.

Tip Tips contain handy information for end-users, such as other ways to perform an action.



CAUTION: In hardware manuals, cautions alert the user to items or situations which may cause damage to the Nexsan Storage System or result in mild injury to the user, or both. In software manuals, cautions alerts the user to situations which may cause data corruption or data loss.



WARNING: Warnings alert the user to items or situations which may result in severe injury or death to the user.

Contacting Nexsan

For questions about Nexsan products, please visit the Nexsan support Web page, and the E-Series and BEAST Documents and Downloads page. If you are unable to find the answer to your question there, please see our contact information below.

Service and support

Nexsan's Technical Services Group provides worldwide assistance with installation, configuration, software support, warranty, and repair for all Nexsan products. A variety of service and support programs are available to provide you with the level of coverage and availability your operation requires.

Nexsan Headquarters

1289 Anvilwood Avenue

Sunnyvale, CA 94089

United States of America

European Head Office, UK

Units 33–35 Parker Centre

Mansfield Road

Derby, DE21 4SZ

United Kingdom

Worldwide Web site

www.nexsan.com

E-Series and BEAST support:

https://www.nexsan.com/support/e-series-and-beast/

Contact:

https://www.nexsan.com/support

Related documents

The following Nexsan product manuals contain related information:

- *Nexsan High-Density Storage Snapshots and Replication User Guide*
- *Nexsan High-Density Storage Multipathing Best Practices Guide*

VMware guides

- *Nexsan VMware Best Practices Guide*
- *Nexsan RAID Plugin for VMware vCenter Installation Guide*
- *Nexsan RAID Storage Plugin for VMware vCenter User Guide*

BEAST-specific guides

- *Nexsan BEAST BT60 and BT60X Storage System Installation Guide*
- *Nexsan BEAST BT60 and BT60X Storage System FRU Removal and Replacement Guide*
- *Nexsan BEAST BT60 and BT60X Quick Start Guide*

Nexsan E18 and Nexsan E32 guides

- *Nexsan E18 and Nexsan E32 Storage System Quick Start Guide*
- *Nexsan E18 and Nexsan E32 Storage System Installation Guide*
- *Nexsan E18 and Nexsan E32 Storage System FRU Removal and Replacement Guide*
- *Nexsan E18X and Nexsan E32X Storage Expansion Installation Guide*
- *Nexsan E18X and Nexsan E32X Storage Expansion FRU Removal and Replacement Guide*

Nexsan E48 and Nexsan E60 guides

- *Nexsan E48 and Nexsan E60 Storage System Quick Start Guide*
- *Nexsan E48 and Nexsan E60 Storage System Installation Guide*
- *Nexsan E48 and Nexsan E60 Storage System FRU Removal and Replacement Guide*
- *Nexsan E48X and Nexsan E60X Storage Expansion Installation Guide*
- *Nexsan E48X and Nexsan E60X Storage Expansion FRU Removal and Replacement Guide*

Safety notices

Always observe the following precautions to reduce the risk of injury and equipment damage:

- Only a fully-trained Service Engineer is authorized to disassemble any other part of the storage system, and then only when the storage system is powered off.

Revision history

This section lists updates and new material added to *Nexsan High-Density Storage User Guide*.

P04050147, Rev D, April 2022

Removed duplicate quick start section, up-issued the document to address a revision problem caused by the importation of Agile data into the new Arena management system.

P04050147, Rev C, March 2022

- Revised IP settings topics to include new instructions and screen captures for configuring IPv6.
- Revised pages throughout the manual to reflect updated options.
- Revised Initial network address setup on page 16
- Converted most procedures and bulleted lists to tables for easy of use.
- Revised references to Nexsan RAID System, Nexsan Storage Unit, Nexsan Expansion Unit and variants to Nexsan Storage System and Nexsan Storage Expansion respectively.
- Revised the E-Alert configuration procedures for encrypted connection (TLS) and setting authentication. Refer to Configure E-Alert Settings on page 27 and E-Alert Settings on page 220
- Replaced the former "Multiple View HTML Builder" page. Refer to Multiple System View on page 118
- Replaced the former "Network Statistics" page with the Port Statistics on page 106
- Removed the former "10Ge iSCSI Statistics" page. Refer to 10Ge iSCSI Information on page 91
- In the the Nexsan Storage Tools appendix, extensively revised all sections. Refer to Nexsan Storage Tools on page 253
- Standardized images sizes and added borders.

P04050147, Rev B, March 2017

- Revised and promoted the procedure Restore Encryption Keys on page 212, and cross referenced it from related sections in other parts of the document.
- Added a subheading and introduction to emphasize the section about backing up or changing an encryption key for encrypted arrays. See Back Up or Change an Encryption Key on page 131

P04050147, Rev A, July 2016

- Changed document number to part number
- Added Information for E60P and E48P
- Added information about restoring encryption keys

NXS-BBES-UG, Rev. 05, November 2015

- Changed name of document to *Nexsan High-Density Storage User Guide*
- Removed all references to SATABeast and SATABoy
- Updated all pertinent sections with information on the BEAST BT60 and BT60X storage systems
- Updated Home page on page 65 to reflect changes made in most recent firmware release

NXS-BBES-UG, Rev. 04, September 2015

- Added section Configure Array Encryption on page 127, and also added descriptions of new disk icons to Home page on page 65 and Disk Information on page 81
- Added instructions for creating encrypted arrays on self-encrypting disks (SEDs) to Create a new RAID array on page 49 and Create a new RAID array on page 122
- Updated *Array Status/Health* section of RAID Information on page 71 to reflect array encryption status
- Added new item, *Encryption*, to the *Disk Information* detail pages in Disk Information on page 81
- Updated sections Delete a RAID Array on page 132, Add Hot Spare on page 134, Retire Disk on page 137, and Reset to Factory Defaults on page 215 with new encrypted array information
- Updated section Audible Alarm on page 201 to include ability to turn off audible alarms
- Updated formatting throughout with new single-page layout

NXS-BBES-UG, Rev. 03, May 2015

- Added to the list of Related documents on page x
- Updated terms used in on the *Configure Time and Date* page in Set time and date on page 30 and Configure Time and Date on page 225
- Added new item, *Used capacity*, to the *RAID Information* page in RAID Information on page 71
- Added new item, *Disk health*, to the *Disk Information* detail pages in Disk Information on page 81
- Updated Disk Statistics on page 87 to include the disk health measurement for SSD disks
- Added new item, *Javascript hot tracking*, to the *GUI Settings* section of Network Services on page 107
- Added section Retire Disk on page 137, and also added descriptions of new disk icons to Home page on page 65 and Disk Information on page 81
- Updated screen shot and description of *Configure Volume Snapshots* page to include **Clone Snapshot** button in Configure Volume Snapshots on page 161
- Updated Acknowledge Rebuild on page 146 with new configuration information
- Added section Migrate Logical Volumes on page 169
- Added two new items, **Generate warnings from drive heuristics** and **SCSI third-party copy extensions**, to Configure Cache on page 198
- Added new item, **Disk retirement scheme**, to Configure Rebuild Priority on page 206

- Added new item, **Enable hot tracking**, to GUI Settings on page 232
- Fixed various formatting errors

NXS-BBES-UG, Rev. 02, July 2014

- Changed more formatting throughout to more closely match Nexsan corporate style
- Added description of **Automatically adjust for Daylight Saving Time** option in Set time and date on page 30 and Configure Time and Date on page 225
- Added note under step 7 in Create a new RAID array on page 49 and under step 6 in Create a new RAID array on page 122 regarding the maximum number of RAID arrays per system
- Added section Configure 1Ge iSCSI on page 178 describing new features available for 1Ge iSCSI ports
- Updated information regarding AutoMAID settings in Configure AutoMAID Settings on page 192
- Updated information about beaconing in Configure Enclosures on page 202

NXS-BBES-UG, Rev. 01, April 2014

Changed formatting throughout to reflect Nexsan as an Nexsan brand; changed name of document to *Nexsan RAID Storage User Guide*.

Chapter 1

Basic Setup

This User Guide is designed to help you get your Nexsan Storage System up and running in a short amount of time. It provides basic setup instructions and complete system configuration details. It does not cover the physical features or rack installation instructions for the system. For that information, see the Nexsan Storage System *Installation Guide*.

All Nexsan BEAST and E-Series Storage Systems have a common operating system and nearly identical graphical user interface (GUI). Therefore, this User Guide is appropriate for both Nexsan BEAST and Nexsan E-Series Storage Systems. For Nexsan Unity Storage Systems, see the *Nexsan Unity Software User Guide*.

This User Guide covers all of the features that can be accessed through the GUI. However, because Nexsan Storage Systems are shipped preconfigured, only the basic setup procedures in this chapter are needed for most Nexsan Storage System installations.

Notes:

- GUI screens vary between Nexsan Storage Systems. Screens in this User Guide may not exactly match the GUI for the product you are using.
- These instructions assume that you are setting up a single Nexsan Storage System or Nexsan Storage System and one Nexsan Storage Expansion. You must perform these procedures for each storage system and expansion you set up.

This chapter contains the following sections:

Initial network address setup 16
Configure the Nexsan Storage System IP address 18
Set up the system: Quick Start Configuration Checklist 22
Network and E-Alert settings 25
Set time and date 30
Array Configuration 33
Volume Configuration and Access 42
When the Quick Start Configuration Check List is complete 45

Initial network address setup

Before you can configure your Nexsan Storage System through the GUI, you must assign a unique IP address to its management port (**MGMT**) and enter the proper gateway and DNS settings. This procedure uses the Nexsan IP Configuration Tool, which is included in the Nexsan Storage Tools.

Other methods of assigning the IP address of your Nexsan Storage System are discussed in Appendix A, Alternate IP configuration on page 245.

Install the Nexsan Storage Tools

This installation procedure walks you through the steps to install the Nexsan Storage Tools on a Windows-based server or workstation. The tools include the IP Configuration Tool, which you'll need for initial setup of your Nexsan Storage System. For details about the tools, see the Nexsan Storage Tools help and Appendix B: Nexsan Storage Tools on page 253.

Installing on Mac or Linux

To install the Nexsan Storage Tools on Macintosh OS X, drag the application files to your hard drive. To install on Linux systems, drag the appropriate installer file (RPM, DEB, or tar.gz) to your hard drive and run it using your application launcher.

The Server Features are only available for installation on Windows Server.

Notes:

- This installation procedure requires that the Nexsan Storage System be connected to the LAN via an Ethernet cable attached to its management port (**MGMT**) (see the *Installation Guide* for your system for details).
- This procedure may require a restart of the operating system where the tools are installed.

Before you begin

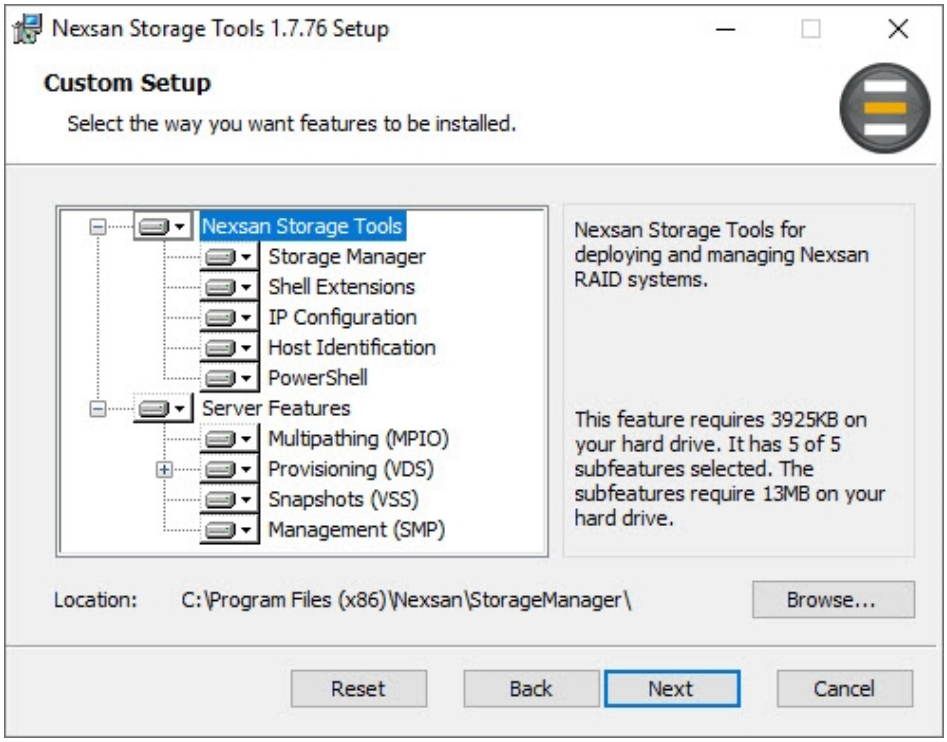
- Download **NexsanTools_*x.x.x*.exe** from https://www.nexsan.com/support/e-series-and-beast/ or obtain it from Nexsan Technical Support (see Technical Support on page 235).

▶ **To install Nexsan Storage Tools:**

1. On a server or workstation that is attached to the same LAN that the Nexsan Storage System is attached to, locate the **NexsanTools_*x.x.x*.exe** icon.
2. Double-click the **NexsanTools_*x.x.x*.exe** icon to launch the installer. The *Welcome* dialog displays.
3. Click **Next** to display the *End-User License Agreement*.
4. Click the check box next to *I accept the terms in the License Agreement*, then click **Next**. The *Custom Setup* dialog displays.

5. The **Nexsan Storage Tools** include both local tools and server features, as shown. Accept the default or make changes as needed. If you are not installing to a Windows Server, the Server Features are excluded. For details, see Nexsan Storage Tools on page 253. Click **Next** when you're ready to proceed.

Figure 1-1: *Custom Setup* dialog box



6. Click **Install** to begin the installation process. Once the installation is complete, the *Completed the Nexsan Storage Tools Setup Wizard* dialog box displays.
7. Click **Finish** to close the dialog box and complete the installation.
8. If prompted to restart the system, click **Yes** to complete the setup process or **No** if you plan to manually restart later.

For more information about the Nexsan Storage Tools, refer to the PDF file included with the tools and Appendix B, Nexsan Storage Tools on page 253.

Configure the Nexsan Storage System IP address

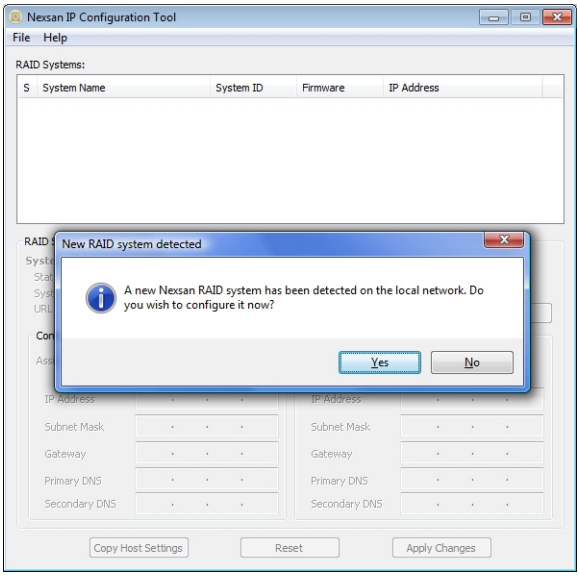
This procedure requires that the Nexsan Storage System be connected to the LAN via an Ethernet cable attached to its management port (**MGMT** – see the Installation Guide for your system for details).

► **To configure the Nexsan Storage System IP address:**

1. Launch the IP Configuration Tool. In Windows, click **Start > Nexsan > IP Configuration Tool**.

   The *Nexsan IP Configuration Tool* opens. If the new Nexsan Storage System is already attached to the same broadcast network, the *New RAID system detected* dialog displays.

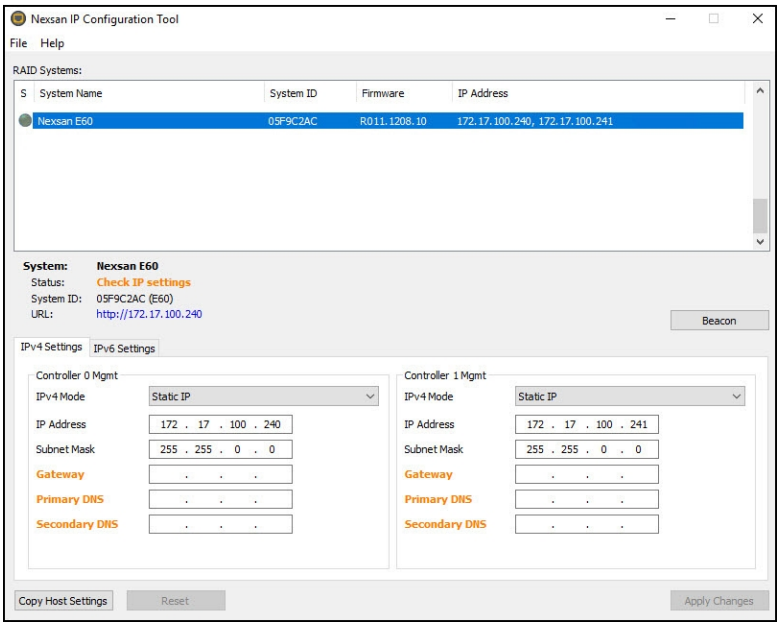
Figure 1-2: *New RAID system detected* dialog



   Click **Yes**. The dialog closes, and the Nexsan Storage System is displayed in the *RAID Systems* list.

2. If the storage system is not already selected, select it in the list.

Figure 1-3: Nexsan IP Configuration Tool RAID Systems list



3. Configure the IP Settings for your Nexsan Storage System, as described:

Table 1-4: IP Settings

Setting	Action
IPv4 Settings tab	Select **Static IP** or **Automatic** to enable IPv4 for both controllers on the storage system, or select **Disable** to disable IPv4. ● If you select **Static IP**, you must fill in values for **IP Address** and **Subnet Mask**. ● If you select **Automatic**, the firmware uses DHCP to assign IP addresses. **Note** To use automatic IP assignment, your network must be configured for DHCP. If not, you MUST use a static IP address.
IPv6 Settings tab	Select **Static IP** or **Automatic** to enable IPv6 for both controllers on the storage system, or select **Disable** to disable IPv6. ● If you select **Static IP**, you must fill in values for **IP Address** and **Prefix Length**. ● If you select **Automatic**, the firmware uses router advertisements (SLAAC) to assign IP addresses. A fixed link-local IPv6 address will also be assigned. **Note** To use automatic IP assignment, your network must be configured to use SLAAC. If not, you MUST use a static IP address.

4. When you have completed making your selections, click **Apply Changes**. If any items remain orange, fill in the necessary information and click **Apply Changes** again.

Accept the End User License Agreement (EULA)

To accept the End User License Agreement:

1. Access the Nexsan Storage System GUI using one of the following methods:

   Using Nexsan Storage Manager (Windows systems only):

   a. Open Nexsan Storage Manager.

   b. In the *RAID Systems* list, select the Nexsan Storage System.

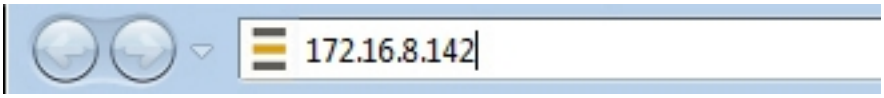
   c. Click **Manage system**.

   Using a Web browser (all systems):

   a. Launch a Web browser (Microsoft Internet Explorer, Mozilla Firefox, Google Chrome, etc.).

   b. In the browser's address field, enter the Management IP address which was set in the Configure the Nexsan High-Density IP section, for example:

   Figure 1-5: Browser address field with Nexsan Storage System IP address entered



   c. Press **Enter** or click the browser's **Go** button.

   The login screen for the Nexsan Storage System displays:

   Figure 1-6: Nexsan Storage System login screen

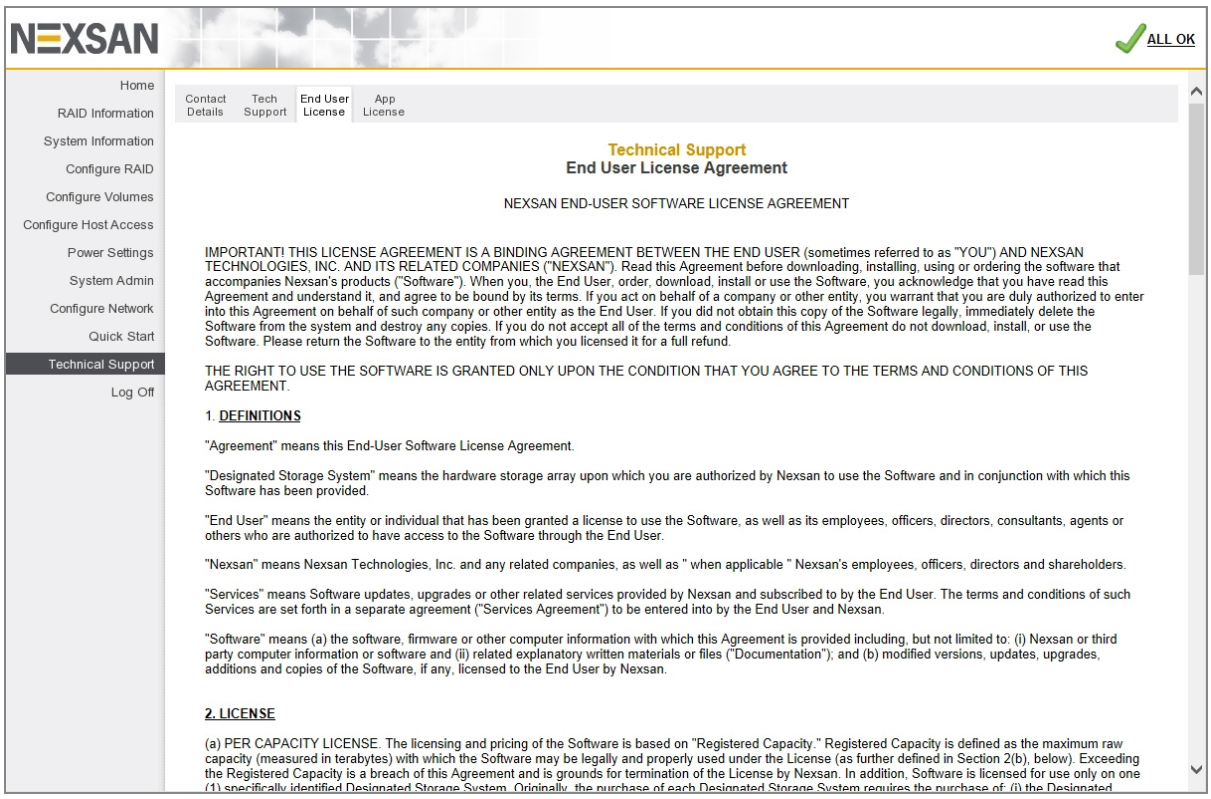


Note The login screen varies depending on the type of Nexsan Storage System you are connected to. However, the **Click Here to Login** button is always displayed.

2. Click the **Click Here to Login** button to log in to the Nexsan Storage System.

   The *End-User License Agreement* screen displays.

Figure 1-7: End User License Agreement



3. Read the EULA, check the box at the end to indicate your agreement, then click the **I Agree** button.

   A message displays, indicating that you have agreed to the terms of the EULA.

Notes:

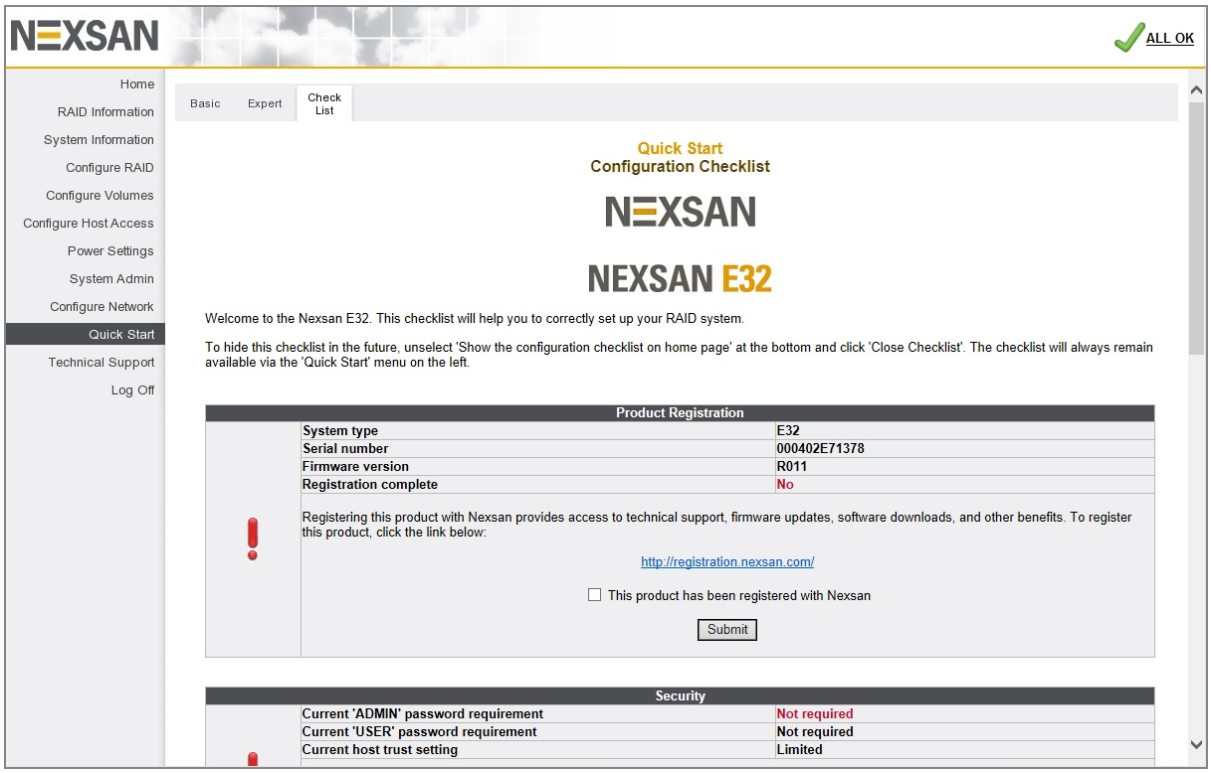
- To access the full functionality of the Nexsan Storage System, you MUST agree to the terms of the EULA.
- Once you have agreed to the terms of the EULA, the *End-User License Agreement* screen will not be displayed again unless you select **Tech Support > EULA** (see End User License Agreement on page 238).

Set up the system: Quick Start Configuration Checklist

Once you accept the EULA, the graphical user interface (GUI) displays the *Quick Start Configuration Checklist*, which you'll use to set up your Nexsan Storage System.

The *Quick Start Configuration Checklist* displays automatically the first time you log in to a system, and can always be accessed by going to **Quick Start > Check List**. However, until the checklist has been completed, the message *The configuration checklist has not yet been completed* appears on the *Home* page along with the **Review Checklist** button, which takes you to the *Quick Start Configuration Checklist* page.

Figure 1-8: *Quick Start Configuration Checklist* page



The items on the *Quick Start Configuration Checklist* are:

Table 1-9: *Quick Start Configuration Checklist*

Checklist item	Related procedures
Product Registration	Product Registration on the facing page
Security Settings	Security settings on the facing page
System Name	System name on page 24 or Configure Enclosures on page 202
Network Settings	Network and E-Alert settings on page 25
Time and Date	Set time and date on page 30

Checklist item	Related procedures
Array Configuration	Array Configuration on page 33 or Configure RAID on page 121
Volume Configuration and Access	Volume Configuration and Access on page 42 or Configure Volumes on page 148

Each item in the list displays its status on the *Quick Start Configuration Checklist*. If an item has a green check mark next to it, that item has been completed with a recommended setting. If an item has a red exclamation point next to it, that item has either not been completed or has an unrecommended setting.

Product Registration

► **To register your Nexsan product:**

1. Click the link to go to http://registration.nexsan.com.
2. Once you have completed the registration, return to the GUI, check the box next to **This product has been registered with Nexsan**, and click **Submit**.

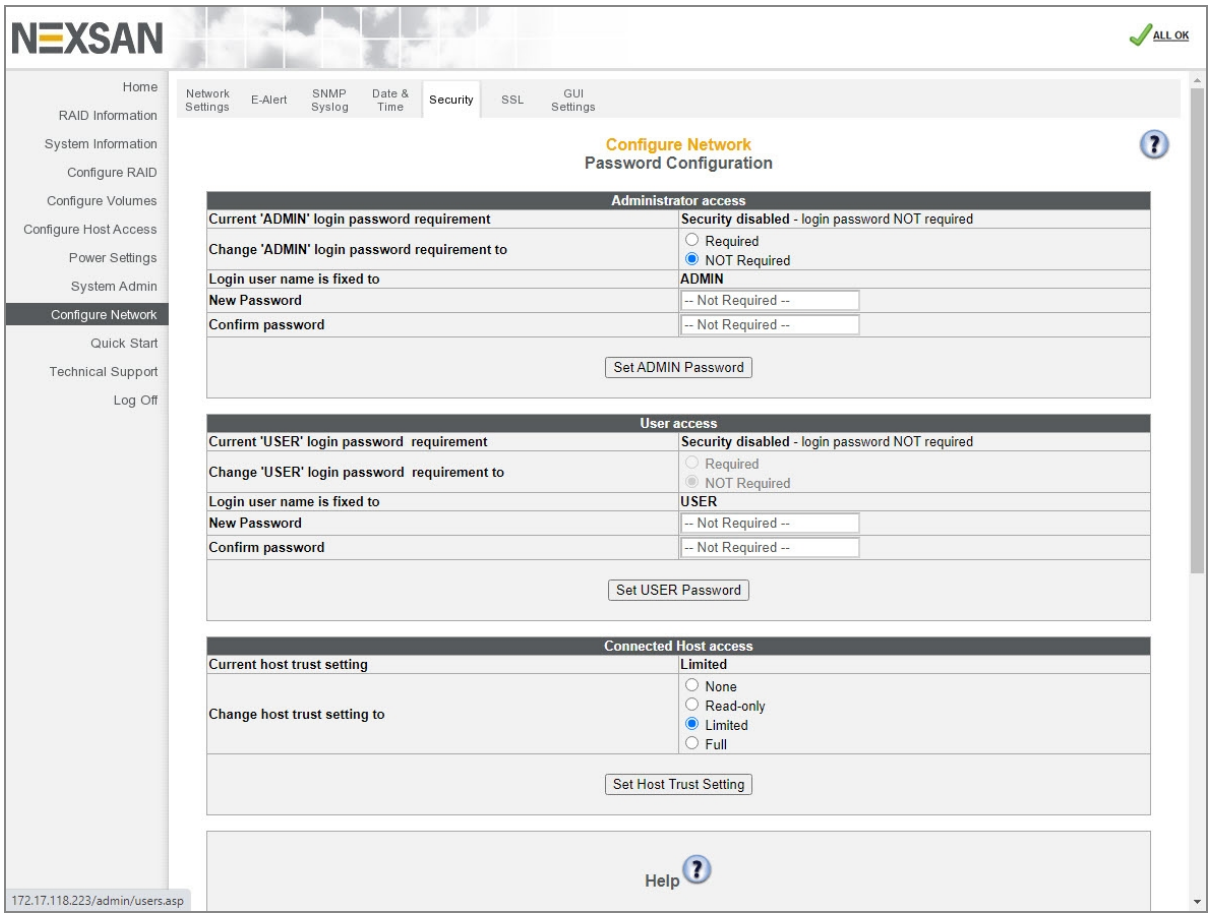
Security settings

To protect the integrity of the storage system, it is strongly recommended that you at least create a password for the ADMIN account. This prevents unauthorized personnel from making changes to the storage system's configuration.

► To change security settings

1. Click the **Change Security Settings** button. This takes you to the *Password Configuration* page.

Figure 1-10: *Password Configuration* page



2. Next to **Change "ADMIN" login password requirement to**, select **Required**.
3. Enter the password into the **New Password** and **Confirm Password** fields.
4. Click **Set ADMIN Password**. A message displays, informing you that the password has been set.
5. Select **Quick Start > Check List** to return to the *Quick Start Configuration Checklist*.

Passwords take effect immediately. The next time you try to access a configuration page, the GUI will ask you to enter the user name and password to gain access. Both fields are case-sensitive, and user names must be entered in all capitals ("ADMIN" or "USER").

System name

Although the system comes preconfigured with a name, it is recommended that you change it to a name more suitable to your environment.

► To set the system name:

1. In the **RAID system name** field, type the name.
2. Click **Set System Name**.

A message displays, letting you know that the setting has been changed.

3. Click the **Back** button to return to the *Quick Start Configuration Checklist*.

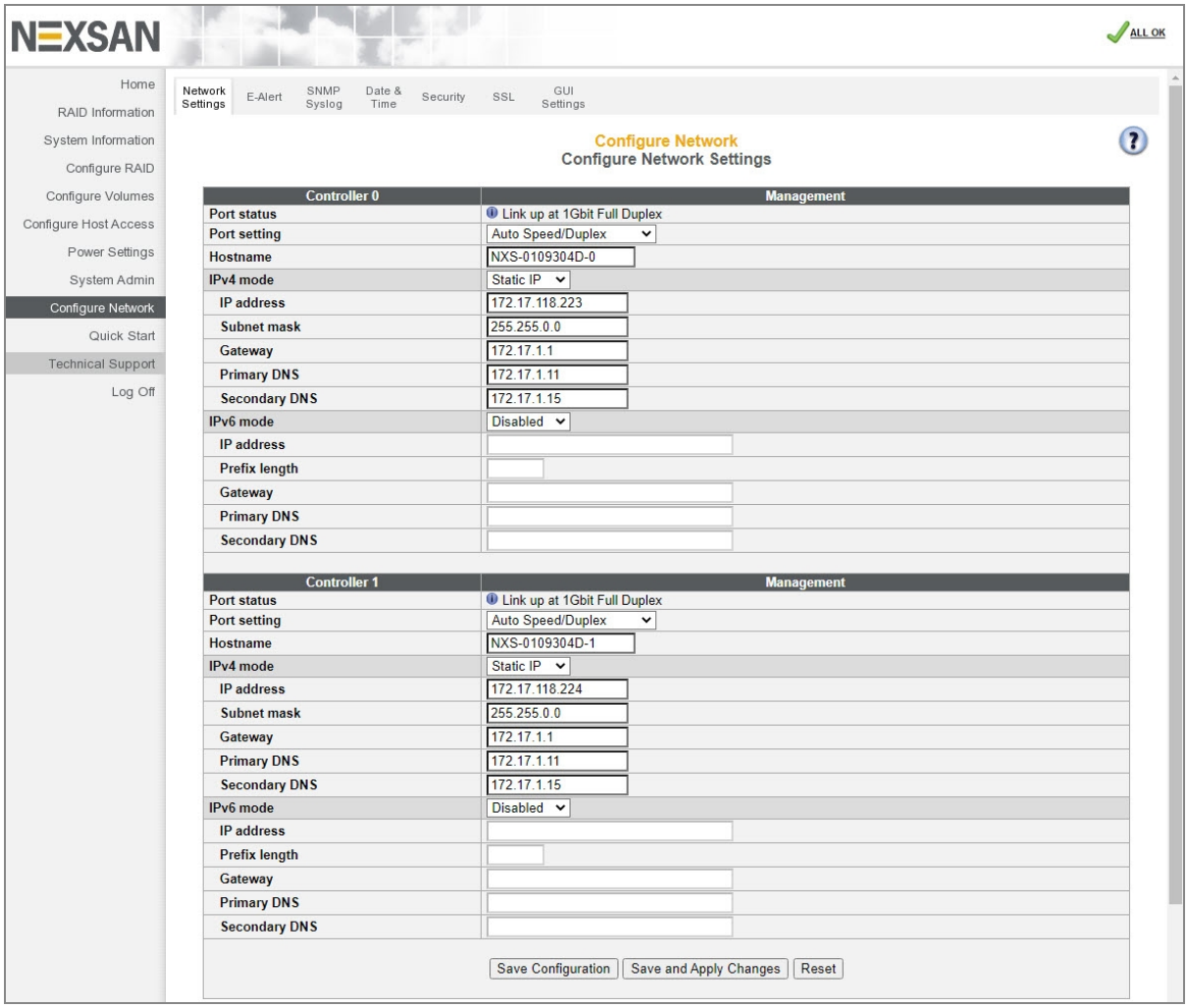
Network and E-Alert settings

It is recommended that you confirm your network and E-Alert settings to make sure that they will work with your local area network (LAN) setup.

Configure Network Settings

To verify or change the network settings for the management (Mgmt) port for each controller, click the **Change Network Settings** button. This takes you to the *Configure Network Settings* page.

Figure 1-11: *Configure Network Settings* page



The information is arranged by controller, with Controller 0 at the top and Controller 1 at the bottom. **Current status** indicates whether the link is up or down. If the link is up, it displays the current link speed and duplex mode setting.

If at any time you wish to return the *Configure Network Settings* page to its initial state, click **Reset**.

To configure network settings:

1. Apply the appropriate network settings for the **Mgmt** port on both controllers of your Nexsan Storage System:

   Table 1-12: Configure Network Settings

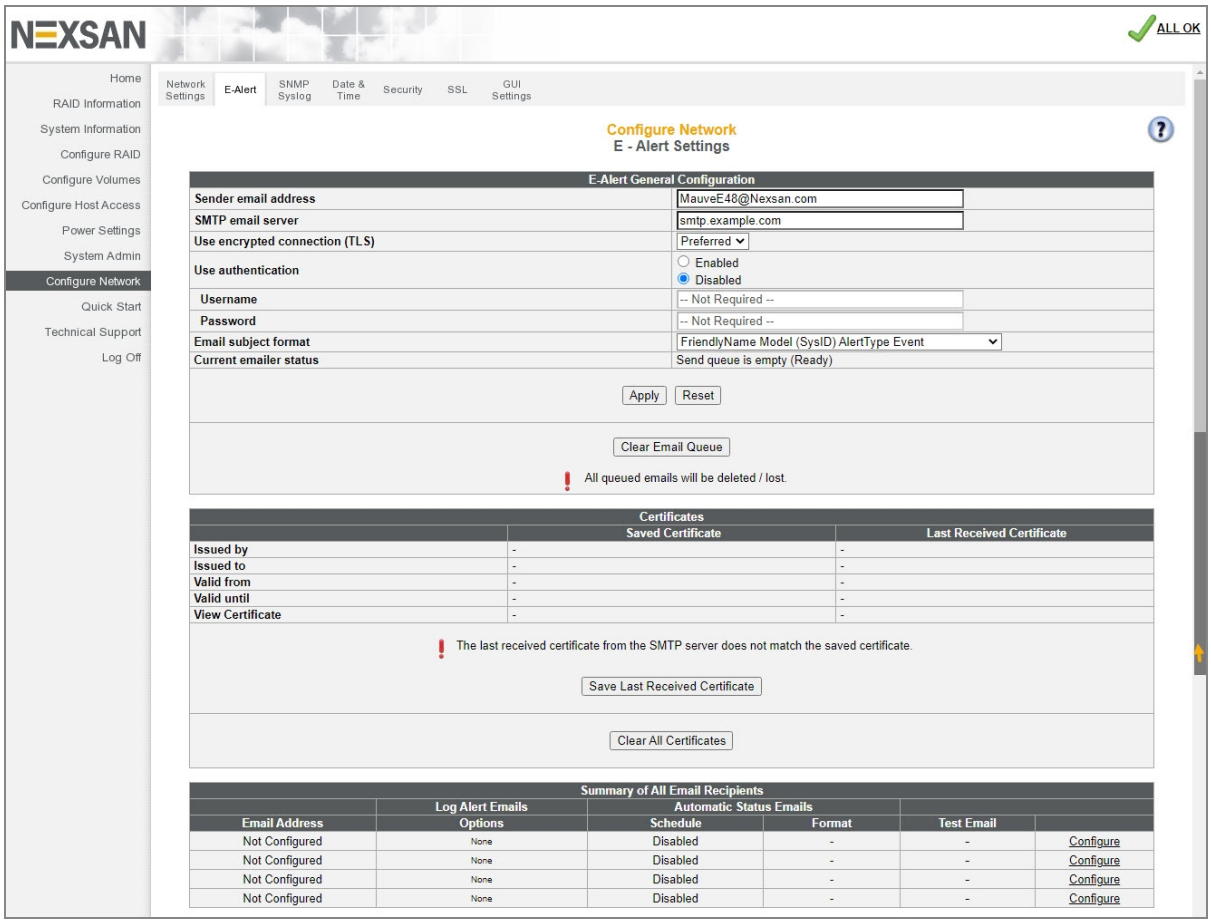
Setting	Action
Port Settings	For most networks, the default setting of **Auto Speed/Duplex** is recommended. However, if your LAN switch doesn't support auto-negotiation, you can "force" one or both settings. The options are: **Auto Speed/Duplex** (the default) **Auto Speed, Full Duplex** **Auto Speed, Half Duplex** **1Gbit Full Duplex** **100Mbit Full Duplex** **100Mbit Half Duplex** **10Mbit Full Duplex** **10Mbit Half Duplex**
Hostname	This defaults to the host's address. Enter a "friendly" host name for the port, if desired.
IPv4 mode	Choose **Automatic**, **Static IP**, or **Disabled** for each controller in the Nexsan Storage System. If you select **Automatic**, then the Nexsan Storage System will use DHCP and no other configuration is needed. **Note** To use **Automatic**, your network must be configured for DHCP. If it is not, you MUST use a static IP address. If you select **Static IP**, then you must fill in the **IP Address** and **Subnet Mask**.
IPv6 mode	Choose **Automatic**, **Static IP**, or **Disabled** for each controller in the Nexsan Storage System. If you select **Automatic**, then no other configuration is needed. IPv6 will be configured automatically from router advertisements (SLAAC), and a fixed link-local IPv6 address will be assigned. **Note** To use **Automatic**, your network must be configured for SLAAC. If not, you MUST use a static IP address. If you select **Static IP**, then you must fill in the **Static IP Address** and **Prefix length**.

2. When you have selected the desired new settings, do one of the following:
   - Click **Save Configuration**. The settings are saved and are applied after the storage system is restarted (see Reboot System on page 203).
   - Click **Save and Apply Changes**. The settings are saved and applied immediately.
   - Return to Set up the system: Quick Start Configuration Checklist on page 22.

Configure E-Alert Settings

Use this procedure to configure E-Alert settings.

Figure 1-13: *E-Alert Settings* page



The *E-Alert General Configuration* section displays settings for the sender (the Nexsan Storage System).

► To verify or change E-Alert settings:

1. Click **Configure Network > E-Alert** to open the *E-Alert Settings* page.
2. Apply settings as described in the following table:

Table 1-14: Verify or change E-Alert settings

Setting	Action
Sender email address	Enter the address for the E-Alert sender. Although this can be any address that the mail server will accept as valid, you may wish to make the sender email address unique to the Nexsan Storage System.

Setting	Action
SMTP email server	Enter the SMTP server IP address or DNS host name of the mail server. You can only use a mail server name (for instance, **`smtp.example.com`**) if you have a domain name server (DNS) configured (see Configure Network Settings on page 218). Otherwise, you must use the server's IP address.
Use encrypted connection (TLS)	Choose the encrypted connection setting: **Required**, **Preferred**, or **Disabled**.
Use authentication	Choose the authentication preference, either **Enabled** or **Disabled**. **User name**: Define a user name to be used for authentication. **Password**: Define a password to be used for authentication.
Email Subject format	Select the email subject format using the **Email Subject format** drop-down list. There are three options: **FriendlyName Model (SysID) AlertType Event** — Populates the subject line with the Nexsan Storage System's friendly name, model, system ID, alert type, and a short description of the event. **FriendlyName Model (SysID) SubSystem AlertType Event** — Populates the subject line with the Nexsan Storage System's friendly name, model, system ID, specific enclosure, alert type, and a short description of the event. **FriendlyName Model (SysID) (S,A) Event** — Populates the subject line with the Nexsan Storage System's friendly name, model, system ID, abbreviated forms of the enclosure and alert type, and a short description of the event.
Current emailer status	Shows whether there are emails waiting in the queue to be sent. You can click **Clear Email Queue** to delete any emails currently in the queue. This may be necessary or useful if you need to have the Nexsan Storage System send a critical alert immediately.

3. Click the **Apply** button to save your settings. A message appears, informing you that the settings have been saved.

The *Certificates* section includes the following viewing options:

Table 1-15: Certificate valid dates

Field	Description
Issued by	Displays a list of all certificates issued by the system.
Issued to	Displays a list of all certificates issued to the system.
Valid from	Displays the certificate valid from date.
Valid until	Displays the certificate valid until date.
View certificate	Displays the certificate details.

You can perform the following actions with certificates:

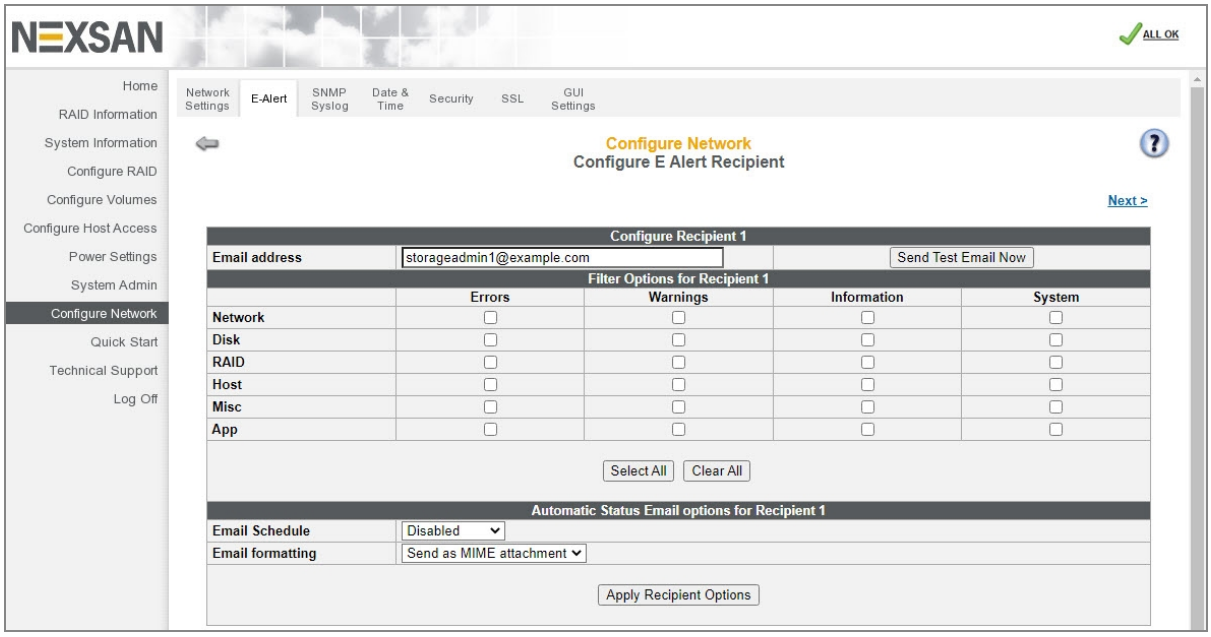
- Save the last received certificate. Click the **Save Last Received Certificate** button.
- Clear all certificates by clicking the **Clear All Certificates** button.

Next, use the *Summary of All Email Recipients* section to configure the types of alerts to be sent to Nexsan Storage System email recipients.

► To configure alert types to be sent:

1. In the *Summary of All Email Recipients* section, click the **Configure** link for an email recipient. The *Configure E-Alert Recipient* page displays:

Figure 1-16: *Configure E-Alert Recipient* page



2. You can configure up to five email addresses to receive email alerts. Configure a selected email recipient using the following table:

Table 1-17: Summary of All Email Recipients for E-Alerts

Setting	Action
Configure Recipient n **Email Address**	Enter a valid email address in the **Email address** field. You can test that the email is valid using the **Send Test Email Now** button.
Filter Options for Recipient *n* **Network, Disk, RAID, Host, Misc, and Application**	Check the boxes for the kinds of messages that you wish to notify the recipient of by email. You can select to receive **Error**, **Warning**, **Information**, or **System** alerts for each category. You can also us the **Select All** and **Clear All** buttons.

Setting	Action
Automatic Status Emails Email schedule	Select **Disabled**, **Every 1 Day**, **Every 2 Days**, **Every 4 Days**, **Weekly**, or **Monthly**.
Email formatting	Select **Send as MIME attachment** or **Send as plain-text email**.

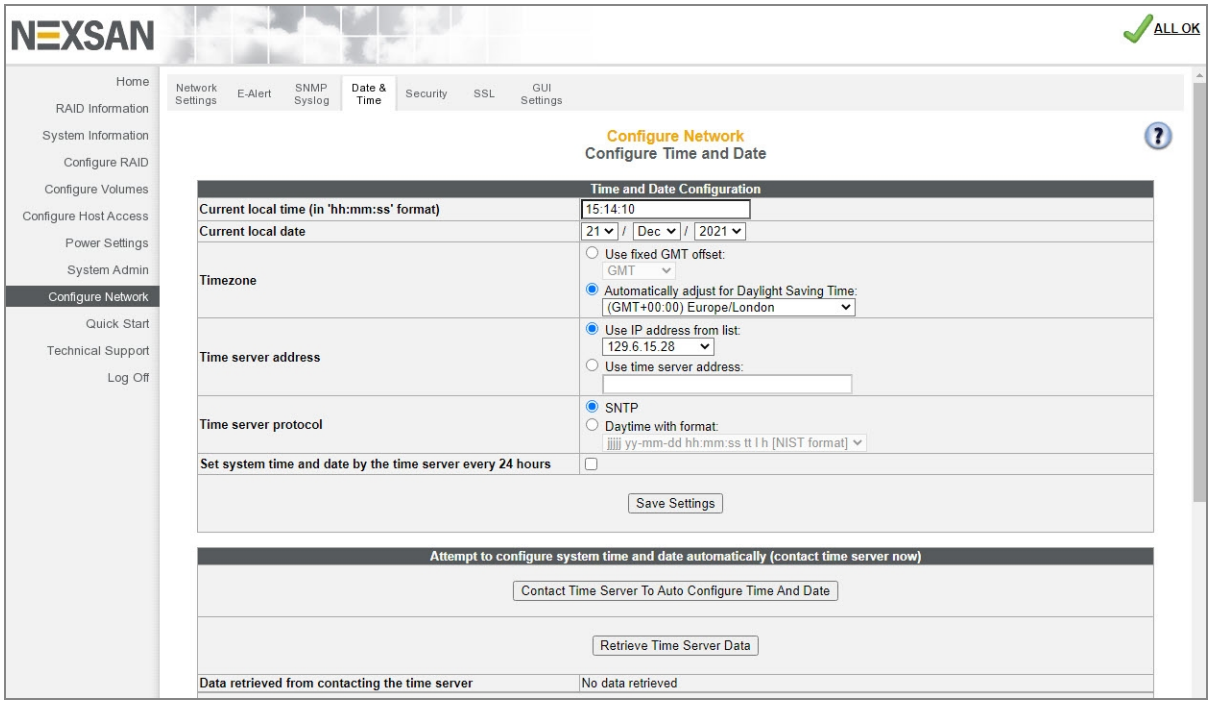
3. Click the **Apply Recipient Options** button.
4. Click the **Back** button to return to the *E-Alert Settings* page.
5. Select **Quick Start > Check List** to return to the *Quick Start Configuration Checklist*.

Set time and date

It is important to set the time and date so that events in the event log (see Event Log on page 112), E-Alerts (see E-Alert Settings on page 220), and SNMP traps (see SNMP/SYSLOG Settings on page 223) show the correct time stamp.

In the quick start checklist, click the **Change Time and Date Settings** button. The *Configure Time and Date* page displays:

Figure 1-18: *Configure Time and Date* page



Set time and date manually

Use this procedure to set your Nexsan Storage System time and date manually. To manually set the time, the time server address and SNTP sections may be left as default.

To set time and date manually:

1. Use the following table for details about setting the parameters:

   Table 1-19: Setting time and date manually

Setting	Action
Current local time (in 'hh:mm:ss' format)	Enter the time in the field. The time entered in the **Current local time (in 'hh:mm:ss' format)** field will be set when you click the **Save Settings** button. Therefore, it is suggested that you enter the time rounded to the next five-minute mark, then click **Save Settings** when the entered time is reached.
Current local date	Enter the date using the drop-down lists.
Timezone	In this section, do one of the following: • Select **Use fixed GMT offset** and set the GMT offset using the drop-down list. • Select **Automatically adjust for Daylight Saving Time** and select the appropriate time zone in the drop down list.
Time server address and Time server protocol	Leave the default settings in these sections. No changes are required when you are setting the time and date manually and no SNTP server is available.
Set system time and date by the time server every 24 hours	In this section, click to enable the setting as required. If no SNTP server is available, the setting remains deselected.

2. Click **Save Settings**.
3. Select **Quick Start > Check List** to return to the *Quick Start Configuration Checklist*. Proceed to Array Configuration on page 33.

Set time and date automatically

Use this procedure to set your Nexsan Storage System time and date automatically.

▶ **To configure the Nexsan Storage System to set time and date automatically:**

1. Use Table 1-20: "Configuring time and date automatically" below for details about setting the parameters:

   Note For automatic time setting to work, you may have to configure the **Gateway** setting for your network. See Configure Network Settings on page 218 for more information.

   Table 1-20: Configuring time and date automatically

Setting	Action
Time and Date Configuration	
Timezone	In this section, do one of the following: • Select **Use fixed GMT offset** and set the GMT offset using the drop-down list. • Select **Automatically adjust for Daylight Saving Time** and select the appropriate time zone in the drop down list.
Time server address	In this section, do one of the following: • Select **Use IP address from list** and select a time server IP address from the drop-down list. • Select **Use time server address** and enter the IP address of a known time server into the text box.
Time server protocol	Select either **SNTP** or **Daytime with format**.
Daytime with format	If you entered a time server address and selected **Daytime with format**, select the time server time and date format using the drop-down list. **Note** If you do not know the format of the time server data, click the **Retrieve Time Server Data** button in the *Attempt to configure system time and date automatically (contact time server now)* section. The data is retrieved and displayed next to *Data retrieved from contacting the daytime server*. Use this data to choose the proper format in the time and date format drop-down list.
Set system time and date by the time server every 24 hours	Enable this option if you want the Nexsan Storage System to contact the time server every twenty-four hours to update the time and date.
Attempt to configure system time and date automatically	

Setting	Action
Contact Time Server To Auto Configure Time And Date	If you want to update the time immediately, click the button in this section. The time and date are updated immediately.

2. Click **Save Settings**.

Select **Quick Start > Check List** to return to the *Quick Start Configuration Checklist*. Proceed to Array Configuration below.

Array Configuration

Arrays must be set up before volumes (where data is stored) can be assigned to them. To set up arrays, click the **Change Array Configuration** button. This takes you to the Basic *Quick Start* page.

If you want control over more parameters, click the **Expert** tab to be taken to the Expert *Quick Start* page (see Expert Quick Start on page 37).

Note For complete control over RAID configuration, volume configuration, logical unit number (LUN) mapping, and host access, see Create a new RAID array on page 122, Create a Logical Volume on page 149, Map Logical Volumes on page 158, and Configure Host Access on page 172.

Basic Quick Start

If you are setting up a Nexsan Storage System with one or more attached Nexsan Storage Expansions, you are first asked to select the Nexsan Storage System that you wish to configure. When you are finished, you can configure any other Nexsan Storage System or expansion by repeating this procedure.

Disk considerations

If you have self-encrypting disks installed, you can enable encryption after array configuration is complete by going to **Configure RAID > Encrypt Array**. See Configure Array Encryption on page 127. Arrays are limited to the disks physically contained in a single Nexsan Storage System.

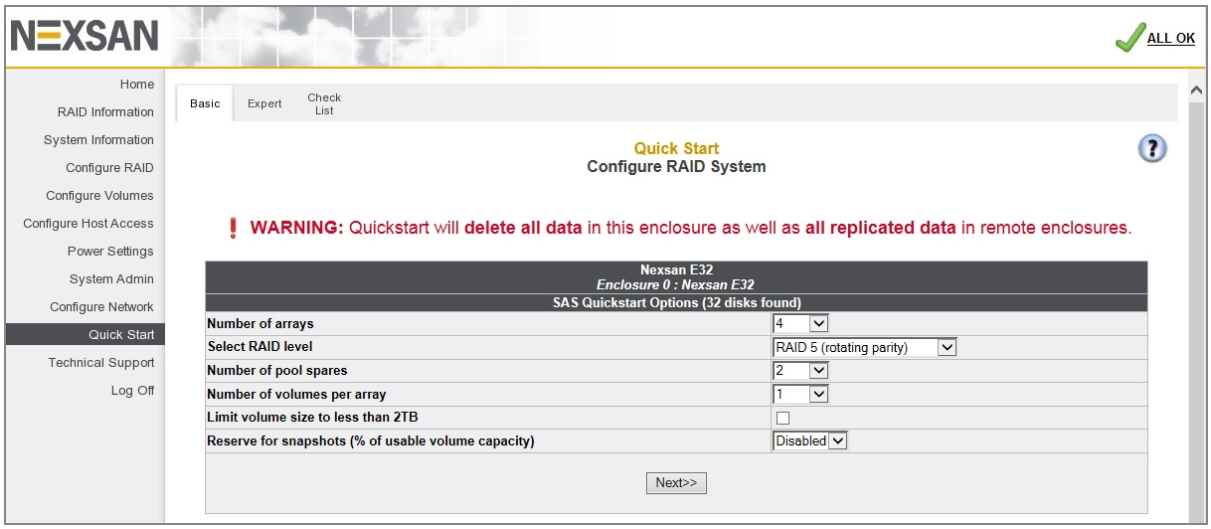
SAS, SATA, and SSD disk drives cannot be used in the same array. If your Nexsan Storage System contains a mixture of disk drive types, the *Quick Start* configuration page will have two or three *Quickstart Options* sections, one for each drive type.

To begin the Quick Start:

1. Select the Nexsan Storage System or Nexsan Storage Expansion you need to configure, then click **Next**.

   The *Quick Start* configuration page displays.

Figure 1-21: Basic *Quick Start* page



2. Using the drop-down lists, set the following parameters:

Table 1-22: Configuring quick start

Setting	Action
Number of arrays	Choose the number of arrays that you wish to create. The maximum number depends on the number and size of disks detected in the Nexsan Storage System.

Setting	Action
Select RAID level	Choose the RAID level that all arrays will be configured for. You can choose from the following: **RAID 0 (striped)** **RAID 1/1+0 (mirrored)** **RAID 4 (parity)** **RAID 5 (rotating parity)** **RAID 6 (rotating dual parity)** **Notes:** • RAID 1+0, also known as RAID 10, is automatically configured if you select **RAID 1/1+0 (mirrored)** and use an even number of drives, with a minimum of four. • For more information on RAID levels, see Appendix C, RAID levels on page 267.
Number of pool spares	Choose the number of spare disks that will be available to use as backups in case a RAID disk fails. The maximum number of pool spares depends on the number of disks detected in the Nexsan Storage System.
Number of volumes per array	This setting controls whether or not each array will be further divided into two or more smaller volumes. The default setting is **1**. The number of volumes per array can be anywhere from **1** to **10**.
Limit volume size to less than 2TB	This option is unchecked by default. If your hosts do not support volumes of more than 2TB in size, check this option.
Reserve for Snapshots (% of total volume capacity)	In the drop-down list, select the amount of each volume's total capacity that you wish to reserve for snapshots. The default setting is **25%**. You can select **10%**, **25%**, **50%**, or **100%**. Enabling snapshots also enables replication. Arrays are automatically created with Advanced features. This option creates two hidden volumes per array, one for the snapshot reservation and one for metadata. These count towards the per-storage system maximum of 254 volumes. See Create a new RAID array on page 49. **Notes:** • Selecting **Disabled** will cause the Quick Start operation to use all available space in the array for volumes. To enable snapshots and replication later, you'll need to delete a volume. At least two volumes must be free for snapshot reservation. • For detailed information about snapshots and replication features, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

3. Click **Next**.

   The *New Configuration Preview* page displays.

4. Ensure that the settings for *Arrays*, *Volumes*, *Pool Spares*, and *Volume Access* are correct.

5. If all settings are acceptable, select the confirmation check box, then click the **Quickstart** button.

CAUTION: If any arrays or volumes have already been configured on the Nexsan Storage System, the graphical user interface (GUI) displays the following warning:

Figure 1-23: Data erasure warning



- If you wish to continue, click the check box and select **Confirm Quickstart Configure**.
- If you do not wish to continue, click **CANCEL Quickstart**.

Note The Quick Start makes volumes available right away, but the entire tuning operation and online array creation may take as long as several hours to complete, depending on the size and number of disk drives in the Nexsan Storage System. You can check the progress of the operation by going to **RAID Information > Progress**.

Select **Quick Start > Check List** to return to the *Quick Start Configuration Checklist*. Proceed to Volume Configuration and Access on page 42.

Expert Quick Start

If you are setting up a Nexsan Storage System with one or more attached Nexsan Storage Expansions, you are first asked to select the Nexsan Storage System that you wish to configure. When you are finished, you can configure any other Nexsan Storage System or expansion by repeating this procedure.

Disk considerations

If you have self-encrypting disks installed, you can enable encryption after array configuration is complete by going to **Configure RAID > Encrypt Array**. See Configure Array Encryption on page 127. Arrays are limited to the disks physically contained in a single Nexsan Storage System.

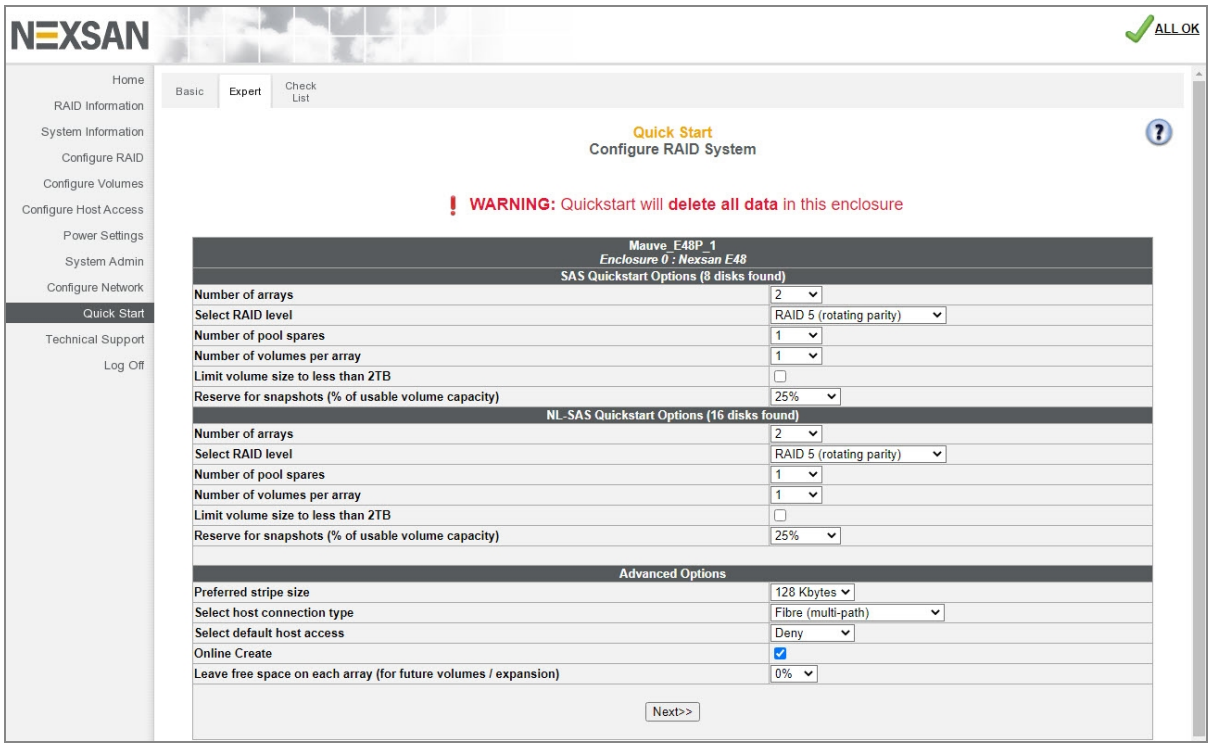
SAS, SATA, and SSD disk drives cannot be used in the same array. If your Nexsan Storage System contains a mixture of disk drive types, the *Quick Start* configuration page will have two or three *Quickstart Options* sections, one for each drive type.

To begin the Quick Start:

1. Select the Nexsan Storage System or Nexsan Storage Expansion you need to configure, then click **Next**.

   The *Quick Start* configuration page displays.

Figure 1-24: Expert *Quick Start* page



2. Using the drop-down lists, set the following parameters:

Table 1-25: Configuring quick start

Setting	Action
Number of arrays	Choose the number of arrays that you wish to create. The maximum number depends on the number and size of disks detected in the Nexsan Storage System.
Select RAID level	Choose the RAID level that all arrays will be configured for. You can choose from the following: **RAID 0 (striped)** **RAID 1/1+0 (mirrored)** **RAID 4 (parity)** **RAID 5 (rotating parity)** **RAID 6 (rotating dual parity)** **Notes:** • RAID 1+0, also known as RAID 10, is automatically configured if you select **RAID 1/1+0 (mirrored)** and use an even number of drives, with a minimum of four. • For more information on RAID levels, see Appendix C, RAID levels on page 267.
Number of pool spares	Choose the number of spare disks that will be available to use as backups in case a RAID disk fails. The maximum number of pool spares depends on the number of disks detected in the Nexsan Storage System.
Number of volumes per array	This setting controls whether or not each array will be further divided into two or more smaller volumes. The default setting is **1**. The number of volumes per array can be anywhere from **1** to **10**.
Limit volume size to less than 2TB	This option is unchecked by default. If your hosts do not support volumes of more than 2TB in size, check this option.

Setting	Action
Reserve for Snapshots (% of total volume capacity)	In the drop-down list, select the amount of each volume's total capacity that you wish to reserve for snapshots. The default setting is **25%**. You can select **10%**, **25%**, **50%**, or **100%**. Enabling snapshots also enables replication. Arrays are automatically created with Advanced features. This option creates two hidden volumes per array, one for the snapshot reservation and one for metadata. These count towards the per-storage system maximum of 254 volumes. See Create a new RAID array on page 49. **Notes:** • Selecting **Disabled** will cause the Quick Start operation to use all available space in the array for volumes. To enable snapshots and replication later, you'll need to delete a volume. At least two volumes must be free for snapshot reservation. • For detailed information about snapshots and replication features, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

3. Using the drop-down lists, set the parameters under *Advanced Options* as described in Table 1-26: "Setting advanced quick start options" on the next page.

Table 1-26: Setting advanced quick start options

Setting	Action
Preferred stripe size	The default stripe size is **128Kbytes**. You can choose to use smaller stripes by selecting **64Kbytes**, **32Kbytes**, or **16Kbytes**. **Note** It is strongly recommended that you do not change this setting.
Select host connection type	By default, this setting is set to **Fibre/10Ge/SAS (multi-path)**, which maps all logical unit numbers (LUNs) to all available host ports. If you wish to change the mapping, select one of the following:
	None (leave unmapped): The LUNs will not be associated with any ports on the Nexsan Storage System and will not be available to the host. You can later manually assign each LUN to one or more ports using the procedure under Volume Configuration and Access on page 42 or **Configure Volumes > Map Volume** (see Map Logical Volumes on page 158).
	Fibre/10Ge/SAS (non-redundant): Assigns each LUN to a single available FC/10GbE/SAS port.
	Fibre/10Ge/SAS (multi-path): Assigns LUNs to all available FC/10GbE/SAS ports (requires multipathing software).
	iSCSI/1Ge (non-redundant): Assigns each LUN to a single available 1Ge iSCSI port.
	iSCSI/1Ge (multi-path): Assigns LUNs to all available 1Ge iSCSI ports (requires multipathing software).
Select default host access	This setting defaults to **Deny**. This will prevent all attached hosts from accessing any volumes on this Nexsan Storage System. If you wish to allow host access to this storage system, change this setting to **Read** or **Read/Write**. **Note** To ensure integrity of data, it is recommended that you leave this setting as **Deny**, then use the procedure under Volume Configuration and Access on page 42 to assign **Read** or **R/W** access to specific hosts.
Online Create	When this box is checked, volumes on this Nexsan Storage System will be available immediately, with RAID creation continuing in the background. This does, however, slow down the RAID creation process. You can speed up the creation process by unchecking this box, in which case volumes will be unavailable until RAID creation is complete.
Leave free space on each array for future volumes/expansion	By default, the volumes will take up all of the space in the arrays. This setting enables you to keep a percentage of the array space free for additional volumes or expansion of current volumes. Select **0%**, **10%**, **25%**, **50%**, or **75%**.

4. Click **Next**.

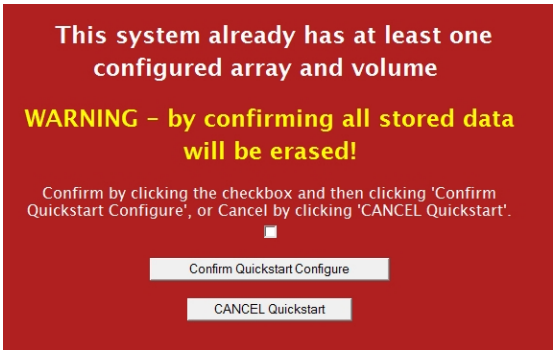
   The *New Configuration Preview* page displays.

5. Ensure that the settings for *Arrays*, *Volumes*, *Pool Spares*, and *Volume Access* are correct.

6. If all settings are acceptable, select the confirmation check box, then click the **Quickstart** button.

   CAUTION: If any arrays or volumes have already been configured on the Nexsan Storage System, the graphical user interface (GUI) displays the following warning:

   Figure 1-27: Data erasure warning

   - If you wish to continue, click the check box and select **Confirm Quickstart Configure**.
   - If you do not wish to continue, click **CANCEL Quickstart**.

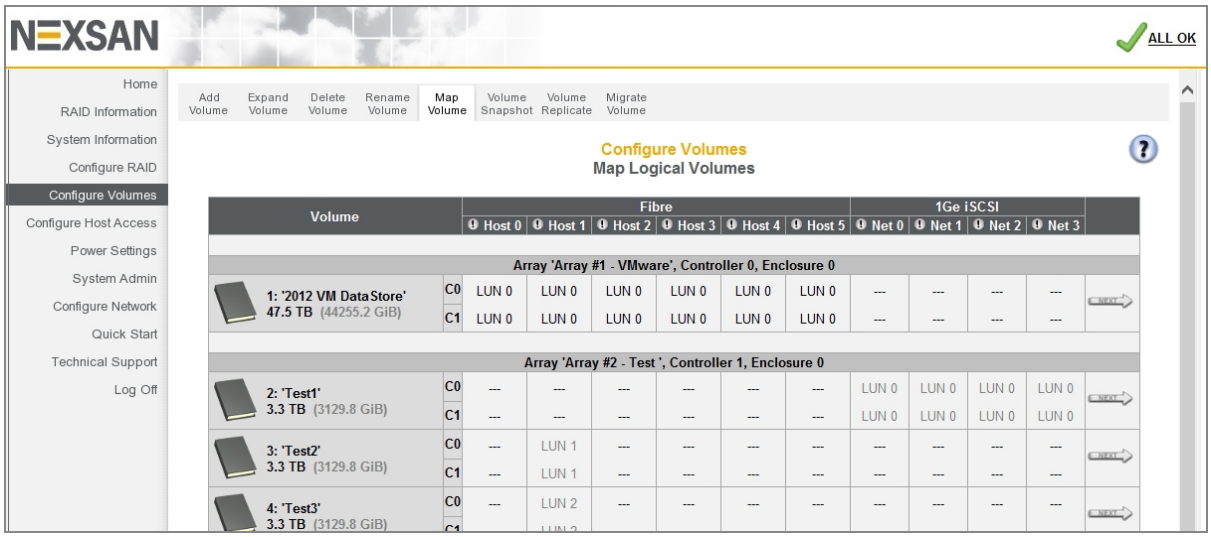
   Note The Quick Start makes volumes available right away, but the entire tuning operation and online array creation may take as long as several hours to complete, depending on the size and number of disk drives in the Nexsan Storage System. You can check the progress of the operation by going to **RAID Information > Progress**.

Select **Quick Start > Check List** to return to the *Quick Start Configuration Checklist*. Proceed to Volume Configuration and Access on the next page.

Volume Configuration and Access

Although default volume and host access configuration is performed during Basic or Expert Quick Start, you may wish to change settings for individual volumes. To do so, click the **Change Volume Mapping** button, at the bottom of the Quick Start Checklist. This takes you to the *Map Logical Volumes* page.

Figure 1-28: *Map Logical Volumes* page



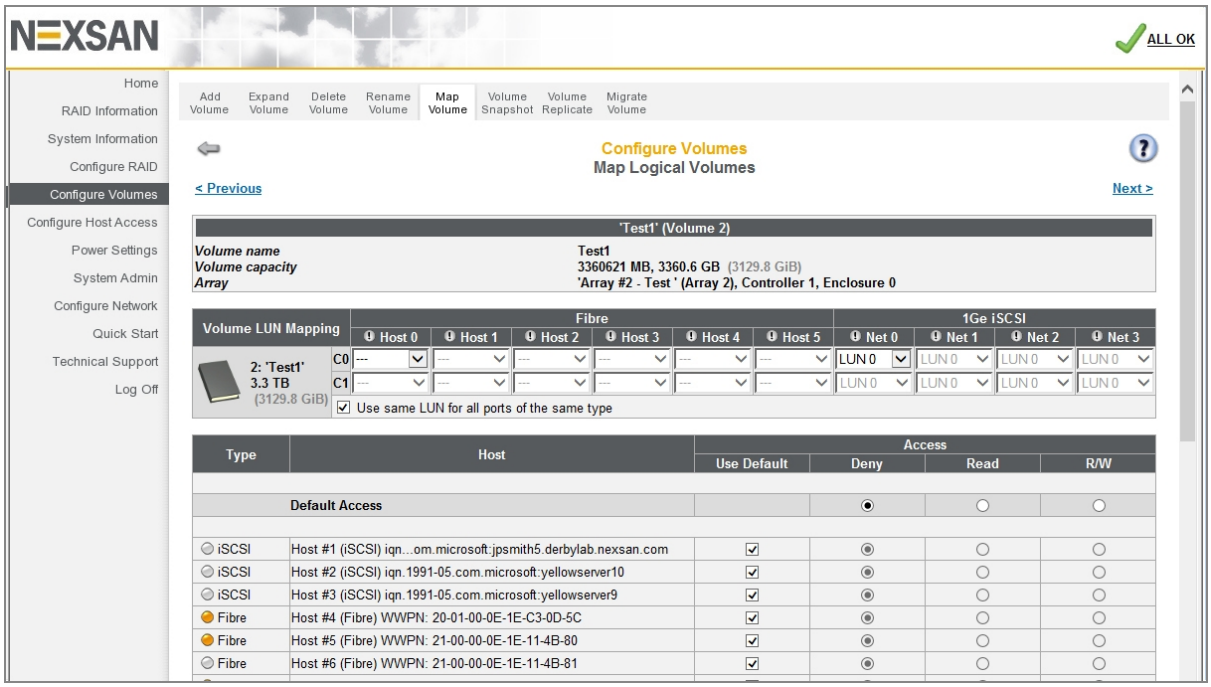
Each volume information section lists the volume number, current volume name, the array the volume belongs to, the controller that the array is assigned to, the enclosure (if there is more than storage system or storage expansion), the volume's capacity, and the volume's host port assignments (see Configure volumes on a RAID array on page 53).

► To map a volume to a logical unit number (LUN):

1. Click the **Next** button next to the volume you wish to map.

   The volume mapping tools are displayed:

Figure 1-29: Volume mapping tools



2. In the *Volume LUN Mapping* section, assign a logical unit number (LUN) for each port that the volume will be accessed through. Check the **Use same LUN for all ports of the same type** check box to have all Fibre Channel, SAS-to-Host, and 10Ge or 1Ge iSCSI ports use the same LUN mapping.
3. Set the **Default Access** (applied to new or unknown hosts) by selecting **Deny**, **Read**, or **R/W**:

   Table 1-30: Setting default access

Setting	Action
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

4. If at least one host group has been created (see Manage Host Groups on page 182), set the **Group Default** by checking or unchecking the box in the *Use Default* column:

   Table 1-31: Setting group default access

Setting	Action
Use Default	This is the default setting, and is the same as **Default Access**.
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

5. Set access privileges for individual hosts by checking or unchecking the box in the *Use Default* column:

   Table 1-32: Setting access privileges for individual hosts

Setting	Action
Use Default	When selected, the host or host group will use the **Group Default** setting (if the host is part of a group) or the **Default Access** setting (if the host is not part of a group). This is the default setting.
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

   Note If at any time you wish to return the *Map Logical Volumes* page to its initial state, click **Reset**.

6. When you have finished assigning host access privileges, click **Apply Changes**. A message displays, indicating that the settings have been saved.

For more information about volumes, see Configure Volumes on page 148. For more information about host access, see Configure Host Access on page 172.

When the Quick Start Configuration Check List is complete

When you have finished configuring the settings listed on the *Quick Start Configuration Check List*, do the following:

When the Quick Start Configuration Check List is complete:

1. Scroll to the bottom of the list.
2. Uncheck the **Show the configuration checklist on home page** check box.
3. Click **Close Checklist**.

   You are taken to the *Home* page (see Home page on page 65).

Chapter 2

Common Tasks

This chapter provides procedures for performing the most common Nexsan Storage System configuration tasks through the GUI.

This chapter contains the following sections:

Log in 48
Create a new RAID array 49
Configure volumes on a RAID array 53
Working with the Event Log 57
Update Firmware 59
Log off 59

Log in

When you enter your Nexsan Storage System IP address into the address field of your Web browser (or select the system in Nexsan Storage Manager and click **Manage System**—see Nexsan Storage Tools on page 253), the login page displays. The appearance of this page varies depending on which Nexsan Storage System you are logging in to, but **Click Here to Login** is always displayed:

Figure 2-1: Nexsan Storage System login screen



Clicking the **Click Here to Login** button does one of two things:

- If no password has been set up for the USER or ADMIN account (see Security on page 228), clicking the **Click Here to Login** button takes you to the *Home* page (see Home page on page 65).
- If a USER or ADMIN account password has been set up, clicking **Click Here to Login** opens a security dialog similar to the one illustrated below:

Figure 2-2: Windows Security login screen (example)



Enter the user name and password for either the USER or ADMIN account, then click **OK** to be taken to the *Home* page.

If you log in as ADMIN, you have access to all pages within the GUI. If you log in as USER, you have access to all information and status pages in the GUI, but are denied access to configuration pages.

Note Both the user name and password fields are case-sensitive. User names must be entered in all capitals (“ADMIN” or “USER”).

Create a new RAID array

Use this procedure if you need to create additional RAID arrays after initial setup.

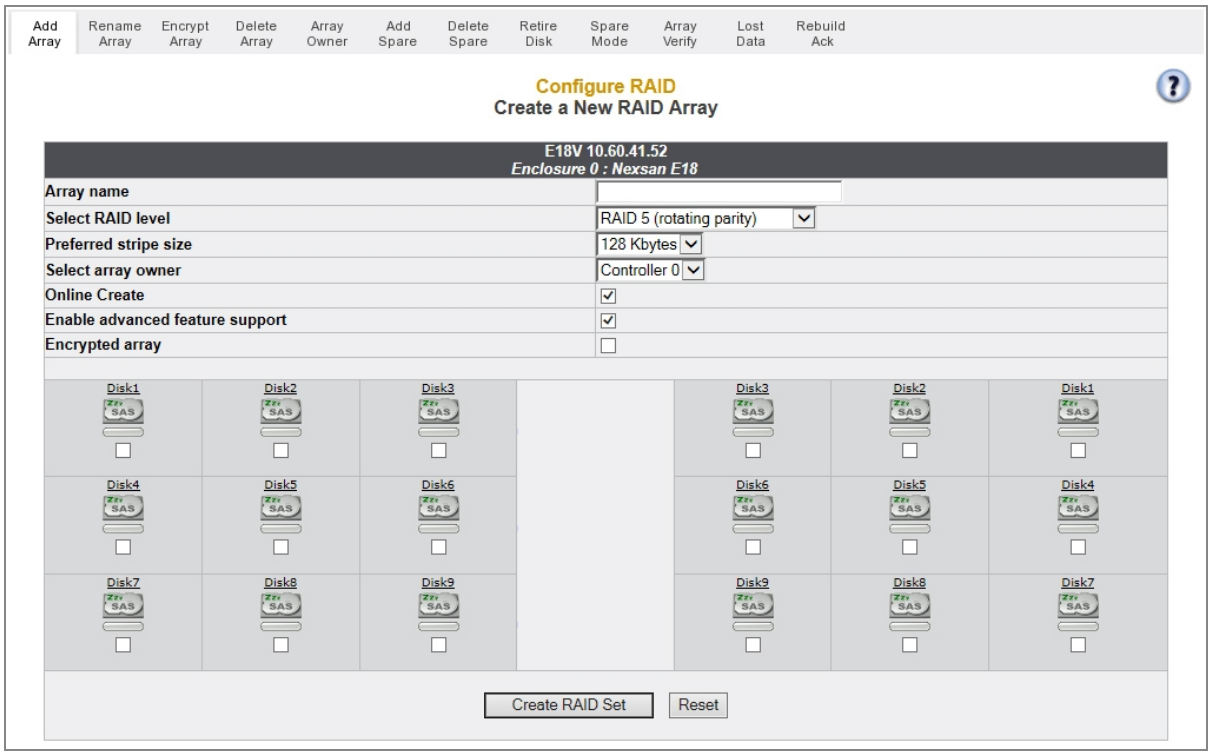
Notes:

- The array creation process takes many hours, depending on how many disks are in the array and whether you select **Online Create** in the creation tool. You can check the array construction progress by clicking **RAID Information > Progress** (see RAID Array Utility Progress on page 75).
- Before you begin, make sure you have enough available disk space to add a new array.

To create a new RAID array:

1. Click **Configure RAID > Add Array**. If your Nexsan Storage System has an attached Nexsan Storage Expansion, you are first prompted to select which storage system the new array will be built on. Make your selection and continue. The Create a New RAID Array page displays.

Figure 2-3: *Create a New RAID Array* page



2. Click the **Create RAID Set** button. The **Create a New RAID Array** tool displays.
3. Use Table 2-4: "RAID array creation tool settings" on the next page for help with completing the RAID array creation.

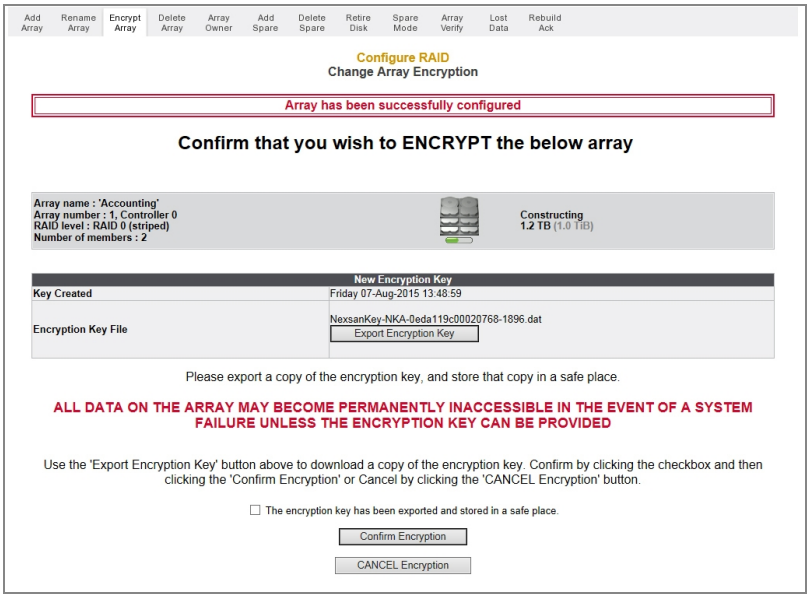
Table 2-4: RAID array creation tool settings

Setting	Action
Array name	Enter a name for the array. If this field is left blank, a default array name (**Array #*N***) is assigned. **Note** Array names can be changed on the *Rename RAID Arrays* page (see Rename RAID Arrays on page 126).
Select RAID level	Select the RAID level in the drop-down list. You can choose from the following: **RAID 0 (striped)** **RAID 1/1+0 (mirrored)** **RAID 4 (parity)** **RAID 5 (rotating parity)** (default) **RAID 5S (SSD parity)** **RAID 6 (rotating dual parity)** **RAID 6S (dual SSD parity)** **Notes:** • RAID 1+0, also known as RAID 10, is automatically configured when you select **RAID 1/1+0 (mirrored)** and use an even number of drives, with a minimum of four. • For more information on RAID levels, see Appendix C, RAID levels on page 267. • RAID 5S and RAID 6S are only available if SSDs are installed.
Preferred stripe size	Set the stripe size using the drop-down list. **128Kbytes** is the default and recommended setting, but you can also choose **64Kbytes**, **32Kbytes**, or **16Kbytes**. **Note** It is strongly recommended that you do not change this setting.
Select array owner	Set which controller will be the “owner” of this array (that is, the one that manages it under most circumstances) using the drop-down list.
Online Create	The box is checked by default. Do one of the following: • Leave it checked if you want to be able to access your volumes right away. This slows down the array creation process, and access to the volumes can be slow during this time. • Uncheck the box if you want to speed up the array creation process. This option makes your volumes unavailable until the array creation process is complete.

Setting	Action
Enable advanced feature support	The box is checked by default. **Note** This setting is NOT CHANGEABLE after initial configuration. Do one of the following: • Leave **Enable advanced feature support** checked if you want advanced features to be enabled for this array. This option creates two hidden volumes per array, one for the snapshot reservation and one for metadata. These count towards the per-storage system maximum of 254 volumes. • Uncheck the box if you want advanced features to be disabled for this array. **Notes:** • Each Nexsan Storage System (whether a single Nexsan Storage System or with Nexsan Storage Expansions attached) can contain a maximum of 32 individual arrays. • For detailed information regarding the snapshots and replication features, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.
Encrypted array	(E-Series only) If there are self-encrypting disks (SEDs) installed in the Nexsan Storage System, apply the **Encrypted array** option to encrypt the array immediately. Checking this box disables the check boxes below all disks that are not SEDs. Encrypting an array ensures that user data on disks that are removed from the Nexsan Storage System cannot be read without the corresponding encryption key. If this option is selected, you will be prompted to download the encryption key once the array has been created.
Select disks	Select each disk that you would like to include in the array (click the check box beneath each available disk). You must select a minimum of two disks for RAID 0 or RAID 1/1+0, a minimum of three disks for RAID 4 or RAID 5, or a minimum of four disks for RAID 6. **Notes:** • There is a section below the **Create RAID Set** button that enables you to select a section of disks all at once. Click the check box next to **Disk *N* through *N*** for each group of disks that you wish to select. • If at any time you wish to return the array creation tool to its initial state, click **Reset**.
Create RAID Set	Click the **Create RAID Set** button.

Setting	Action
Export Encryption Key	(E-Series only) If you are creating an encrypted array, the *Configure Array Encryption* page displays.

Figure 2-5: *Configure Array Encryption* confirmation page



Do the following:

a. Click the **Export Encryption Key** button to save the encryption key to your hard drive.

   Note When the encryption key for an encrypted array is changed, previous encryption keys cannot be used to restore access to the array. Export the new encryption key file and keep the backup in a secure place. If drives become inaccessible (for example, if they are removed from the chassis), you can restore access to the drives by uploading exported encryption key files. See Restore Encryption Keys on page 212.

b. Check the check box next to **The encryption key has been exported and stored in a safe place**.

c. Click the **Confirm Encryption** button.

Note If you decide that you do not wish to create an encrypted array, click the **CANCEL Encryption** button.

You are taken to the **Configure Logical Volume** page (see Configured Logical Volumes on page 76). The message Array has been successfully configured displays at the top of the page, along with an additional message:

- If you left the **Online Create** check box checked, the message displayed is *Performance will be degraded until tuning is completed*.
- If you unchecked **Online Create**, the message displayed is *Volumes will not be accessible until initialization is completed*.

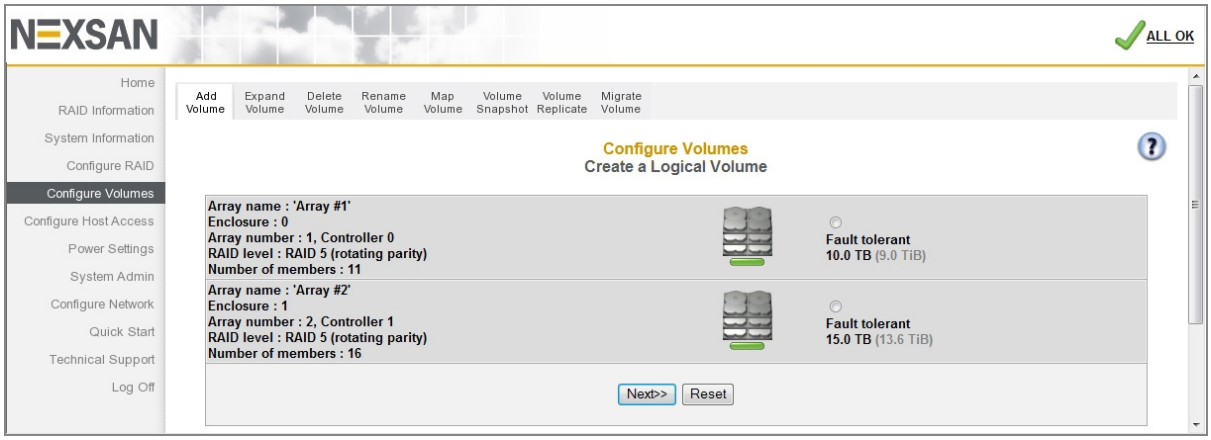
Configure volumes on a RAID array

Use this procedure to configure volumes on a RAID array.

► To add volumes to a RAID array:

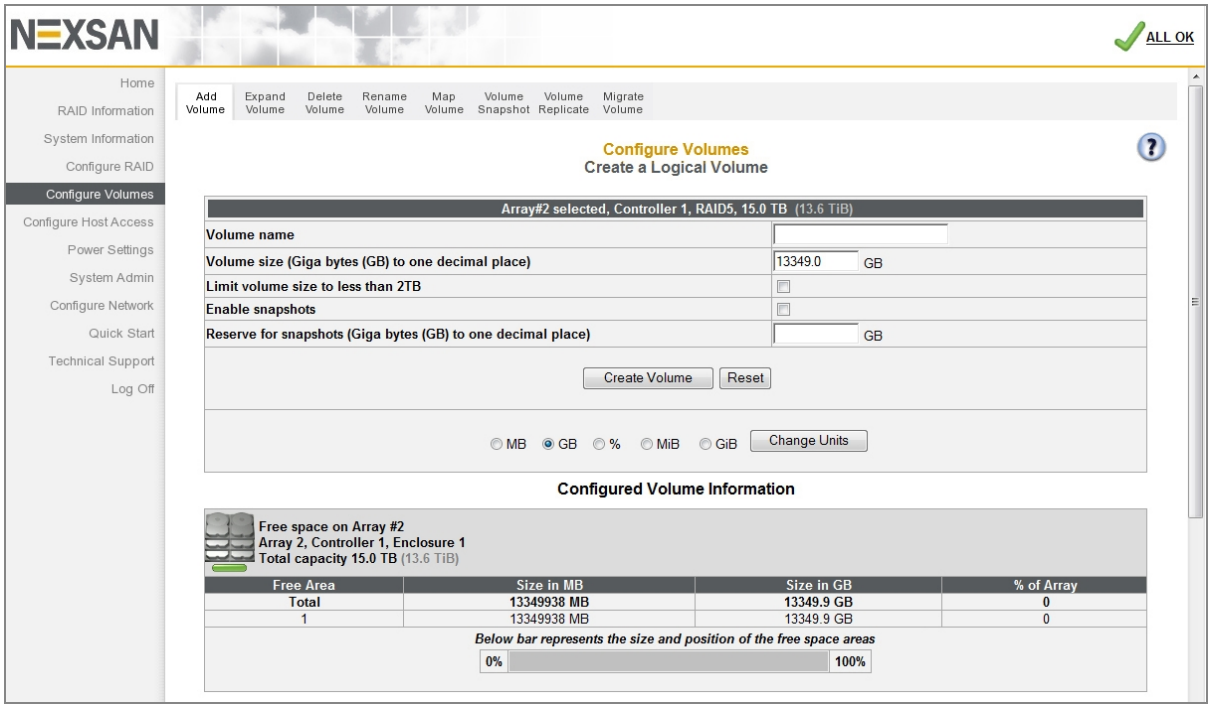
1. Click **Configure Volumes** in the navigation pane to go to the *Configure a Logical Volume* page.

Figure 2-6: *Configure a Logical Volume* array selection page



2. Select which RAID array you want to create volumes on by clicking its selection button.
3. Click **Next** to go to the volume creation tool.

Figure 2-7: *Create a Logical Volume* tool page



4. Enter the following information:

Table 2-8: Adding volumes to a RAID array

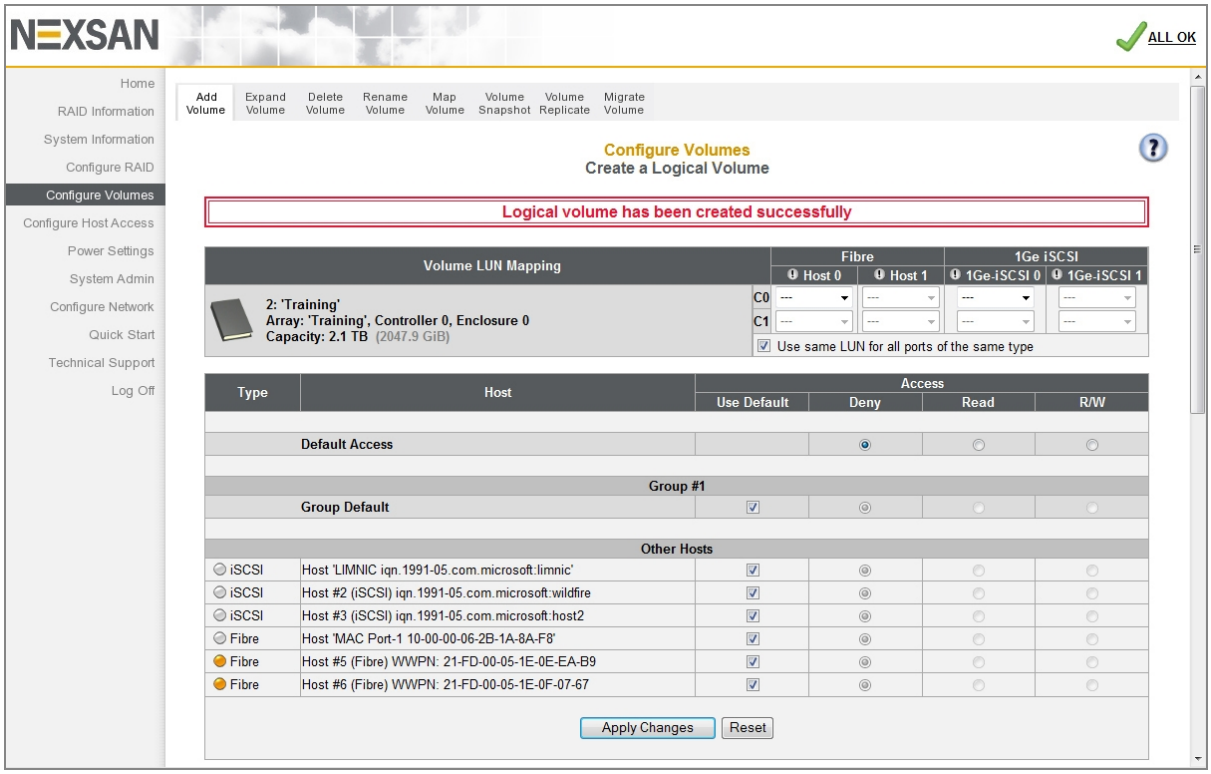
Setting	Action
Volume Name	Enter a name for the volume. Volume names can be up to 63 characters long. If this is the first volume configured for this array, the name defaults to the name of the array. If there are already volumes on the array, then the **Volume Name** field is blank.
Volume Size (*X* to one decimal place)	Enter the desired size of the new volume. The value of this field defaults to all of the remaining space left on the array. The Nexsan Storage System defaults to true gigabytes (GB), but this can be changed using the unit type selection buttons and **Change Units** button (located below the **Create Volume** and **Reset** buttons).
Limit volume size to less than 2TB	This option is unchecked by default. If your hosts do not support volumes of more than 2 terabytes (TB) in size, check this option. **Note** If you select this option, the value entered in **Volume Size (*X* to one decimal place)** must not exceed 2 TB, or else the volume will not be built and an error message will appear.
Enable snapshots	To enable snapshots (and replication) for this volume, leave this box checked. To disable snapshots for this volume, uncheck the box. On arrays that have advanced feature support enabled, (see Create a new RAID array on page 122), this option is checked by default. **Notes:** • If you disable snapshots for this volume, you can enable them later on the *Configure Volume Snapshots* page (see Configure Volume Snapshots on page 161). • For detailed information regarding the snapshots and replication features, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.
Reserve for snapshots (X to one decimal place)	Enter the desired size of the snapshot reserve. When **Enable snapshots** is checked, the value of this field defaults to approximately 25% of the value of **Volume Size (*X* to one decimal place)**. **Note** It is recommended that the snapshot reservation be set to approximately 25% of the volume size. See the *Nexsan High-Density Storage Snapshots and Replication User Guide* for more information.

Note If at any time you wish to return the *Create a Logical Volume* page to its initial state, click **Reset**.

5. When you have entered all of the required information, click **Create Volume**.

   A message is displayed, informing you that the volume as been created, and you are prompted to assign the logical unit numbers (LUNs) and host port access:

Figure 2-9: Volume mapping tool



6. In the *Volume LUN Mapping* section, assign a logical unit number (LUN) for each port that the volume will be accessed through. Check the **Use same LUN for all ports of the same type** check box to have all Fibre Channel, SAS-to-Host, and 10Ge or 1Ge iSCSI ports use the same LUN mapping.
7. Set the **Default Access** (applied to new or unknown hosts) by selecting **Deny**, **Read**, or **R/W**:

   Table 2-10: Setting default access

Setting	Action
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

8. If at least one host group has been created (see Manage Host Groups on page 182), set the **Group Default** by checking or unchecking the box in the *Use Default* column:

Table 2-11: Setting group default access

Setting	Action
Use Default	This is the default setting, and is the same as **Default Access**.
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

9. Set access privileges for individual hosts by checking or unchecking the box in the *Use Default* column:

Table 2-12: Setting access privileges for individual hosts

Setting	Action
Use Default	When selected, the host or host group will use the **Group Default** setting (if the host is part of a group) or the **Default Access** setting (if the host is not part of a group). This is the default setting.
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

Note If at any time you wish to return the *Map Logical Volumes* page to its initial state, click **Reset**.

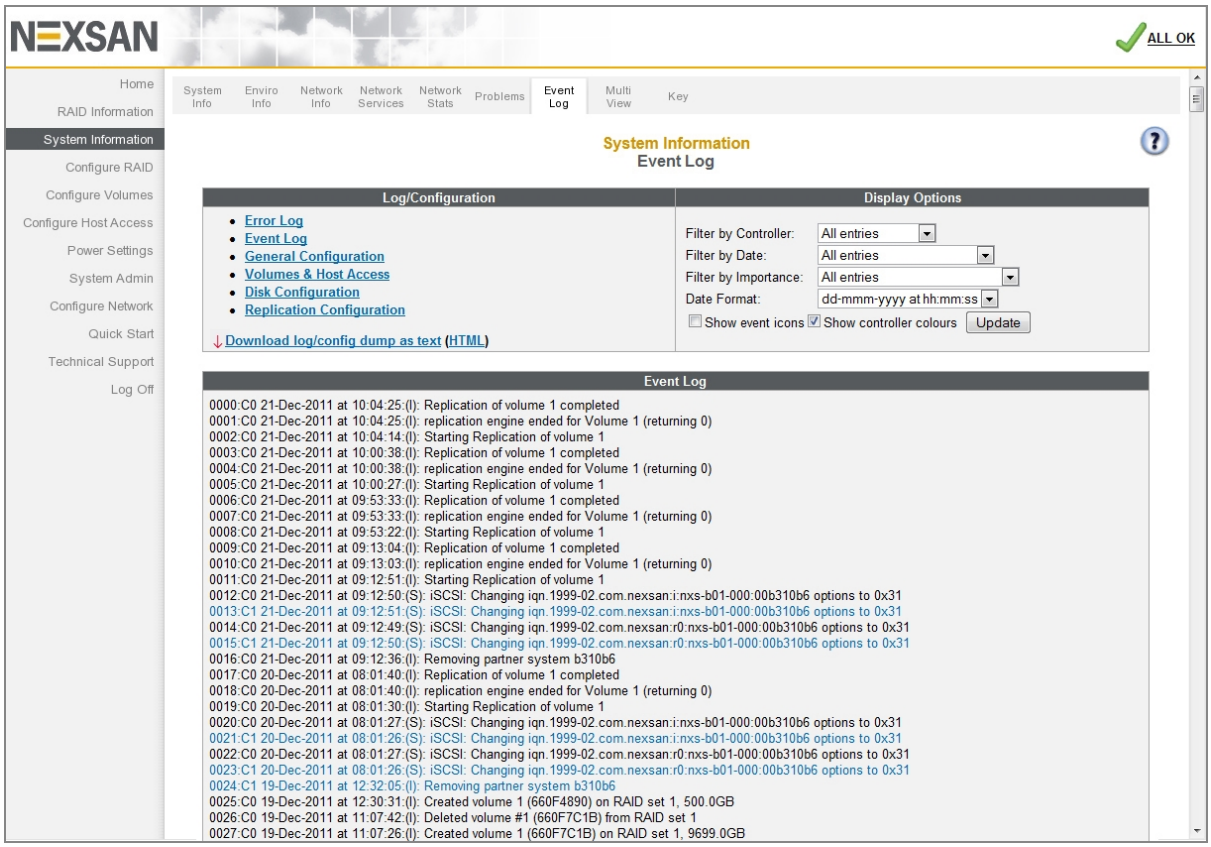
10. When you have finished assigning host access privileges, click **Apply Changes**. A message displays, indicating that the settings have been saved.

Note For more information about host access, see Configure Host Access on page 172.

Working with the Event Log

To view, manage, or download the system's event log, click **System Information** in the left navigation pane, then click **Event Log** in the top navigation bar to be taken to the *Event Log* page.

Figure 2-13: *Event Log* page



This log can be used to find information about configuration changes, data errors, hardware failures, and other events experienced by the Nexsan Storage System (and Nexsan Storage Expansion, if present).

Event log entries follow a standard format:

Figure 2-14: Event log entry format

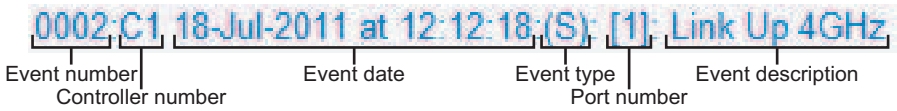


Table 2-15: Event log entry format description

Setting	Description
Event number	The reference number for the event, in reverse order of occurrence (event *0000* is the most recent event).
Controller number	The RAID Controller that the event is related to.

Setting	Description	
Event date	The date and time of the event's occurrence, in "dd-mmm-yyyy at hh:mm:ss" format.	
Event type	The broad category that the event falls into:	
	Error (E)	Serious problems that likely require user intervention. Examples include a failed disk, a RAID Controller going offline, or a fan problem.
	Warning (W)	Problems that may indicate an imminent failure, but are themselves unlikely to compromise data. Examples include excessive temperature, firmware errors, or disk block failures.
	Information (I)	Events that indicate items of interest to the user. Examples include array creation or deletion, verification scan start and stop, or a new disk being inserted.
	System (S)	Lower-level information events. Examples include port status, IP address changes, or array initialization messages.
Port number	For events that pertain to a particular port, the number of the port.	
Event description	A brief description of the event.	

Filtering and formatting the Event Log

The event log can be filtered and formatted using the controls under *Display Options*:

Table 2-16: Setting filters and formats for the Event Log

Setting	Description
Filter by Controller	Shows events for **Controller 0**, **Controller 1**, or both RAID Controllers.
Filter by Date	Shows events from the last day, week, or month; or show all entries.
Filter by Importance	Shows only error events (E); errors and warnings (E & W); errors, warnings, and information events (E, W, I); or all events (E, W, I, S).
Date Format	Shows dates in one of three formats: • **dd-mmm-yyyy at hh:mm:ss** (international format, the default) • **dd/mm/yyyy hh:mm:ss** (European format) • **mm/dd/yyyy hh:mm:ss** (North American format)
Show event icons	Display icons for each event category at the beginning of each event entry. Icons are color coded: pink for system events, blue for information events, yellow for warnings, and red for errors. This option is deselected by default. If **Show event icons** is selected, the event type is not displayed after the event date.

Setting	Description
Show controller colours	Display events for Controller 0 in black and events for Controller 1 in blue. This option is selected by default.

Viewing Only Errors

Clicking the **Error Log** link on the *Event Log* page displays only the error events (E) in the log.

Downloading Event Log Files

You can download the Event Log in text format by clicking the **Download log/config dump as text** link. You can download them as an HTML file by clicking the **HTML** link in parentheses next to it.

Update Firmware

From time to time, Nexsan issues updates to Nexsan Storage System firmware to introduce new features or to solve firmware-related issues. New firmware files can be acquired by clicking **System Admin > Update Firmware > Check for Updates** or from Nexsan Technical Support (see Technical Support on page 235). Usually, the new firmware file is compressed in a .zip archive and must be extracted before uploading.

See also Update Firmware on page 213

Log off

Use this procedure for detailed instructions for logging off from your Nexsan Storage System.

▶ **To log off of the system:**

1. Click the **Log Off** button in the left navigation pane.

   The logoff.asp page displays, with the message **Please shutdown your browser to log off**.

2. Close the browser to clear its cache and prevent unauthorized access to the storage system.

Chapter 3

The Graphical User Interface

This chapter describes each of the sections of the graphical user interface (GUI) and their functions. It contains the following sections:

Navigation and Status 62
Home page 65
RAID Information 71
System Information 99
Configure RAID 121
Configure Volumes 148
Configure Host Access 172
Power Settings 188
System Administration 197
Configure Network 217
Technical Support 235
Log Off 240

Navigation and Status

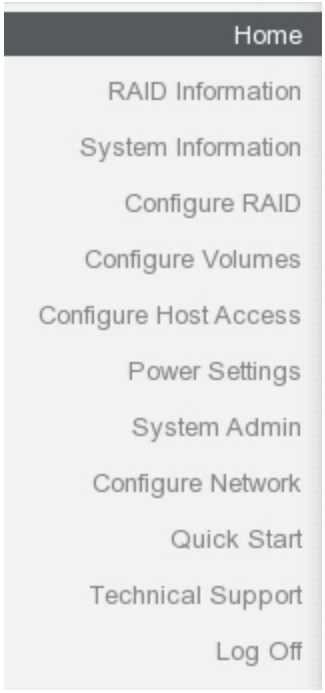
This section contains the following topics:

Navigation Menus 62
Status indicator 63

Navigation Menus

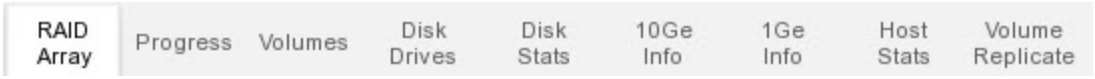
The main menu is located on the left side of each page and links to each section of the graphical user interface (GUI) for the Nexsan Storage System:

Figure 3-1: Nexsan Storage System left navigation panel



Each section (except the *Home* and *Login* pages) also has a navigation bar across the top.

Figure 3-2: Nexsan Storage System top navigation bar (example)



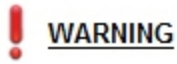
These are different for each section of the GUI.

Status indicator

The upper right corner of the GUI displays a storage system status indicator. When the storage system is operating within specifications, this indicator displays ALL OK with a green check mark.



When an environmental reading is outside of specified limits, but no failure has yet occurred, this indicator displays WARNING with a red exclamation point.

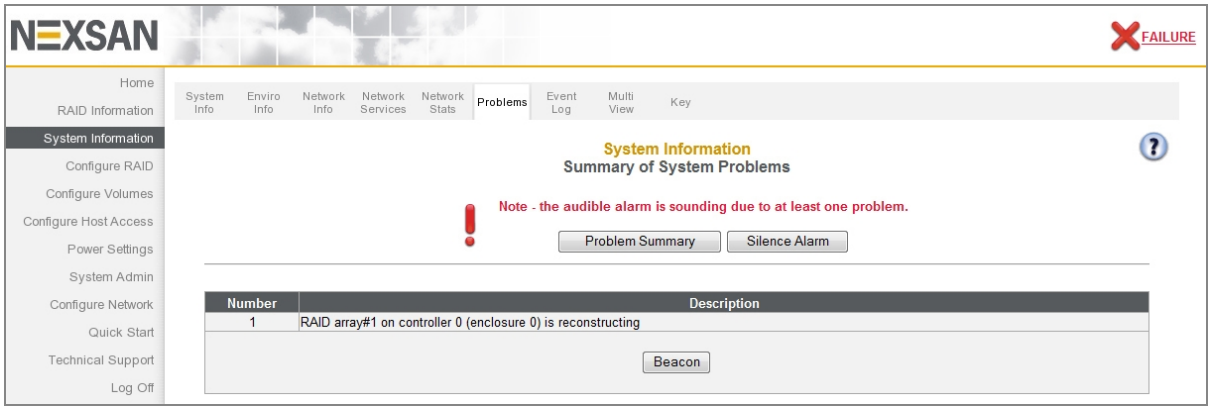


If a module fails, this indicator displays FAILURE with a red X.



Click the WARNING or FAILURE indicator to be taken to the *Summary of System Problems* page (see Summary of System Problems on page 111 for more information).

Figure 3-3: *Summary of System Problems* page



When an array has been rebuilt or data has been lost after the storage system has recovered from a failure, the indicator displays a red exclamation point next to the ALL OK indicator.



Click the exclamation point to be taken to the *Lost Data/Bad Blocks* page (see Lost Data/Bad Blocks on page 145) or the *Acknowledge Rebuild* page (see Acknowledge Rebuild on page 146).

Figure 3-4: *Lost Data/Bad Blocks* page

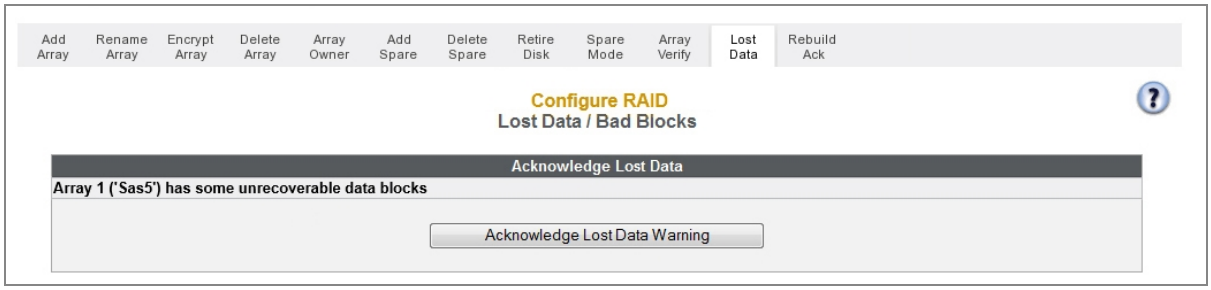
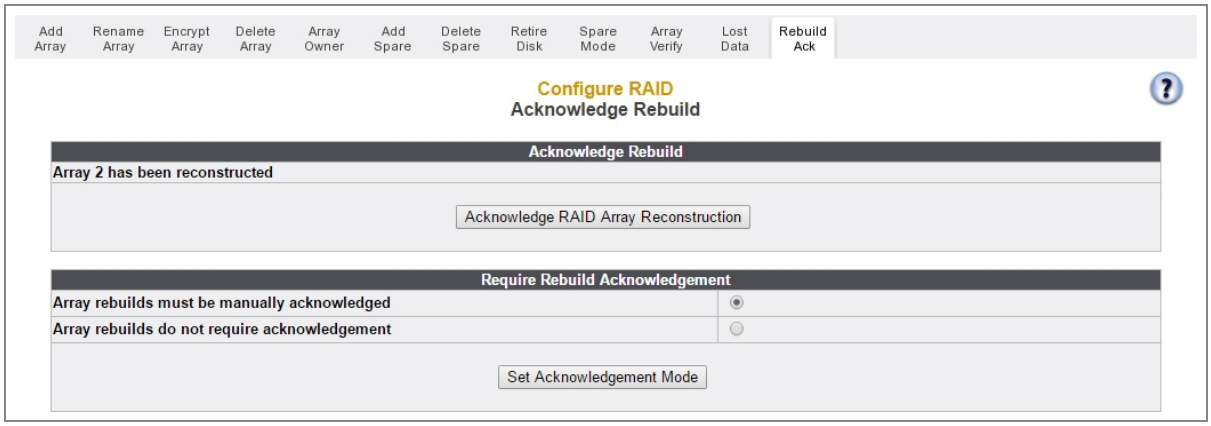


Figure 3-5: *Acknowledge Rebuild* page



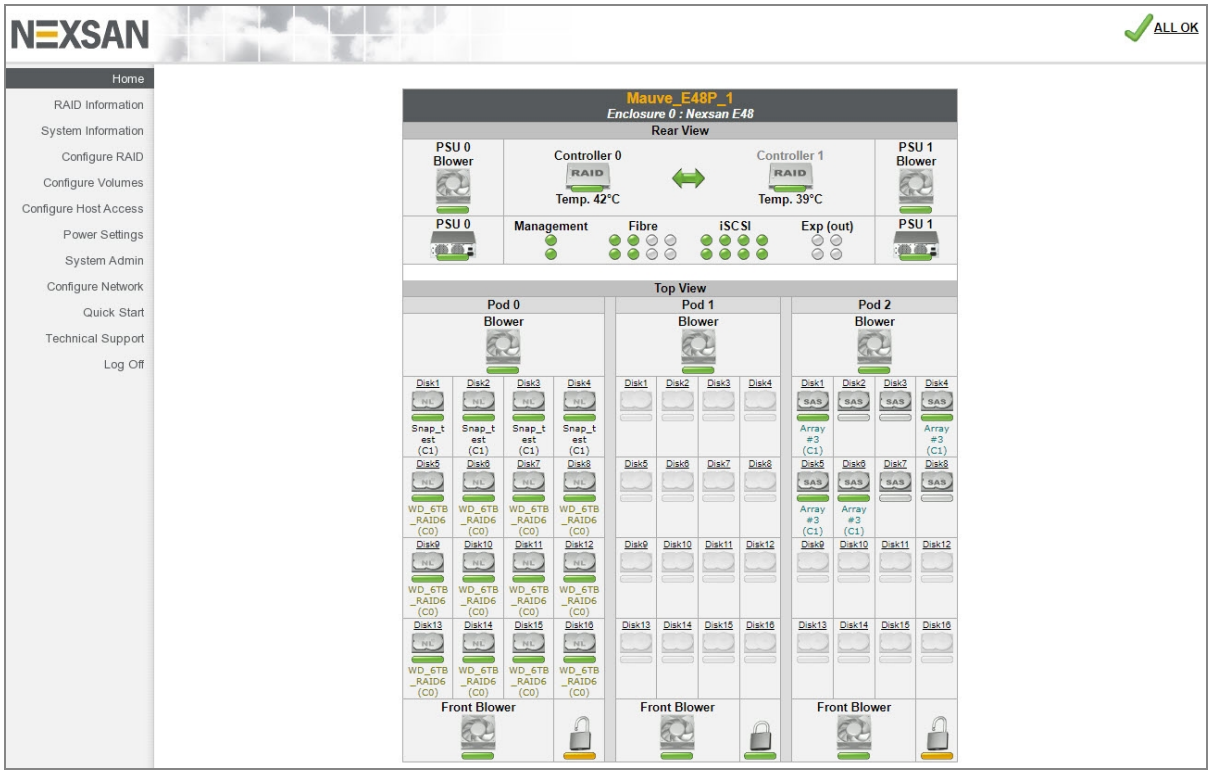
Home page

The *Home* page provides a quick summary of the state of your Nexsan Storage System and all of its modules. Its appearance depends on whether you are connecting to a single Nexsan Storage System or to a Nexsan Storage System with one or more Nexsan Storage Expansions.

Single Nexsan Storage System

When you are viewing a single Nexsan Storage System, the *Home* page displays a diagram of the storage system with icons for each component.

Figure 3-6: Nexsan Storage System *Home* page (example, single storage system)



Each icon indicates the associated component's current status. Generally:

- A green status bar indicates that the associated component is functioning correctly.
- A flashing red status bar indicates that the associated component has failed or is indicating a fault.

Some icons can indicate additional states, depending on the component:

- Black text above a **Controller** icon indicates the controller currently accessing the system's GUI. The other controller is indicated by gray text above the icon. To switch between the two, click the icon with the gray text.
- Text beneath each **Controller** icon indicates the current temperature of that RAID Controller.

- The **Management**, **1Ge iSCSI**, **Host**, and **Exp (out)** icons can indicate several states:

  Table 3-7: Host/port cons

Icon	Description
	Green indicates that the host/port is connected.
	Gray indicates that the host/port is not connected or is offline.
	Red indicates that the host/port is on a failed RAID Controller.

In Figure 3-6 on page 65, the host icon is labeled "Fibre," as the controller contains a Fibre HBA.

Disk icons indicate the disk's type and state. See Disk Information on page 81.

Additionally, clicking on any **Disk** icon takes you to that drive's *Disk Information* detail page (see Disk Information on page 81).

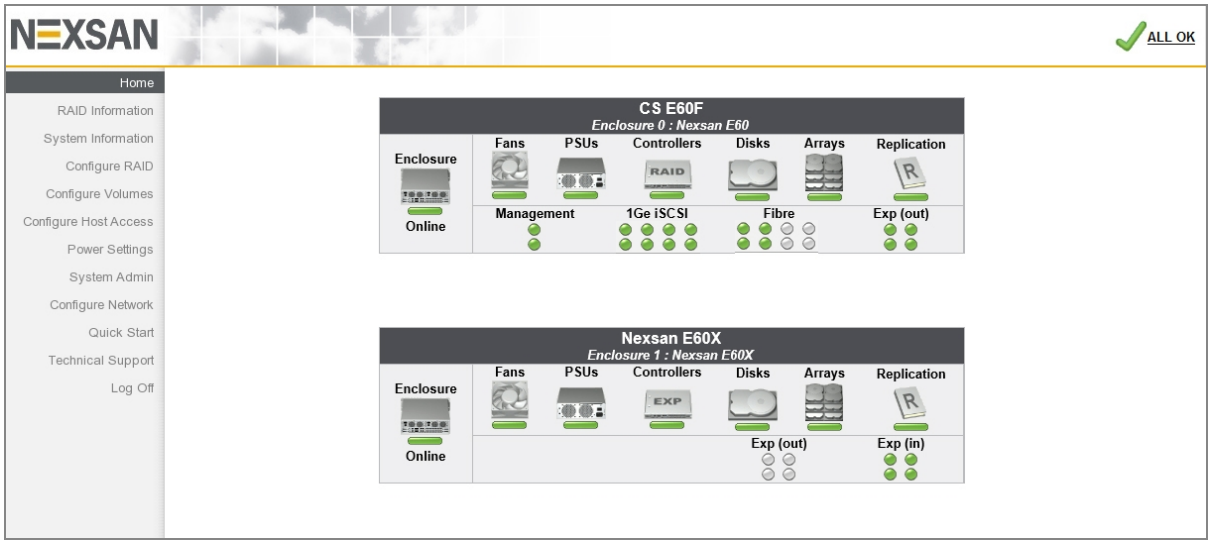
On Nexsan Storage Systems with active drawers (Nexsan E-Series Storage Systems), each drawer has a lock icon:

- A closed lock icon with a green status bar indicates that the drawer is locked.
- An open lock icon with a yellow status bar indicates that the drawer is unlocked.

Nexsan Storage System with Nexsan Storage Expansions

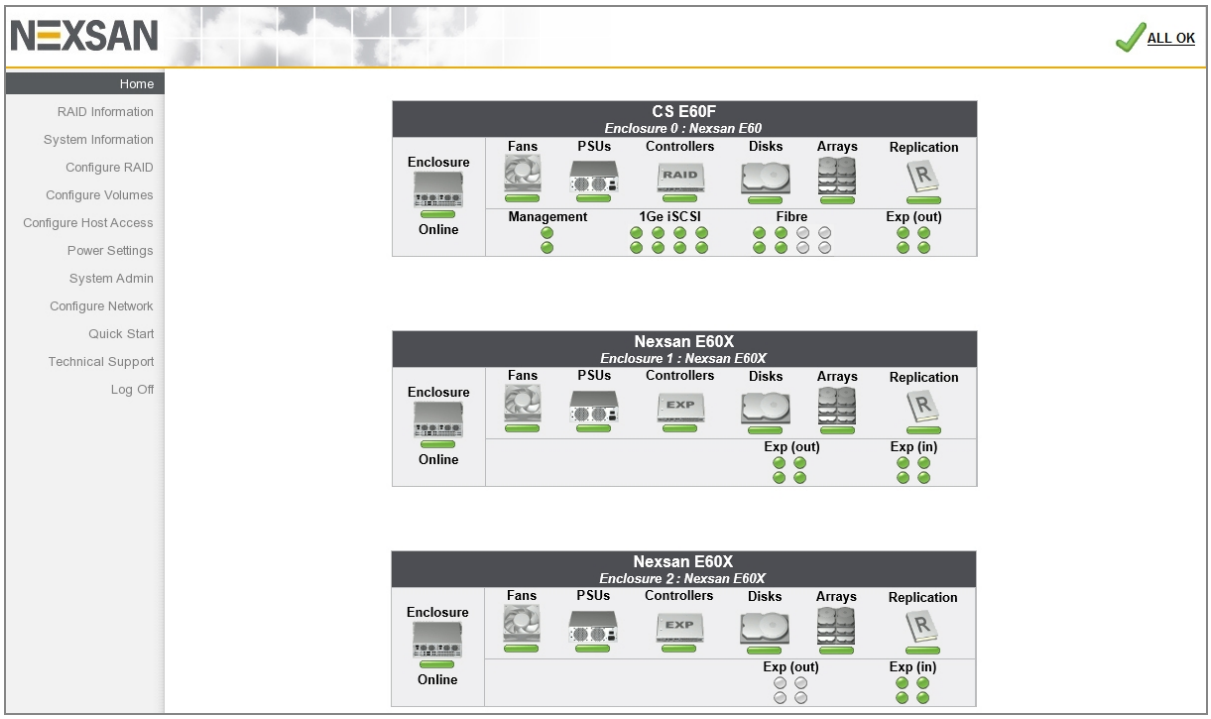
When you are viewing a Nexsan Storage System with attached Nexsan Storage Expansions, the *Home* page displays a summary diagram of each enclosure, with icons for each subsystem. If the system has one attached Nexsan Storage Expansion, the *Home* page looks like this:

Figure 3-8: Nexsan Storage System *Home* page (example, one Nexsan Storage Expansion)



If the system has two attached Nexsan Storage Expansions, the *Home* page looks like this:

Figure 3-9: Nexsan Storage System *Home* page (example, two Nexsan Storage Expansions)



Each icon indicates the status of the components within each subsystem. Generally:

- A green status bar indicates that the associated component is functioning correctly.
- A flashing red status bar indicates that the associated component has failed or is indicating a fault.

Some icons can indicate additional states, depending on the subsystem:

- The text beneath the **Enclosure** icon indicates whether the Nexsan Storage System is online or offline.
- The **Arrays** icon can indicate several states:

Table 3-10: Array icons

Icon	Description
	**Fault tolerant array**: A green status bar indicates that all arrays are functioning correctly and are fault-tolerant.
	**Array under construction**: A moving green status bar indicates that one or more arrays are being constructed.
	**Array critical**: A status bar alternating amber and red indicates that one or more arrays are in a critical state.
	**Array rebuilding**: A status bar alternating green and amber indicates that one or more arrays are being rebuilt.
	**Array offline**: A red icon with a flashing red status bar indicates that one or more arrays are offline or have failed.

The **Management**, **1Ge iSCSI**, **Host**, and **Exp** (in or out) icons can indicate several states:

Table 3-11: Management, 1Ge iSCSI, Host, and Exp icons

Icon	Description
	Green indicates that the host/port is connected.
	Gray indicates that the host/port is not connected or is offline.
	Red indicates that the host/port is on a failed RAID Controller.

In Figure 3-8 and Figure 3-9, the host icon is labeled "1Ge iSCSI", as the controllers contain 1Ge iSCSI HBAs.

Additionally, each icon (except **Exp**) is a link to its associated subsystem:

Table 3-12: Storage System Home page icons

Icon	Description
Enclosure	Links to the status page for that physical Nexsan Storage System, which is identical to the status page for a single storage system (see Single Nexsan Storage System on page 65).
Fans, **PSUs**, **and Controller icons**	Link to the *Environmental Information* page (see Environmental Information on page 102).
Disks	Links to the *Disk Information* page (see Disk Information on page 81).
Arrays	Links to the *RAID Array Information* page (see RAID Array Information on page 72).
Replications	Links to the *Replica Information* page (see Replication Information on page 97).
Management	Links to the *Network Information* page (see Network Information on page 105).
1Ge iSCSI	Links to the *1Ge iSCSI Information* page (see 1Ge iSCSI Information on page 94).
Host	Links to the *Fibre/SAS/10Ge Information* page (see Fibre Channel Information on page 88, SAS Information on page 90 or 10Ge iSCSI Information on page 91,

Alarms and warnings

If a failure occurs, the top of the *Home* page contains an alarm statement and extra buttons.

Problem Summary and Silence Alarm buttons

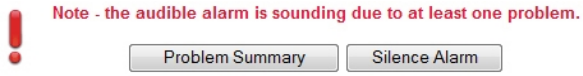


Table 3-13: Problem Summary and Silence Alarm buttons

Button	Description
Problem Summary	Takes you to the *Summary of System Problems* page (see Summary of System Problems on page 111).
Silence Alarm	Silences the audible alarm on the Nexsan Storage System. A message displays, indicating that the alarm has been silenced. Click the **Back** button to return to the *Home* page. **Note** If further problems occur, the audible alarm will sound again.

Acknowledge Array Reconstruction button

When an array has been rebuilt following a failure, the top of the *Home* page contains a rebuild statement and the **Acknowledge Array Reconstruction** button:

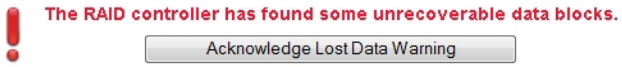


Action

Click the **Acknowledge Array Reconstruction** button to acknowledge the rebuilt array. A message displays, stating that the rebuild has been acknowledged (see Acknowledge Rebuild on page 146).

Acknowledge Lost Data Warning button

When data in an array has been lost following a failure, the top of the *Home* page contains a data loss statement and the **Acknowledge Lost Data Warning** button:



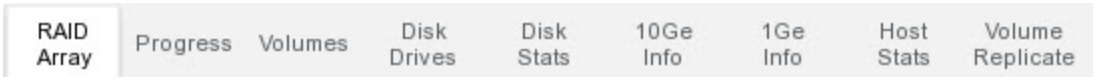
Action

Click the **Acknowledge Lost Data Warning** button to acknowledge the data loss. A message displays, stating that the data loss has been acknowledged (see Lost Data/Bad Blocks on page 145).

RAID Information

Clicking **RAID Information** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-14: *RAID Information* navigation bar (10GbE iSCSI)



For SAS and Fibre Channel variants of the navigation bar, see For SAS and Fibre-Channel Storage Systems below.

Refer to Table 3-15 for help with the Nexsan E-Series/BEAST RAID information:

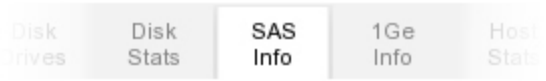
Table 3-15: RAID information pages

Nav bar button	GUI pages and documentation links
RAID Array	RAID Array Information on the next page
Progress	RAID Array Utility Progress on page 75
Volumes	Configured Logical Volumes on page 76
Disk Drives	Disk Information on page 81
Disk Stats	Disk Statistics on page 87
10Ge Info	10Ge iSCSI Information on page 91
1Ge Info	1Ge iSCSI Information on page 94
Host Stats	Host Statistics on page 96
Volume Replicate	Replication Information on page 97

For SAS and Fibre-Channel Storage Systems

On Nexsan E-Series Storage Systems configured for SAS-to-Host, the navigation bar includes a **SAS Info** tab. See SAS Information

Figure 3-16: *RAID Information* navigation bar (SAS)



On Nexsan E-Series Storage Systems configured for Fibre Channel-to-Host, the navigation bar includes a **Fibre Info** tab. See Fibre Channel Information.

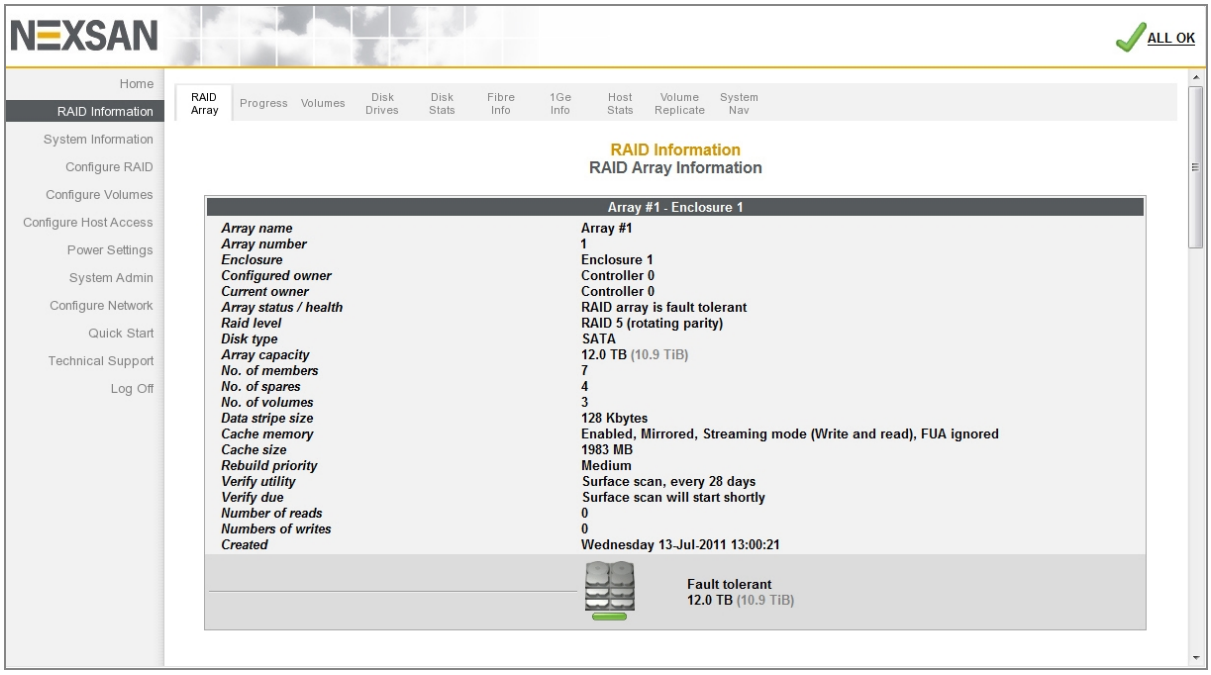
Figure 3-17: *RAID Information* navigation bar (Fibre Channel)



RAID Array Information

Clicking **RAID Information** takes you to the *RAID Array Information* page, which displays summary information for each array that has been configured on the Nexsan Storage System. This includes arrays that are being constructed or rebuilt.

Figure 3-18: *RAID Array Information* page



There is an information block for each array, which contains the following information:

Table 3-19: RAID Array Information

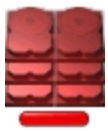
Label	Description
Title bar	The *Array name*, *Array number*, and *Enclosure*.
Array name	The user-defined name of the array. If no name has been assigned, this item defaults to *Array #n*, where *n* is the *Array number*. The name can be changed on the *Rename RAID Arrays* page (see Rename RAID Arrays on page 126).
Array number	Reference number for the array, assigned in order of creation.
Enclosure	Reference number of the enclosure that houses the disks that make up this array. *Enclosure 0* is the storage system; *Enclosure 1* is the first Nexsan Storage Expansion; and *Enclosure 2* is the second Nexsan Storage Expansion.
Configured owner	Displays the RAID Controller to which this array is assigned. Can be changed on the *RAID Array Ownership* page (see RAID Array Ownership on page 133).

Label	Description
Current owner	Displays the RAID Controller that is currently controlling this array. This may differ from *Configured owner* if the assigned RAID Controller is restarting or has failed.
Array status/health	Displays the current status of the RAID array: fault tolerant, not fault tolerant, constructing, critical, rebuilding, or offline. Arrays that were created "online" (see Create a new RAID array on page 122) also display the *Tuning* progress. If the array is encrypted (see Configure Array Encryption on page 127), then *Encrypted* is also displayed here. If an array verification is currently being performed (see Verify RAID Array on page 141), the progress of the scan is also displayed here.
RAID level	Displays the RAID level that this array is configured for. See Appendix C, RAID levels on page 267 for more information.
Disk Type	Displays the type of disks used for this array. This can be SATA, SAS, or SSD.
Array capacity	Displays the total data storage space of the array, in true terabytes (TB) followed by binary terabytes (TiB).
No. of members	The number of disks that make up the array.
No. of spares	The total number of spares available for the array. This includes both pool spares and dedicated spares. New spares can be added on the *Add Hot Spare* page (see Add Hot Spare on page 134).
No. of volumes	The number of configured volumes in this array.
Data stripe size	The size of the individual data stripes in this array.
Cache memory	Indicates whether the cache is enabled, its mirroring status, its streaming mode, and its FUA status.
Cache size	The total size of the cache, in megabytes (MB).
Rebuild priority	Displays the configured rebuild priority, ranging from Lowest to Highest. This controls the amount of resources that a RAID Controller assigns to rebuilding the array versus handling host data requests. See Configure Rebuild Priority on page 206 for more information.
Verify utility	Displays the user-configured verification tests for this array, as well as how often they are run. Verification tests are configured on the *Verify RAID Array* page (see Verify RAID Array on page 141).

Label	Description
Verify due	The date and time of the next scheduled verification, formatted as “Day-of-week DD-Mmm-YYYY HH:MM”. If the verification is scheduled to begin within a few hours, this displays *[Verification test] will start shortly*. If the verification is currently running, it displays *[Verification test] is currently active*. You can run a RAID array verification at any time by going to the *Verify RAID Array* page and clicking the **Start** button (see Verify RAID Array on page 141).
No. of reads	Displays the number of reads from the array.
No. of writes	Displays the number of writes to the array.
Created	Displays the date and time that the array was created, formatted as “Day-of-Week DD-Mmm-YYYY HH:MM”.

The bottom area displays the array status icon, the *Array status/health*, and the *Array capacity*. The array status icon can indicate several states:

Table 3-20: Array icons

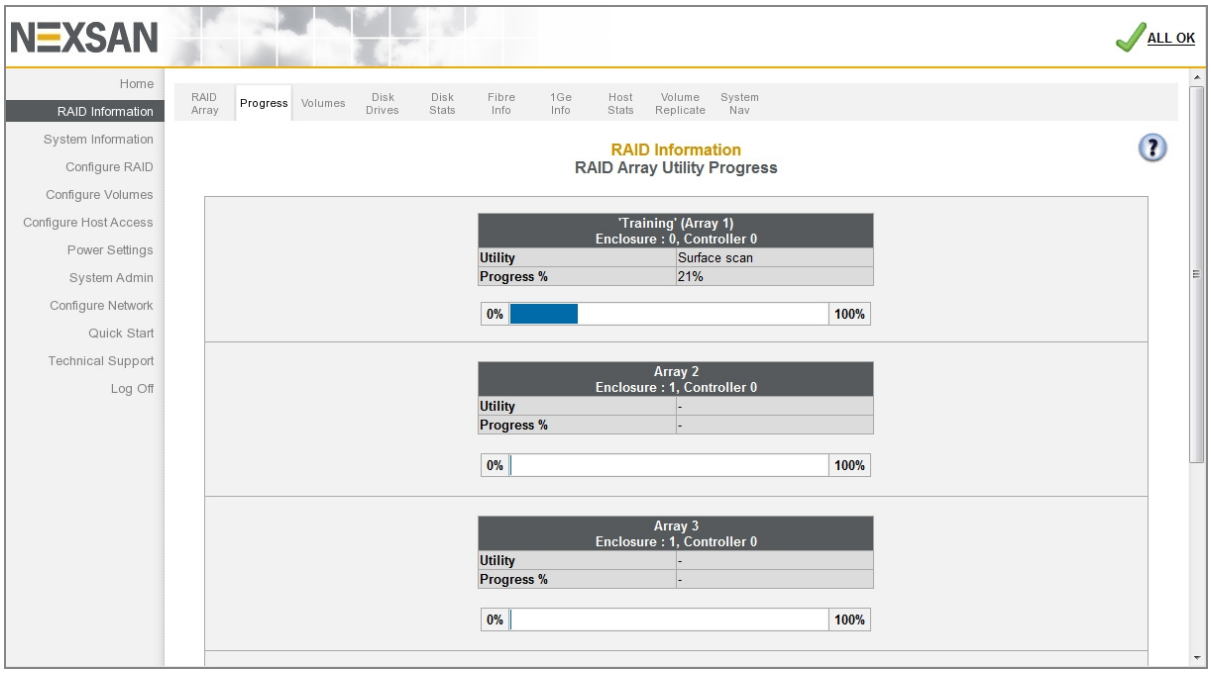
Icon	Description
	**Fault tolerant array**: A green status bar indicates that all arrays are functioning correctly and are fault-tolerant.
	**Array under construction**: A moving green status bar indicates that one or more arrays are being constructed.
	**Array critical**: A status bar alternating amber and red indicates that one or more arrays are in a critical state.
	**Array rebuilding**: A status bar alternating green and amber indicates that one or more arrays are being rebuilt.
	**Array offline**: A red icon with a flashing red status bar indicates that one or more arrays are offline or have failed.

New arrays can be created on the *Create a New RAID Array* page (see Create a new RAID array on page 122). Arrays can be deleted on the *Delete a RAID Array* page (see Delete a RAID Array on page 132).

RAID Array Utility Progress

Clicking **RAID Information > Progress** takes you to the *RAID Array Utilities Progress* page, which displays the progress of active RAID array utilities.

Figure 3-21: *RAID Array Utilities Progress* page



Processes that can be viewed on this page are:

Table 3-22: RAID Array Utility Progress fields

Setting	GUI pages and documentation links
Array construction/tuning	Create a new RAID array on page 122
Array reconstruction	Configure Rebuild Priority on page 206
Disk retirement	Retire Disk on page 137
Surface scan	Verify RAID Array on page 141
Parity scrub	

Configured Logical Volumes

Clicking **RAID Information > Volumes** takes you to the *Configured Logical Volumes* page, which displays the configured volumes for each array.

Figure 3-23: *Configured Logical Volumes* page

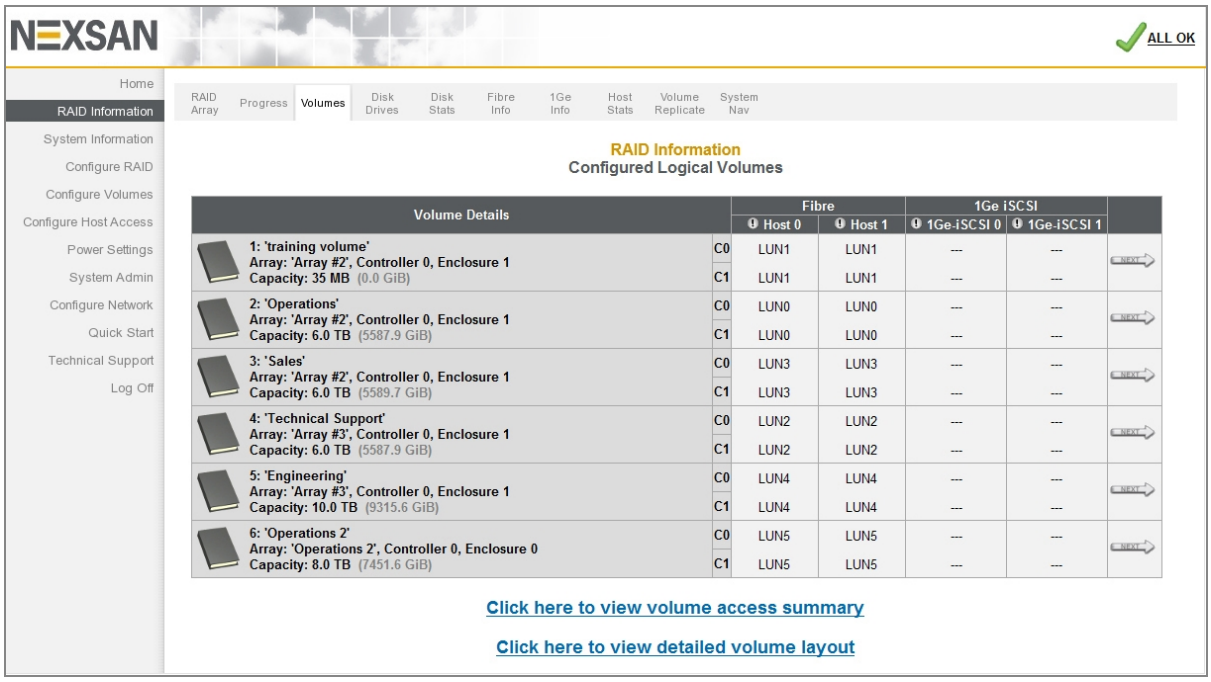


Table 3-24: Configured Logical Volumes information

Column	Description
Volume Details	Displays the volume number, volume name, the array to which it is assigned, the number of the controller to which the array is assigned, the storage system that the array is in (if this is a Nexsan Storage System with one or more Nexsan Storage Expansions), and the total capacity of the volume. The volume name can be changed on the *Rename Logical Volumes* page (see Rename Logical Volumes on page 157). If there is room left in the array, the total capacity of the volume can be expanded on the *Expand a Logical Volume* page (see Expand a Logical Volume on page 154).
Fibre (or *SAS* or *10GE*) and *1Ge iSCSI*	Display the host port configurations and LUN mappings. The LUN mappings can be changed on the *Map Logical Volumes* page (see Map Logical Volumes on page 158).

Clicking the **Next** button beside a volume takes you to the details page for the volume.

Figure 3-25: *Configured Logical Volumes* detail page

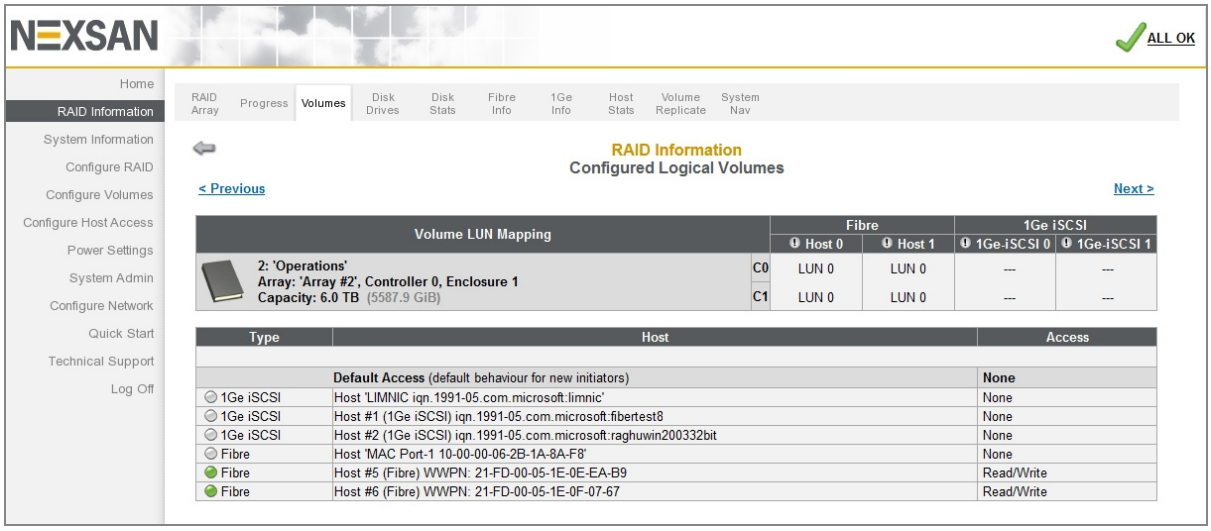


Table 3-26: Configured Logical Volumes details

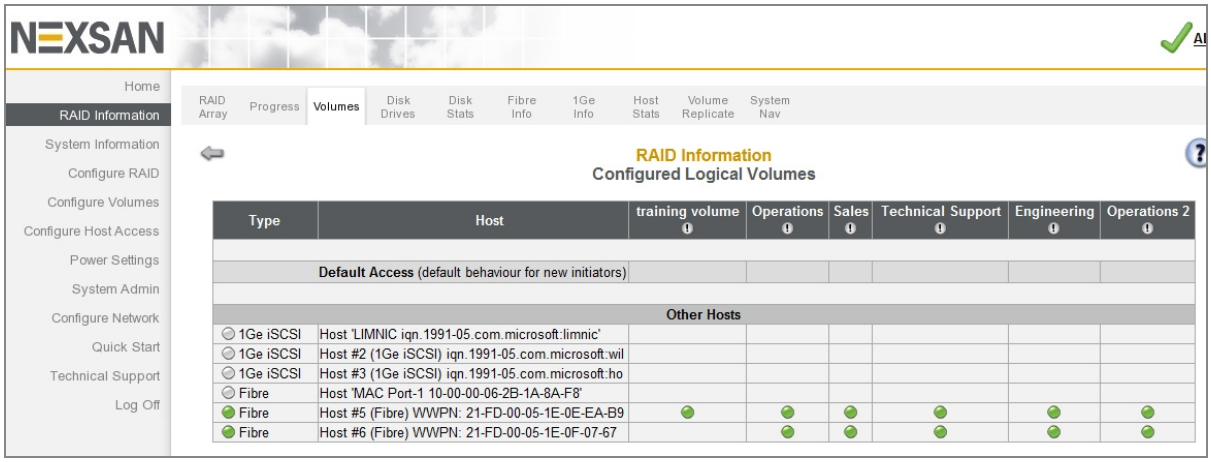
Column	Description
Volume LUN Mapping	Displays volume LUN mapping information: the LUN name and total capacity.
Type	Displays the kind of host link (Fibre/SAS/10GE or 1Ge iSCSI) and its status: • green for connected • yellow for connected but with no LUNs assigned • gray for disconnected or offline.
Host	Displays the host number or name, and its type and connection.
Access	Displays the kind of access the host has to the volume: *None*, *Read*, or *Read/Write*. You can change access on the *Host Access* page (see Configure Host Access on page 172).

You can create volumes on the *Add Volume* page (see Create a Logical Volume on page 149) and delete them on the *Delete Volume* page (see Delete a Logical Volume on page 156).

Volume Access Summary

If you click the **Click here to view volume access summary** link at the bottom of the main *Configured Logical Volumes* page, it takes you to a summary page that displays which hosts have access to which volumes.

Figure 3-27: *Configured Logical Volumes* access summary page



There are columns for *Type*, *Host*, and each configured volume in the system. There are rows for *Default Access*, *Groups* (if any), and each Host connection.

The icons in the volume columns indicate the access privileges each host has to that volume, as described in the following table.

Table 3-28: Status icons

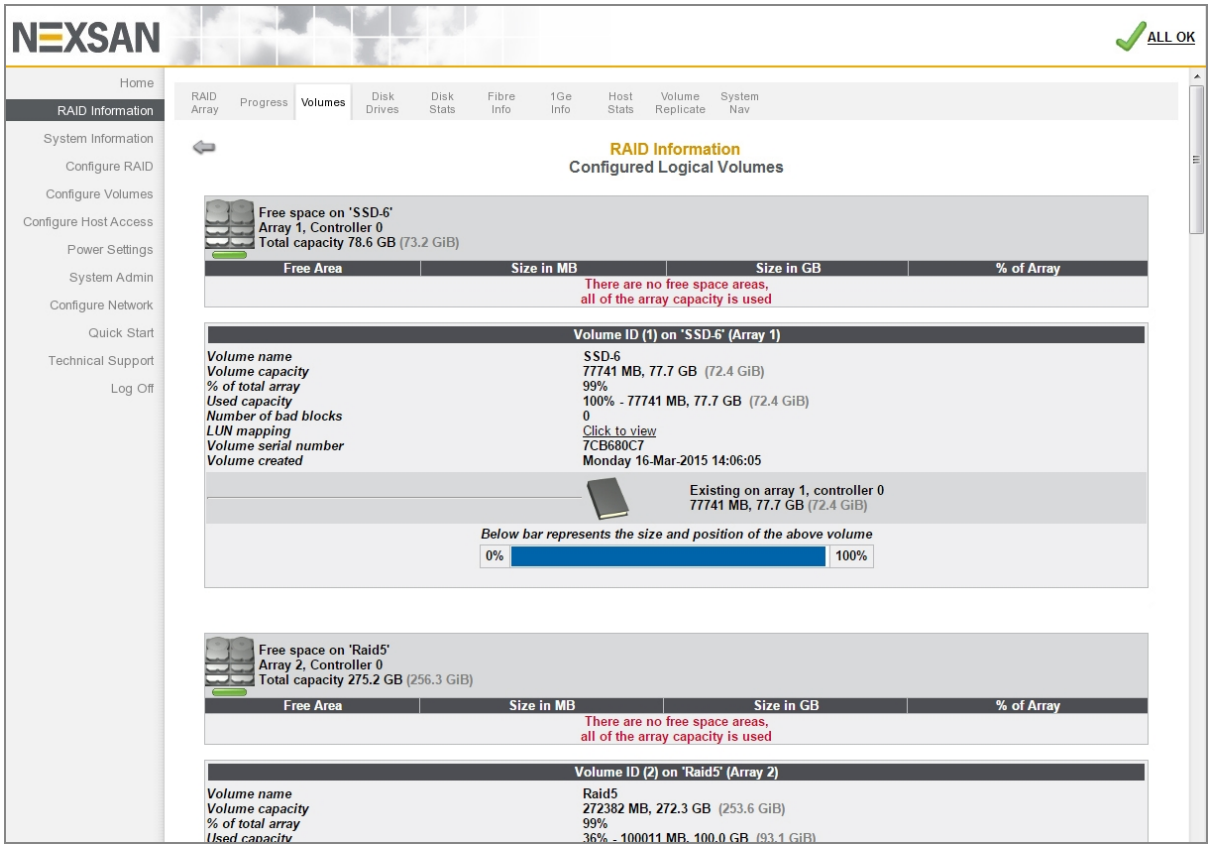
Icon	Description
–	No icon indicates no access.
	A green icon on a gray background indicates Read/Write access.
	An amber icon on a gray background indicates Read/Write access, but the host is not connected to a port with a logical unit number (LUN) mapping.
	A gray icon on a gray background indicates Read/Write access, but that the host is disconnected or offline.
	A green icon on a green background indicates Read Only access.
	An amber icon on a green background indicates Read Only access, but the host is not connected to a port with a logical unit number (LUN) mapping.
	A gray icon on a green background indicates Read Only access, but that the host is disconnected or offline.

Clicking the gray arrow button on the left takes you back to the main *Configured Logical Volumes* page.

Detailed Volume Layout

Clicking the **Click here to view detailed volume layout** link at the bottom of the *Configured Logical Volumes* page takes you to this page, which shows the free space left in each array (if any), the size of each volume, the percentage of the total array that the volume takes up, and the volume's relative position within the array.

Figure 3-29: *Configured Logical Volumes* detailed layout page



The information sections are arranged by array. Each array's section displays a status icon, the array name, the array number, the controller number, the total capacity, and a list of any free areas in the array (see RAID Array Information on page 72 for more information). If there is no free space in the array, a message displays in place of the list.

Below each array's information section are sections for each volume in the array. These display the following information:

Table 3-30: Volume information

Label	Description
Title bar	The volume ID, volume number, array name, and array number.
Volume name	The user-defined name of the volume.
Volume capacity	Displays the total data storage space of the array, in megabytes (MB), true gigabytes (GB), and binary gigabytes (GiB).

Label	Description
% of total array	Displays the percentage of the array capacity that this volume uses.
Used capacity	Displays the amount of the total volume capacity that is taken up by data. This item is only displayed for arrays that have advanced features enabled (see Create a new RAID array on page 122).
Number of bad blocks	Displays the number of blocks in the volume that cannot be read or written to because of disk media errors.
LUN Mapping	Displays a link: **Click to view**. Clicking the link takes you to the volume's detail page.
Volume serial number	Displays the volume's unique serial number.
Volume created	Displays the date and time that the volume was created, formatted as "Day of Week DD-Mon-YYYY HH:MM".

The darker area below the listed items displays the name of the array that the volume belongs to, the controller number, and the volume capacity.

The bottom area contains a bar which represents the percentage of the array's capacity that the volume uses, as well as the volume's relative position within the array.

Disk Information

Clicking **RAID Information > Disk Drives** takes you to the *Disk Information* page, which shows all of the disk drives in the system and displays information about each disk. On E-Series systems, this information is organized by drawer (*Pod 0*, *Pod 1*, etc.).

Figure 3-31: *Disk Information* page

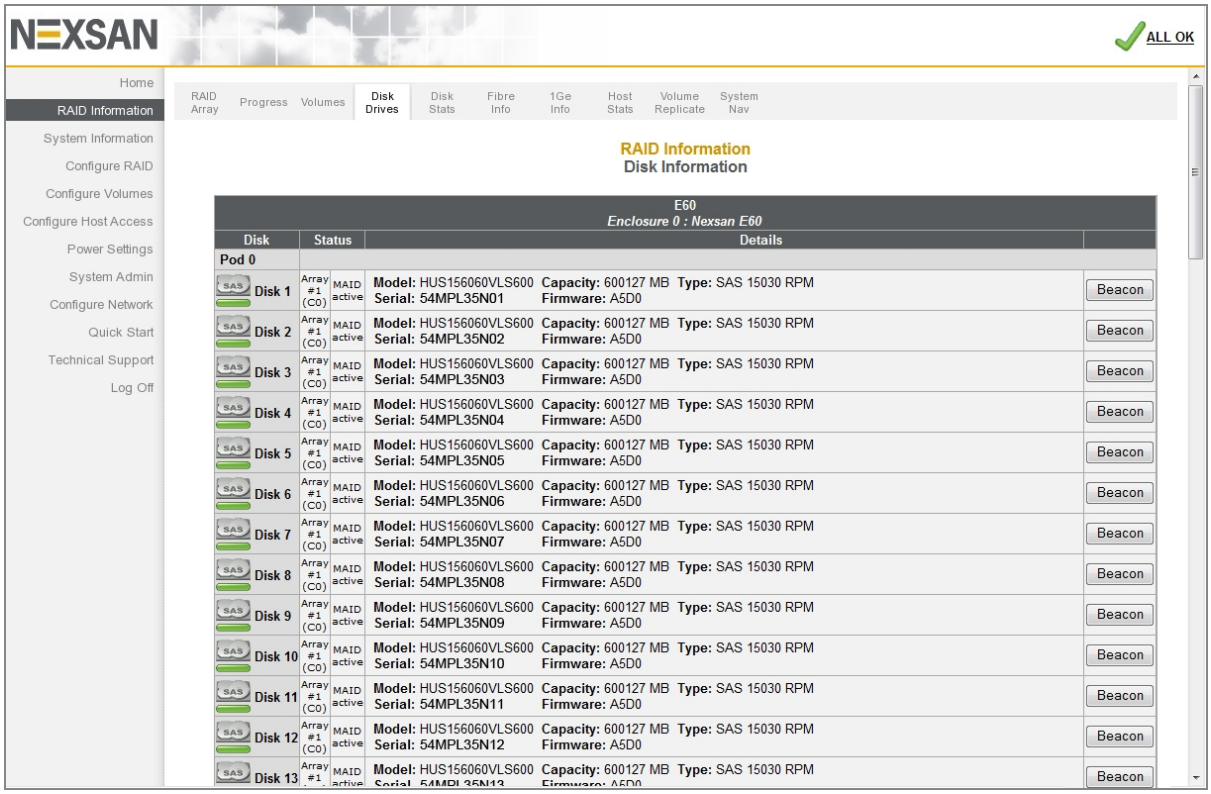


Table 3-32: Disk information classes

Column	Description
Disk	Displays the disk number and a disk icon. Clicking the disk icon takes you to a detail page for that disk (see Disk Information Detail Page on page 85).
Status	Displays the array that the disk belongs to, the controller number, and the AutoMAID status of the disk (see Power Settings on page 188).
Details	Lists the following information: • *Model* is the manufacturer's model number for the drive. • *Capacity* is the raw data storage capacity of the drive, in megabytes (MB). • *Serial Number* is the manufacturer's serial number for the drive. • *Firmware* is the firmware that the drive is currently running.

The **Beacon** button, on the far right of each disk's row, causes the status LED for that disk to blink. This makes it easier to find a specific disk in the storage system. The disk status LEDs are located immediately

next to each disk in the storage system. For specific LED locations and other information, see the Nexsan Storage System *Installation Guide*.

The disk icon indicates the disk's type and state.

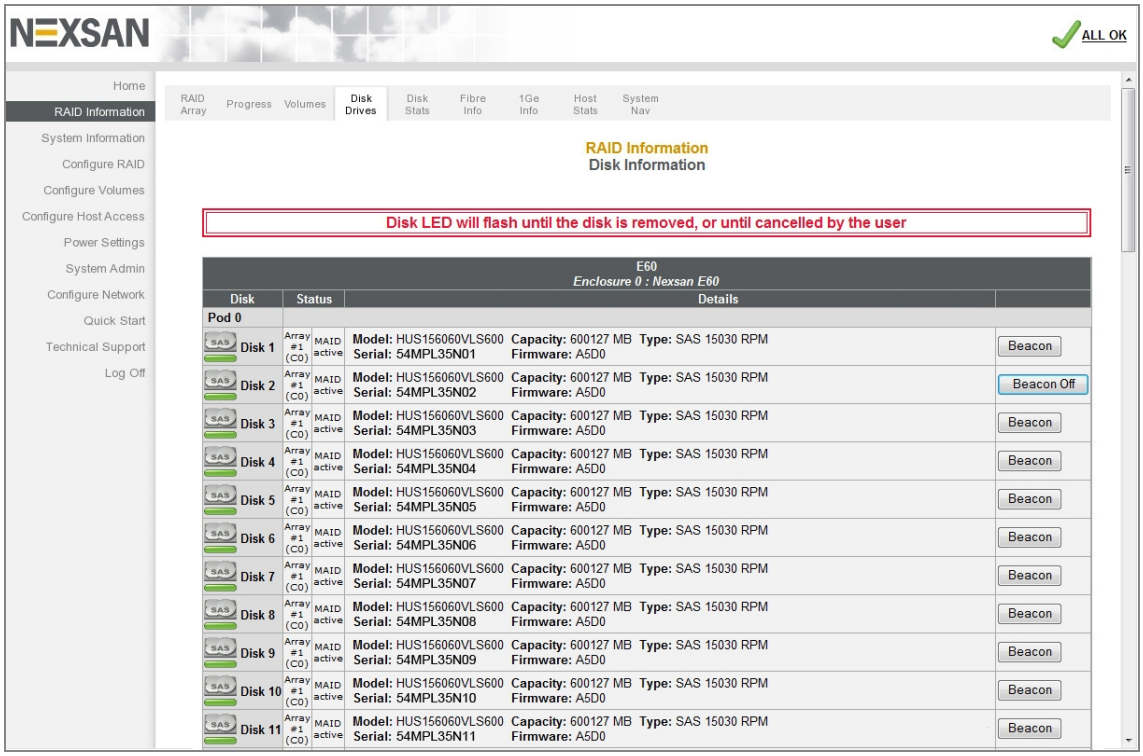
Table 3-33: Disk icons

Disk icon	State	Description
	**Disk not present**	A grayed out icon with a grayed out status bar indicates that no drive is installed in that slot.
	**Disk not configured**	A gray status bar indicates that the drive is functioning, but is not assigned to an array and is not designated as a spare.
	**Array disk, functioning normally**	A green status bar indicates that the drive is functioning and is part of a array (see RAID Array Information on page 72). The text below it indicates which array it belongs to and which RAID Controller owns that array.
	**Spare disk**	A blue status bar indicates that the drive is functioning and is designated as a spare, which will be used to rebuild arrays when other drives fail (see Add Hot Spare on page 134, Delete Hot Spare on page 136, and Configure Hot Spare Mode on page 140). The text below it indicates whether it is a "Pool Spare" (which can be used by any array) or a dedicated spare (assigned to a specific array).
	**Disk idle**	A green "Zzz" on a disk icon indicates that the drive is in low-power mode (see Power Settings on page 188). This does not apply to SSD disks.
	**Disk inaccessible**	A red status bar indicates that the drive is functioning, but the array to which it belongs is currently inaccessible.
	**Disk in critical array**	A status bar alternating amber and red indicates that the drive is functioning, but is part of a array that is in a critical state (see RAID Information on page 71).
	**Disk failed**	A red icon with a flashing red status bar indicates that the drive has failed.
	**Spare added to array**	A "filling" green status bar indicates that this disk was a spare, but is being added to the array. Data from the missing drive is being rebuilt and saved onto this disk.

Disk icon	State	Description
	**Disk being retired**	An “emptying” green status bar indicates that this disk is being retired. Data from this drive is being rebuilt and saved onto a spare disk.
	**Disk retired**	A flashing red status bar indicates that the disk has been retired. A retired disk cannot be added to an array or added as a spare disk.
	**Array rebuilding**	A status bar alternating green and amber indicates that the drive is functioning and is part of a array that is being rebuilt.
	**Disk locked**	An orange icon with a flashing red status bar indicates that the drive is locked and cannot be used. Locked disks are disks that previously belonged to an encrypted array (see Configure Array Encryption on page 127), but that were moved from one Nexsan Storage System to another without first being decrypted. Uploading the proper encryption key unlocks the disks. Access to the drives can be restored by uploading the exported encryption key file(s). See Download & Upload System Settings on page 210.

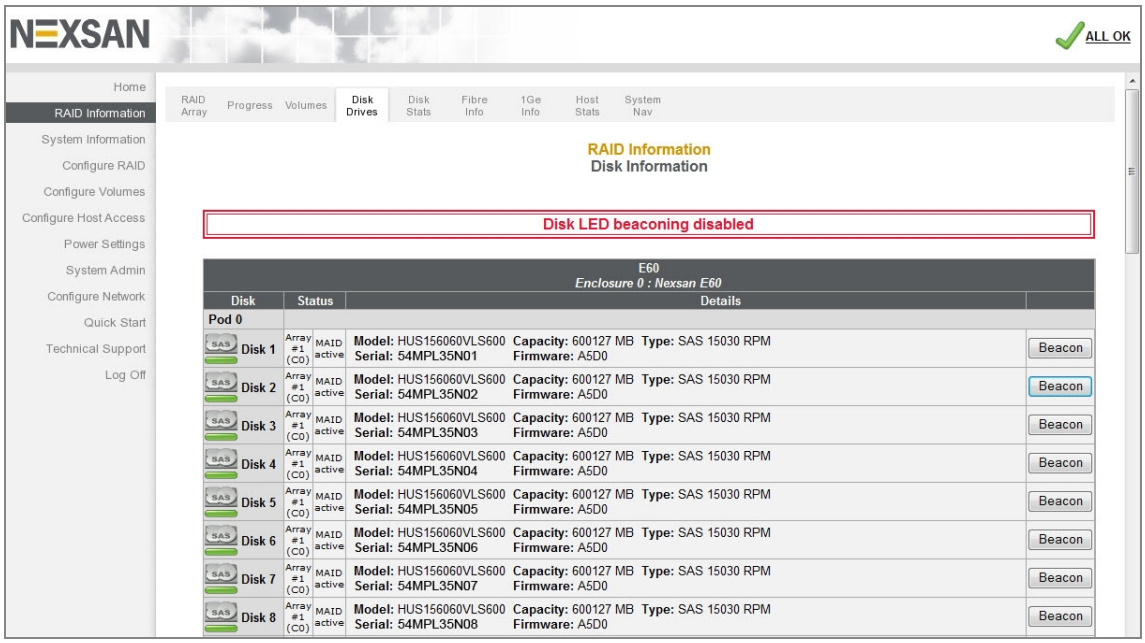
When a disk's **Beacon** button is clicked, a message appears, letting you know that the disk status LED is blinking, and that this can be canceled by either removing the associated disk from the storage system or by clicking the **Beacon Off** button.

Figure 3-34: *Disk Information* page with beacon message and **Beacon Off** button displayed



Clicking the **Beacon Off** button stops the disk status LED blinking.

Figure 3-35: *Disk Information* page with beacon disabled message displayed



Disk Information Detail Page

When you click a disk icon on the *Disk Information* page or an information icon on the *Disk Statistics* page (see Disk Statistics on page 87), you are taken to the detail page for that particular disk.

Figure 3-36: *Disk Information* detail page (SATA and SAS disks)

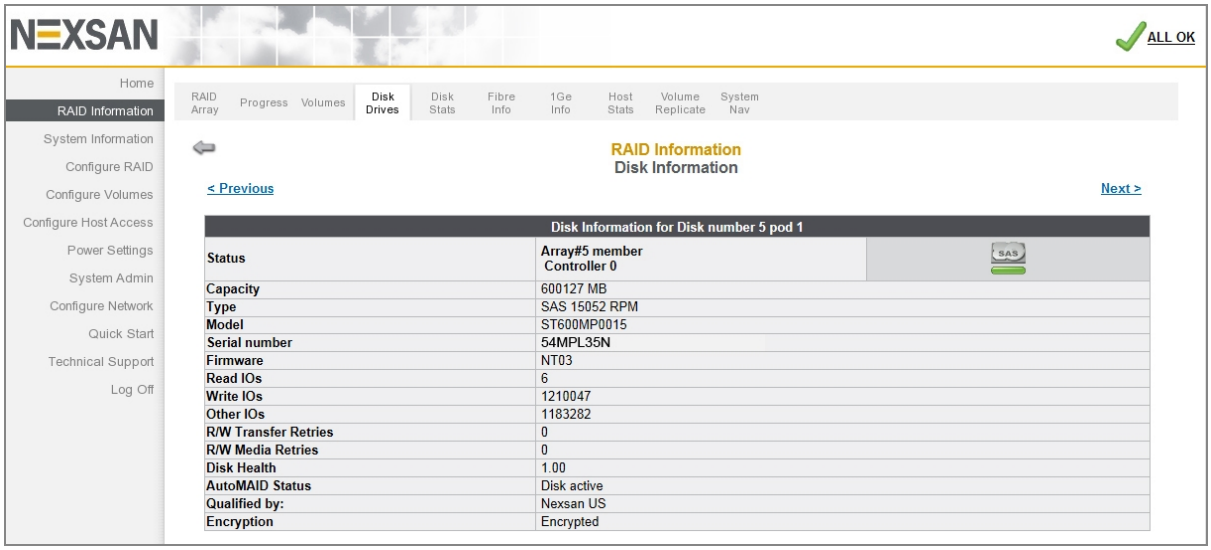
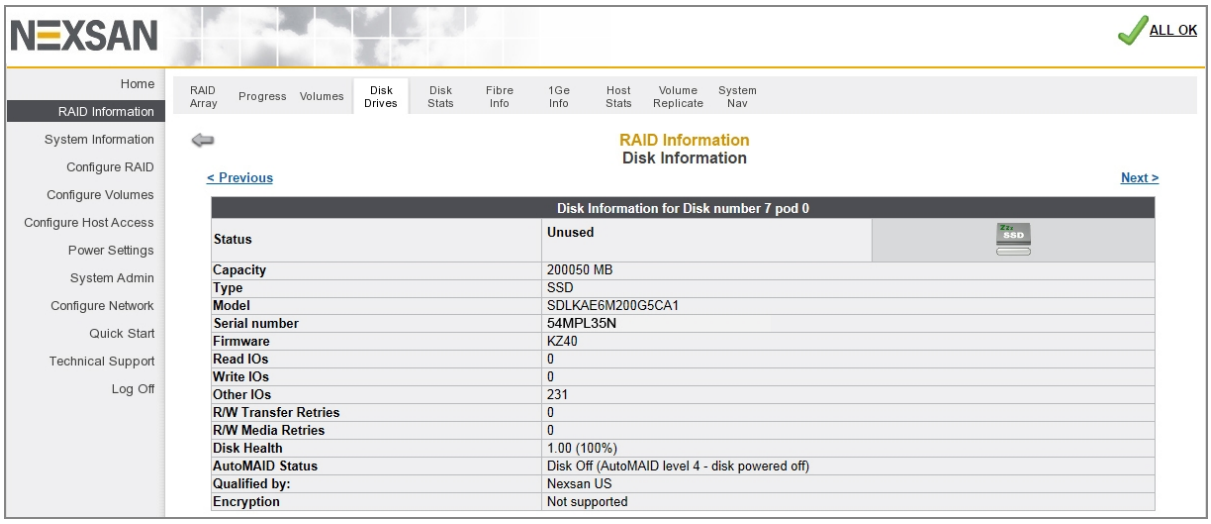


Figure 3-37: *Disk Information* detail page (SSD disks)



The following information displays:

Table 3-38: Disk Information details

Label	Description
Status	Displays the array that the disk belongs to, the controller number, and the status icon.
Capacity	Displays the raw data storage capacity of the drive, in megabytes (MB).
Type	Displays the drive type (SAS, SATA, or SSD) and it's speed in revolutions per minute (RPMs).
Model	Displays the manufacturer's model number for the drive.
Serial number	Displays the manufacturer's serial number for the drive.
Firmware	Displays the firmware that the drive is currently running.
Read IOs	Displays the number of reads executed on the drive because of array access by attached hosts.
Write IOs	Displays the number of writes executed on the drive because of array access by attached hosts.
Other IOs	Displays the number of disk input/output operations (I/Os) executed on the drive that are not because of array access, but are directly from the RAID Controller.
R/W Transfer Retries	Displays the number of times that the RAID Controller has had to retry a read or write operation on a block of data on this drive due to data transfer problems.
R/W Media Retries	Displays the number of times that the RAID Controller has had to retry a read or write operation on a block of data on this drive due to disk media problems.
Disk Health	Displays the disk responsiveness score (see Disk Statistics on the facing page) and the percentage of disk life remaining (for SSD disks).
AutoMAID status	Displays the current AutoMAID level of the disk, if any (see Power Settings on page 188).
Qualified by	Shows who qualified the drive for use in Nexsan Storage Systems. If the disk is unqualified, this row is not displayed.
Encryption	Displays the encryption status of the disk: *Encrypted*, *Disabled*, or *Not supported*.

Clicking **Previous** or **Next** takes you to other disk's detail pages.

Disk Statistics

Clicking **RAID Information > Disk Stats** takes you to the *Disk Statistics* page, which displays data on how often individual disks have been accessed and how many retries have been performed in data recovery attempts. On E-Series systems, this information is organized by drawer (*Pod 0*, *Pod 1*, etc.).

Figure 3-39: *Disk Statistics* page

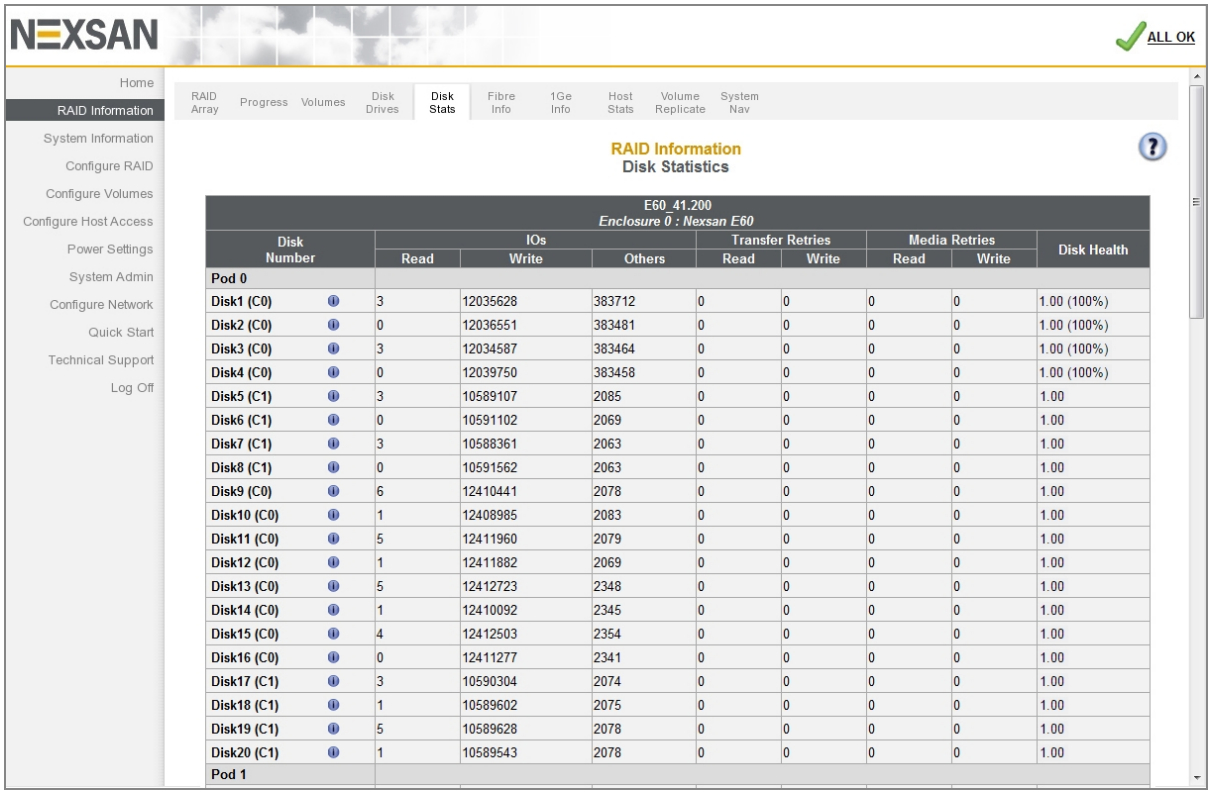


Table 3-40: Disk statistics

Column	Description
Disk Number	Displays the disk number, the controller to which it belongs, and an information icon. Hover the mouse over the information icon for a pop-up dialog that displays that disk's information. Click the icon to be taken to that disk's detail page (see Disk Information Detail Page on page 85).
IOs	Displays the number of input/output operations performed on the disk in the following categories: • *Read* indicates the number of times the drive has been read because of host array access. • *Write* indicates the number of times the drive has been written to because of host array access. • *Others* indicates the number of times that the drive has been accessed by the RAID Controller directly. Examples include array creation, array rebuilds, and verifications.

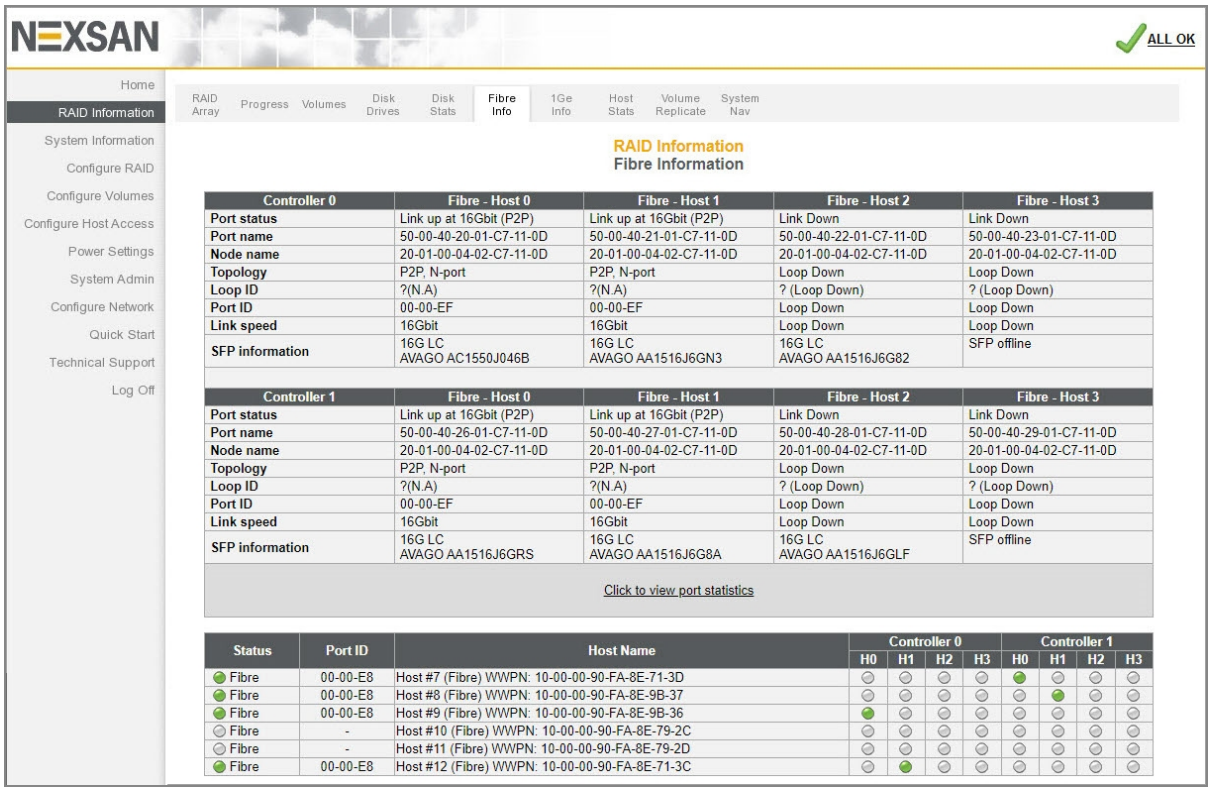
Column	Description
Transfer Retries	Displays the number of times (for *Read* and *Write* operations, respectively) that the RAID Controller has had to retry an I/O operation due to data transfer problems.
Media Retries	Displays the number of times (for *Read* and *Write* operations, respectively) that the RAID Controller has had to retry an I/O operation due to disk media problems.
Disk Health	Displays a numerical assessment of each drive's performance based on command completion times aggregated over time. For SSD drives, it also displays the percentage of expected disk life left.

Fibre Channel Information

Clicking **RAID Information > Fibre Info** takes you to the *Fibre Channel Information* page, which provides an information summary for each Fibre Channel port on each RAID Controller in the system.

For a system with four Fibre Channel ports per controller, the *Fibre Channel Information* page looks like this:

Figure 3-41: *Fibre Channel Information* page (for storage systems with four ports per controller)



Controller 0	Fibre - Host 0	Fibre - Host 1	Fibre - Host 2	Fibre - Host 3
Port status	Link up at 16Gbit (P2P)	Link up at 16Gbit (P2P)	Link Down	Link Down
Port name	50-00-40-20-01-C7-11-0D	50-00-40-21-01-C7-11-0D	50-00-40-22-01-C7-11-0D	50-00-40-23-01-C7-11-0D
Node name	20-01-00-04-02-C7-11-0D	20-01-00-04-02-C7-11-0D	20-01-00-04-02-C7-11-0D	20-01-00-04-02-C7-11-0D
Topology	P2P, N-port	P2P, N-port	Loop Down	Loop Down
Loop ID	?(N.A)	?(N.A)	? (Loop Down)	? (Loop Down)
Port ID	00-00-EF	00-00-EF	Loop Down	Loop Down
Link speed	16Gbit	16Gbit	Loop Down	Loop Down
SFP information	16G LC AVAGO AC1550J046B	16G LC AVAGO AA1516J6GN3	16G LC AVAGO AA1516J6G82	SFP offline

Controller 1	Fibre - Host 0	Fibre - Host 1	Fibre - Host 2	Fibre - Host 3
Port status	Link up at 16Gbit (P2P)	Link up at 16Gbit (P2P)	Link Down	Link Down
Port name	50-00-40-26-01-C7-11-0D	50-00-40-27-01-C7-11-0D	50-00-40-28-01-C7-11-0D	50-00-40-29-01-C7-11-0D
Node name	20-01-00-04-02-C7-11-0D	20-01-00-04-02-C7-11-0D	20-01-00-04-02-C7-11-0D	20-01-00-04-02-C7-11-0D
Topology	P2P, N-port	P2P, N-port	Loop Down	Loop Down
Loop ID	?(N.A)	?(N.A)	? (Loop Down)	? (Loop Down)
Port ID	00-00-EF	00-00-EF	Loop Down	Loop Down
Link speed	16Gbit	16Gbit	Loop Down	Loop Down
SFP information	16G LC AVAGO AA1516J6GRS	16G LC AVAGO AA1516J6G8A	16G LC AVAGO AA1516J6GLF	SFP offline

Status	Port ID	Host Name	Controller 0				Controller 1			
			H0	H1	H2	H3	H0	H1	H2	H3
Fibre	00-00-E8	Host #7 (Fibre) WWPN: 10-00-00-90-FA-8E-71-3D								
Fibre	00-00-E8	Host #8 (Fibre) WWPN: 10-00-00-90-FA-8E-9B-37								
Fibre	00-00-E8	Host #9 (Fibre) WWPN: 10-00-00-90-FA-8E-9B-36								
Fibre	-	Host #10 (Fibre) WWPN: 10-00-00-90-FA-8E-79-2C								
Fibre	-	Host #11 (Fibre) WWPN: 10-00-00-90-FA-8E-79-2D								
Fibre	00-00-E8	Host #12 (Fibre) WWPN: 10-00-00-90-FA-8E-71-3C								

The Fibre information is arranged by controller and host port. For each, the following information displays:

Table 3-42: Fibre Channel Information

Label	Description
Port status	Displays the status of the Fibre Channel Loop, either up or down. It also displays the loop speed in gigabits per second (Gb/s).
Port name	The World Wide Port Name (WWPN) of the Fibre Channel port.
Node name	The World Wide Node Name (WWNN) of the Fibre Channel node. This is the address of the Nexsan Storage System, which is able to support multiple ports.
Topology	Displays the current Fibre Channel topology, either Loop or Point-to-Point (P2P). It also indicates whether the topology is full-fabric.
Loop ID	Shows the loop address if the port is in loop mode.
Port ID	Shows the ID if the port is in point-to-point mode.
Link speed	Shows the current Fibre Channel link speed in gigabits per second (Gb/s).
SFP Information	Displays the make and model of the installed SFPs (see your Nexsan Storage System *Installation Guide* for more information).

For port statistics information about the volume of transmitted and received data per port and controller, refer to Port Statistics on page 106.

Table 3-43: Fibre Channel Host Connectivity

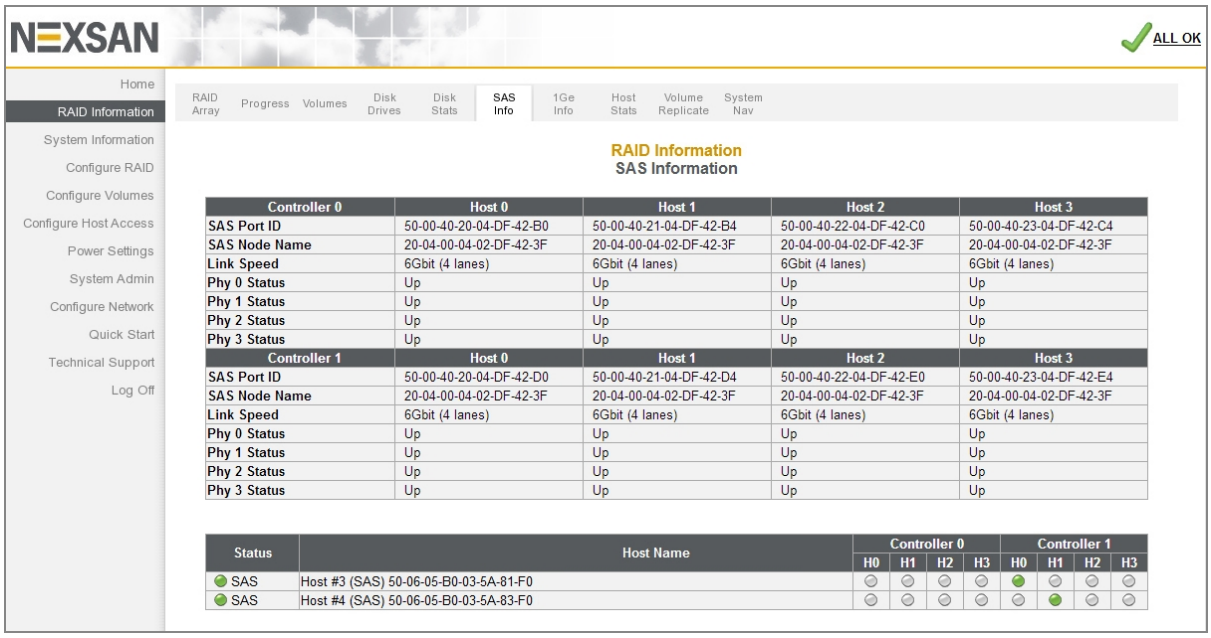
Label	Description	
Status	Icons indicate the following host states:	
		Green indicates that the host is connected.
		Gray indicates that the host is not connected or is offline.
		Amber indicates that the host is connected, but no volumes have been mapped to it.
		Red indicates that the host is on a failed RAID Controller.
Port ID	Displays the port ID for connected hosts.	
Host Name	Displays the default or user-configured name of the host (see Manage Hosts on page 184).	
Controller	The *Controller* columns show which host ports on which controllers the host is connected to. There are two Controller columns, which are subdivided into *H0* and *H1* (for two-port controllers) or *H0*, *H1*, *H2*, and *H3* (for four-port controllers), indicating the specific port on that RAID Controller.	

SAS Information

If your Nexsan Storage System is configured for SAS-to-Host connectivity, clicking **RAID Information > SAS Info** takes you to the *SAS Information* page, which provides an information summary for each SAS-to-Host port on each RAID Controller in the system.

On systems with four SAS ports per controller, the *SAS Information* page looks like this:

Figure 3-44: *SAS Information* page (for storage systems with four ports per controller)



The information is arranged by controller and host port. For each, the following information displays:

Table 3-45: SAS Information

Label	Description
SAS Port ID	The World Wide Port Name (WWPN) of the SAS port.
SAS Node Name	The World Wide Node Name (WWNN) of the SAS node. This is the address of the Nexsan Storage System, which is able to support multiple ports.
Link Speed	Shows the current SAS link speed in gigabits per second (Gb/s) and the number of operating lanes. If the link is not operating, displays *Port Down*.
Phy *N* Status	Displays the status of each physical SAS connection, either *Up*, *Down*, or *Disabled*.

The settings, display only at the bottom of the page, can be configured or changed on the *Configure SAS* page (see Configure SAS on page 174).

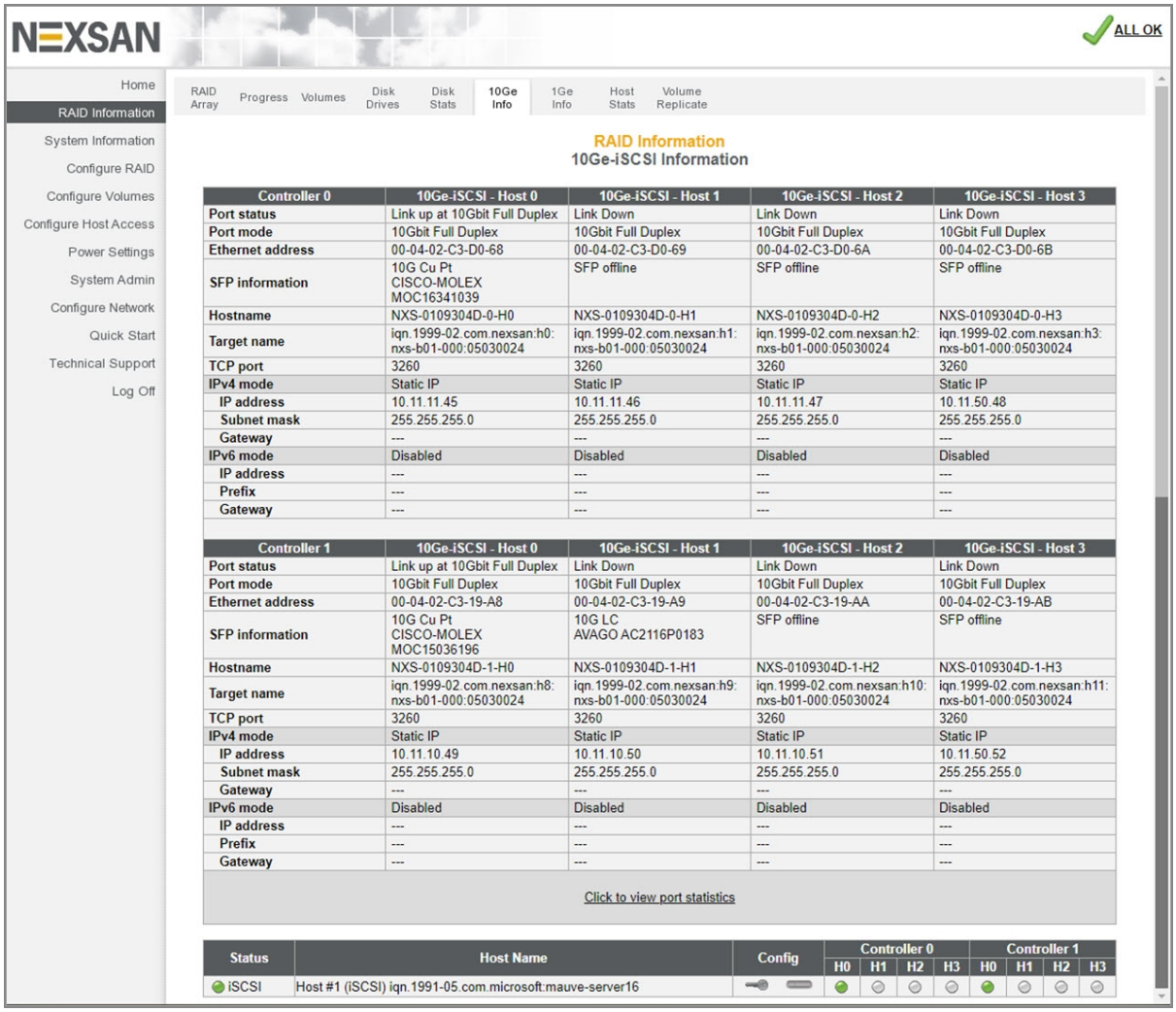
For Fibre Channel Host Connectivity, see Fibre Channel Host Connectivity on page 89.

10Ge iSCSI Information

If your Nexsan Storage System is configured for 10Gb Ethernet iSCSI connectivity, clicking **RAID Information > 10Ge Info** takes you to the *10Ge-iSCSI Information* page, which provides an information summary for each 10Gb Ethernet iSCSI port on each RAID Controller in the system. To configure the host connectivity settings, refer to Configure 10Ge iSCSI on page 175.

On Nexsan Storage Systems with four 10Ge iSCSI ports per controller, the *10Ge-iSCSI Information* page looks like this:

Figure 3-46: *10Ge iSCSI Information* page



For port statistics information about the volume of transmitted and received data per port and controller, refer to Port Statistics on page 106.

The information is arranged by controller and host port. For each, the following information displays:

Table 3-47: iSCSI Host Fields

Setting	Description
Port status	Displays the current speed and duplex setting for the port. If the port is not active, Link Down displays.
Port mode	Displays the speed and duplex configuration settings for the port, either automatic or fixed.
Ethernet address	Displays the physical Ethernet (MAC) address of the port.
Hostname	Displays the default or user-assigned host name of the port.
Target Name	Displays the name of the iSCSI target.
TCP port	Displays the TCP port that iSCSI is using. This is fixed at 3260.
IPv4 Mode	
IP address	Displays the current port IP address.
Subnet mask	Displays the current subnet mask.
Gateway	Displays the configured gateway IP address.
IPv6 mode	
IP address	Displays the current port IP address.
Prefix	Displays the network prefix of the IP address.
Gateway	Displays the configured gateway IP address.

Host connectivity details appear at the bottom of the iSCSI information page for the controllers and host ports:

Table 3-48: iSCSI Host Connectivity

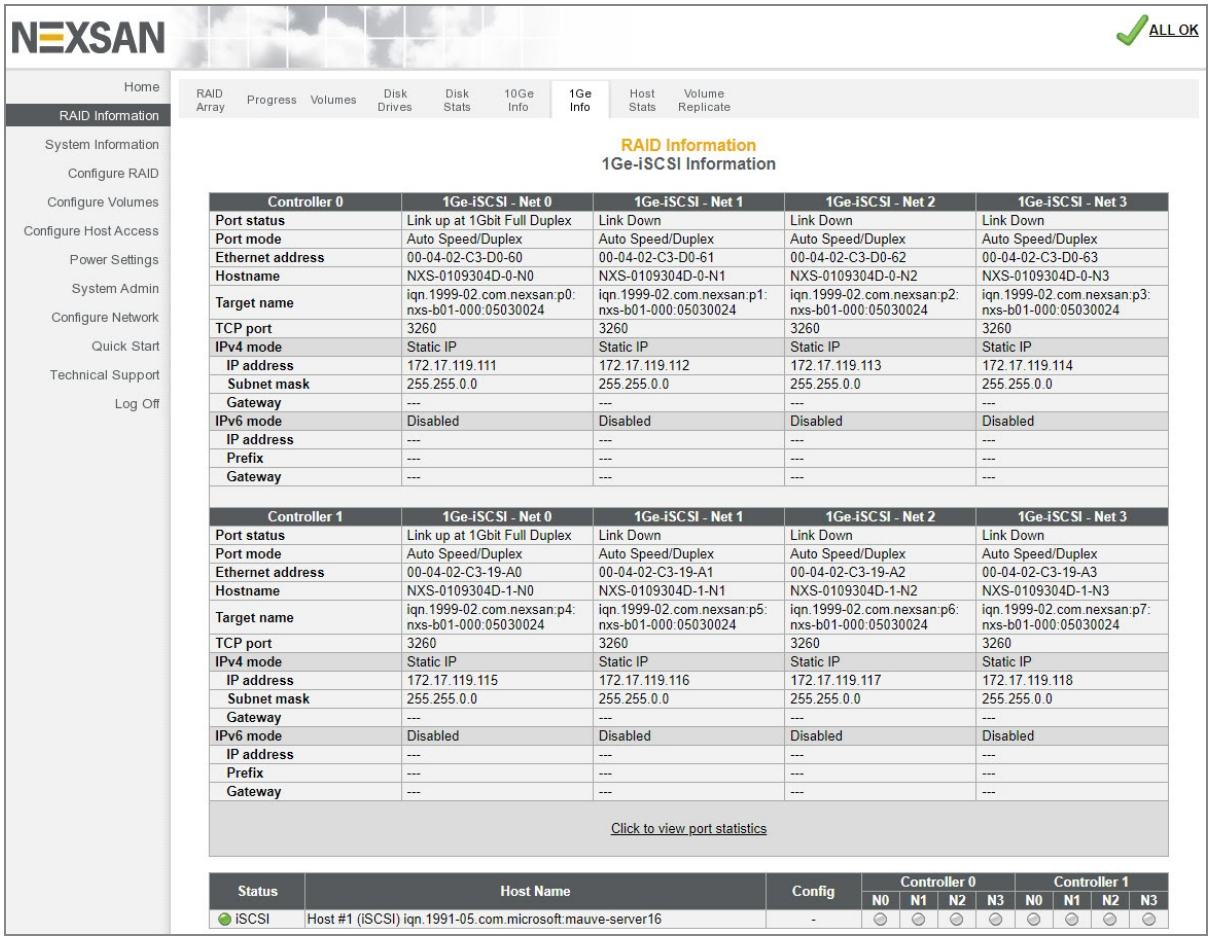
Icon	Description	
Status	Icons indicate the following host states:	
		Green indicates that the host is connected.
		Gray indicates that the host is not connected or is offline.
		Amber indicates that the host is connected, but no volumes have been mapped to it.
		Red indicates that the host is on a failed RAID Controller.
Host Name	Displays the default or user-configured name of the host (see Manage Hosts on page 184).	
Config	Displays digest and CHAP authentication settings.	
Controller	Displays which host ports on which controllers the host is connected to. There are two Controller columns, which are subdivided into *N0* and *N1* (for two-port controllers) or *N0*, *N1*, *N2*, and *N3* (for four-port controllers), indicating the specific port on that RAID Controller.	

1Ge iSCSI Information

Clicking **RAID Information > 1Ge Info** takes you to the *1Ge iSCSI Information* page, which provides an information summary for each 1Ge iSCSI port on each RAID Controller in the system. To configure the host connectivity settings, refer to Configure 1Ge iSCSI on page 178.

On Nexsan Storage Systems with four active 1Ge iSCSI ports per controller, the *1Ge iSCSI Information* page looks like this:

Figure 3-49: *1Ge iSCSI Information* page



Controller 0	1Ge-iSCSI - Net 0	1Ge-iSCSI - Net 1	1Ge-iSCSI - Net 2	1Ge-iSCSI - Net 3
Port status	Link up at 1Gbit Full Duplex	Link Down	Link Down	Link Down
Port mode	Auto Speed/Duplex	Auto Speed/Duplex	Auto Speed/Duplex	Auto Speed/Duplex
Ethernet address	00-04-02-C3-D0-60	00-04-02-C3-D0-61	00-04-02-C3-D0-62	00-04-02-C3-D0-63
Hostname	NXS-0109304D-0-N0	NXS-0109304D-0-N1	NXS-0109304D-0-N2	NXS-0109304D-0-N3
Target name	iqn.1999-02.com.nexsan:p0:nxs-b01-000:05030024	iqn.1999-02.com.nexsan:p1:nxs-b01-000:05030024	iqn.1999-02.com.nexsan:p2:nxs-b01-000:05030024	iqn.1999-02.com.nexsan:p3:nxs-b01-000:05030024
TCP port	3260	3260	3260	3260
IPv4 mode	Static IP	Static IP	Static IP	Static IP
IP address	172.17.119.111	172.17.119.112	172.17.119.113	172.17.119.114
Subnet mask	255.255.0.0	255.255.0.0	255.255.0.0	255.255.0.0
Gateway	---	---	---	---
IPv6 mode	Disabled	Disabled	Disabled	Disabled
IP address	---	---	---	---
Prefix	---	---	---	---
Gateway	---	---	---	---

Controller 1	1Ge-iSCSI - Net 0	1Ge-iSCSI - Net 1	1Ge-iSCSI - Net 2	1Ge-iSCSI - Net 3
Port status	Link up at 1Gbit Full Duplex	Link Down	Link Down	Link Down
Port mode	Auto Speed/Duplex	Auto Speed/Duplex	Auto Speed/Duplex	Auto Speed/Duplex
Ethernet address	00-04-02-C3-19-A0	00-04-02-C3-19-A1	00-04-02-C3-19-A2	00-04-02-C3-19-A3
Hostname	NXS-0109304D-1-N0	NXS-0109304D-1-N1	NXS-0109304D-1-N2	NXS-0109304D-1-N3
Target name	iqn.1999-02.com.nexsan:p4:nxs-b01-000:05030024	iqn.1999-02.com.nexsan:p5:nxs-b01-000:05030024	iqn.1999-02.com.nexsan:p6:nxs-b01-000:05030024	iqn.1999-02.com.nexsan:p7:nxs-b01-000:05030024
TCP port	3260	3260	3260	3260
IPv4 mode	Static IP	Static IP	Static IP	Static IP
IP address	172.17.119.115	172.17.119.116	172.17.119.117	172.17.119.118
Subnet mask	255.255.0.0	255.255.0.0	255.255.0.0	255.255.0.0
Gateway	---	---	---	---
IPv6 mode	Disabled	Disabled	Disabled	Disabled
IP address	---	---	---	---
Prefix	---	---	---	---
Gateway	---	---	---	---

For port statistics information about the volume of transmitted and received data per port and controller, refer to Port Statistics on page 106.

The information is arranged by controller and host port. For each, the following information displays:

Table 3-50: iSCSI Host Fields

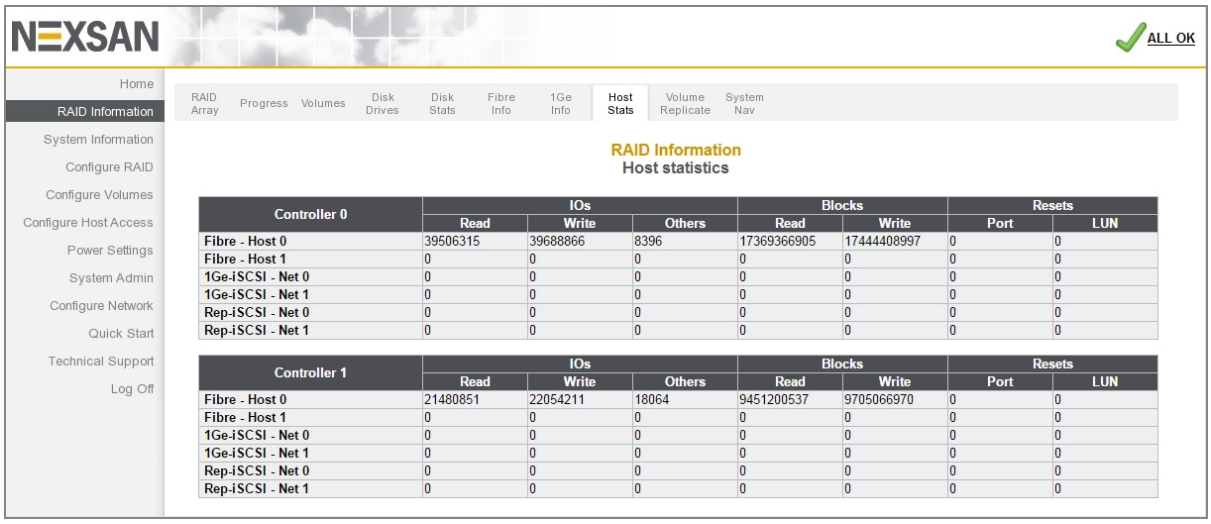
Setting	Description
Port status	Displays the current speed and duplex setting for the port. If the port is not active, Link Down displays.
Port mode	Displays the speed and duplex configuration settings for the port, either automatic or fixed.
Ethernet address	Displays the physical Ethernet (MAC) address of the port.
Hostname	Displays the default or user-assigned host name of the port.
Target Name	Displays the name of the iSCSI target.
TCP port	Displays the TCP port that iSCSI is using. This is fixed at 3260.
IPv4 Mode	
IP address	Displays the current port IP address.
Subnet mask	Displays the current subnet mask.
Gateway	Displays the configured gateway IP address.
IPv6 mode	
IP address	Displays the current port IP address.
Prefix	Displays the network prefix of the IP address.
Gateway	Displays the configured gateway IP address.

Host connectivity details appear at the bottom of the iSCSI information page for the controllers and host ports. See iSCSI Host Connectivity on page 93.

Host Statistics

Clicking **RAID Information > Host Status** takes you to the *Host Statistics* page, which displays I/O, block, and reset statistics for each host port.

Figure 3-51: *Host Statistics* page



The information, described in the following table, is arranged by controller.

Table 3-52: Host statistics

Column	Description
Controller	Lists the host ports for each controller.
IOs	Displays the number of input/output operations (I/Os) performed through the port in the following categories: • *Read* indicates the number of times that a read operation has been performed through the port. • *Write* indicates the number of times that a write operation has been performed through the port. • *Others* indicates the number of times an I/O operation has been performed through the port. Examples include array creation, rebuilding, and verification.
Blocks	Displays the number of 512-byte data blocks that have been accessed by a *Read* or *Write* I/O operation through the host.
Resets	Displays the number of times that a logical unit (*LUN*) or a *Port* has been reset according to the host communication management protocol.

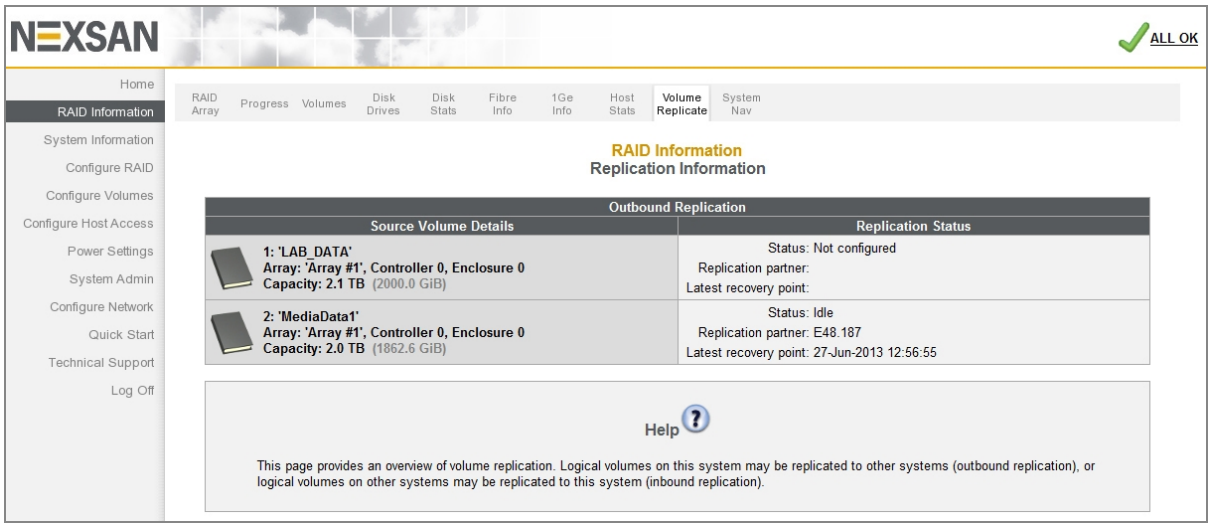
Replication Information

Clicking **RAID Information > Volume Replicate** takes you to the *Replication Information* page, which displays outgoing and incoming replication information for the Nexsan Storage System.

Note For detailed information regarding the snapshots and replication features of Nexsan Storage Systems, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Outbound replications are displayed in the *Outbound Replications* section:

Figure 3-53: *Replication Information* page (with *Outbound Replications* section only)



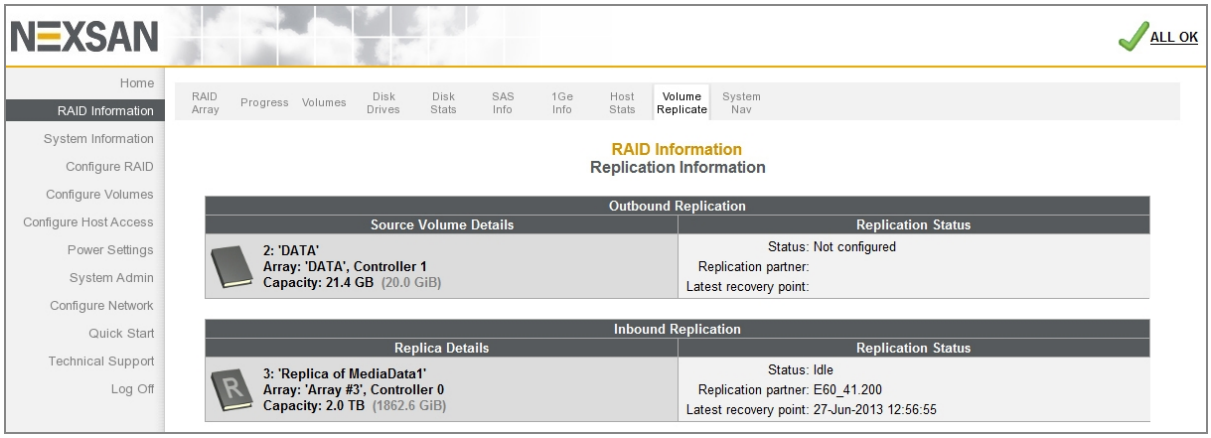
The *Outbound Replication* section contains the following columns:

Table 3-54: Outbound Replication

Label	Description
Source Volume Details	Displays information for each configured volume on the storage system: the volume number, volume name, the *Array* to which it is assigned, the number of the *Controller* to which the array is assigned, the *Enclosure* on which the array resides, and the total *Capacity* of the volume.
Replication Status	Displays one of the following: • The message *Not configured*. OR • The replication *Status*, the *Replication partner*, and the time and date of the *Latest recovery point*.

If one or more inbound replications are configured, the *Inbound Replications* section displays:

Figure 3-55: *Replication Information* page (with *Inbound Replications* section)



The *Inbound Replication* section contains the following columns:

Table 3-56: Inbound replication

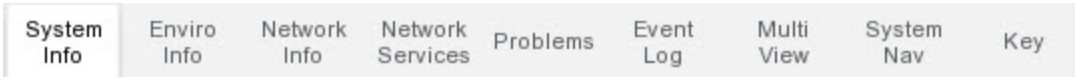
Label	Description
Replica Details	Displays the replica number, replica name, the *Array* to which it is assigned, the number of the *Controller* to which the RAID set is assigned, and the total *Capacity* of the replica.
Replication Status	Displays the replication *Status*, the *Replication partner*, and the time and date of the *Latest recovery point*.

Replications are configured on the *Replicate Logical Volumes* page (see Replicate Logical Volumes on page 164).

System Information

Clicking **System Information** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-57: System Information navigation bar



Refer to Table 3-58 for help with the Nexsan E-Series/BEAST system information firmware:

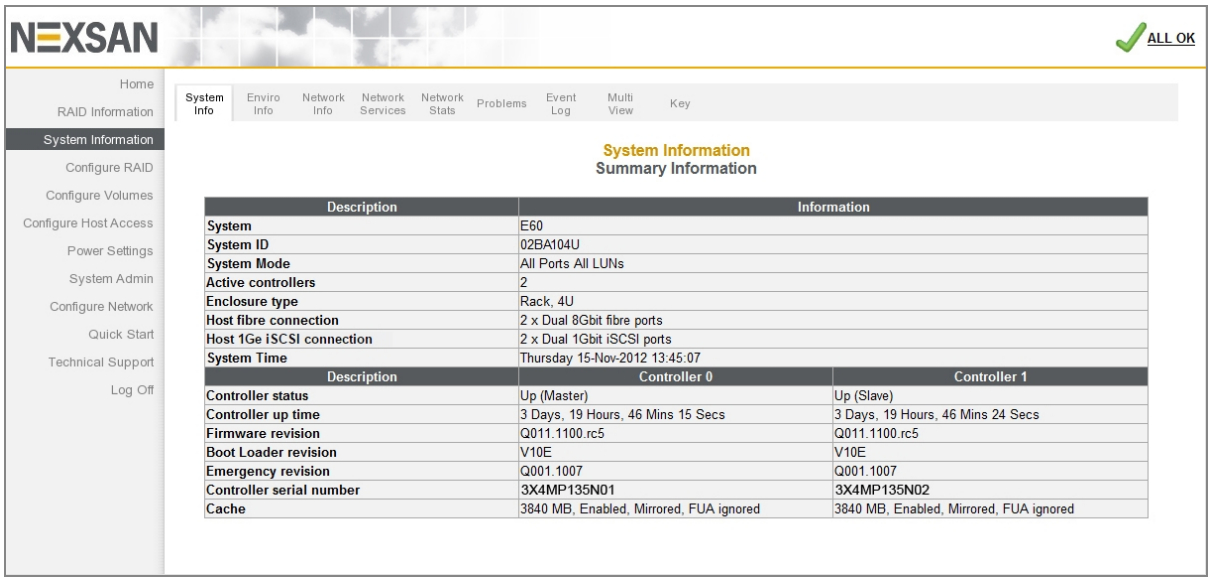
Table 3-58: System information pages

Nav bar button	GUI pages and documentation links
System Info	Summary Information on the next page
Enviro Info	Environmental Information on page 102
Network Info	Network Information on page 105
Network Services	Network Services on page 107
Problems	Summary of System Problems on page 111
Event Log	Event Log on page 112
Multi View	Multiple System View on page 118
System Nav	System Hierarchal View on page 119
Key	Icon Key on page 120

Summary Information

Clicking **System Information** takes you to the *Summary Information* page, which displays information about the Nexsan Storage System.

Figure 3-59: *Summary Information* page



Note Only the information for the main Nexsan Storage System displays, not for the Nexsan Storage Expansion.

The displayed information includes the following:

Table 3-60: System Summary Information

Label	Description
System	The Nexsan Storage System family model (Nexsan BEAST, Nexsan E18, Nexsan E32, Nexsan E48, or Nexsan E60).
System ID	The storage system's unique system identifier.
System Mode	Displays the controller failover configuration.
Active Controllers	Displays the number of active RAID Controllers in the system.
Enclosure Type	Displays the physical attributes of the system, including its U-height.
Host fibre/SAS/10Ge iSCSI connection	Displays the configuration of the Fibre Channel, SAS-to-Host, or 10Ge iSCSI connection.
Host 1Ge iSCSI connection	Displays the configuration of the 1Ge iSCSI connection.
System Time	Displays the current date and time according to the storage system's internal clock.

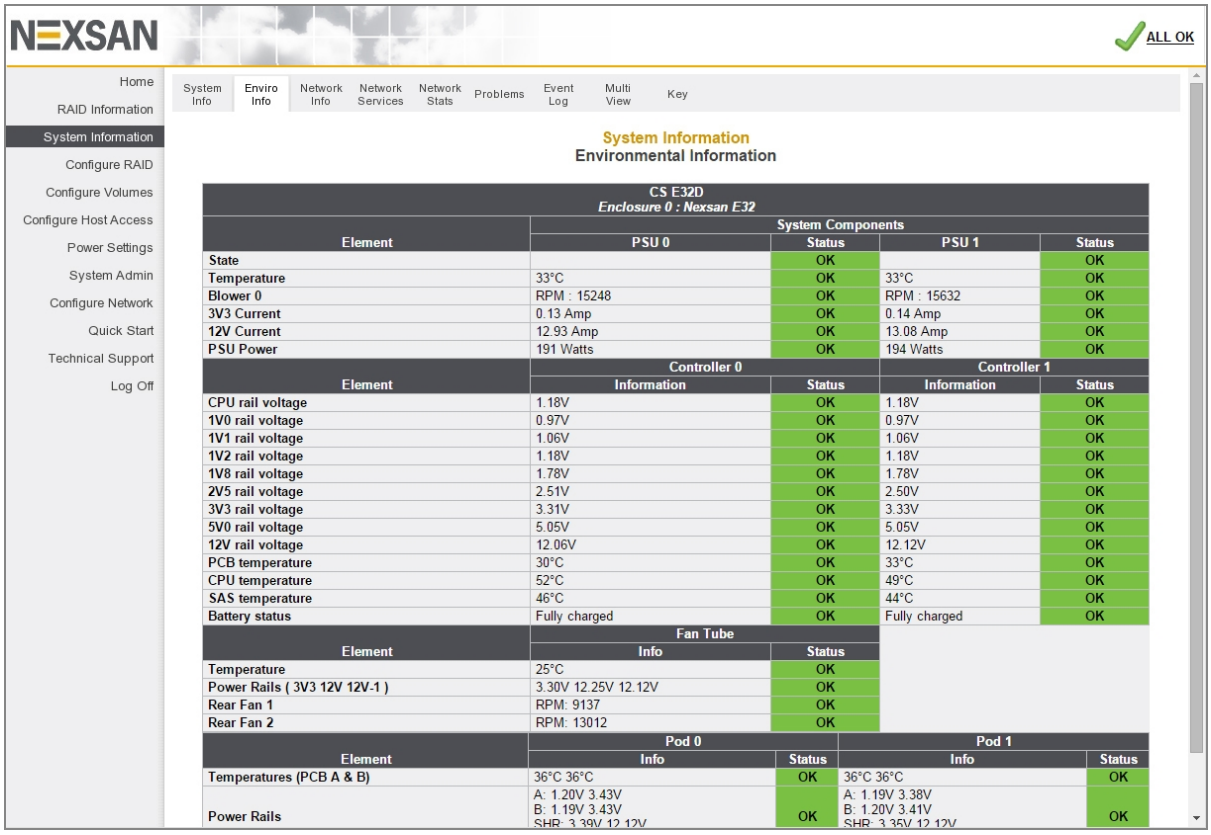
Label	Description
Controller Status	Displays the current status of each RAID Controller (Up or Down) as well as which controller is primary (**Master** or **Slave**).
Controller up time	Displays the total amount of time that each RAID Controller has been running continuously.
Firmware revision	Displays the firmware version that each RAID Controller is running.
Boot Loader revision	Displays the revision number of the boot loader.
Emergency revision	Displays the version number of code used for alternative system booting. Booting the system into Emergency mode enables you to upload a main firmware file if the main firmware gets corrupted during upload or if it contains a bug that prevents the normal uploading of new firmware. Refer to your *Nexsan Storage Systems FRU Removal and Replacement Guide* for details.
Controller serial number	Displays the serial number of each RAID Controller.
Cache	Indicates the total cache size in megabytes (MB), whether the cache is enabled, its mirroring status, its streaming mode, and its FUA status. Refer to Configure Cache on page 198

Environmental Information

Clicking **System Information > Enviro Info** takes you to the *Environmental Information* page, which displays the values of various environmental sensors throughout the storage system. Each item displays its status (*OK* or *FAULT*) and related information, if any. The information is arranged by component, and different storage systems will display this information in different arrangements.

If one or more Nexsan Storage Expansions are attached to the Nexsan Storage System, a **Next Enclosure >** link displays at the top right of the screen. Click it to be taken to the *Environmental Information* page for the first storage expansion.

Figure 3-61: *Environmental Information* page (example)



For power supply units (*PSU 0* and *PSU 1*), the following information displays:

Table 3-62: Power supply unit Environmental Information

Label	Description
State	The overall status of the power supply unit
Temperature	The current temperature of the power supply unit
Blower*N*	The current RPMs of the designated PSU fan
3V3/12V Current	The electrical current being supplied from each output of the PSU
PSU Power	The power of the PSU in Watts

For RAID Controllers and Expansion Controllers (*Controller 0* and *Controller 1*), the following information displays:

Table 3-63: RAID Controller and Expansion Controller Environmental Information

Label	Description
CPU rail voltage	The voltage of the Controller's central processing unit (CPU).
***XX* rail voltage**	The voltage of each rail in the Controller.
Controller temperature (Nexsan Storage Expansions only)	The current temperature of the Expansion Controller.
***XX* temperature**	The current temperature of each component in the RAID Controller.
Battery status	The charge status of the cache battery.

For Nexsan E18 and Nexsan E32 Storage Systems, the following information for the *Fan Tube* displays:

Table 3-64: Nexsan E18 and Nexsan E32 fan tube Environmental Information

Label	Description
Temperature	The current temperature of the fan tube.
Power Rails (3V3 12V 12V_1)	The voltage of each rail in the fan tube.
Rear Fan 1/2	The current RPMs of the designated rear tube fan.

For Nexsan BEAST Storage Systems, the following information for the left, middle, and right sections of the drive bay (*Slice 0*, *Slice 1*, and *Slice 2*) displays:

Table 3-65: Nexsan BEAST drive bay Environment Information

Label	Description
Power Module A/B	The current status of the power modules.
Power Pod Internals	The current status of the power pod's internal components.
Temperatures (PCB A & B)	The current temperatures of the printed circuit boards.
Power Rails	The current voltages of the A, B, SHR, and STBY power rails.
Rear Fans	The current RPMs of the four rear fans for each slice.
Front Fans	The current RPMs of the front fan for each slice.

For Nexsan E18, E18X, and E32 Storage Systems, the following information for the active drawers (*Pod N*) displays:

Table 3-66: Nexsan E32 and Nexsan E18/E18X active drawer Environmental Information

Label	Description
Temperatures (PCB A & B)	The current temperature of each printed circuit board (A and B) in the active drawer.
Power Rails	The voltage of each rail in the active drawer.
Rear Fans	The current RPMs of the fans in the back of the active drawer.
Front Fans	The current RPMs of the fans in the front of the active drawer.

For Nexsan E48/E48X and E60/E60X Storage Systems, the following information for the active drawers (*Pod N*) displays:

Table 3-67: Nexsan E48/E48X and Nexsan E60/E60X active drawer Environmental Information

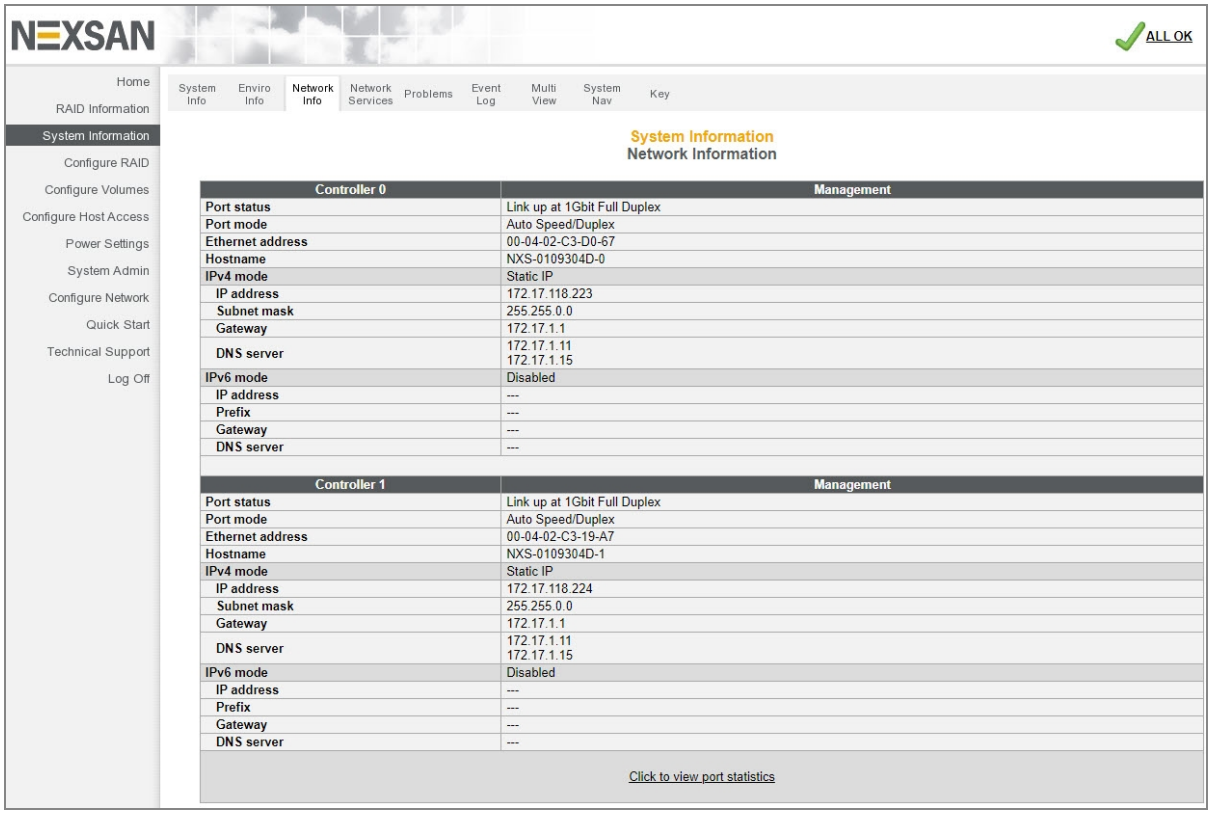
Label	Description
Power Module A/B	The status of power modules A and B in the active drawer.
Power Pod Internals	The status of internal power components in the active drawer.
Temperatures (PCB A & B)	The current temperature of each printed circuit board (A and B) in the active drawer.
Power Rails	The voltage of each rail in the active drawer.
Rear Fans	The current RPMs of the fans in the back of the active drawer.
Front Fans	The current RPMs of the fans in the front of the active drawer.

If a *FAULT* occurs in a field-replaceable module, refer to the storage system's *FRU Removal and Replacement Guide* for instructions on how to replace the module. If a *FAULT* occurs in a component that is not field-replaceable, contact Technical Support for instructions (see Technical Support on page 235).

Network Information

Clicking **System Information > Network Info** takes you to the *Network Information* page, which displays LAN information for both the management (Mgmt) network ports. This information is arranged by RAID Controller and then by port.

Figure 3-68: *Network Information* page (with two active Mgmt ports)



On some storage systems, there are four active Mgmt ports. Regardless of the storage system being examined, this page provides the same information about each port.

Table 3-69: Network Information

Label	Description
Port status	Displays the current speed and duplex setting for the port. If the port is not active, Link Down displays.
Port mode	Displays the speed and duplex configuration settings for the port, either automatic or fixed.
Ethernet address	Displays the physical Ethernet (MAC) address of the port.
Hostname	Displays the default or user-assigned host name of the port.

Label	Description
IPv4 mode	
IP address	Displays the current port IP address.
Subnet mask	Displays the current subnet mask.
Gateway	Displays the configured gateway IP address.
DNS server	Displays the IP address of the primary and secondary domain name service (DNS) servers. This setting only applies to the management port (**Mgmt**).
IPv6 mode	
IP address	Displays the current port IP address.
Prefix	Displays the network prefix of the IP address.
Gateway	Displays the configured gateway IP address.
DNS server	Displays the IP address of the primary and secondary domain name service (DNS) servers. This setting only applies to the management port (**Mgmt**).

For port statistics information about the volume of transmitted and received data per port and controller, refer to Port Statistics below.

Port Statistics

Nexsan Storage Systems provide the following types of port statistics for each controller and port:

Figure 3-70: Port Statistics

Controller 0	Management
Transmitted bytes	761299892
Received bytes	2441492186
Transmitted packets	1067785
Received packets	29394492
Received multicast packets	28627022
Transmit errors	0
Receive errors	0
Controller 1	**Management**
Transmitted bytes	63947823
Received bytes	2361428383
Transmitted packets	261962
Received packets	28664401
Received multicast packets	28626644
Transmit errors	0
Receive errors	0

Table 3-71: Port statistics

Controller 0 or 1	Description
Transmitted bytes	The number of bytes transmitted by the port.
Received bytes	The number of bytes received by the port.

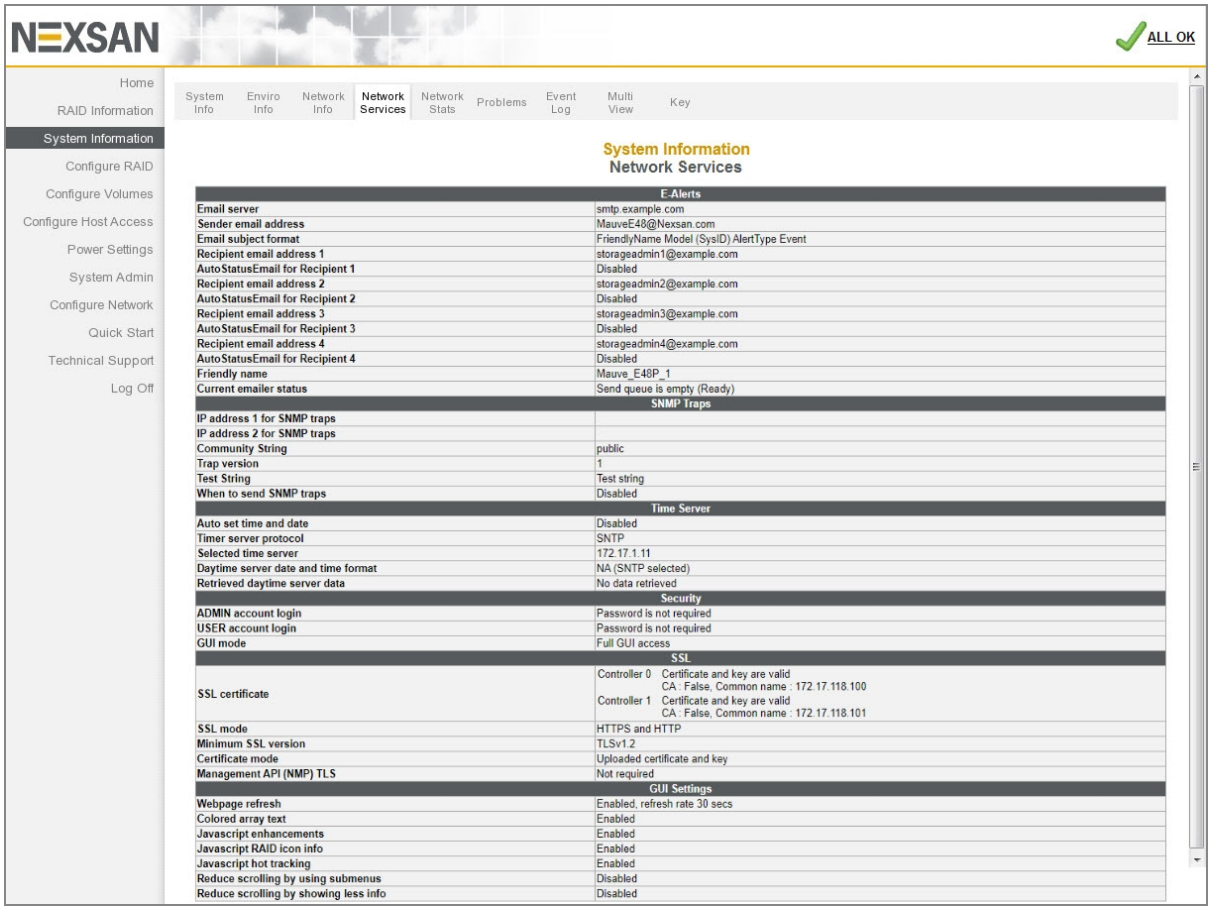
Controller 0 or 1	Description
Transmitted packets	The number of packets transmitted by the port.
Received packets	The number of packets received by the port.
Received multicast packets	The number of multicast packets received by the port.
Transmit errors	The number of transmission errors reported by the port.
Receive errors	The number of reception errors reported by the port.

The management port settings can be configured or changed on the *Configure Network Settings* page (see Configure Network Settings on page 218), and the settings for the iSCSI ports can be configured or changed on the *Configure 1Ge iSCSI* page (see Configure 1Ge iSCSI on page 178).

Network Services

Clicking **System Information > Network Services** takes you to the *Network Services* page, which provides information about various network and system services.

Figure 3-72: *Network Services* page



Use the following tables for help with *Network Services* page details.

E-Alerts

Table 3-73: E-Alerts

Label	Description
Email server	The IP address or DNS name of the SMTP email server.
Sender email address	The email address that alerts and statuses are sent from.
Email Subject format	The format for the subject line of sent emails.
Recipient email address N	The email addresses that alerts and statuses are sent to.
AutoStatusEmail for Recipient N	The frequency that automatic status updates are sent to the associated email address.
AutoStyleEmail for Recipient N	The format of automatic status updates sent to the associated email address. This is only displayed if *AutoStatusEmail for Recipient N* is something other than *Disabled*.
Network/Disk/RAID/Host/Misc/ App Alerts for N	The kinds of events (*Errors*, *Warnings*, *Information*, or *System*) for each category that are sent to the recipient. If no events in a particular category are configured, the entry is not displayed.
Friendly name	The user-defined “friendly” name of the system.
Current emailer status	Indicates how many emails are queued to be sent.

E-Alerts are sent from the management port. E-Alert settings are configured on the *E-Alert Settings* page (see E-Alert Settings on page 220) except for *Friendly Name*, which is configured on the *Configure Enclosure* page (see Configure Enclosures on page 202).

SNMP Traps

Table 3-74: SNMP Traps

Label	Description
IP address N for SNMP traps	The IP address that SNMP traps are sent to. One or two IP addresses can be specified.
Community string	The SNMP password. By default, this is *public*.
Trap version	The type of SNMP trap that is sent: SNMPv1 (abbreviated *1*) or SNMPv2c (abbreviated *2c*).
Test String	Text that is sent to test the SNMP trap.
When to send SNMP traps	Indicates when SNMP traps are sent: on errors; on warnings and errors; on information, warnings, and errors; or for all events. It can also be set to *Disabled*, meaning that no SNMP traps are sent.

SNMP trap settings are configured on the *SNMP/SYSLOG Settings* page (see SNMP/SYSLOG Settings on page 223).

Time Server

Table 3-75: Time Server

Label	Description
Auto set time and date	Indicates whether the time and date are configured to be automatically updated by a time server.
Time Server Protocol	The method by which the time server updates the storage system's time and date: *Daytime* or *SNTP*.
Selected time server	The IP address of the time server.
Daytime server date and time format	The date and time format used by the Daytime time server. Not applicable if an SNTP time server is used.
Retrieved daytime server data	The retrieved data from the time server.

Time server settings are configured on the *Configure Time and Date* page (see Configure Time and Date on page 225).

Security

Table 3-76: Security

Label	Description
ADMIN account login	Indicates whether or not a password is required for the ADMIN account. If a password is required, but the default password has not been changed, the default password value *Password* displays.
USER account login	Indicates whether or not a password is required for the USER account. If a password is required, but the default password has not been changed, the default password value *Password* displays.
GUI mode	Indicates the current GUI restrictions. If there are none, *Full GUI access* displays.

Security settings are configured on the *Password Configuration* page (see Security on page 228).

SSL

Table 3-77: SSL

Label	Description
SSL certificate	Indicates the type of SSL certificate currently in use, and also provides a download link for the current certificate.

Label	Description
SSL mode	Indicates what kinds of browser connections are allowed for the storage system: *HTTP only*, *HTTPS only*, or *HTTPS or HTTP*.
Minimum SSL version	Indicates the minimum SSL version set for the storage system.
Certificate mode	Indicates the current certificate mode.
Management API (NMP) TLS	Indicates the current NMP TLS setting.

SSL settings are configured on the *SSL Configuration* page (see SSL Configuration on page 230).

GUI Settings

Table 3-78: GUI Settings

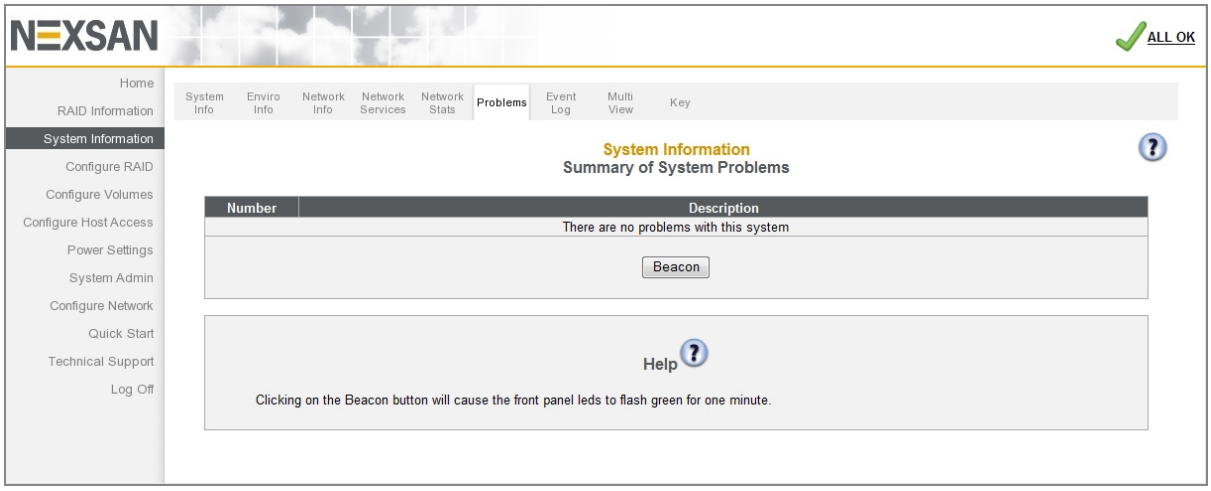
Label	Description
Webpage refresh	The current page auto-refresh setting.
Colored array text	Indicates whether different arrays are displayed with different colored text.
Javascript enhancements	Indicates whether JavaScript is currently being used in the GUI.
Javascript RAID icon info	Indicates whether JavaScript is being used for RAID icon help.
Javascript hot tracking	Indicates whether JavaScript is being used to highlight lines in tables when the mouse cursor is hovering over them.
Reduce scrolling by using sub-menus	Indicates whether optional submenus are being used in the GUI.
Reduce scrolling by showing less info	Indicates whether pages are displayed with reduced information.

Graphical user interface (GUI) settings are configured on the *GUI Settings* page (see GUI Settings on page 232).

Summary of System Problems

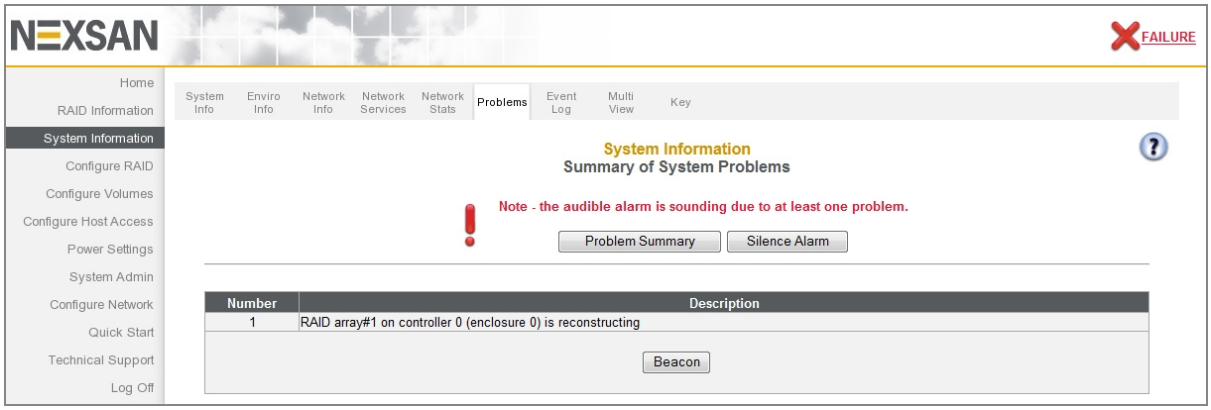
Clicking **System Information > Problems**, the "Failure" indicator in the upper right corner of any page, or the **Problem Summary** button on the *Home* page takes you to the *Summary of System Problems* page, which displays a list of any current problems that the storage system is experiencing. When there are no problems, the *Summary of System Problems* page looks like this:

Figure 3-79: *Summary of System Problems* page, displaying no problems



However, when problems exist, the *Summary of System Problems* page looks like this:

Figure 3-80: *Summary of System Problems* page, displaying a problem



Each problem that the storage system is experiencing is listed, with a *Number* indicating its order of occurrence and a *Description* that gives a summary of the problem and the component that it is related to.

Clicking the **Beacon** button causes the LEDs on the front of the storage system to flash for one minute. This can help in locating a specific storage system in a large installation where multiple Nexsan Storage Systems are located.

Clicking the **Silence Alarm** button causes the audible alarm on the storage system to stop sounding.

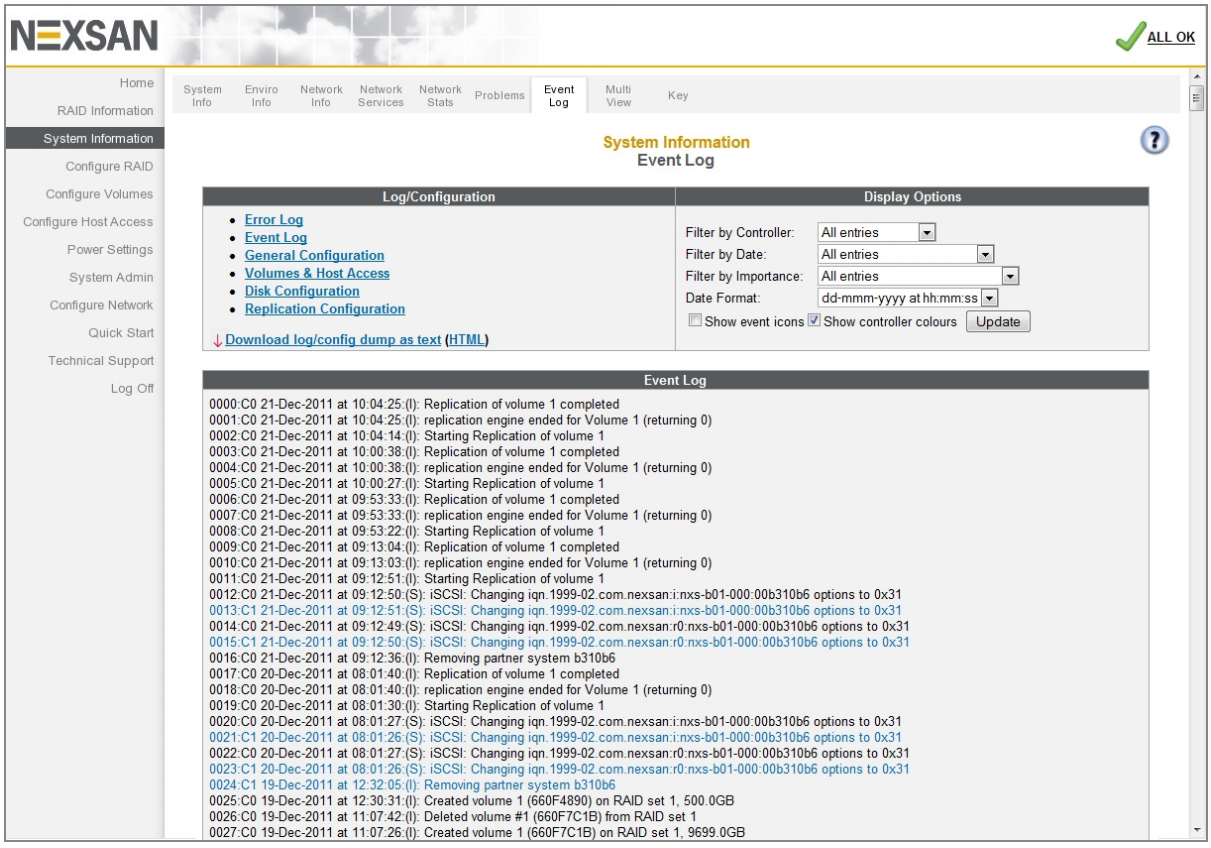
Note If further problems occur, the audible alarm will sound again.

More information about each problem can be obtained by going to the information page for the indicated component (see RAID Information on page 71 or System Information on page 99).

Event Log

Clicking **System Information > Event Log** takes you to the *Event Log* page, which displays the event log for the Nexsan Storage System. This log can be used to find information about configuration changes, data errors, hardware failures, and other events experienced by the Nexsan Storage System (and Nexsan Storage Expansion, if present).

Figure 3-81: *Event Log* page



Event log entries follow a standard format:

Figure 3-82: Event log entry format

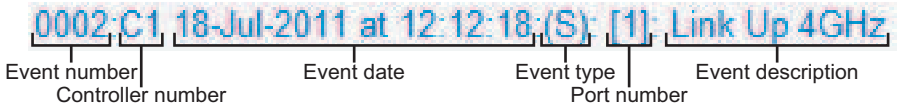


Table 3-83: Event log entry format description

Setting	Description
Event number	The reference number for the event, in reverse order of occurrence (event *0000* is the most recent event).
Controller number	The RAID Controller that the event is related to.

Setting	Description	
Event date	The date and time of the event's occurrence, in "dd-mmm-yyyy at hh:mm:ss" format.	
Event type	The broad category that the event falls into:	
	Error (E)	Serious problems that likely require user intervention. Examples include a failed disk, a RAID Controller going offline, or a fan problem.
	Warning (W)	Problems that may indicate an imminent failure, but are themselves unlikely to compromise data. Examples include excessive temperature, firmware errors, or disk block failures.
	Information (I)	Events that indicate items of interest to the user. Examples include array creation or deletion, verification scan start and stop, or a new disk being inserted.
	System (S)	Lower-level information events. Examples include port status, IP address changes, or array initialization messages.
Port number	For events that pertain to a particular port, the number of the port.	
Event description	A brief description of the event.	

The event log can be filtered and formatted using the controls under *Display Options*:

Table 3-84: Setting filters and formats for the Event Log

Setting	Description
Filter by Controller	Shows events for **Controller 0**, **Controller 1**, or both RAID Controllers.
Filter by Date	Shows events from the last day, week, or month; or show all entries.
Filter by Importance	Shows only error events (E); errors and warnings (E & W); errors, warnings, and information events (E, W, I); or all events (E, W, I, S).
Date Format	Shows dates in one of three formats: • **dd-mmm-yyyy at hh:mm:ss** (international format, the default) • **dd/mm/yyyy hh:mm:ss** (European format) • **mm/dd/yyyy hh:mm:ss** (North American format)
Show event icons	Display icons for each event category at the beginning of each event entry. Icons are color coded: pink for system events, blue for information events, yellow for warnings, and red for errors. This option is deselected by default. If **Show event icons** is selected, the event type is not displayed after the event date.

Setting	Description
Show controller colours	Display events for Controller 0 in black and events for Controller 1 in blue. This option is selected by default.

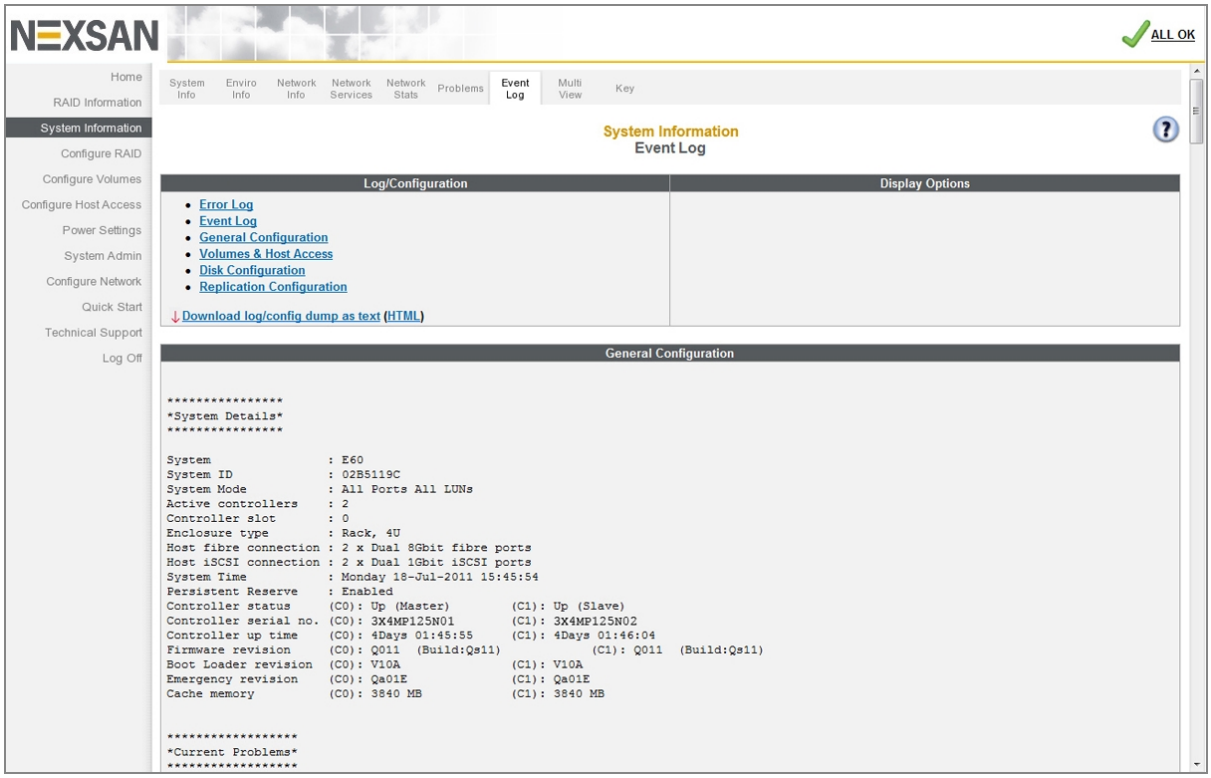
Error Log

Clicking the **Error Log** link on the *Event Log* page displays only the error events (E) in the log. It is a shortcut for selecting **Errors only** in the **Filter by Importance** drop-down list under *Display Options*.

General Configuration

Clicking the **General Configuration** link on the *Event Log* page displays a text-based summary of the current system configuration.

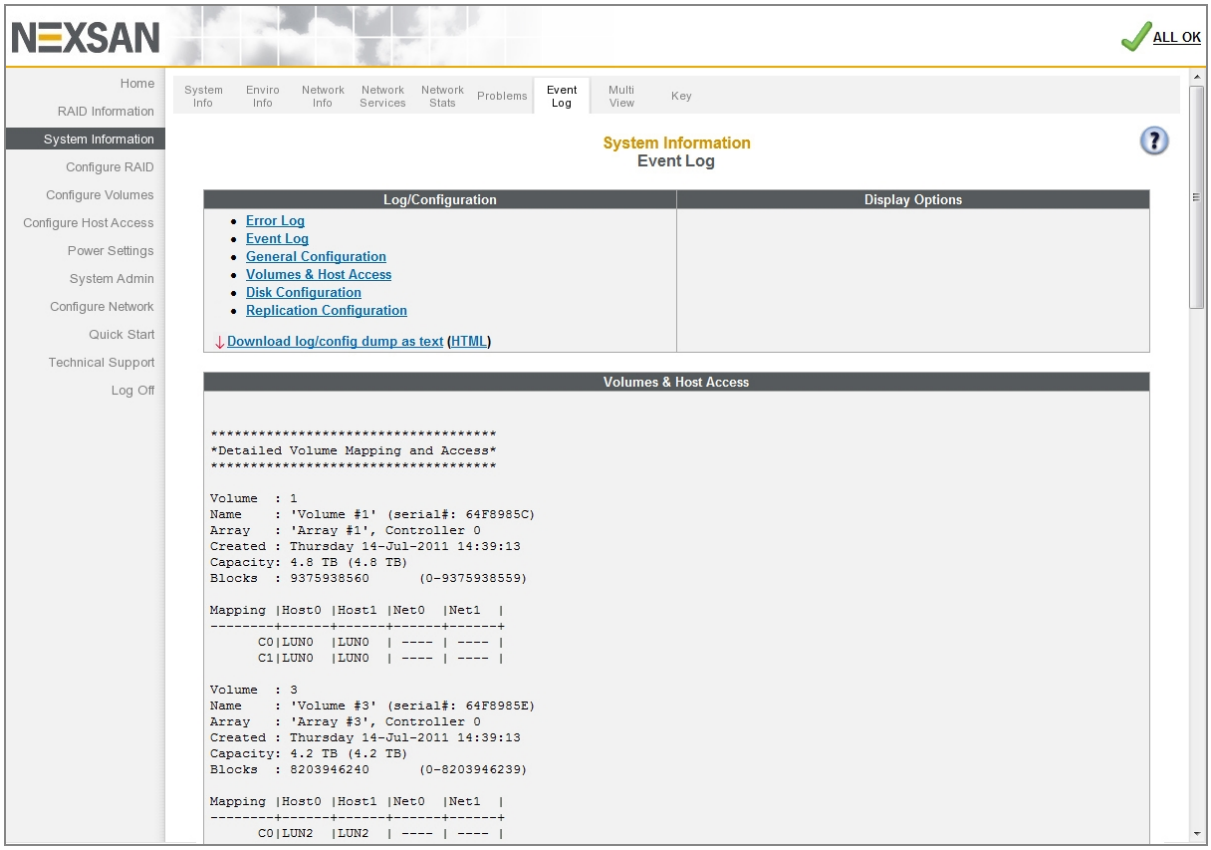
Figure 3-85: *Event Log* general configuration page



Volumes and Host Access

Clicking the **Volumes & Host Access** link displays a text-based volume mapping and host access summary.

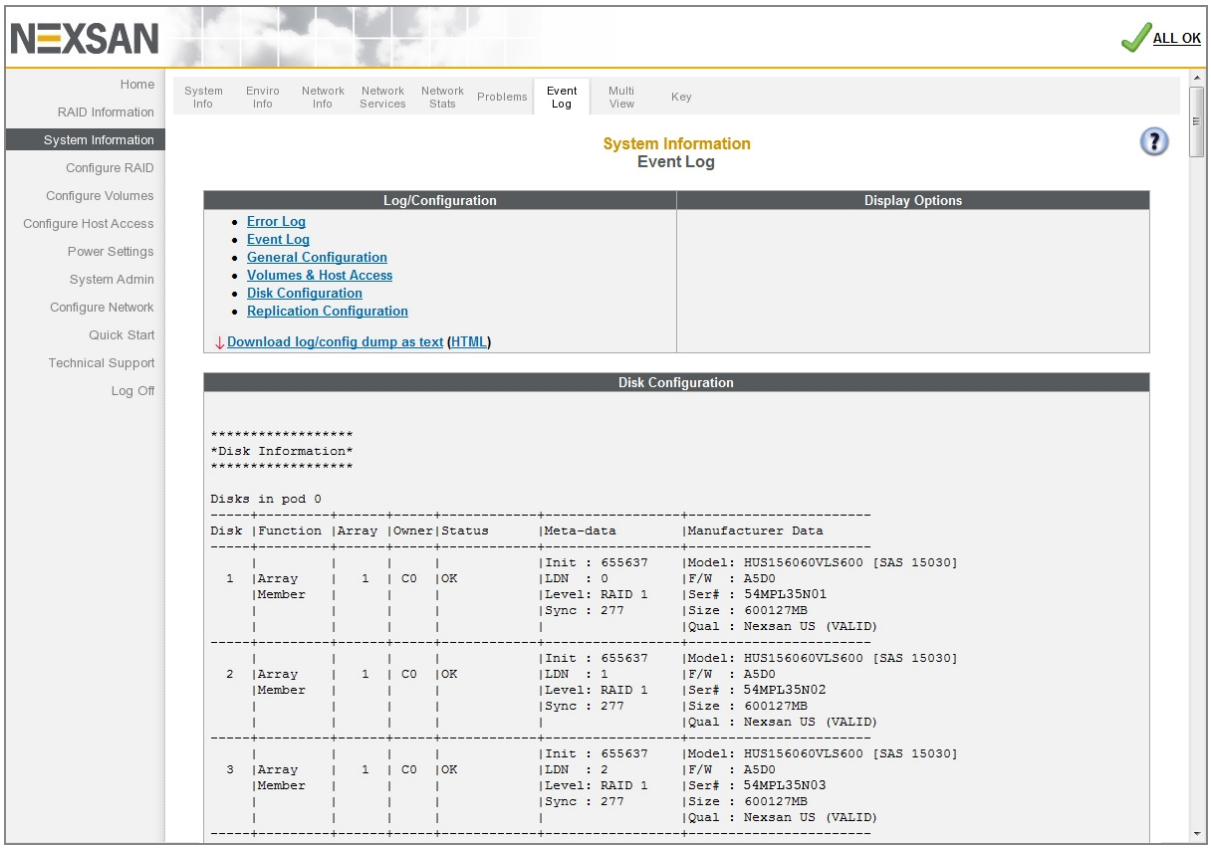
Figure 3-86: *Event Log* volume and host access summary page



Disk Configuration

Clicking the **Disk Configuration** link displays a text-based summary of disk information.

Figure 3-87: *Event Log* disk configuration summary page

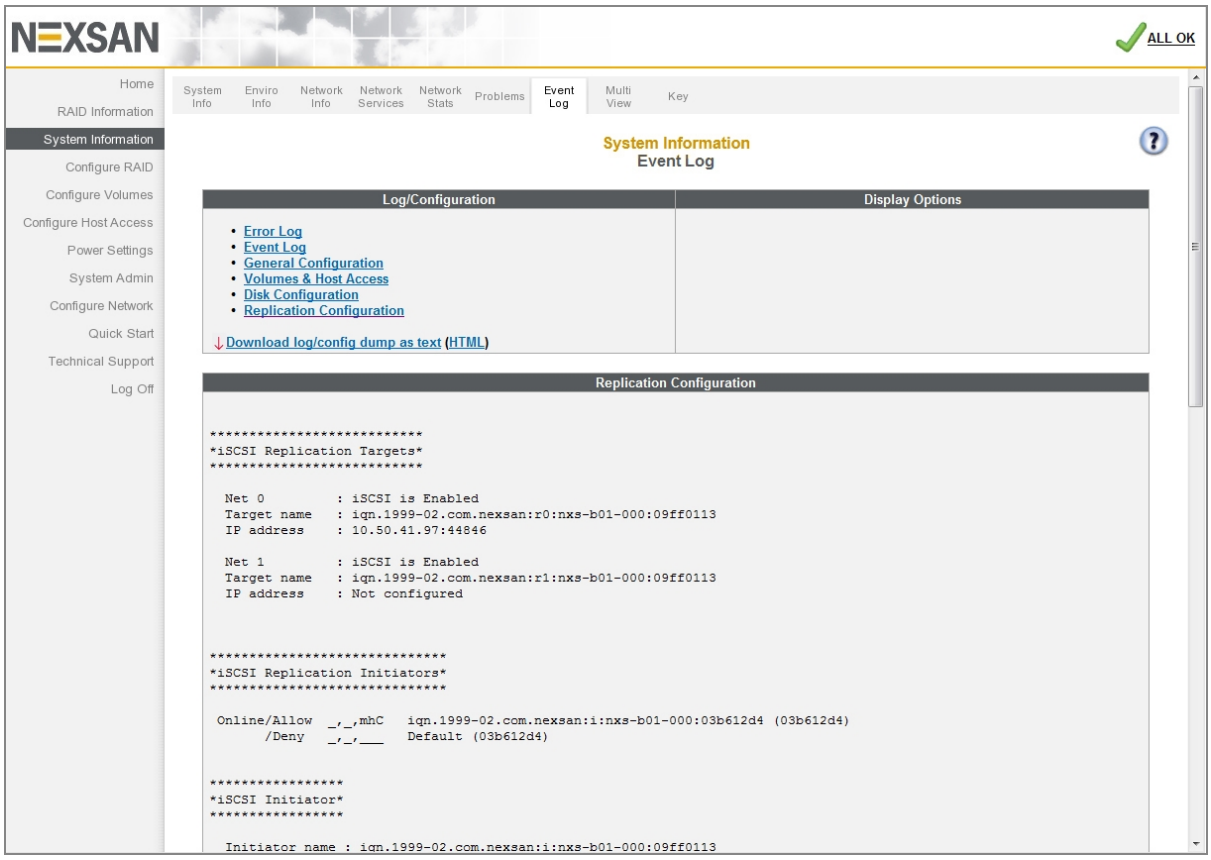


Replication Configuration

Clicking the **Replication Configuration** link displays a text-based summary of the replication configuration status of the Nexsan Storage System.

For detailed information regarding the snapshots and replication features of Nexsan Storage Systems, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Figure 3-88: *Event Log* replication configuration summary page



Download Event Log Files

You can download the Event Log, General Configuration, Volumes & Host Access, and Disk Information files in text format by clicking the **Download log/config dump as text** link. These files can be read in a text editor. You can download them as an HTML file by clicking the **HTML** link in parentheses next to it.

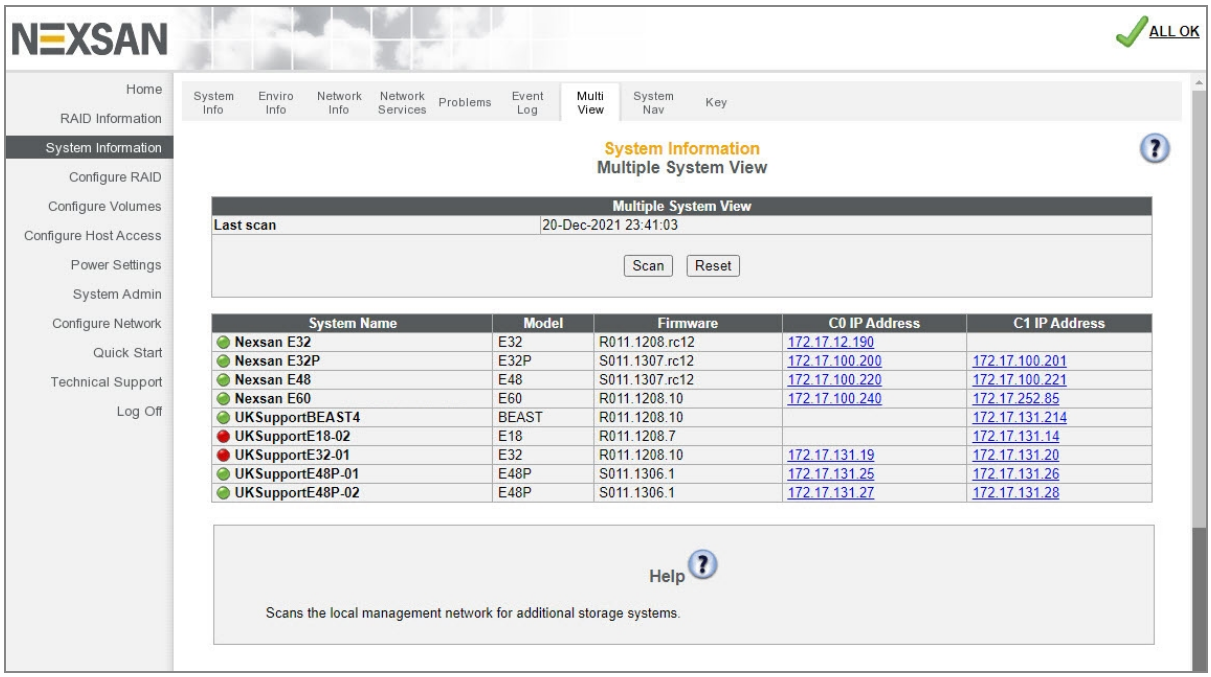
Multiple System View

Clicking **System Information > Multi View** takes you to the *Multiple System View* page, where you can generate a summary of multiple Nexsan Storage Systems.

The multiple view page shows a summary of each scanned device. This summary includes system name, model, firmware version, and controller IP addresses. Clicking the IP address or the summary takes you to the *Login* page for that storage system.

Click **Scan** to display the summary:

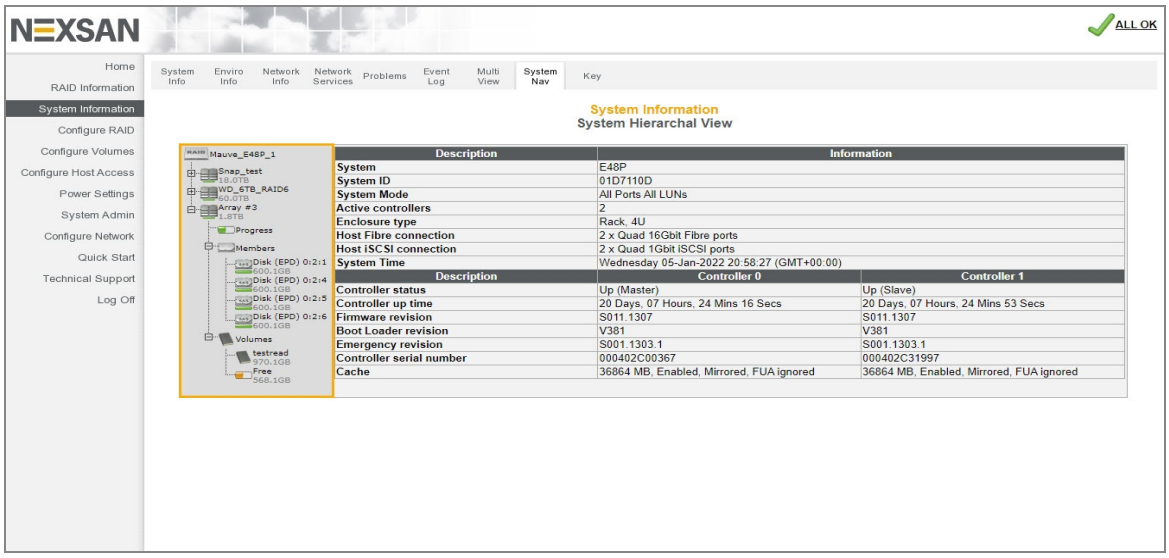
Figure 3-89: *Multiple System View* page



System Hierarchal View

Clicking **System Information > System Nav** takes you to the *System Hierarchal View* page, which gives an overview of the configured arrays, volumes, and array member disks in a hierarchical view.

Figure 3-90: *System Hierarchal View* page



Click a "**+**" icon next to an item to expands it to list its components. Click an icon to display information related to the component. See Table 3-92: "Hierarchal component details" on the next page.

Figure 3-91: Hierarchal view closeup

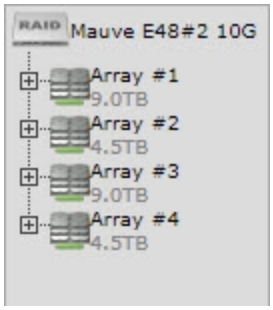
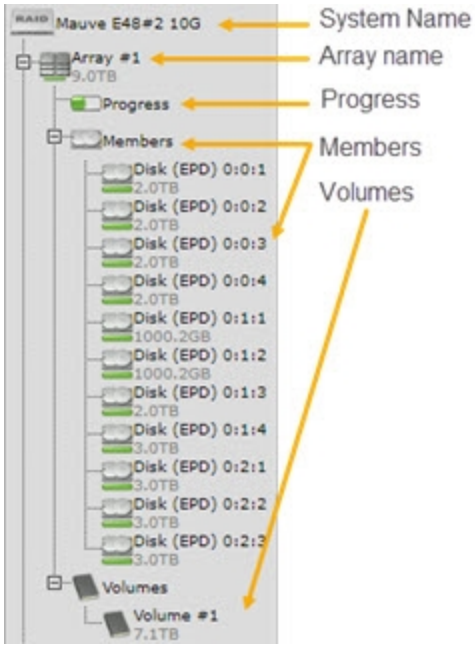
Collapsed view	Expanded view
	

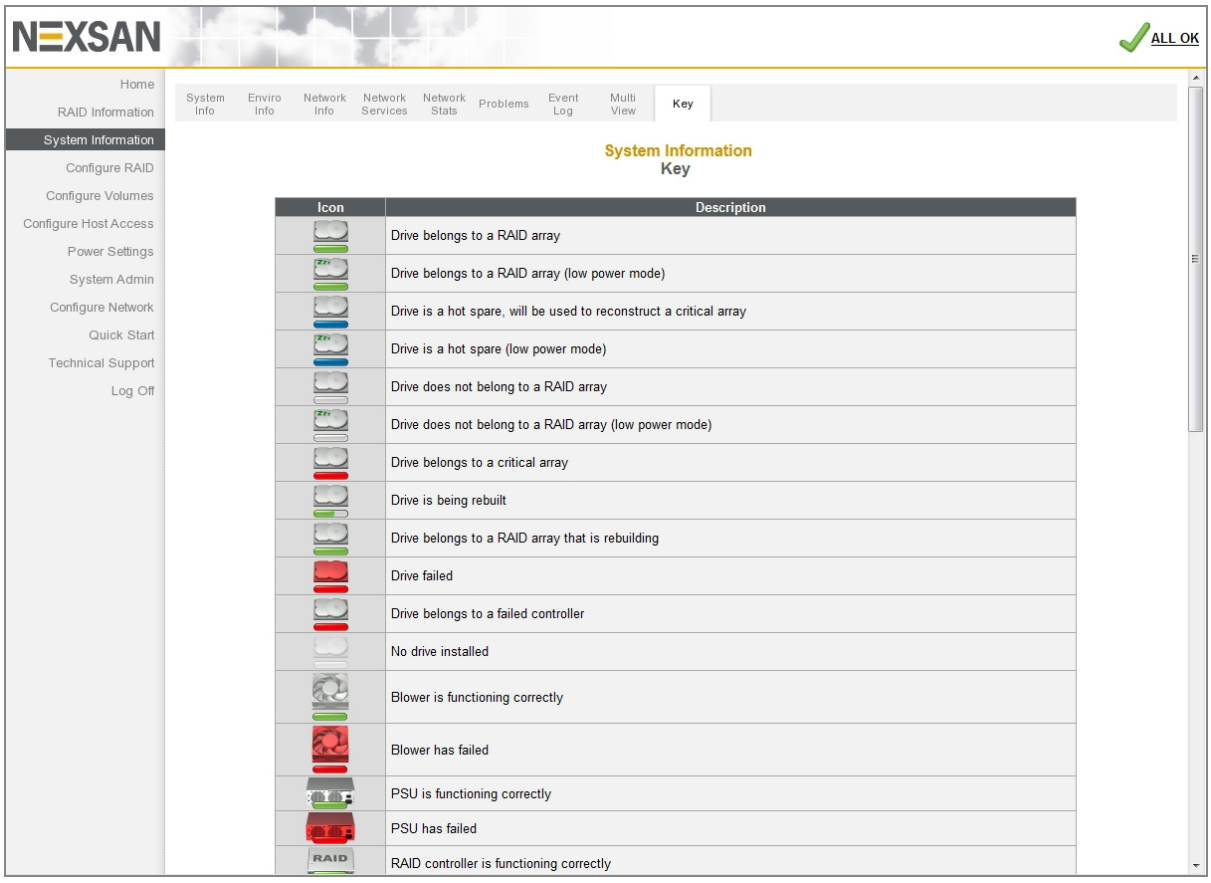
Table 3-92: Hierarchal component details

Label	Description
System name	Displays Nexsan Storage System name, such as Mauve E48#2 10G in the example (see Summary Information on page 100).
Array	Displays the RAID array name and capacity (see RAID Array Information on page 72).
Progress	Displays the progress of any running utilities (see RAID Array Utility Progress on page 75).
Members	Displays the member disks in the array, including individual capacity, as well as EPD (Enclosure:Pod:Disk) numbers, for example E:P:D (0:0:1).
Volumes	Displays information specific to the volume, but in a format similar to the Detailed Volume Layout page (see Detailed Volume Layout on page 79).

Icon Key

Clicking **System Information > Key** takes you to the *Key* page, which displays a legend of the various icons used throughout the Nexsan Storage System GUI.

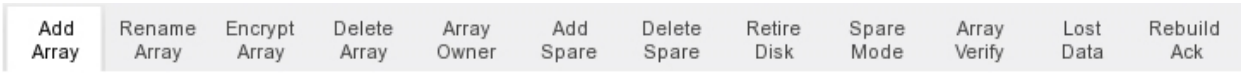
Figure 3-93: *Key* page



Configure RAID

Clicking **Configure RAID** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-94: Configure RAID navigation bar



Refer to Table 3-95 for help with the Nexsan E-Series/BEAST RAID configuration firmware:

Table 3-95: RAID configuration pages

Nav bar button	GUI pages and documentation links
Add Array	Create a new RAID array on the next page
Rename Array	Rename RAID Arrays on page 126
Encrypt Array	Configure Array Encryption on page 127
Delete Array	Delete a RAID Array on page 132
Array Owner	RAID Array Ownership on page 133
Add Spare	Add Hot Spare on page 134
Delete Spare	Delete Hot Spare on page 136
Retire Disk	Retire Disk on page 137
Spare Mode	Configure Hot Spare Mode on page 140
Array Verify	Verify RAID Array on page 141
Lost Data	Lost Data/Bad Blocks on page 145
Rebuild Ack	Acknowledge Rebuild on page 146

Create a new RAID array

Clicking **Configure RAID** takes you to the *Create a New RAID Array* page, which enables you to create arrays from two or more unused disks.

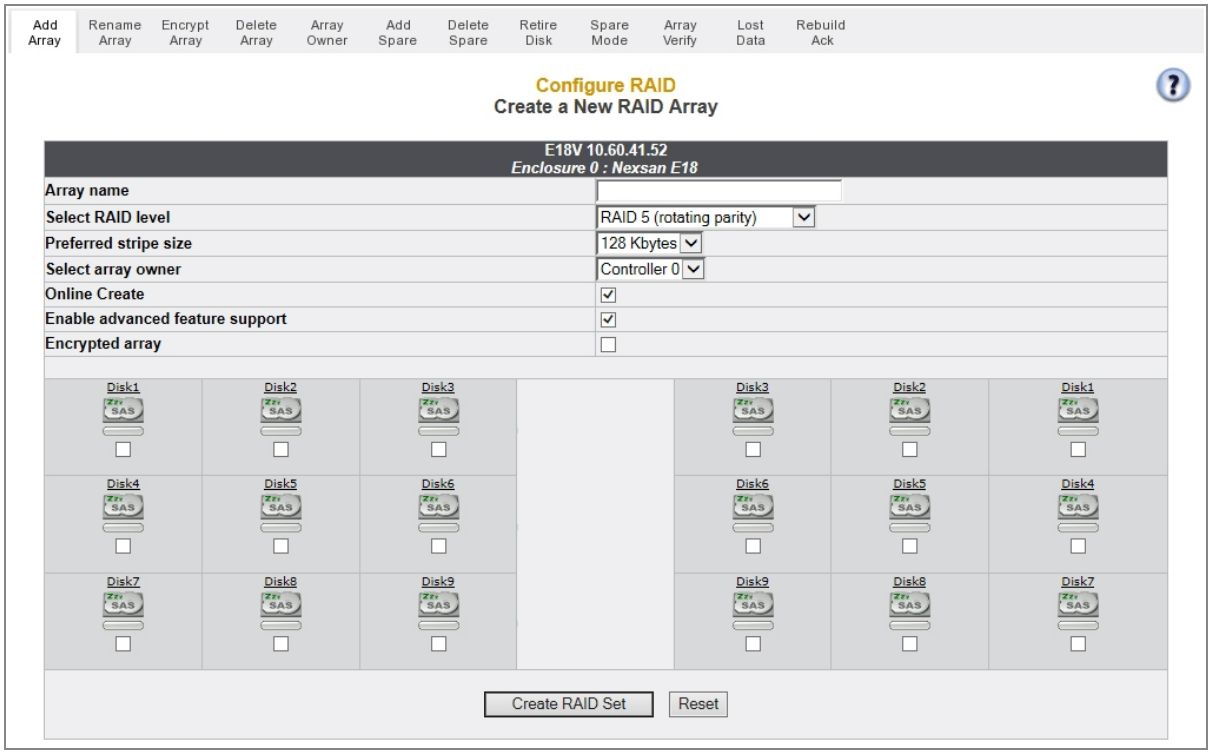
Notes:

- The array creation process takes many hours, depending on how many disks are in the array and whether you select **Online Create** in the creation tool. You can check the array construction progress by clicking **RAID Information > Progress** (see RAID Array Utility Progress on page 75).
- Before you begin, make sure you have enough available disk space to add a new array.

To create a new RAID array:

1. Click **Configure RAID > Add Array**. If your Nexsan Storage System has an attached Nexsan Storage Expansion, you are first prompted to select which storage system the new array will be built on. Make your selection and continue. The Create a New RAID Array page displays.

Figure 3-96: *Create a New RAID Array* page



2. Click the **Create RAID Set** button. The **Create a New RAID Array** tool displays.

3. Use Table 3-97 for details about RAID creation settings.

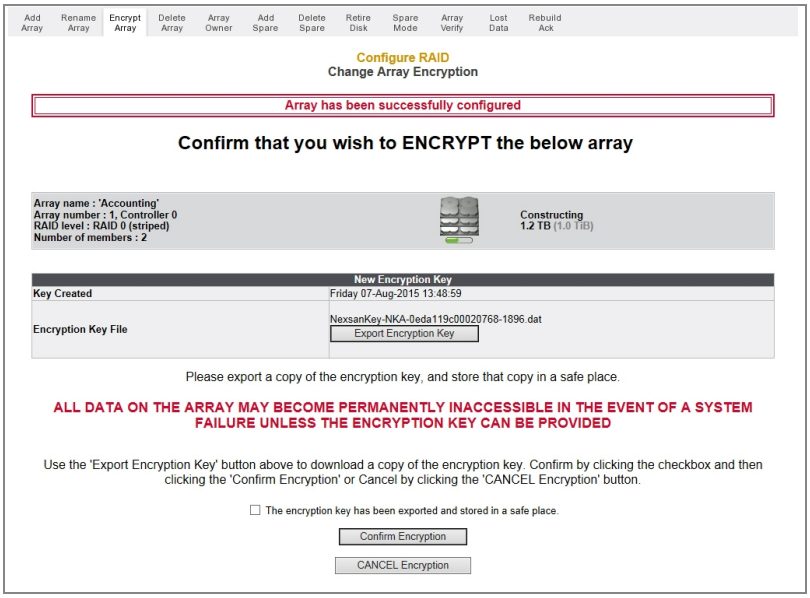
Table 3-97: RAID array creation tool settings

Setting	Action
Array name	Enter a name for the array. Array names can be up to 63 characters in length. If this field is left blank, a default array name (**Array #*N***) is assigned. **Note** Array names can be changed on the *Rename RAID Arrays* page (see Rename RAID Arrays on page 126).
Select RAID level	Select the RAID level in the drop-down list. You can choose from the following: **RAID 0 (striped)** **RAID 1/1+0 (mirrored)** **RAID 4 (parity)** **RAID 5 (rotating parity)** (default) **RAID 5S (SSD parity)** **RAID 6 (rotating dual parity)** **RAID 6S (dual SSD parity)** **Notes:** • RAID 1+0, also known as RAID 10, is automatically configured when you select **RAID 1/1+0 (mirrored)** and use an even number of drives, with a minimum of four. • For more information on RAID levels, see Appendix C, RAID levels on page 267. • RAID 5S and RAID 6S are only available if SSDs are installed.
Preferred stripe size	Set the stripe size using the drop-down list. **128Kbytes** is the default and recommended setting, but you can also choose **64Kbytes**, **32Kbytes**, or **16Kbytes**. **Note** It is strongly recommended that you do not change this setting.
Select array owner	Set which controller will be the “owner” of this array (that is, the one that manages it under most circumstances) using the drop-down list.
Online Create	The box is checked by default. Do one of the following: • Leave it checked if you want to be able to access your volumes right away. This slows down the array creation process, and access to the volumes can be slow during this time. • Uncheck the box if you want to speed up the array creation process. This option makes your volumes unavailable until the array creation process is complete.

Setting	Action
Enable advanced feature support	The box is checked by default. **Note** This setting is NOT CHANGEABLE after initial configuration. Do one of the following: • Leave **Enable advanced feature support** checked if you want advanced features to be enabled for this array. This option creates two hidden volumes per array, one for the snapshot reservation and one for metadata. These count towards the per-storage system maximum of 254 volumes. • Uncheck the box if you want advanced features to be disabled for this array. **Notes:** • Each Nexsan Storage System (whether a single Nexsan Storage System or with Nexsan Storage Expansions attached) can contain a maximum of 32 individual arrays. • For detailed information regarding the snapshots and replication features, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.
Encrypted array	(E-Series only) If there are self-encrypting disks (SEDs) installed in the Nexsan Storage System, apply the **Encrypted array** option to encrypt the array immediately. Checking this box disables the check boxes below all disks that are not SEDs. Encrypting an array ensures that user data on disks that are removed from the Nexsan Storage System cannot be read without the corresponding encryption key. If this option is selected, you will be prompted to download the encryption key once the array has been created.
Select disks	Select each disk that you would like to include in the array (click the check box beneath each available disk). You must select a minimum of two disks for RAID 0 or RAID 1/1+0, a minimum of three disks for RAID 4 or RAID 5, or a minimum of four disks for RAID 6. **Notes:** • There is a section below the **Create RAID Set** button that enables you to select a section of disks all at once. Click the check box next to **Disk *N* through *N*** for each group of disks that you wish to select. • If at any time you wish to return the array creation tool to its initial state, click **Reset**.
Create RAID Set	Click the **Create RAID Set** button.

Setting	Action
Export Encryption Key	(E-Series only) If you are creating an encrypted array, the *Configure Array Encryption* page displays.

Figure 3-98: *Configure Array Encryption* confirmation page



Do the following:

a. Click the **Export Encryption Key** button to save the encryption key to your hard drive.

   Note When the encryption key for an encrypted array is changed, previous encryption keys cannot be used to restore access to the array. Export the new encryption key file and keep the backup in a secure place. If drives become inaccessible (for example, if they are removed from the chassis), you can restore access to the drives by uploading exported encryption key files. See Restore Encryption Keys on page 212.

b. Check the check box next to **The encryption key has been exported and stored in a safe place**.

c. Click the **Confirm Encryption** button.

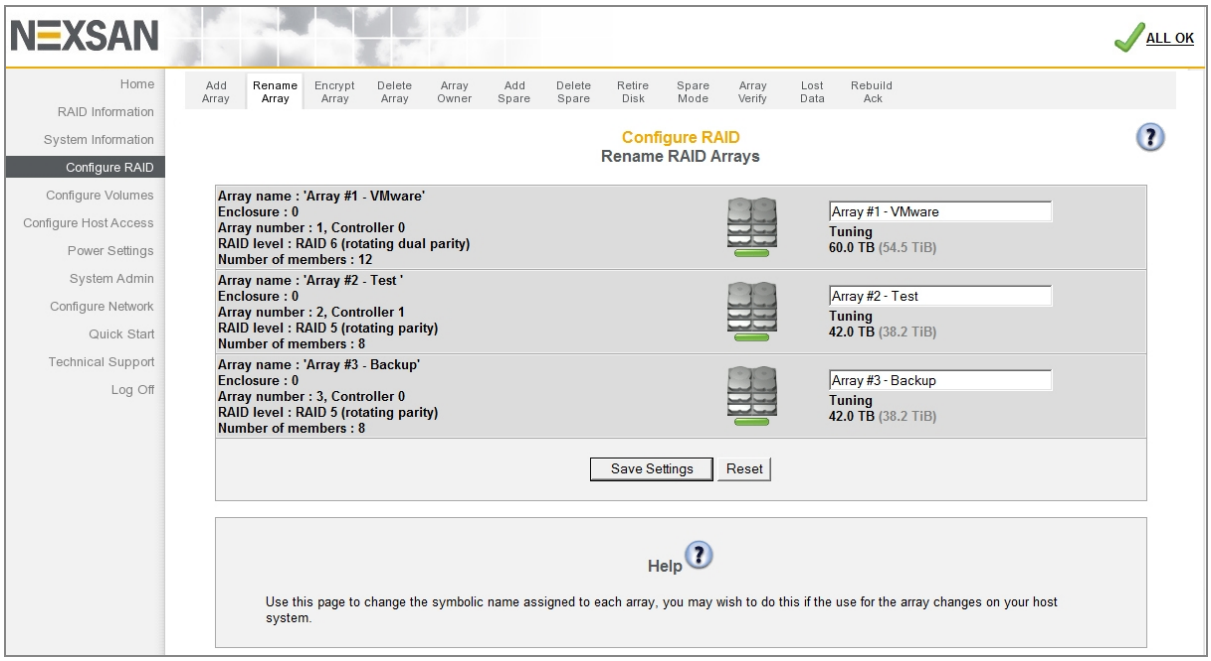
Note If you decide that you do not wish to create an encrypted array, click the **CANCEL Encryption** button.

4. You are taken to the **Configure Logical Volume** page (see Configured Logical Volumes on page 76). The message Array has been successfully configured displays at the top of the page, along with an additional message:
5. If you left the **Online Create** check box checked, the message displayed is *Performance will be degraded until tuning is completed*.
6. If you unchecked **Online Create**, the message displayed is *Volumes will not be accessible until initialization is completed*.

Rename RAID Arrays

Clicking **Configure RAID > Rename Array** takes you to the *Rename RAID Arrays* page.

Figure 3-99: *Rename RAID Arrays* page



Each array displays in a separate section, which includes the *Array name*, *Enclosure*, *Array number*, *Controller* number, *RAID level*, *Number of members*, array icon, array status, and array capacity. For information on these items, see RAID Array Information on page 72.

► To rename one or more arrays:

1. Enter the new name into the field to the right of the icon for the array.

   Notes:

   - If you leave one or more enter new name fields blank, those arrays retain their previous names.
   - If at any time you wish to return the *Rename RAID Arrays* page to its initial state, click **Reset**.

2. Click **Save Settings**.

The arrays are immediately renamed.

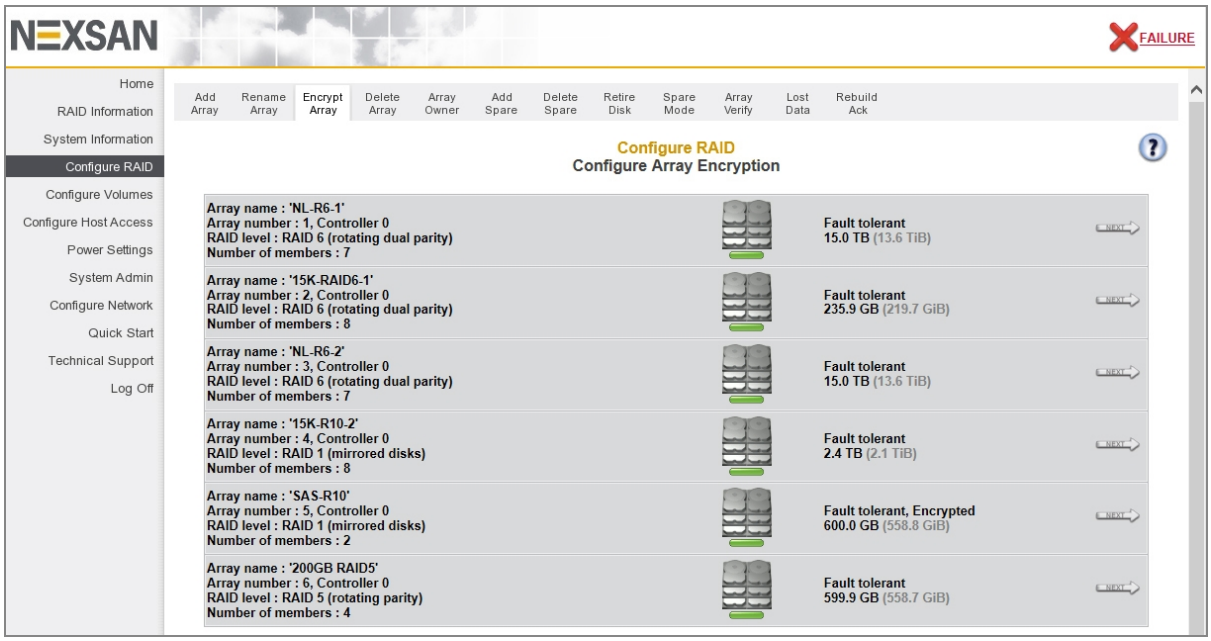
Configure Array Encryption

Clicking **Configure RAID > Encrypt Array** takes you to the *Configure Array Encryption* array selection page, where you can encrypt and decrypt arrays.

Notes:

- Array encryption is only available on Nexsan E-Series Storage Systems.
- Encrypting an array prevents user data from being read from disks that are removed from the Nexsan Storage System without the corresponding encryption key. Decrypting an array makes its disk drives fully readable after removal from the Nexsan Storage System without the encryption key. Neither encrypting nor decrypting an array alters the data in the array in any way, nor do they require any system down-time.

Figure 3-100: *Configure Array Encryption* selection page

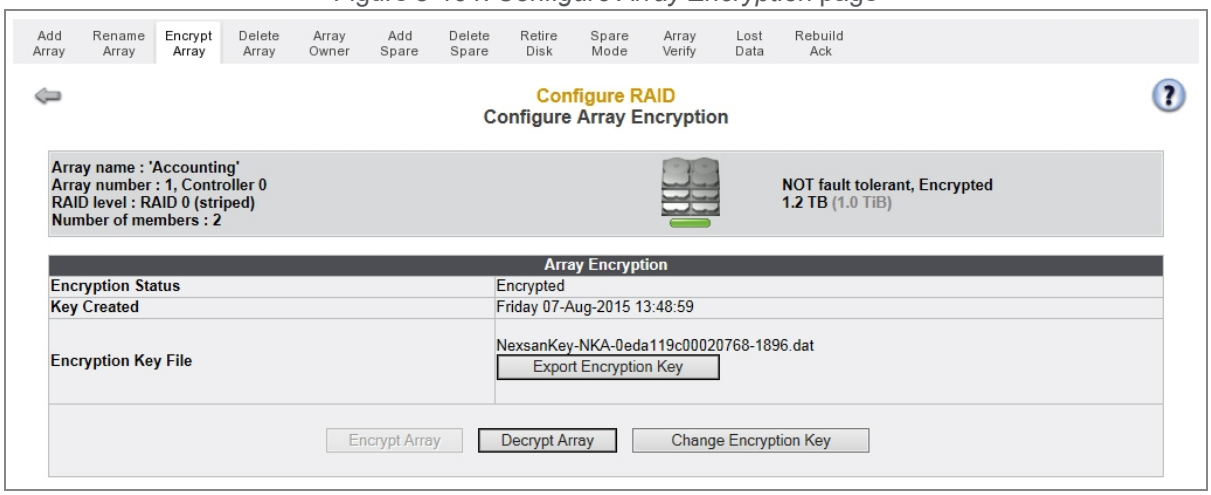


Each array listed shows the *Array name*, *Array number*, *Controller*, *RAID level*, *Number of members*, whether the array is fault tolerant, whether the array is encrypted, and its size.

To display array encryption or decryption information:

1. Click **Configure RAID > Encrypt Array**.
2. Click the **Next** button for the desired array. The array encryption or decryption page displays:

Figure 3-101: *Configure Array Encryption* page



The *Array Encryption* section displays the following:

Table 3-102: Array Encryption

Setting	Description
Encryption Status	*Encrypted*, *Unencrypted*, or *Disabled (not supported by disks)*. If the array does not support encryption, then all buttons are grayed out and *Encryption Status* reads *Disabled (not supported by disks)*.
Key Created	Date and time of key creation in format *Day DD-Mon-YYYY HH:MM:SS*.
Encryption Key File	The name of the encryption key file and the **Export Encryption Key** button.

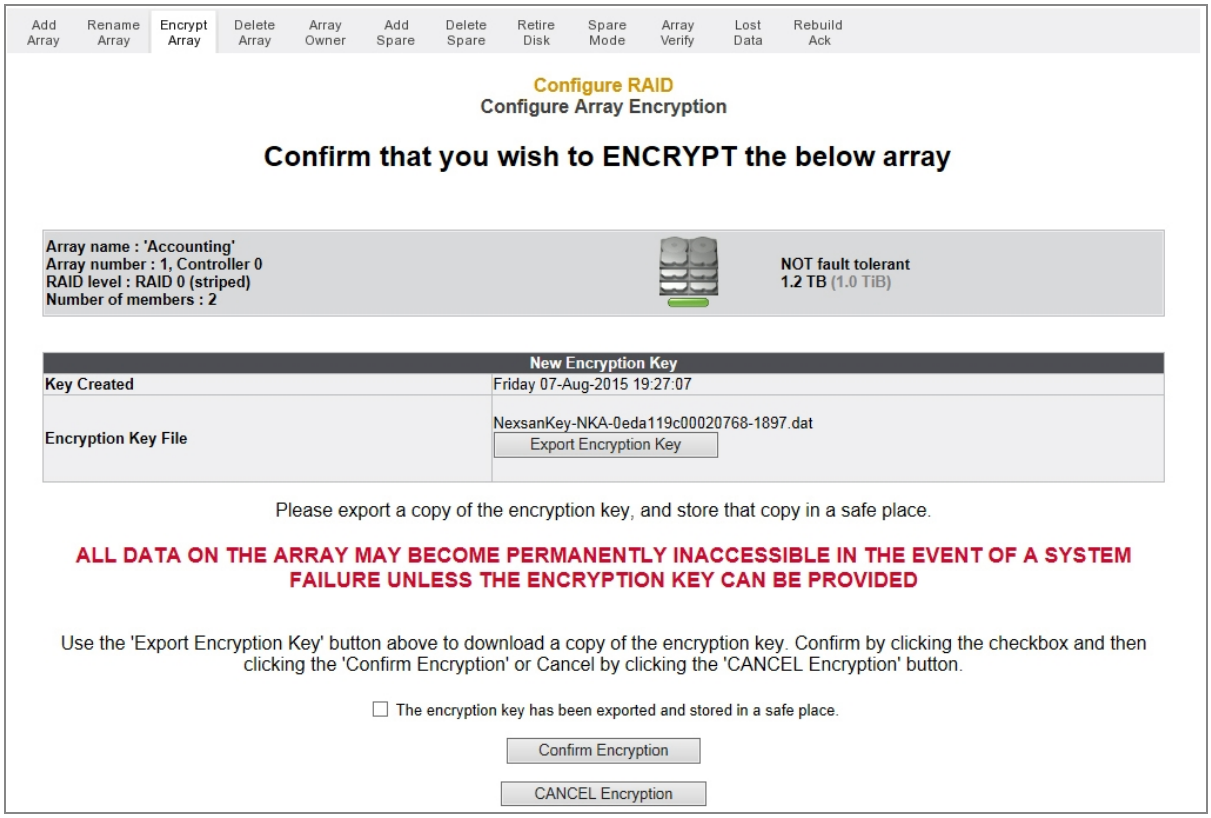
The section also contains the **Encrypt Array**, **Decrypt Array**, and **Change Encryption Key** buttons.

► To encrypt an array:

1. On the **Configure Array Encryption** page, click the **Next** button for the desired array.
2. Click the **Encrypt Array** button.

   The array encryption confirmation page displays:

Figure 3-103: Array encryption confirmation page



3. Click the **Export Encryption Key** button to save the encryption key to a .dat file on your hard drive.

   Note When the encryption key for an encrypted array is changed, previous encryption keys cannot be used to restore access to the array. Export the new encryption key file and keep the backup in a secure place. If drives become inaccessible (for example, if they are removed from the chassis), you can restore access to the drives by uploading exported encryption key files. See Restore Encryption Keys on page 212.
4. Check the check box next to **The encryption key has been exported and stored in a safe place**.
5. Click **Confirm Encryption**.

   A message displays, letting you know that the array has been encrypted.

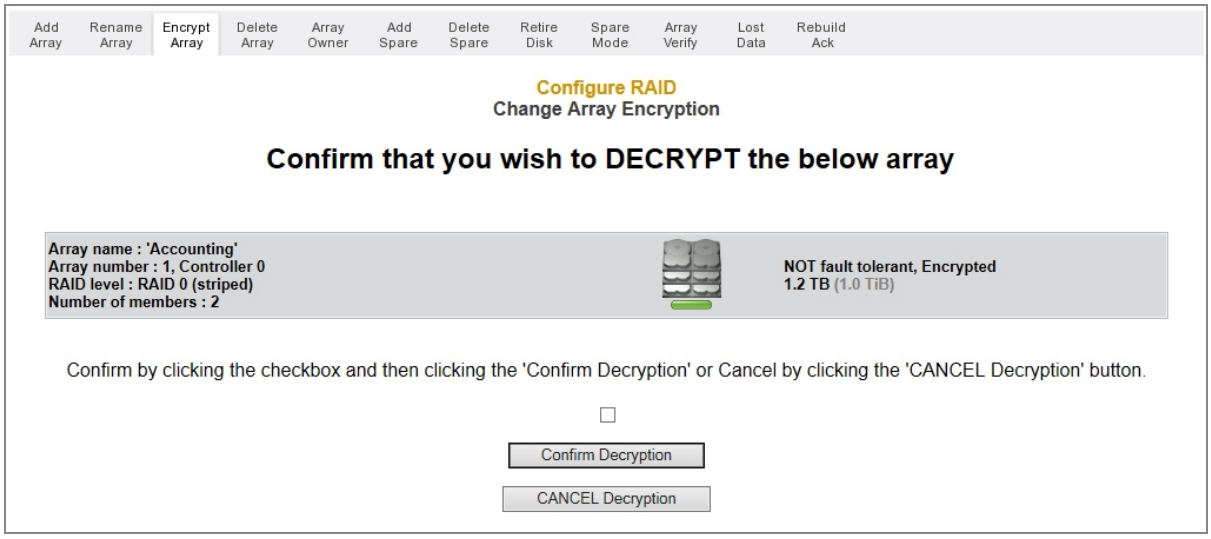
   Note If you change your mind about encrypting the array, click the **CANCEL Encryption** button.

► To decrypt an array:

1. On the **Configure Array Encryption** page, click the **Next** button for the desired array.
2. Click the **Decrypt Array** button.

   The array decryption confirmation page displays:

Figure 3-104: Array decryption confirmation page



3. Check the confirmation check box, then click **Confirm Decryption**. A message displays letting you know that the array has been decrypted.

   Note If you change your mind about decrypting the array, click the **CANCEL Decryption** button.

Back Up or Change an Encryption Key

Clicking **Configure RAID > Encrypt Array** takes you to the *Configure Array Encryption* array selection page.

Note When the encryption key for an encrypted array is changed, previous encryption keys cannot be used to restore access to the array. Export the new encryption key file and keep the backup in a secure place. If drives become inaccessible (for example, if they are removed from the chassis), you can restore access to the drives by uploading exported encryption key files. See Restore Encryption Keys on page 212.

▶ **To export the encryption key (encrypted arrays only):**

- Click the **Export Encryption Key** button to create a backup.

The file is saved according to your browser's usual method.

▶ **To change the encryption key (encrypted arrays only):**

1. On the **Configure Array Encryption** page, click the **Next** button for the desired array.
2. Click the **Change Encryption Key** button.

   The confirmation page displays.
3. Click the **Export Encryption Key** button to save the new encryption key to a .dat file on your hard drive.
4. Check the check box next to **The encryption key has been exported and stored in a safe place**.
5. Click **Confirm Encryption**.

   A message displays, letting you know that the array has been encrypted.

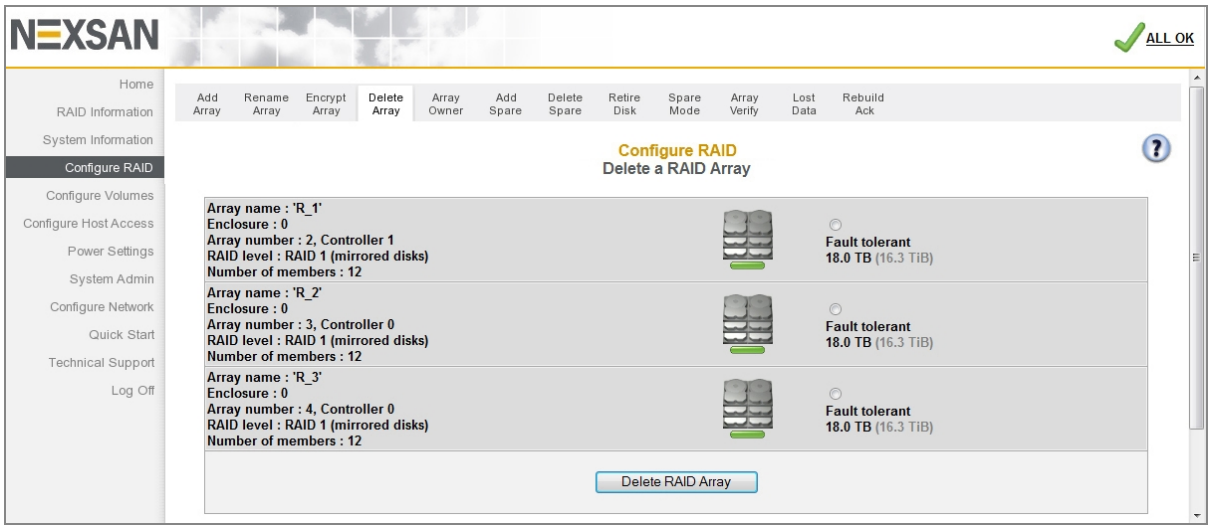
   Note If you change your mind about encrypting the array, click the **CANCEL Encryption** button.

   Note This only changes the encryption key for this specific array. All other arrays are unaffected.

Delete a RAID Array

Clicking **Configure RAID > Delete Array** takes you to the *Delete a RAID Array* page.

Figure 3-105: *Delete a RAID Array* page



RAID arrays cannot be deleted if they contain volumes. If you try to delete an array that contains volumes, a message displays, telling you to delete the volumes first. See Delete a Logical Volume on page 156.

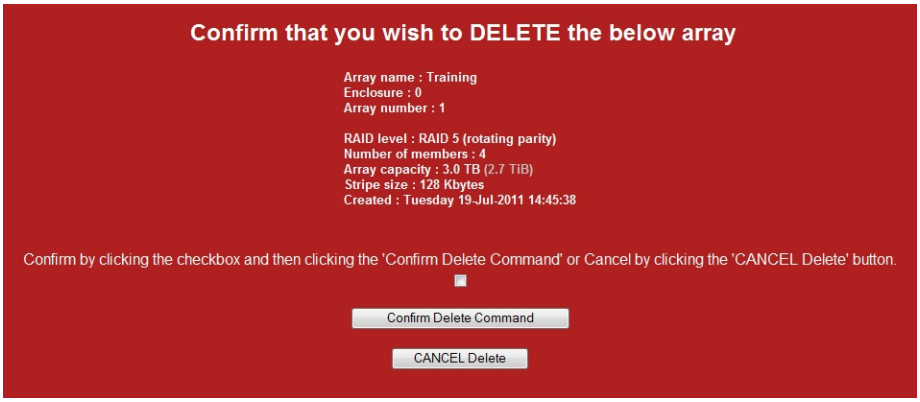
Note Deleting an encrypted array (see Configure Array Encryption on page 127) cryptographically erases all of its disk drives and then unlocks them.

► To delete an array:

1. Select the array you wish to delete by clicking the button next to the array icon.
2. Click **Delete RAID Array**.

   A confirmation page displays, asking you to confirm that you wish to delete the array:

Figure 3-106: Array deletion warning and confirmation dialog



3. To delete the array, click the confirmation check box, then click **Confirm Delete Command**.

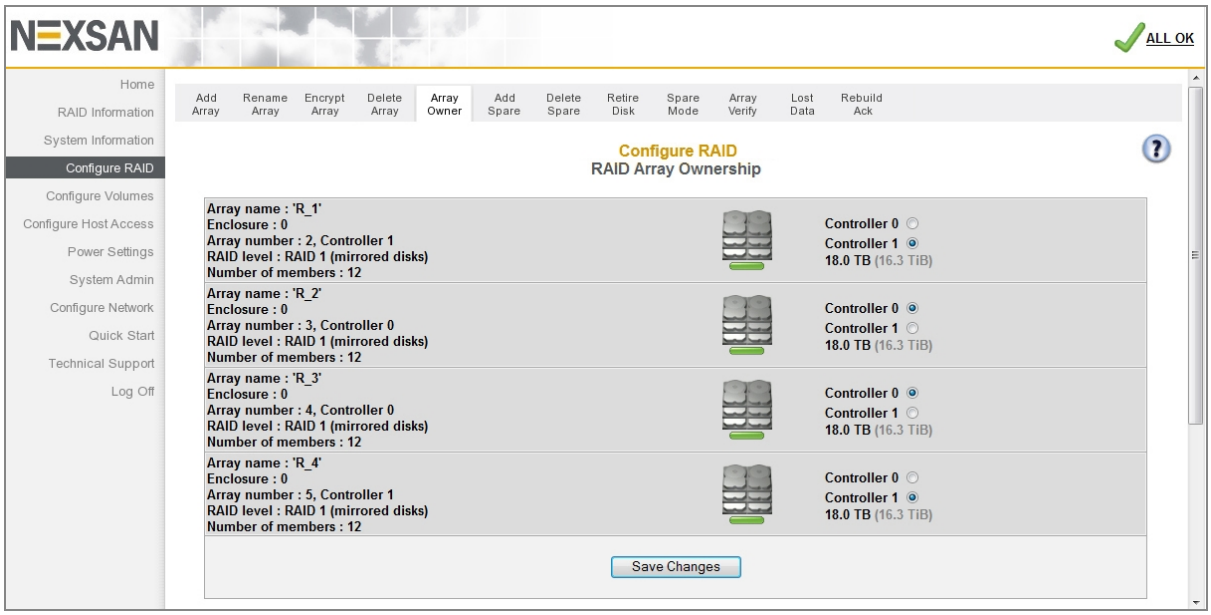
   Note To cancel the delete operation, click **CANCEL Delete**.

   A message displays, informing you of the results of your choice. Click the **Back** button to go to the *Home* page.

RAID Array Ownership

Clicking **Configure RAID > Array Owner** takes you to the *RAID Array Ownership* page.

Figure 3-107: *RAID Array Ownership* page



Each array displays in a separate section, which includes the *Array name*, *Enclosure*, *Array number*, *Controller* number, *RAID level*, *Number of members*, array icon, array status, and array capacity. For information on these items, see RAID Array Information on page 72.

Each section also displays **Controller *N*** selection buttons. The selected button indicates which controller the array is currently assigned to.

► To assign an array to a different controller:

1. Click the selection button next to the desired controller.
2. Click **Save Changes**.

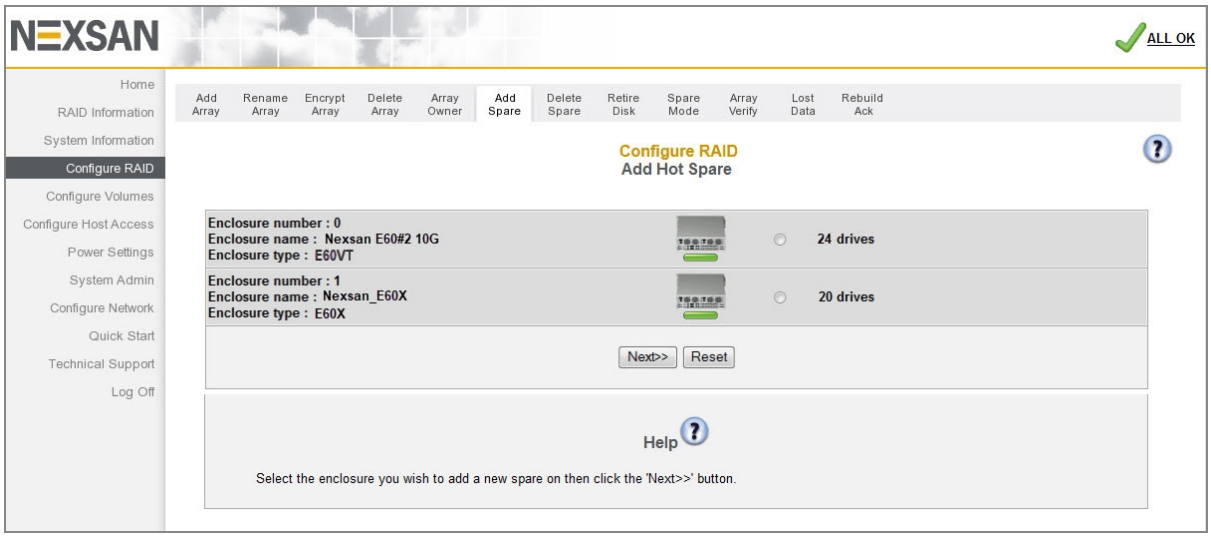
A message displays, informing you that the settings have been updated. Click the **Back** button to return to the *RAID Array Ownership* page.

Add Hot Spare

Clicking **Configure RAID > Add Spare** takes you to the *Add Hot Spare* page, which enables you to designate specific disk drives as “spares”, which will be used to reconstruct RAID arrays when array disks fail.

If your Nexsan Storage System has an attached Nexsan Storage Expansion, you are first prompted to select which storage system or storage expansion the new spare is in.

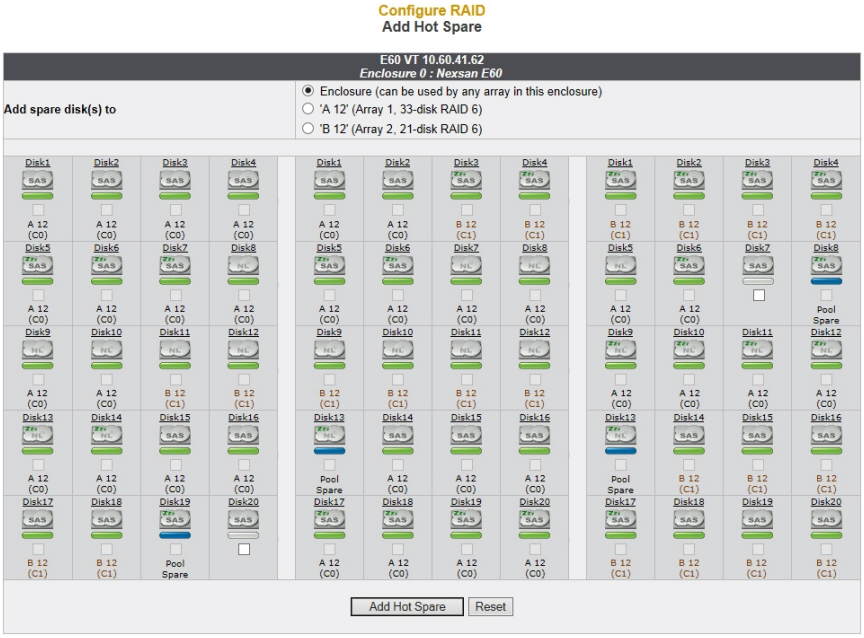
Figure 3-108: *Add Hot Spare* enclosure selection page



- Select the enclosure and click **Next** to be taken to the *Add Hot Spare* tool.

Once you have selected the desired enclosure, or if your Nexsan Storage System occupies a single enclosure, the *Add Hot Spare* tool displays.

Figure 3-109: *Add Hot Spare* tool page (example)



The disks in the Nexsan Storage System are represented in a similar fashion to the summary diagram on the *Home* page (see Home page on page 65).

There are two kinds of spare disks that the system uses:

- Pool Spares, which are disks that can be used by any array in the Nexsan Storage System.
- Dedicated Spares, which are disks that are assigned as a spare for a specific array.

Spares can only be used by arrays in the same enclosure.

► To designate an unused disk as a Pool Spare:

1. Next to *Add spare disk(s) to*, select **Enclosure** (this is the default).
2. Select the check box beneath each disk that you wish to designate as a Pool Spare.

   Notes:

   - Pool Spares that are not self-encrypting disks (SEDs) cannot be used to rebuild an encrypted array. Pool Spares that are SEDs can be used to rebuilt both encrypted and unencrypted arrays
   - If at any time you wish to return the *Add Hot Spare* page to its initial state, click **Reset**.
3. Click the **Add Hot Spare** button.

A message displays, informing you that the new Pool Spares have been added. Click the **Back** button to return to the *Add Hot Spare* page.

► To designate an unused disk as a Dedicated Spare:

1. Next to *Add spare disk(s) to*, select the **Array Name**.
2. Select the check box beneath each disk that you wish to designate as a Dedicated Spare for that array.

   Notes:

   - All disks selected will be added to the same array, as selected in step 1. To add disks to multiple arrays, you must repeat steps 1 and 2 for each.
   - Disks that are not self-encrypting disks (SEDs) cannot be added as Dedicated Spares to an encrypted array. Self-encrypting disks can be added as Dedicated Spares to either encrypted or unencrypted arrays.
   - If at any time you wish to return the *Add Hot Spare* page to its initial state, click **Reset**.
3. Click the **Add Hot Spare** button.

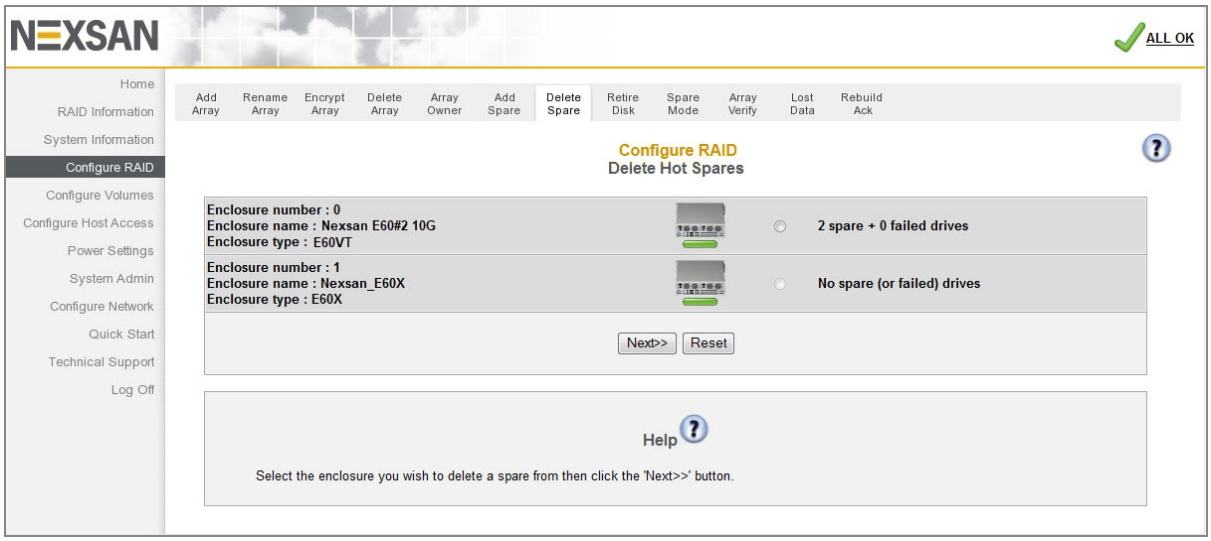
A message displays, informing you that the new Dedicated Spares have been added. Click the **Back** button to return to the *Add Hot Spare* page.

Delete Hot Spare

Clicking **Configure RAID > Delete Spare** takes you to the Delete Hot Spares page, which enables you to remove the “spare” designation from a disk and return it to unused status.

If your Nexsan Storage System has an attached Nexsan Storage Expansion, you are first prompted to select which storage system the spare is in.

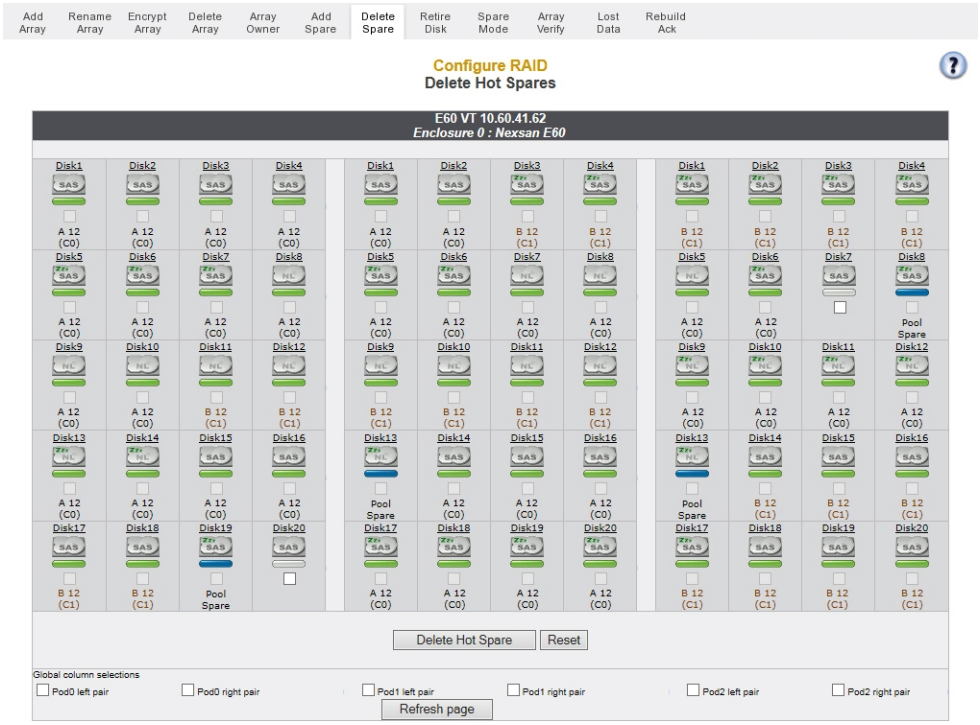
Figure 3-110: *Delete Hot Spare* enclosure selection page



- Select the enclosure and click **Next** to be taken to the *Delete Hot Spares* tool.

Once you have selected the desired enclosure, or if your Nexsan Storage System is a single storage system, the *Delete Hot Spares* tool displays.

Figure 3-111: *Delete Hot Spare* tool page (example)



The disks in the Nexsan Storage System are represented in a similar fashion to the summary diagram on the *Home* page (see Home page on page 65).

To delete one or more spares:

1. Click the check box below the spare or spares that you wish to return to the unused state.

   Note If at any time you wish to return the *Delete Hot Spare* page to its initial state, click **Reset**.

2. Click **Delete Hot Spare**.

A message displays, informing you that the spares have been deleted and are now unassigned. Click the **Back** button to return to the *Delete Hot Spares* page.

Retire Disk

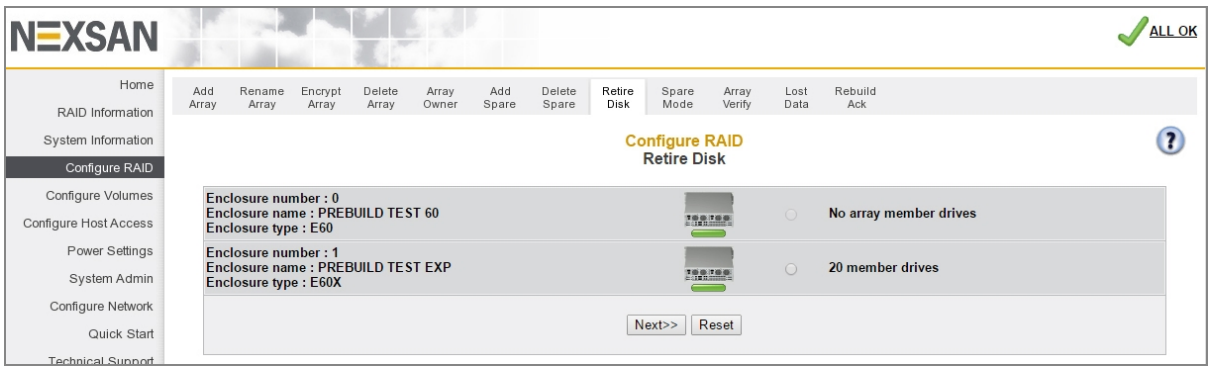
Clicking **Configure RAID > Retire Disk** takes you to the *Retire Disk* page, which enables you to manually take an array disk out of service while maintaining full redundancy. The disk's data is rebuilt onto a dedicated spare or pool spare (see Add Hot Spare on page 134), and the disk is not taken offline until the data has been completely rebuilt onto the spare. This function enables you to remove a troublesome disk from the Nexsan Storage System without compromising data integrity.

Notes:

- Retiring a disk from an encrypted array (see Configure Array Encryption on page 127) does not decrypt the user data on the disk. Reading or writing to the disk requires the exported encryption key.
- The **Disk retirement setting** on the *Configure Rebuild Options* page (see Configure Rebuild Priority on page 206) affects how disks are retired and how information is rebuilt.

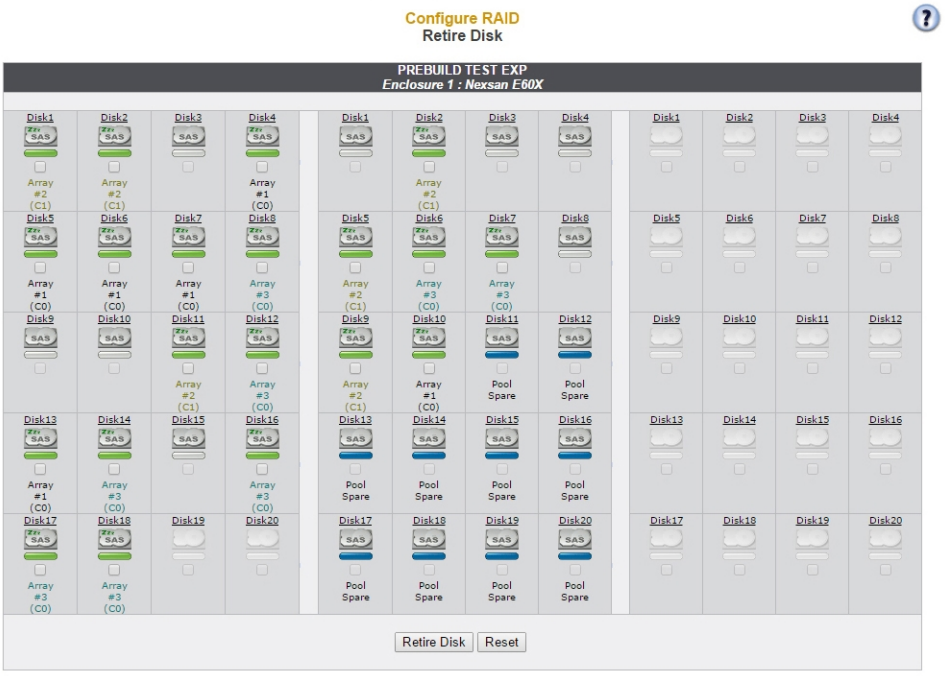
- If your Nexsan Storage System has an attached Nexsan Storage Expansion, you are first prompted to select the storage system containing the disk you want to retire.

Figure 3-112: *Retire Disk* enclosure selection page



Select the enclosure by clicking its selection button, then click **Next**. The disk selection page displays.

Figure 3-113: *Retire Disk* disk selection page



The disks in the Nexsan Storage System are represented in a similar fashion to the summary diagram on the *Home* page (see Home page on page 65).

To retire a disk:

1. Select one or more disks to retire by clicking their check boxes.

   Notes:

   - Only disks that are part of an array can be retired. Spare disks and unassigned disks cannot.
   - A disk can only be retired if there is a spare disk available to the array (see Add Hot Spare on page 134). This is true for each disk retired. For example, if you wish to retire three disks, then three spares must be available.

2. Click **Retire Disk**.

   A warning dialog displays.

   Figure 3-114: Retire Disk warning dialog



3. To retire the disk, click the confirmation check box and then click **Confirm Retire Command**.

   A message displays, confirming that the disk is being retired. Click the **Back** button to return to the *Retire Disk* page. The disk's icon now displays an "emptying" status bar and the caption "retiring disk".

   When the retirement process is complete, the disk icon displays a flashing red status bar and an event log message is generated.

   Note To cancel the disk retirement, click the **CANCEL Retire** button.

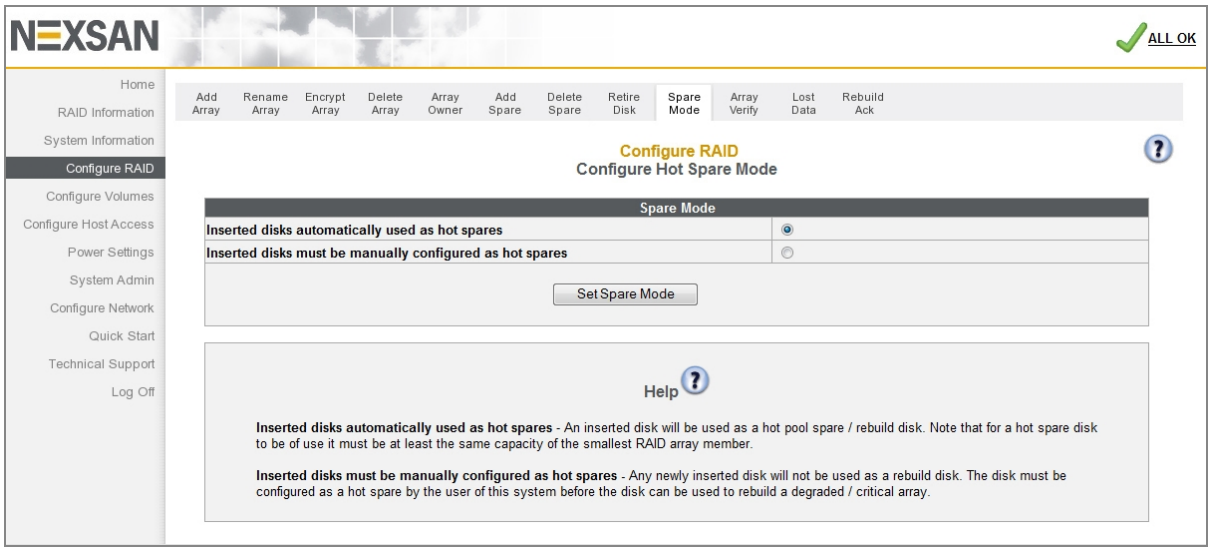
   A message displays, stating that the operation has been canceled. Click the **Back** button to return to the *Retire Disk* page.

4. When the disk retirement process is complete, remove the disk from the Nexsan Storage System and replace it with a suitable replacement disk (see the *Nexsan FRU Removal and Replacement Guide* for your storage system).

Configure Hot Spare Mode

Clicking **Configure RAID > Spare Mode** takes you to the *Configure Hot Spare Mode* page.

Figure 3-115: *Configure Hot Spare Mode* page



▶ To change the Hot Spare Mode setting:

1. Select one of the two options:
   - **Inserted disks automatically used as hot spares**: This is the default setting. New disk drives, when inserted into a drive slot and recognized by the system, are automatically configured as pool spares.
   - **Inserted disks must be manually configured as hot spares**: When this setting is active, new disk drives are configured as unused disks which are available for use in a RAID array or as either pool or dedicated spares.

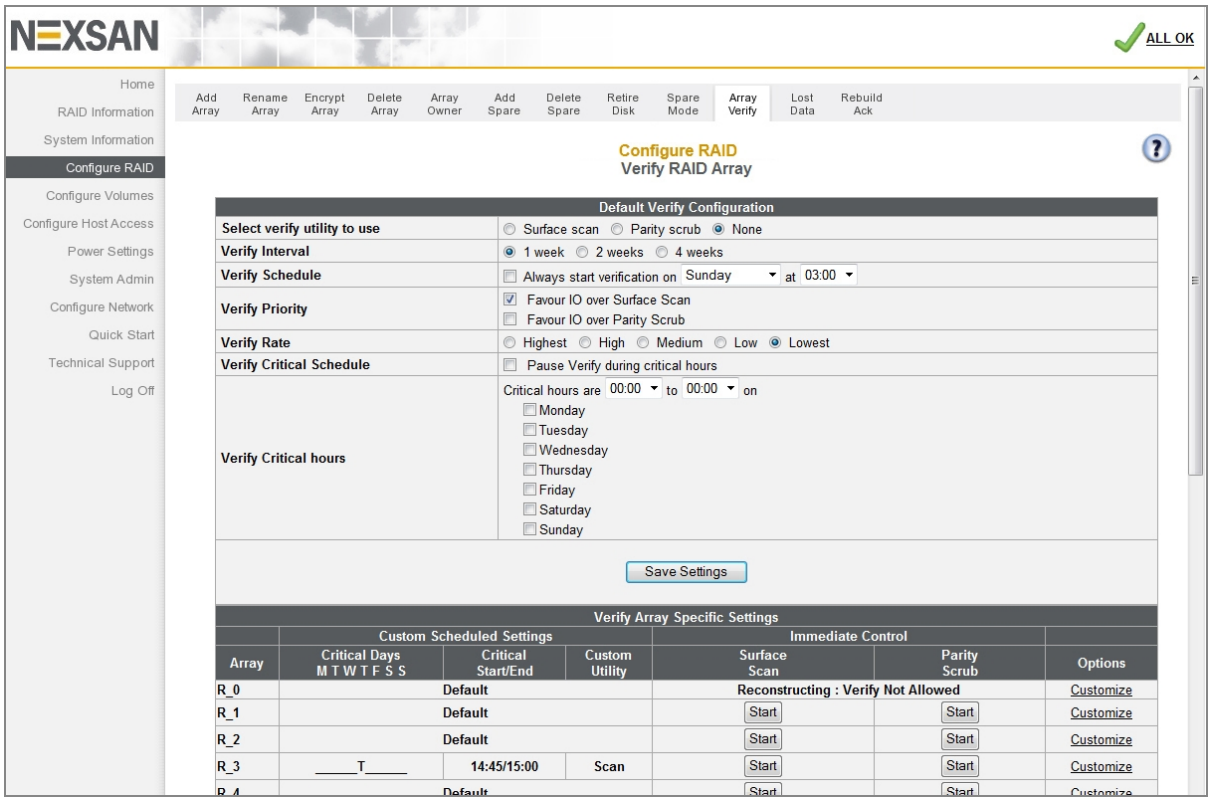
   Note If at any time you wish to return the *Configure Hot Spare Mode* page to its initial state, click **Reset**.
2. Click **Set Spare Mode**.

A message displays, informing you that the setting has been updated. Click the **Back** button to return to the *Configure Hot Spare Mode* page.

Verify RAID Array

Clicking **Configure RAID > Array Verify** takes you to the *Verify RAID Array* page, which enables you to configure the method and frequency of RAID array verification.

Figure 3-116: *Verify RAID Array* page



Schedule Default RAID Array Verification

Use the *Default Verify Configuration* section to set up the default RAID array verification schedule.

To schedule default RAID array verification:

1. Use the following table for help with scheduling default RAID array verification:

Table 3-117: Verification utilities

Setting	Action
Select verify utility to use	**Surface scan:** Reads all blocks on each disk drive in the array to ensure their integrity. If it encounters a bad block, it will quarantine that block and rebuild it using mirrored data (for RAID 1 or 10) or parity data (for RAID 4, 5 or 6).
	Parity scrub: Reads all array data and ensures that the parity data is intact. If it encounters a parity inconsistency, it will correct the inconsistency. Parity scrub also rebuilds bad data blocks in a similar fashion to **Surface scan**.
	None: If you do not wish RAID array verification to be scheduled, select **None**. **Note** If you choose **None**, it is still recommended that, at a minimum, you perform a **Surface Scan** on a regular basis. See Start or stop RAID array verification immediately on the facing page.
Verify Interval	Select one of the options: **1 week** (the default), **2 weeks**, or **4 weeks**.
Verify schedule	Check the **Always start verification on** check box, then select a day of the week and a time of day using the drop-down lists.
Verify Priority	Check one or both of the check boxes if you want I/O operations to be favored over RAID array verification by the system. You can select either **Favour IO over Surface Scan** or **Favour IO over Parity Scrub**, or both.
Verify Rate	Select the preferred verification rate by clicking its selection button. The default is **Lowest**. **Note** When there is high host activity, less spare I/O time is available, which can result in longer verification times. In this situation, it may become necessary to increase the verification rate so that arrays are verified more quickly.
Verify Critical Schedule	Check the **Pause verify during critical hours** check box to have the Nexsan Storage System pause any verification that is in progress during times when the extra I/O and CPU load would be undesirable.
Pause verify during critical hours	If checked, use the *Verify Critical hours* drop-down lists and check boxes to indicate the times and days of the week that are “critical”, so that verification is paused during these times.

2. Click **Save Settings**.

A message displays, informing you that the settings have been updated. Click the **Back** button to return to the *Home* page.

When a verification utility is running, you can check its progress on the *RAID Array Utility Progress* page (see RAID Array Utility Progress on page 75).

Start or stop RAID array verification immediately

Each array is listed in the *Verify Array Specific Settings* section. Each row contains the *Array name*, the *Custom Schedule Settings* (which displays *Default* when no custom settings are set), **Start** buttons for surface scan and parity scrub, and a **Customize** link.

To manually start RAID array verification:

1. Find the row for the array you wish to verify.
2. Click the **Start** button in either the *Surface Scan* or *Parity Scrub* column.

A message displays, informing you that the verification has begun. Click the **Back** button to return to the *Verify RAID Array* page.

Progress can monitored on the *RAID Array Utility Progress* page (see RAID Array Utility Progress on page 75).

To manually stop RAID array verification:

1. Find the row for the array that you wish to stop verification for (for instance, if it is negatively impacting host I/O performance).
2. Click the **Stop Verify** button.

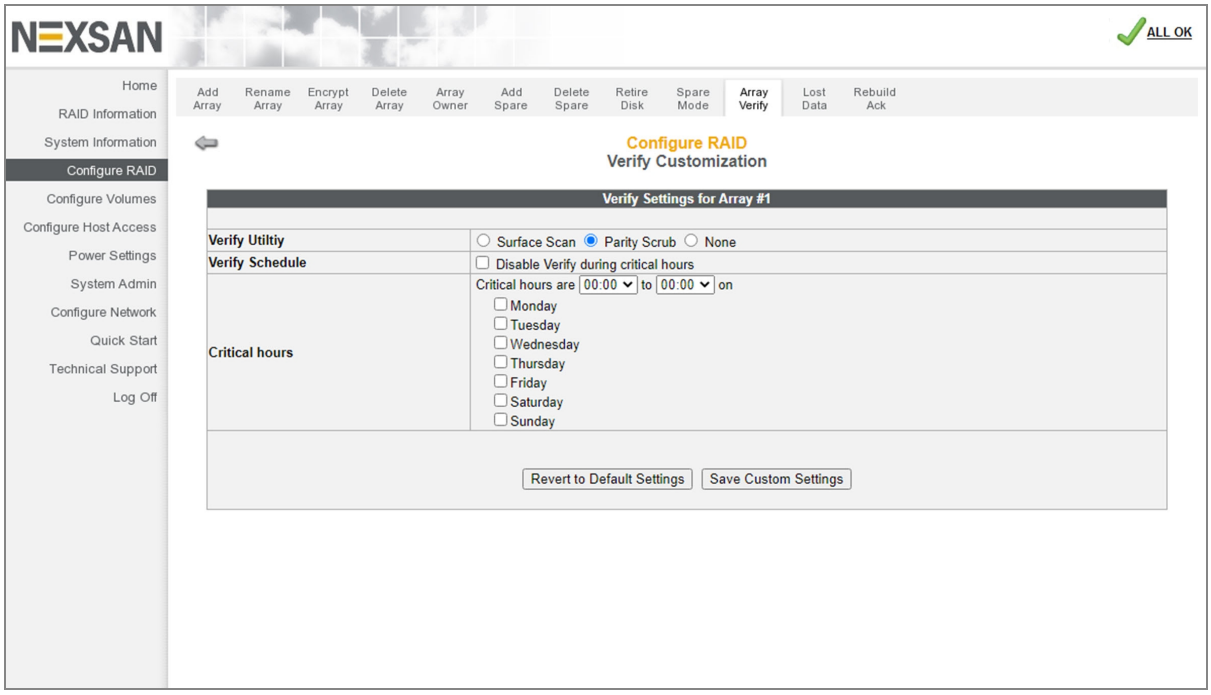
A message displays, informing you that the verification has stopped. Click the **Back** button to return to the *Verify RAID Array* page.

Schedule verification for specific arrays

To set a custom verification schedule for a particular array:

1. In the *Verify Array Specific Settings* section, find the row for the array you wish to schedule verification for and click the **Customize** link. You are taken to the *Verify Customization* page.

Figure 3-118: *Verify Customization* scheduling page



2. For *Verify Utility*, select the utility you wish to use on this array: **Surface Scan**, **Parity Scrub**, or **None**.
3. For *Verify Schedule*, to have the Nexsan Storage System pause any verification that is in progress during times when the extra I/O and CPU load would be undesirable, check the **Disable Verify during critical hours** check box.
   a. If **Disable Verify during critical hours** is checked, use the *Critical hours* drop-down lists and check boxes to indicate the times and days of the week that are “critical”, so that verification is paused during these times.
4. Click **Save Custom Settings**.

A message displays, informing you that the settings have been updated. Click the **Back** button to return to the *Home* page.

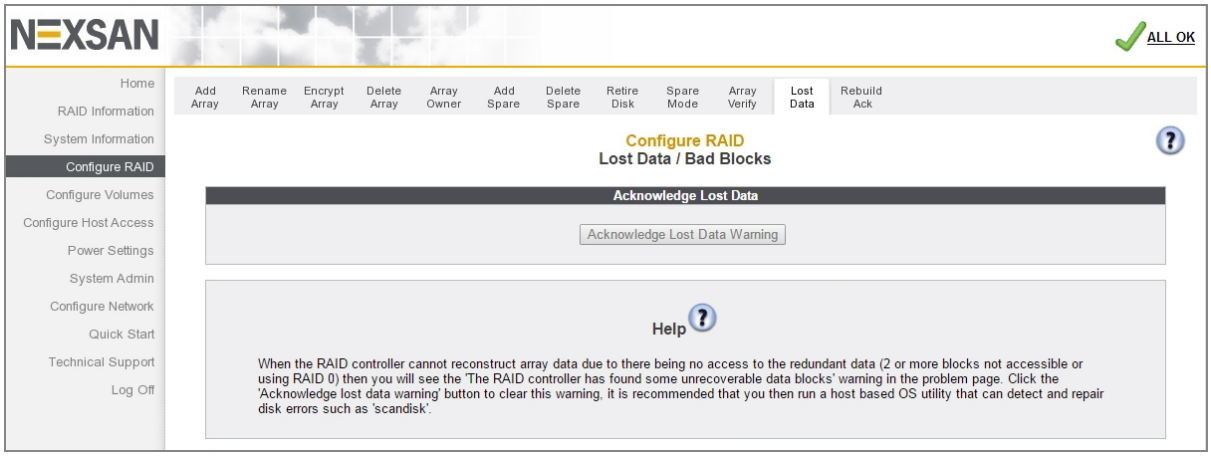
Note To undo the custom settings for any array, click the **Customize** link, then click the **Revert to Default Settings** button.

Lost Data/Bad Blocks

Clicking **Configure RAID > Lost Data** takes you to the *Lost Data/Bad Blocks* page. In RAID 0 arrays, data is lost if any of the component disks fail or develop errors. In RAID 1, RAID 4, and RAID 5 arrays, data is only lost if two or more component disks fail or develop errors simultaneously. In RAID 6 arrays, data is only lost if three or more component disks fail or develop errors simultaneously. See Appendix C, RAID levels on page 267 for more information.

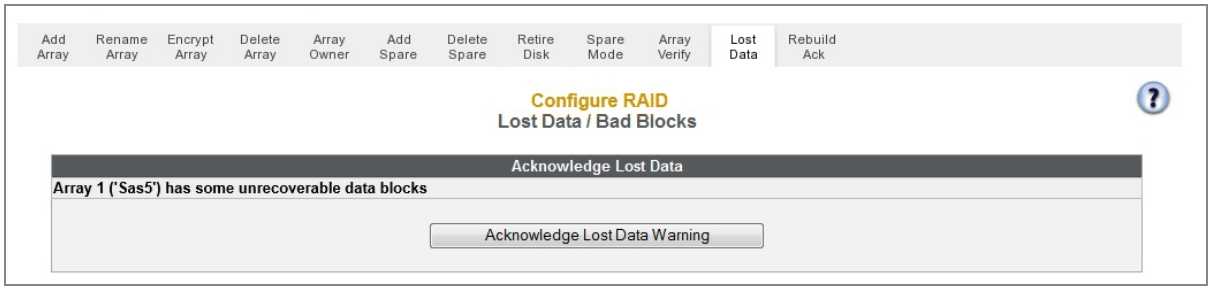
Normally, the *Lost Data/Bad Blocks* page looks like this:

Figure 3-119: *Lost Data/Bad Blocks* page with no error message



When there is a lost data warning, the **Lost Data/Bad Blocks** page looks like this:

Figure 3-120: *Lost Data/Bad Blocks* page with bad data blocks message



Click the **Acknowledge Lost Data Warning** button to acknowledge the warning. A message displays, confirming the acknowledgment. Click the **Back** button to return to the *Lost Data/Bad Blocks* page.

Recommended follow-up actions

After acknowledging lost data, it is STRONGLY RECOMMENDED that you run

1. An array verification immediately, and
2. A host-side scan of the file system to determine if the lost data has caused any corruption.

See Verify RAID Array on page 141 for instructions.

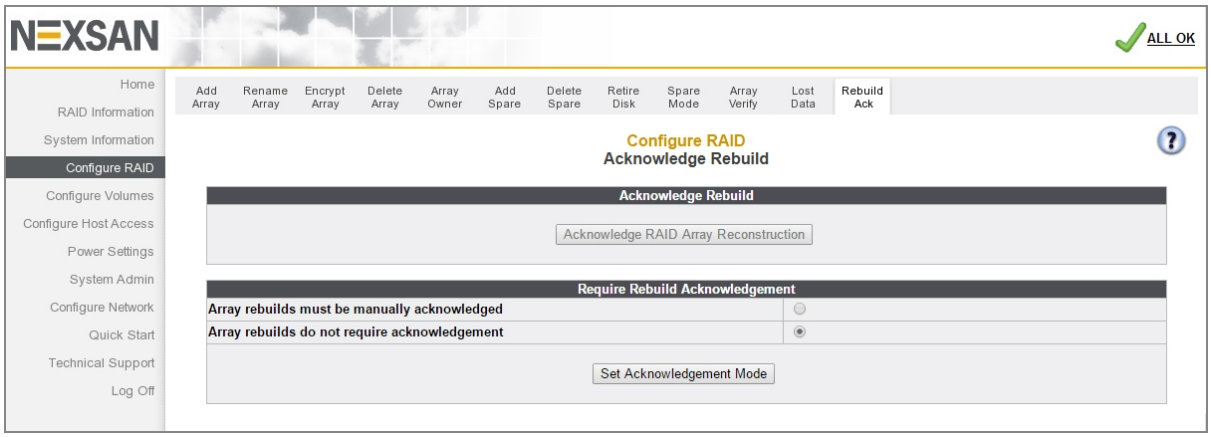
Lost data warnings also appear on the *Home* page and can be acknowledged from there (see Home page on page 65).

Acknowledge Rebuild

Clicking **Configure RAID > Rebuild Ack** takes you to the *Acknowledge Rebuild* page. When a RAID array has been rebuilt after a component disk failure, this page displays a warning and enables you to acknowledge that you have seen it.

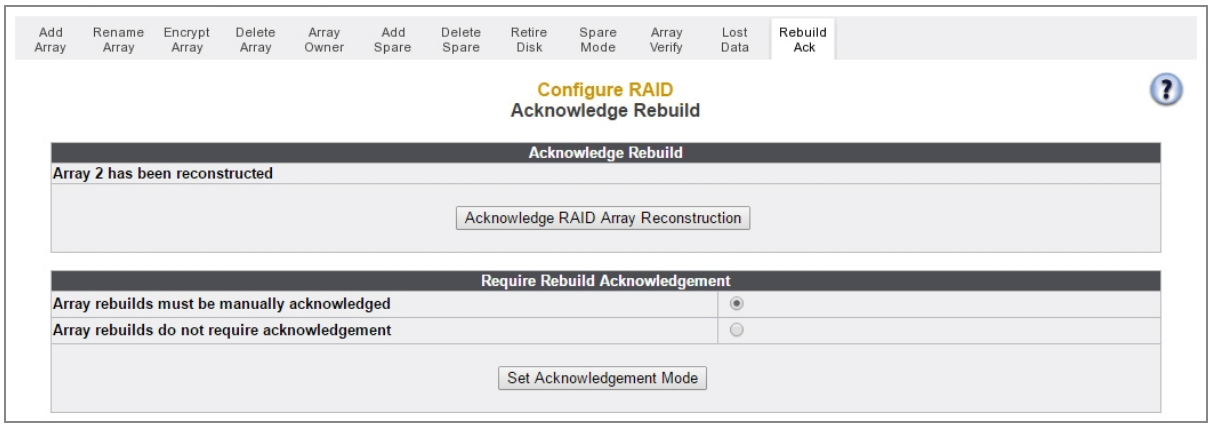
When no recent RAID array rebuilds have taken place, the *Acknowledge Rebuild* page looks like this:

Figure 3-121: *Acknowledge Rebuild* page with no rebuild message



When a RAID array has been recently rebuilt, the *Acknowledge Rebuild* page looks like this:

Figure 3-122: *Acknowledge Rebuild* page with rebuild message



► To acknowledge RAID array reconstruction:

- Click the **Acknowledge RAID Array Reconstruction** button to acknowledge the rebuild. A message displays, confirming the acknowledgment. Click the **Back** button to return to the *Acknowledge Rebuild* page.

Note RAID array reconstruction warnings also appear on the *Home* page and can be acknowledged from there (see Home page on page 65).

The *Require Rebuild Acknowledgment* section enables you to set the rebuild acknowledgment mode.

- When **Array rebuilds must be manually acknowledged** is selected (the default), array rebuild notifications will appear on the Home page and on the *Acknowledge Rebuild* page, and the **Acknowledge RAID Array Reconstruction** button must be pressed to clear the message.

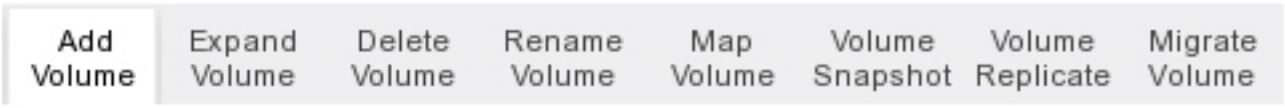
- When *Array rebuilds do not require acknowledgment* is selected, array rebuild notifications do not appear on the Home page or the *Acknowledge Rebuild* page and only appear in the Event Log.

Select the option that you prefer and press the **Set Acknowledgement Mode** button.

Configure Volumes

Clicking **Configure Volumes** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-123: Configure Volumes navigation bar



Refer to Table 3-124 for help with the Nexsan E-Series/BEAST volume configuration firmware:

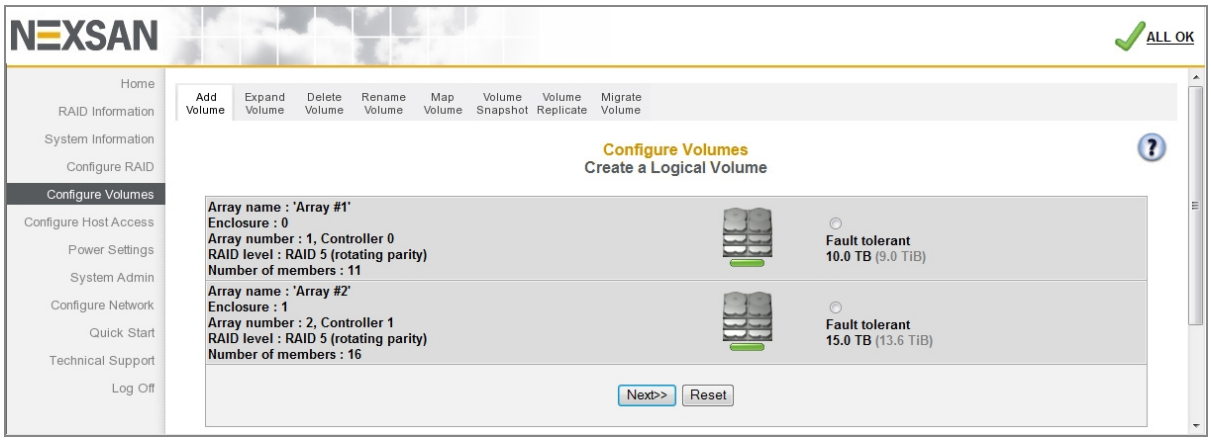
Table 3-124: Volume configuration pages

Nav bar button	GUI pages and documentation links
Add Volume	Create a Logical Volume on the facing page
Expand Volume	Expand a Logical Volume on page 154
Delete Volume	Delete a Logical Volume on page 156
Rename Volume	Rename Logical Volumes on page 157
Map Volume	Map Logical Volumes on page 158
Volume Snapshot	Configure Volume Snapshots on page 161
Volume Replicate	Replicate Logical Volumes on page 164
Migrate Volume	Migrate Logical Volumes on page 169

Create a Logical Volume

Clicking **Configure Volume** takes you to the *Create a Logical Volume* page, which enables you to create logical volumes that act like disk partitions on RAID arrays in your system.

Figure 3-125: *Create a Logical Volume* array selection page

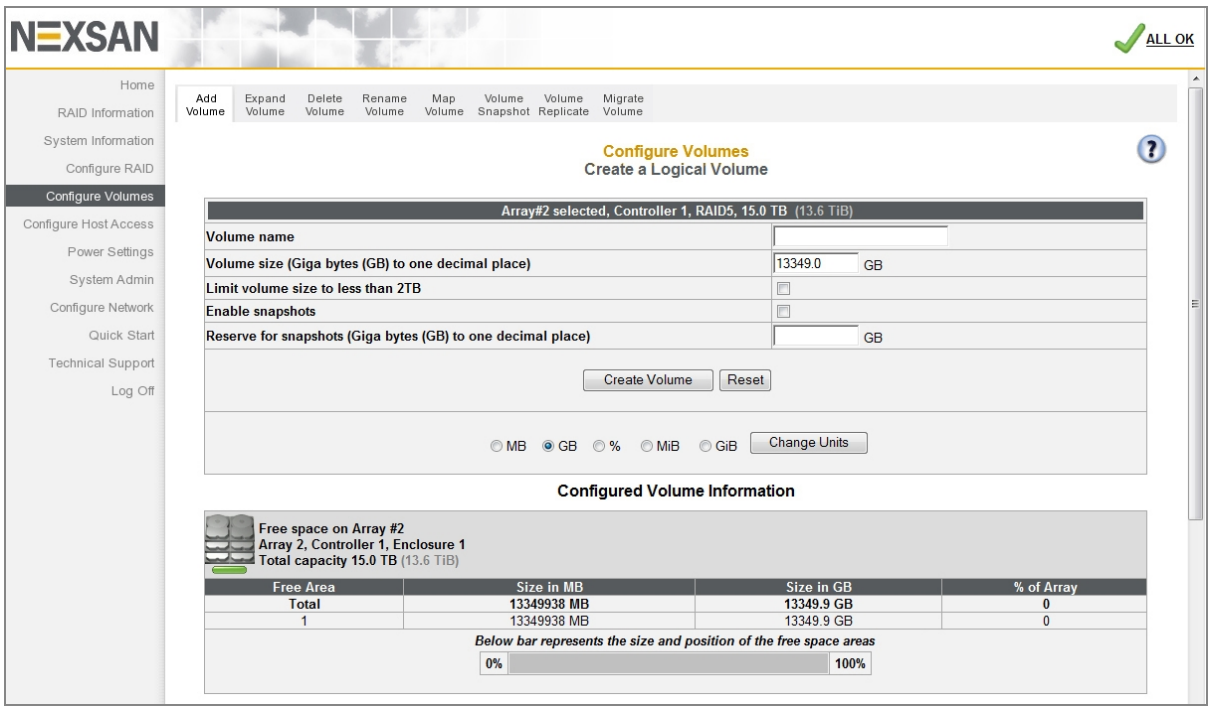


To open the volume creation tool:

- Select which RAID array you want to create volumes on by clicking its selection button, then click **Create Volume** to open the volume creation tool.

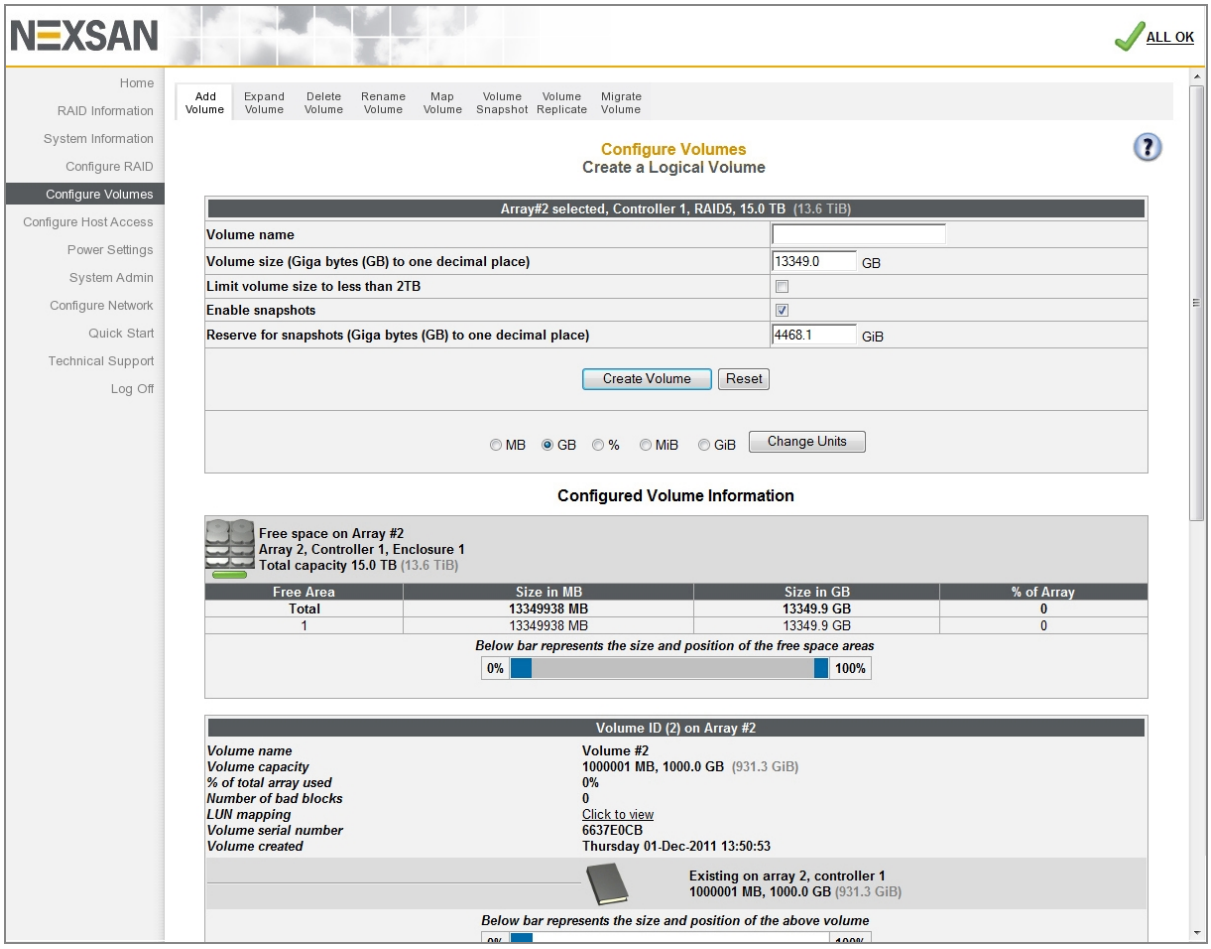
If the selected array has no volumes on it, the volume creation tool looks like this:

Figure 3-126: *Create a Logical Volume* tool page (no volumes in selected array)



If the selected array already has one or more logical volumes configured, the volume creation tool looks like this:

Figure 3-127: *Create a Logical Volume* tool page (one or more volumes in selected array)



3

► **To add volumes to a RAID array:**

1. Enter the following information:

Table 3-128: Adding volumes to a RAID array

Setting	Action
Volume Name	Enter a name for the volume. Volume names can be up to 63 characters long. If this is the first volume configured for this array, the name defaults to the name of the array. If there are already volumes on the array, then the **Volume Name** field is blank.

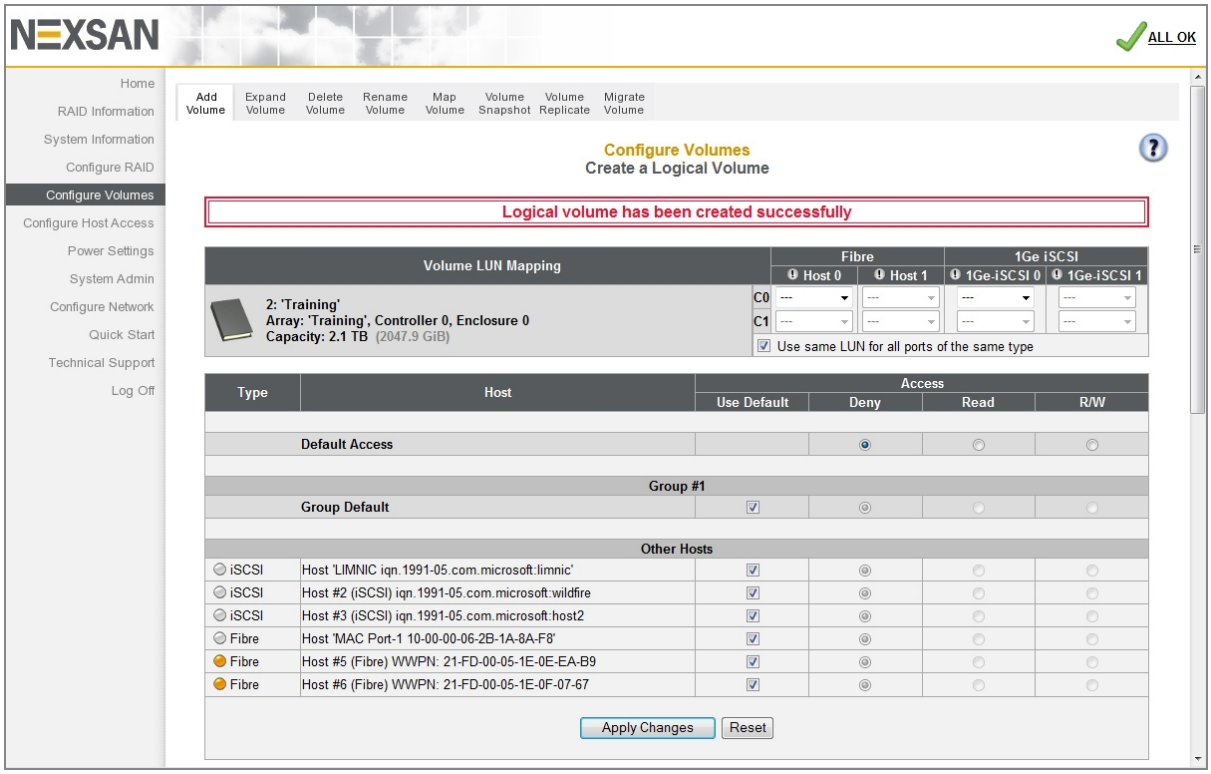
Setting	Action
Volume Size (*X* to one decimal place)	Enter the desired size of the new volume. The value of this field defaults to all of the remaining space left on the array. The Nexsan Storage System defaults to true gigabytes (GB), but this can be changed using the unit type selection buttons and **Change Units** button (located below the **Create Volume** and **Reset** buttons).
Limit volume size to less than 2TB	This option is unchecked by default. If your hosts do not support volumes of more than 2 terabytes (TB) in size, check this option. **Note** If you select this option, the value entered in **Volume Size (*X* to one decimal place)** must not exceed 2 TB, or else the volume will not be built and an error message will appear.
Enable snapshots	To enable snapshots (and replication) for this volume, leave this box checked. To disable snapshots for this volume, uncheck the box. On arrays that have advanced feature support enabled, (see Create a new RAID array on page 122), this option is checked by default. **Notes:** • If you disable snapshots for this volume, you can enable them later on the *Configure Volume Snapshots* page (see Configure Volume Snapshots on page 161). • For detailed information regarding the snapshots and replication features, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.
Reserve for snapshots (X to one decimal place)	Enter the desired size of the snapshot reserve. When **Enable snapshots** is checked, the value of this field defaults to approximately 25% of the value of **Volume Size (*X* to one decimal place)**. **Note** It is recommended that the snapshot reservation be set to approximately 25% of the volume size. See the *Nexsan High-Density Storage Snapshots and Replication User Guide* for more information.

Note If at any time you wish to return the *Create a Logical Volume* page to its initial state, click **Reset**.

2. When you have entered all of the required information, click **Create Volume**.

   A message is displayed, informing you that the volume as been created, and you are prompted to assign the logical unit numbers (LUNs) and host port access:

Figure 3-129: Volume mapping tool



3. In the *Volume LUN Mapping* section, assign a logical unit number (LUN) for each port that the volume will be accessed through. Check the **Use same LUN for all ports of the same type** check box to have all Fibre Channel, SAS-to-Host, and 10Ge or 1Ge iSCSI ports use the same LUN mapping.
4. Set the **Default Access** (applied to new or unknown hosts) by selecting **Deny**, **Read**, or **R/W**:

Table 3-130: Setting default access

Setting	Action
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

5. If at least one host group has been created (see Manage Host Groups on page 182), set the **Group Default** by checking or unchecking the box in the *Use Default* column:

Table 3-131: Setting group default access

Setting	Action
Use Default	This is the default setting, and is the same as **Default Access**.
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

6. Set access privileges for individual hosts by checking or unchecking the box in the *Use Default* column:

Table 3-132: Setting access privileges for individual hosts

Setting	Action
Use Default	When selected, the host or host group will use the **Group Default** setting (if the host is part of a group) or the **Default Access** setting (if the host is not part of a group). This is the default setting.
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

Note If at any time you wish to return the *Map Logical Volumes* page to its initial state, click **Reset**.

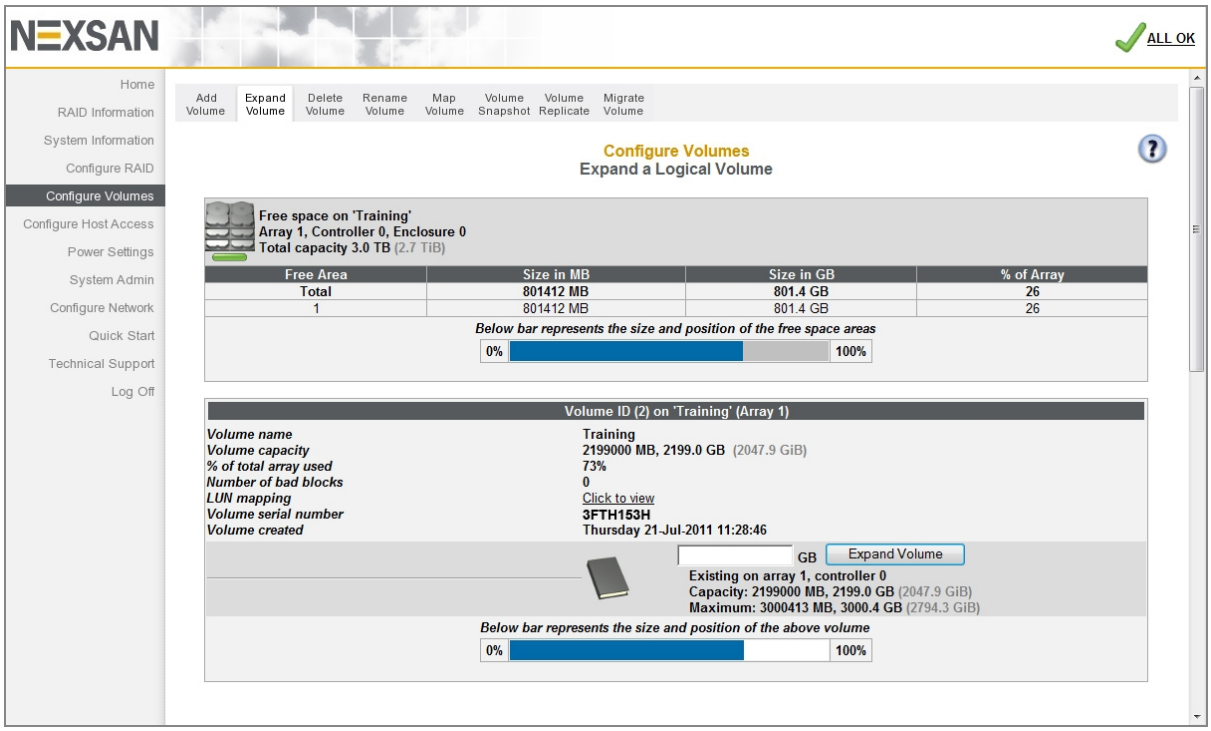
7. When you have finished assigning host access privileges, click **Apply Changes**. A message displays, indicating that the settings have been saved.

Note For more information about host access, see Configure Host Access on page 172.

Expand a Logical Volume

Clicking **Configure Volumes > Expand Volume** takes you to the *Expand a Logical Volume* page. This page lists each array in the system and all volumes in each array. Scroll down to see all arrays and volumes.

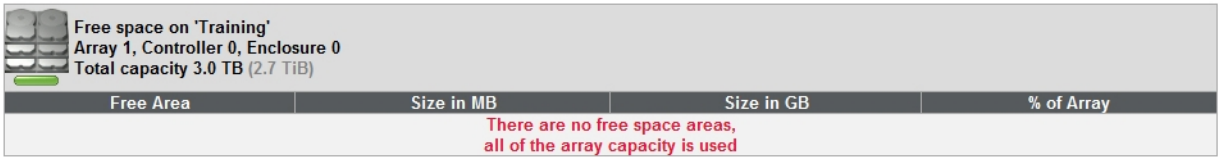
Figure 3-133: *Expand a Logical Volume* page



The array information section lists the array name, array number, array owner, enclosure, and total capacity. See RAID Array Information on page 72 for more information. If there is free space on the array, this section displays the total amount of space taken up by existing volumes, plus the percentage of the array's total capacity used.

If there is no space on the array, the array information section looks like this:

Figure 3-134: Message indicating no free space on array



Each volume's information section lists the volume ID, array name, volume name, volume capacity, the percentage of the array that the volume uses, the number of bad blocks, a link to the logical unit number (LUN) mapping information, the volume serial number, and the date that the volume was created (see Detailed Volume Layout on page 79).

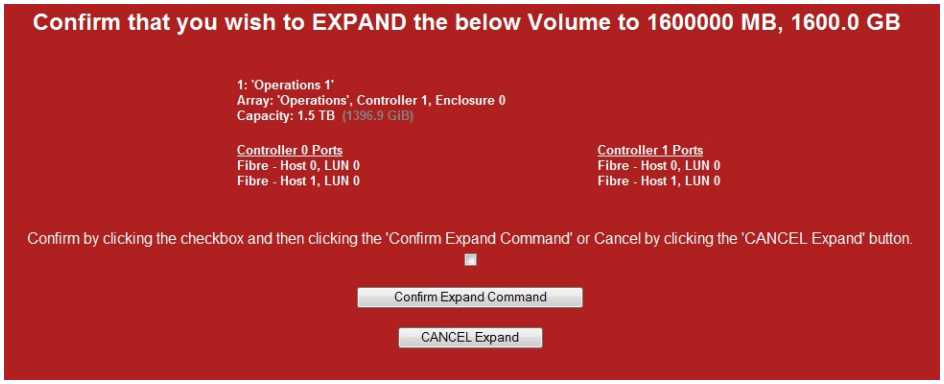
The darker area below the listed items displays the **GB** text field, the **Expand Volume** button, the name of the array that the volume belongs to, the controller number, the *Capacity*, and the *Maximum* size that the volume can be expanded to.

The bottom area contains a bar which represents the percentage of the array's capacity that the volume uses, as well as the volume's relative position within the array.

To expand a volume:

1. Click **Configure Volumes > Expand Volume**. The *Expand a Logical Volume* page opens (see Figure 3-133).
2. Before you commit the changes, we recommend that you check the new volume size shown at the top of the confirmation screen to ensure that you have enough free space to proceed.
3. If you have space to proceed, enter a new volume size in true gigabytes (GB) in the **GB** field.
4. Click **Expand Volume**. A confirmation screen displays:

Figure 3-135: Volume expansion warning and confirmation dialog



5. To proceed with the volume expansion, check the confirmation check box and click **Confirm Expand Command**. A message displays, confirming that the volume has been expanded. Click the **Back** button to return to the *Expand a Logical Volume* page.

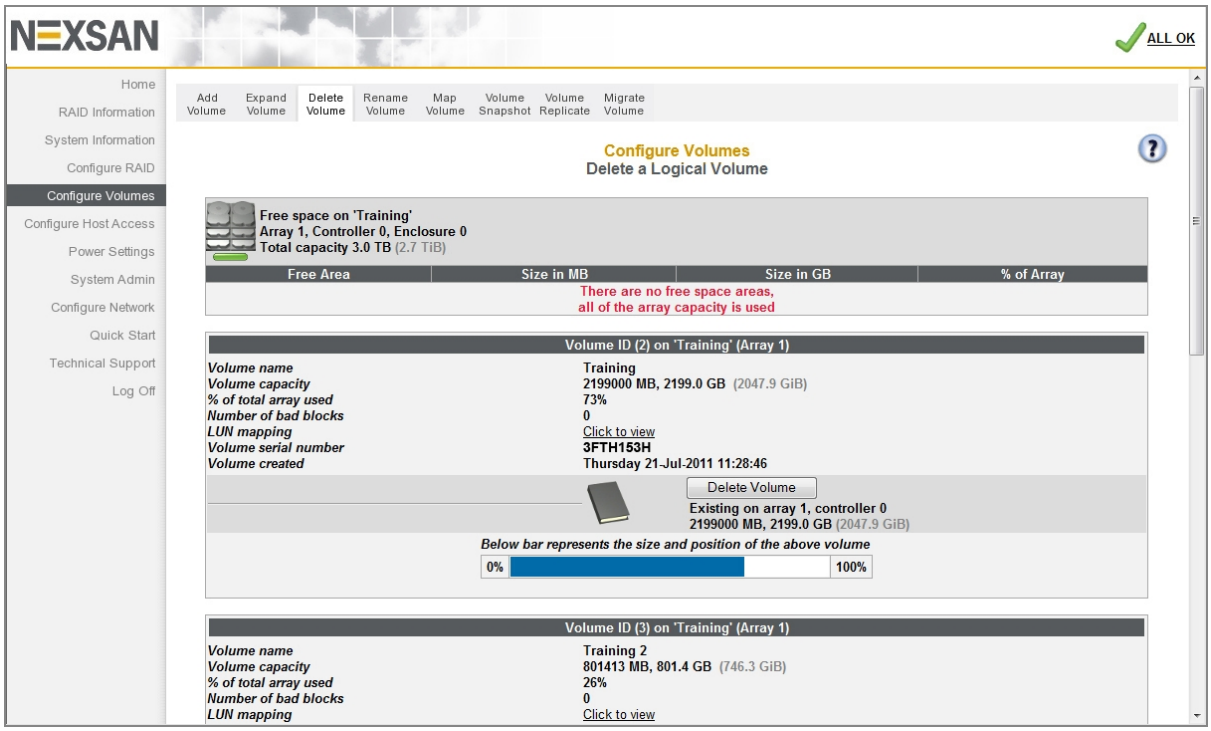
   Note To cancel the volume expansion, click **CANCEL Expand**.

   A message displays, stating that the operation has been canceled. Click the **Back** button to return to the *Expand a Logical Volume* page.

Delete a Logical Volume

Clicking **Configure Volume > Delete Volume** takes you to the *Delete a Logical Volume* page. This page lists each array in the system and all volumes in each array. Scroll down to see all arrays and volumes.

Figure 3-136: *Delete a Logical Volume* page



The array information section lists the array name, array number, array owner, enclosure, and total capacity. See RAID Array Information on page 72 for more information. If there is free space on the array, this section displays the total amount of space taken up by existing volumes, plus the percentage of the array's total capacity used.

Each volume's information section lists the volume ID, array name, volume name, volume capacity, the percentage of the array that the volume uses, the number of bad blocks, a link to the logical unit number (LUN) mapping information, the volume serial number, and the date that the volume was created (see Detailed Volume Layout on page 79).

To delete a volume:

1. Click the **Delete Volume** button in the volume's information area.

   A confirmation screen displays.

Figure 3-137: Volume deletion warning and confirmation dialog



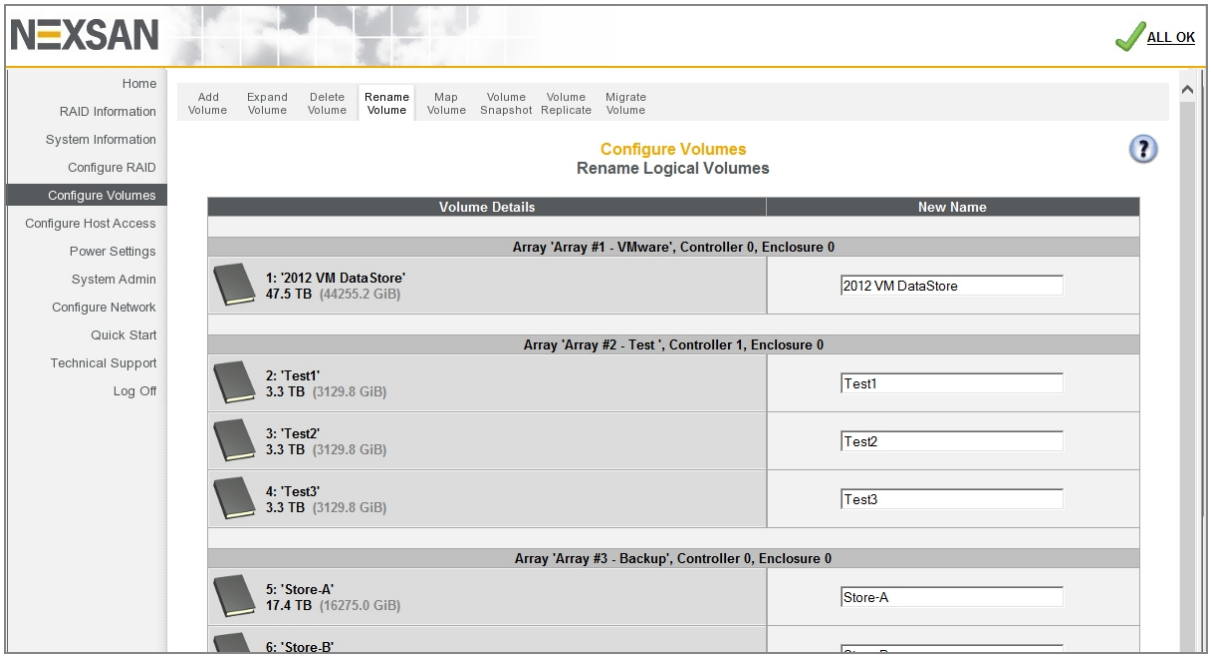
2. To delete the volume, click the confirmation check box and then click **Confirm Delete Command**. A message displays, confirming that the volume has been deleted. Click the **Back** button to return to the *Delete a Logical Volume* page.

   Note To cancel the volume deletion, click the **CANCEL Delete** button. A message displays, stating that the operation has been canceled. Click the **Back** button to return to the *Delete a Logical Volume* page.

Rename Logical Volumes

Clicking **Configure Volume > Rename Volume** takes you to the *Rename Logical Volumes* page.

Figure 3-138: *Rename Logical Volumes* page



Each volume information section lists the volume number, current volume name, the array the volume belongs to, the controller that the array is assigned to, the enclosure, and the volume's capacity (see Configured Logical Volumes on page 76).

To change the name of a volume:

1. Enter the new volume name in the **New Name** field (default is the current volume name).

   Note If at any time you wish to return the *Rename Logical Volumes* page to its initial state, click **Reset**.

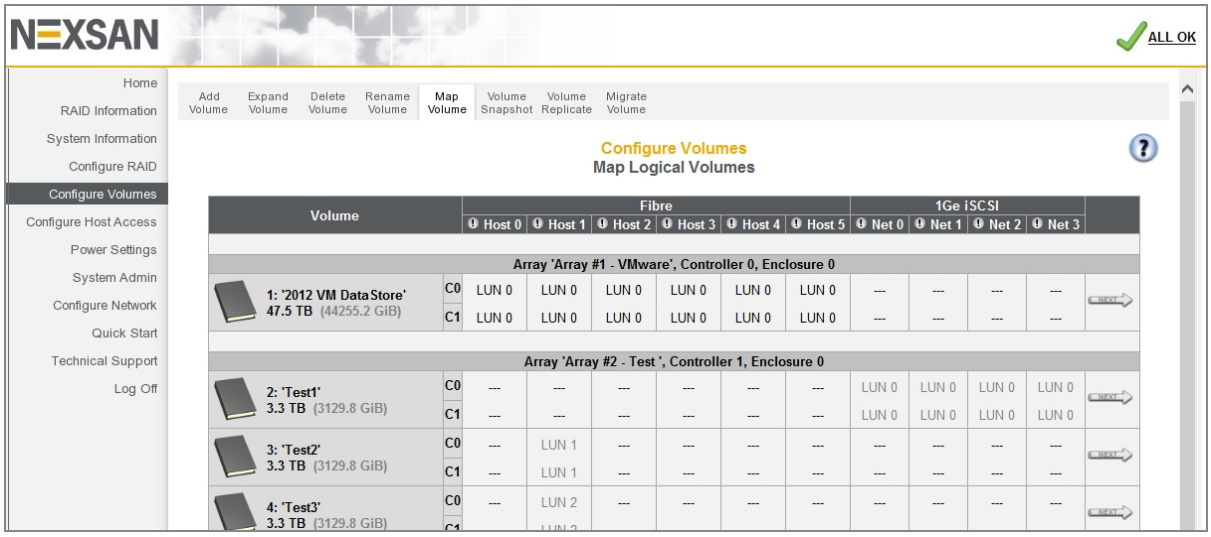
2. Click **Save Settings**.

   A message displays, confirming that the name setting has been changed. Click the **Back** button to return to the *Rename Logical Volumes* page.

Map Logical Volumes

Clicking **Configure Volumes > Map Volume** takes you to the *Map Logical Volumes* page.

Figure 3-139: *Map Logical Volumes* page



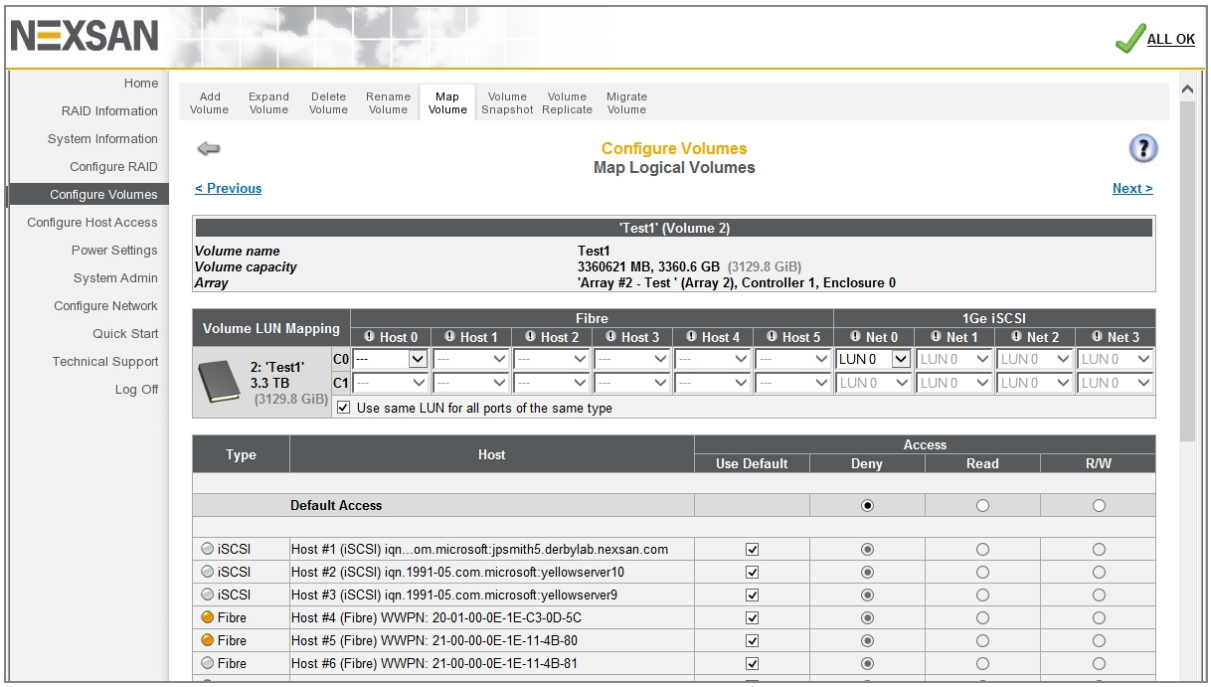
Each volume information section lists the volume number, current volume name, the array the volume belongs to, the controller that the array is assigned to, the enclosure (if there is more than storage system or storage expansion), the volume's capacity, and the volume's host port assignments (see Configure volumes on a RAID array on page 53).

► To map a volume to a logical unit number (LUN):

1. Click the **Next** button next to the volume you wish to map.

   The volume mapping tools are displayed:

Figure 3-140: Volume mapping tools



2. In the *Volume LUN Mapping* section, assign a logical unit number (LUN) for each port that the volume will be accessed through. Check the **Use same LUN for all ports of the same type** check box to have all Fibre Channel, SAS-to-Host, and 10Ge or 1Ge iSCSI ports use the same LUN mapping.
3. Set the **Default Access** (applied to new or unknown hosts) by selecting **Deny**, **Read**, or **R/W**:

   Table 3-141: Setting default access

Setting	Action
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

4. If at least one host group has been created (see Manage Host Groups on page 182), set the **Group Default** by checking or unchecking the box in the *Use Default* column:

   Table 3-142: Setting group default access

Setting	Action
Use Default	This is the default setting, and is the same as **Default Access**.
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

5. Set access privileges for individual hosts by checking or unchecking the box in the *Use Default* column:

   Table 3-143: Setting access privileges for individual hosts

Setting	Action
Use Default	When selected, the host or host group will use the **Group Default** setting (if the host is part of a group) or the **Default Access** setting (if the host is not part of a group). This is the default setting.
Deny	Select to prevent all new or unknown hosts from accessing the volume. This is the default setting. **Note** It is recommended to leave the **Default Access** setting as **Deny** and then grant access to specific hosts as necessary. This prevents unconfigured hosts from modifying existing data.
Read	Select to allow read-only access to the volume for all new or unknown hosts.
R/W	Select to allow read/write access to the volume for all new or unknown hosts.

   Note If at any time you wish to return the *Map Logical Volumes* page to its initial state, click **Reset**.

6. When you have finished assigning host access privileges, click **Apply Changes**. A message displays, indicating that the settings have been saved.

Note For more information about host access, see Configure Host Access on page 172.

Configure Volume Snapshots

Clicking **Configure Volumes > Volume Snapshot** takes you to the *Volume Snapshots* page, where you can take snapshots and configure snapshot settings for individual volumes.

For detailed instructions on how to configure, create, and manage snapshots, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Figure 3-144: *Volume Snapshots* page

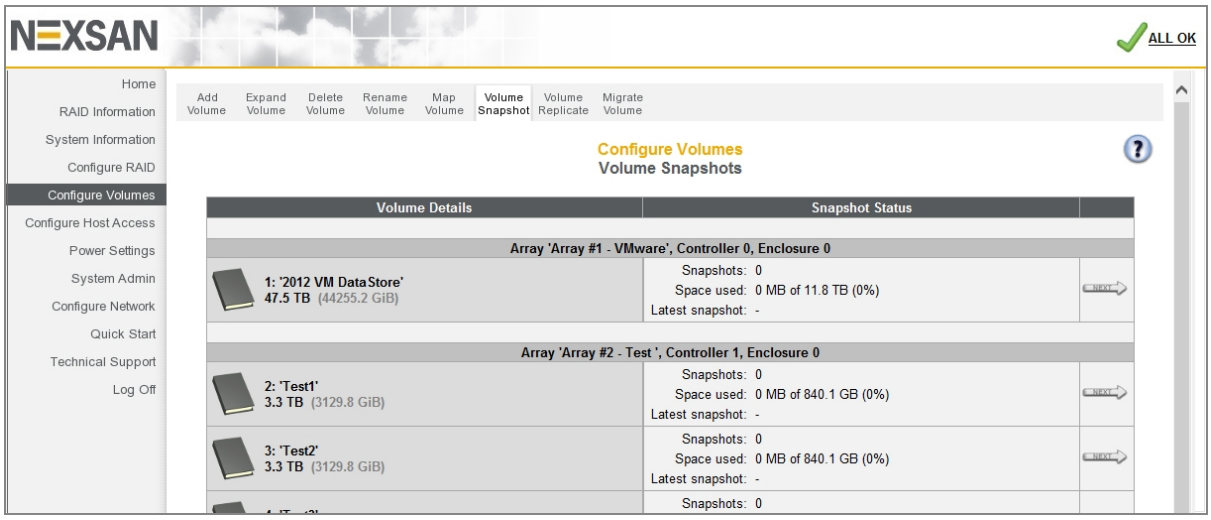


Table 3-145: Volume Snapshots

Section	Description
Volume Details	Lists the volume number, current volume name, the array that the volume belongs to, the Controller that the RAID set is assigned to, the enclosure, and the volume's capacity.
Snapshot Status	Displays the number of snapshots, the amount of hard disk space used by snapshots, and the date and time of the latest snapshot.

Clicking a volume's **Next** button takes you to the volume's snapshot management tools page.

Figure 3-146: *Configure Volume Snapshots* page

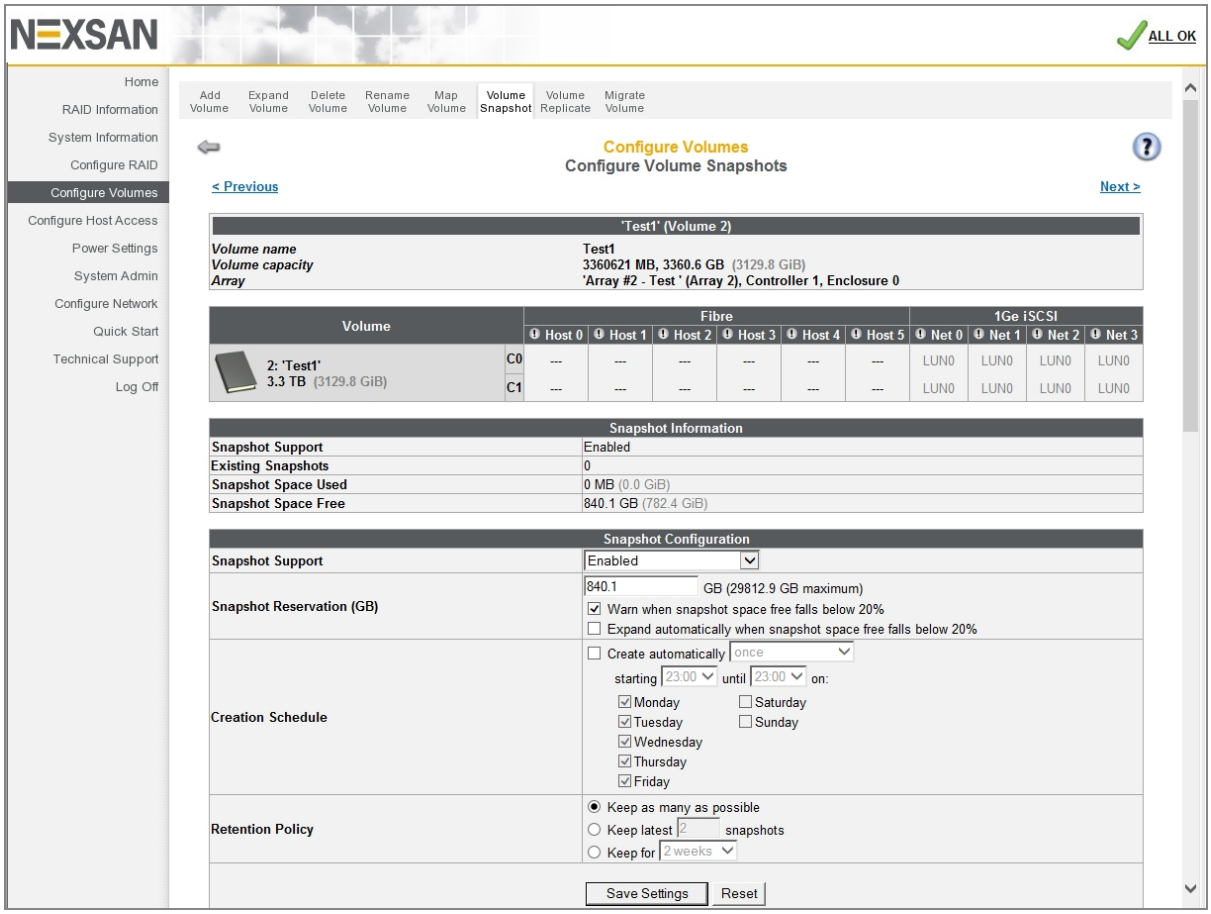
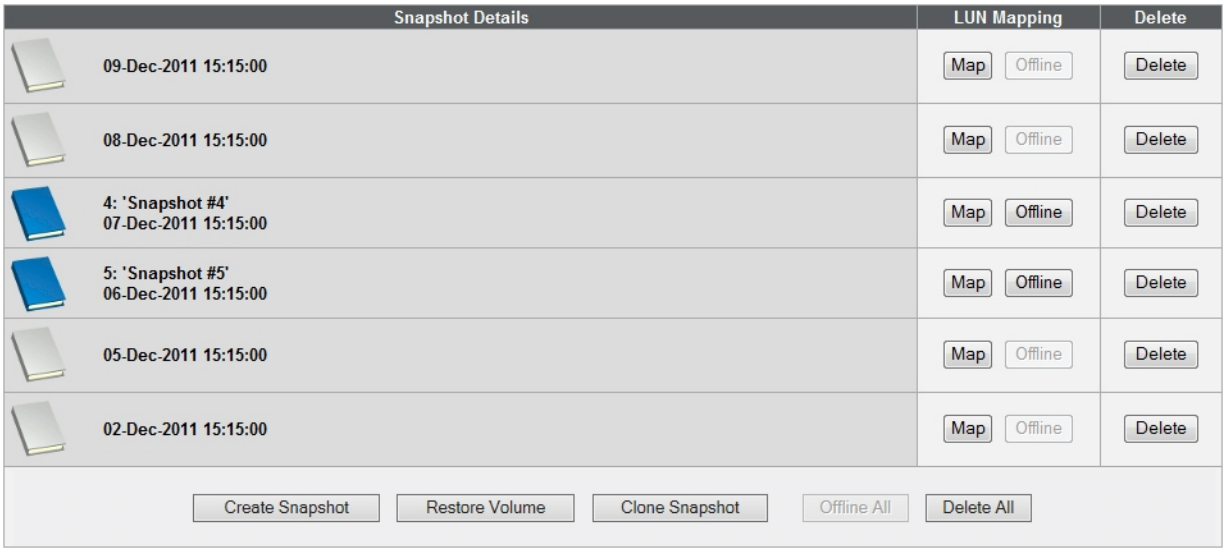


Table 3-147: Configure Volume Snapshots

Section	Description
Volume Details	Displays the volume number, current volume name, the array that the volume belongs to, the Controller that the array is assigned to, the volume's capacity, and the volume's host port assignments (see Configured Logical Volumes on page 76).
Snapshot Information	Displays whether snapshots are enabled for the volume. If they are, then it also shows the number of snapshots, the amount of hard disk space used by existing snapshots, and the amount of space available for additional snapshots.
Snapshot Configuration	Enables you to configure the snapshot settings for this volume, including **Snapshot Support**, **Snapshot Reservation (GB)**, **Creation Schedule**, and **Retention Policy**. For more information on configuring snapshots, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Section	Description
Snapshot Details (See Figure 3-148)	Displays the date and time of each snapshot that has been made of that volume, plus its LUN mapping status. It also contains buttons for creating a snapshot, restoring the volume from a snapshot, cloning a snapshot, unmapping all mapped snapshots, and deleting all snapshots.

Figure 3-148: *Snapshot Details* section of *Configure Volume Snapshots* page



Note Snapshots created through the GUI may not contain information that is still in the host's internal cache and not written to the RAID array, which may cause data to become corrupted. For this reason, it is strongly recommended that all host I/O be halted when taking a volume snapshot through the GUI.

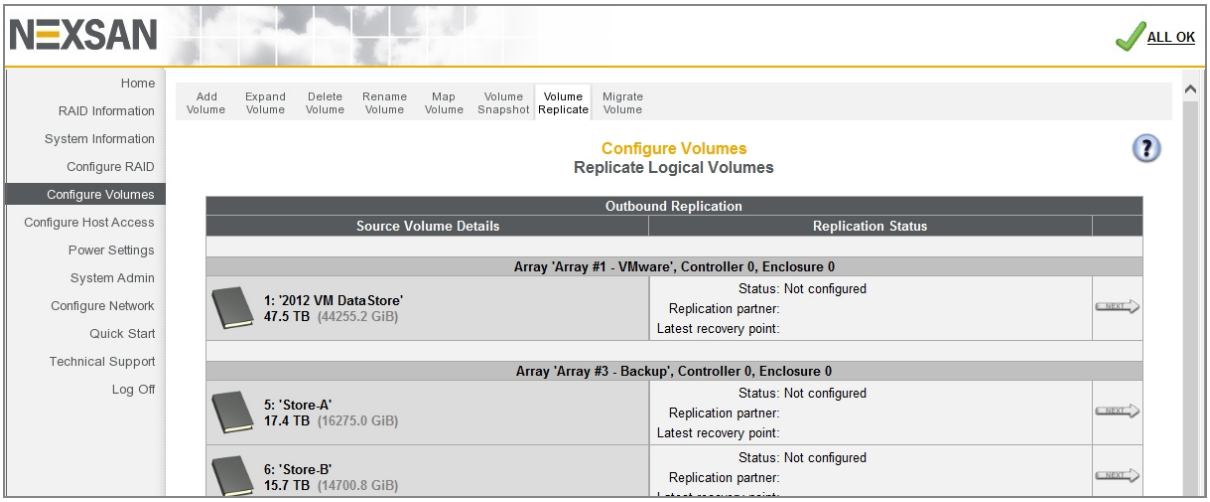
Snapshots can be used to restore the volume to a previous state, create a new volume based on this volume's previous state, be mapped to a LUN so that hosts can access it, or can be deleted if they are no longer needed. For details on how to perform these tasks, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Replicate Logical Volumes

Clicking **Configure Volumes > Volume Replicate** takes you to the *Replicate Logical Volumes* page, where you can set up, manage, and view details about volume replications.

For detailed instructions on how to configure, create, and manage replication between Nexsan Storage Systems, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Figure 3-149: *Replicate Logical Volumes* page



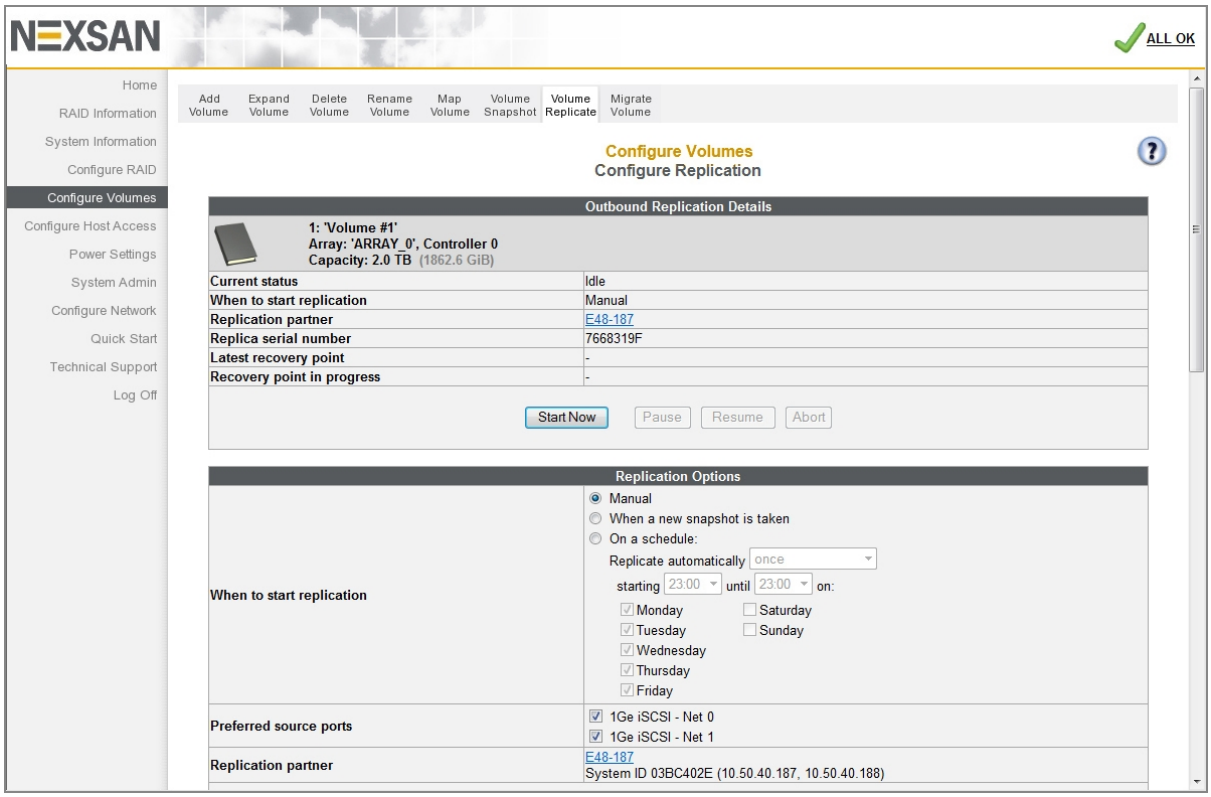
Outbound replication

The *Outbound Replication* section contains the same information as can be found on the *Replication Information* page. See Replication Information on page 97.

Clicking the **Next** button for a volume that is not yet configured for replication takes you to the *Create Replication - Select Partner* page. For instructions on how to set up replication between Nexsan Storage Systems, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Clicking the **Next** button for a volume that has replication configured takes you to the *Configure Replication* page.

Figure 3-150: *Configure Replication* page for outbound replication



The *Outbound Replication Details* section displays the following information:

Table 3-151: Outbound Replication Details

Setting	Description
Volume name	The user-defined name of the volume.
Array	The user-defined name of the array that the volume is on, the controller which controls that array, and (if the Nexsan Storage System has attached Nexsan Storage Expansions) the enclosure on which the volume resides.

Setting	Description
Capacity	Displays the total data storage space of the volume, in terabytes (TB) and binary gigabytes (GiB).
Current status	Displays the current replication status. Possible values are *Created*, *Idle*, *Running*, *Aborted*, and *Reference Snapshot is Missing*.
When to start replication	Displays when replication is performed: *Manual*, *On Snapshot*, or the schedule that is configured in *Replication Options*.
Replication partner	Displays a link to the Nexsan Storage System that the volume is being replicated to.
Replica serial number	Displays the unique serial number of the volume replica.
Latest recovery point	Displays the date and time of the latest recovery point, formatted as "Day of Week DD-Mon-YYYY HH:MM". If no replications have yet been made, this field displays a single dash (-).
Recovery point in progress	Displays the date and time of the replication that is currently in progress, formatted as "Day of Week DD-Mon-YYYY HH:MM". If there is no replication currently in progress, this field displays a single dash (-).

The section also contains four action buttons: **Start Now**, **Pause**, **Resume**, and **Abort**.

Table 3-152: Action buttons

Button	Description
Start Now	When the replication status is *Idle* or *Aborted*, clicking **Start Now** begins replication.
Pause	When a replication is in progress, clicking **Pause** pauses the replication.
Resume	When a replication is paused, clicking **Resume** resumes the replication.
Abort	When a replication is running, clicking **Abort** stops the replication.

The *Replication Options* section enables you to configure replication settings for this replication pair, including **When to start replication**, **Preferred source ports**, and **Replication partner**. For instructions on how to configure replication, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

The *Modify Replication* section displays buttons for performing various actions on the replication pair, including breaking replication, deleting replication, promoting the replica, restoring from the replica (after promotion), and reversing replication.

Figure 3-153: *Modify Replication* section of *Configure Replication* page for outbound replication



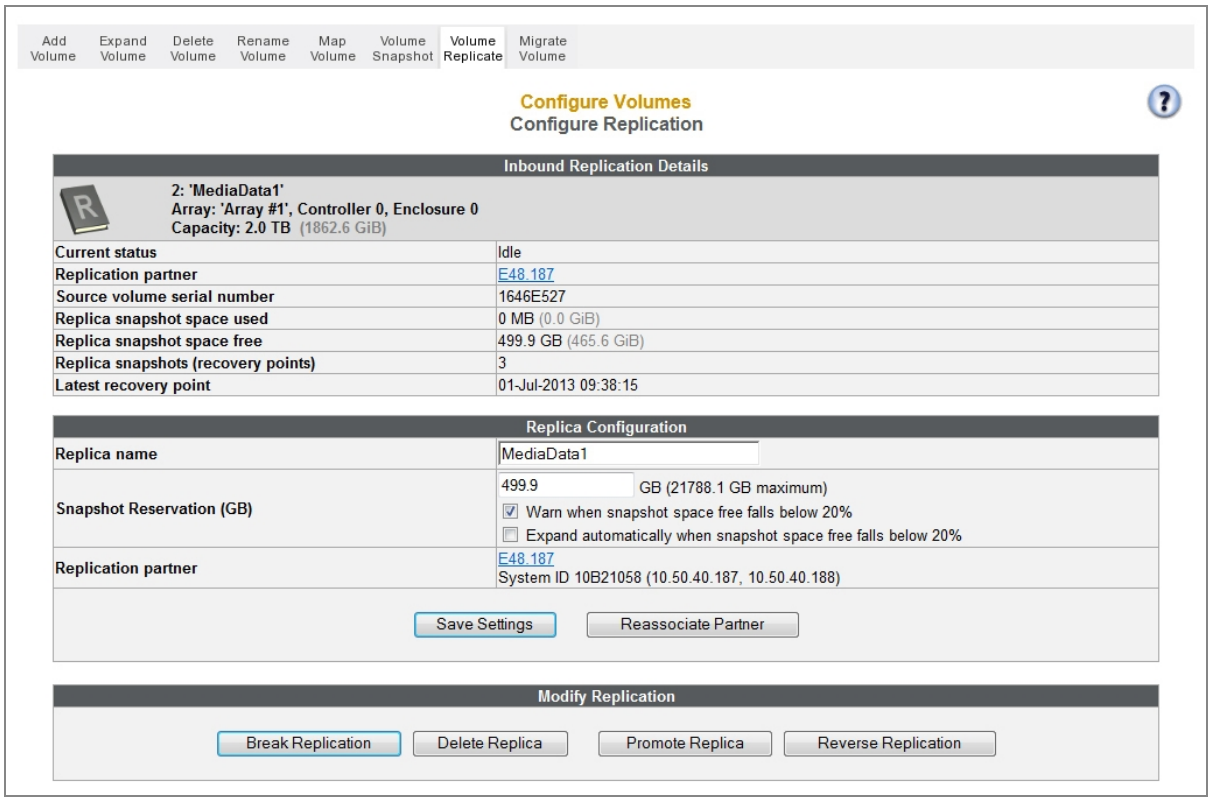
For instructions on how to perform these tasks, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Inbound replication

The *Inbound Replication* section contains the same information as can be found on the *Replication Information* page. See Replication Information on page 97.

Clicking the **Next** button for a replica takes you to the *Configure Replication* page.

Figure 3-154: *Configure Replication* page for inbound replication



The *Inbound Replication Details* section displays the following information:

Table 3-155: Inbound Replication Details

Setting	Description
Replica name	The user-defined name of the replica.
Array	The user-defined name of the array that the replica is on, the controller which controls that array, and the enclosure where the replica resides.
Capacity	Displays the total data storage space of the replica, in terabytes (TB) and binary gigabytes (GiB).
Current status	Displays the current replication status. Possible values are *Created*, *Idle*, *Running*, *Aborted*, and *Reference Snapshot is Missing*.

Setting	Description
Replication partner	Displays a link to the Nexsan Storage System that houses the source volume.
Source volume serial number	Displays the unique serial number of the source volume.
Replica snapshot space used	The amount of the replica's snapshot reservation that is being used by existing snapshots, in megabytes (MB) and binary gigabytes (GiB).
Replica snapshot space free	The amount of the replica's snapshot reservation that is empty, in gigabytes (GB) and binary gigabytes (GiB)
Replica snapshots (recovery points)	The number of snapshots in the replica's snapshot reservation.
Latest recovery point	Displays the date and time of the latest recovery point, formatted as "Day of Week DD-Mon-YYYY HH:MM". If no replications have yet been made, this field displays a single dash (-).

The *Replication Configuration* section enables you to configure replication settings for this replication pair, including **Replica name**, **Snapshot Reservation**, and **Replication partner**. For instructions on how to configure replication, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

The *Manage Replication* section displays buttons for performing various actions on the replication pair, including breaking replication, deleting replication, promoting the replica, restoring from the replica (after promotion), and reversing replication.

Figure 3-156: *Modify Replication* section of *Configure Replication* page for inbound replication



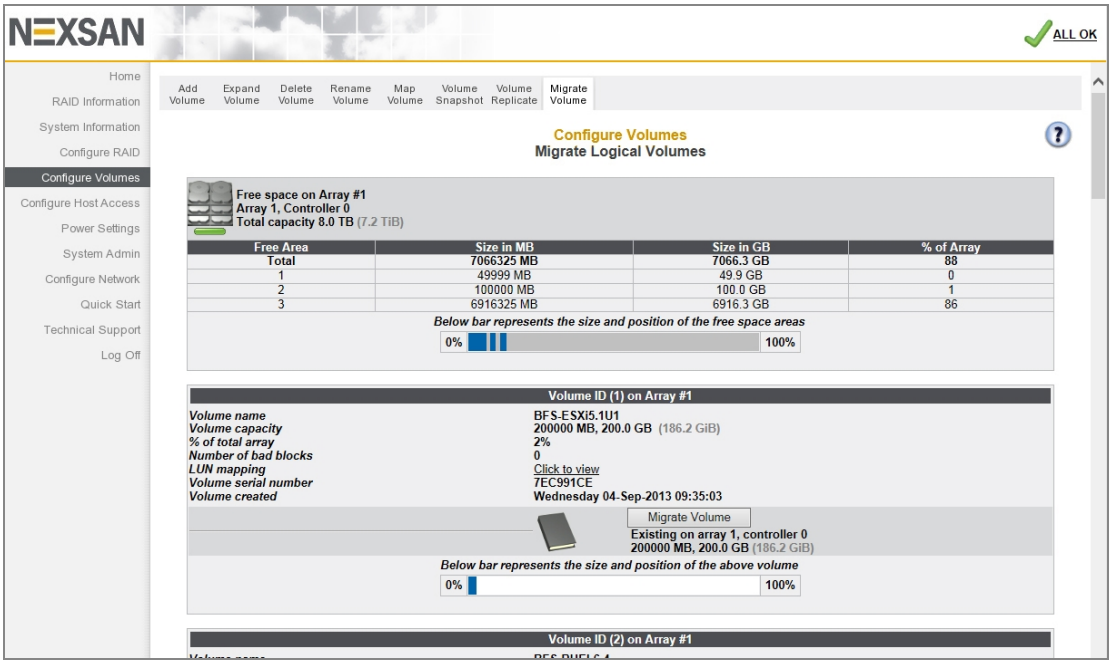
For instructions on how to perform these tasks, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Migrate Logical Volumes

Clicking **Configure Volumes > Migrate Volume** takes you to the *Migrate Logical Volumes* page. This page enables you to move a live volume from one RAID array to another. It lists each array in the system and all volumes in each array. Scroll down to see all arrays and volumes.

Note The volume migration feature *moves* a volume from one array to another. It does NOT make a *copy* of the volume.

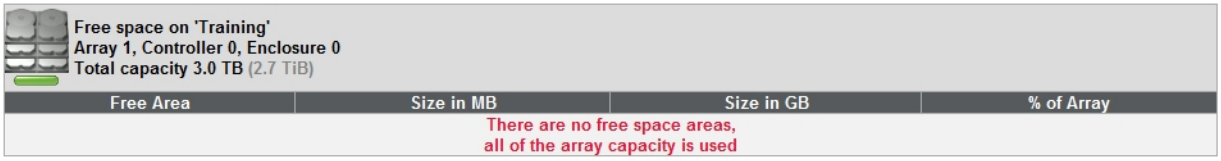
Figure 3-157: Migrate Logical Volumes page



The array information section lists the array name, array number, array owner, enclosure, and total capacity. See RAID Array Information on page 72 for more information. If there is free space on the array, this section displays the total amount of space taken up by existing volumes, plus the percentage of the array's total capacity used.

If there is no space on the array, the array information section looks like this:

Figure 3-158: Message indicating no free space on array



Each volume's information section lists the volume ID, array name, volume name, volume capacity, the percentage of the array that the volume uses, the number of bad blocks, a link to the logical unit number (LUN) mapping information, the volume serial number, and the date that the volume was created (see Detailed Volume Layout on page 79).

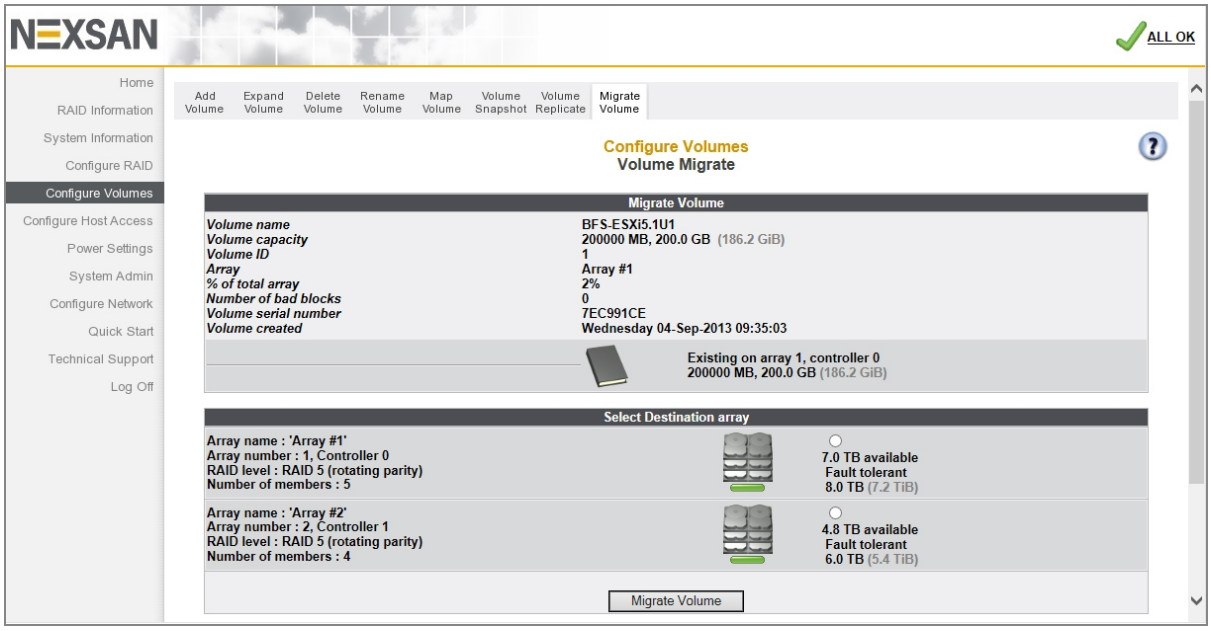
The darker area below the listed items displays the **Migrate Volume** button, the name of the array that the volume belongs to, the controller number, and the volume capacity.

The bottom area contains a bar which represents the percentage of the array's capacity that the volume uses, as well as the volume's relative position within the array.

► To migrate a volume from one array to another:

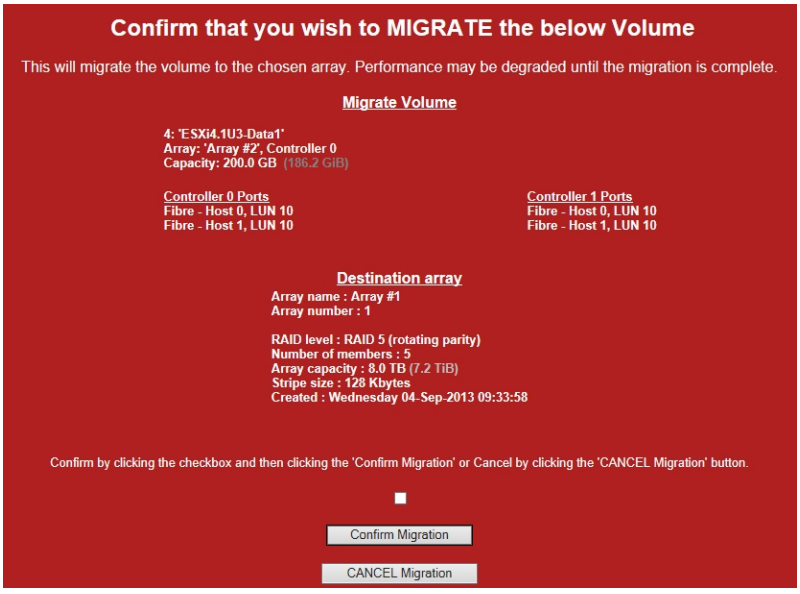
1. For the volume you wish to move, click the **Migrate Volume** button. The *Volume Migrate* page displays.

Figure 3-159: Volume Migrate page



2. In the *Select Destination array* section, click the selection button for the array that you want to send the volume to.
3. Click **Migrate Volume**. A confirmation screen displays:

Figure 3-160: Volume migration warning and confirmation dialog

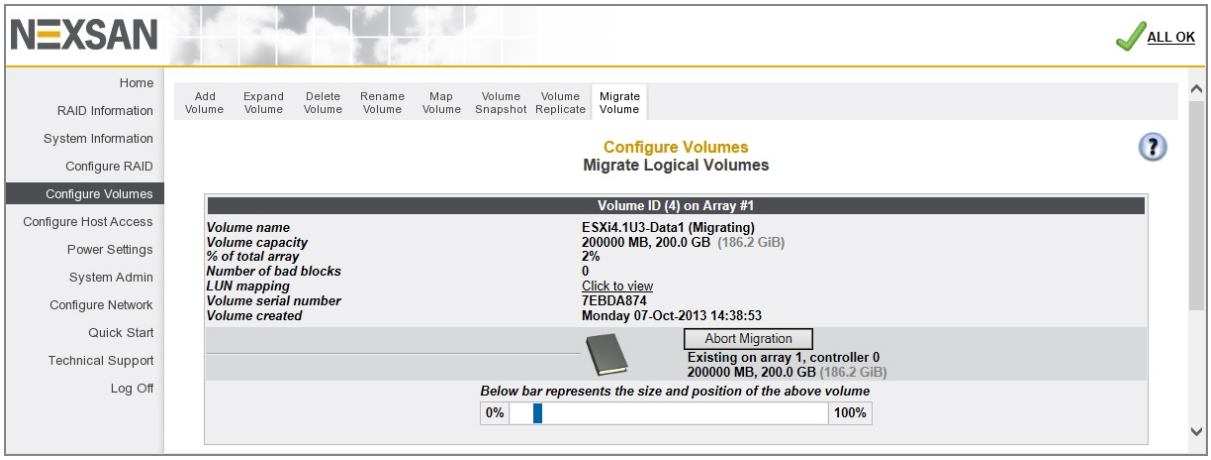


4. To proceed with the volume migration, check the confirmation check box and click **Confirm Migration**. A message displays, saying that the volume migration has started.

   Note To cancel the volume migration, click **CANCEL Migration**. A message displays, stating that the operation has been canceled. Click the **Back** button to return to the *Migrate Logical Volume* page.

5. If you selected **Confirm Migration** in the previous step, click the **Back** button to see the volume migration progress.

Figure 3-161: Volume migration progress

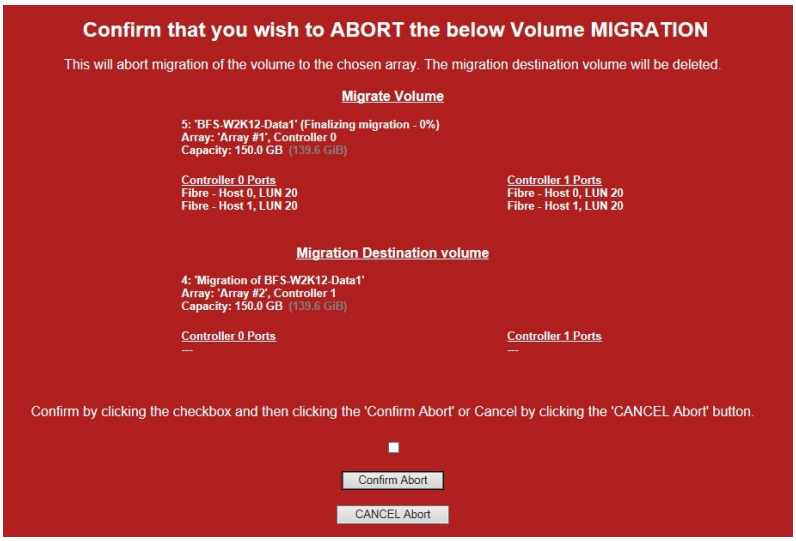


The volume name has the status *Migrating*, and the button has changed to **Abort Migration**.

► To abort the volume migration:

1. Click the Abort Migration button. A confirmation screen displays:

Figure 3-162: Volume migration abort warning and confirmation dialog



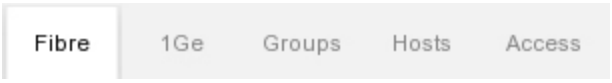
2. To abort the volume migration, check the confirmation check box and click **Confirm Abort**. A message displays, saying that the volume migration has been aborted. Click the **Back** button to return to the *Migrate Logical Volume* page.

   Note To cancel the abort, click **CANCEL Abort**. A message displays, stating that the operation has been canceled. Click the **Back** button to return to the *Migrate Logical Volume* page.

Configure Host Access

Clicking **Configure Host Access** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-163: *Configure Host Access* navigation bar (Fibre Channel)



For SAS and 10Ge variants of the Host Access navigation bar, see For SAS and 10Ge Storage Systems below.

Refer to Table 3-164 for help with the Nexsan E-Series/BEAST host access firmware:

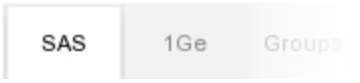
Table 3-164: Host access configuration pages

Nav bar button	GUI pages and documentation links
Fibre	Configure Fibre on the facing page
1Ge	Configure 1Ge iSCSI on page 178
Groups	Manage Host Groups on page 182
Hosts	Manage Hosts on page 184
Access	Host Access on page 185

For SAS and 10Ge Storage Systems

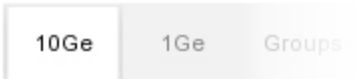
On Nexsan Storage Systems configured for SAS-to-Host, the **Fibre** tab is replaced by a **SAS** tab, which links to Configure SAS.

Figure 3-165: *Configure Host Access* navigation bar (SAS)



On Nexsan Storage Systems configured for 10Gb Ethernet iSCSI, the **Fibre** tab is replaced by a **10Ge** tab which links to Configure 10Ge iSCSI.

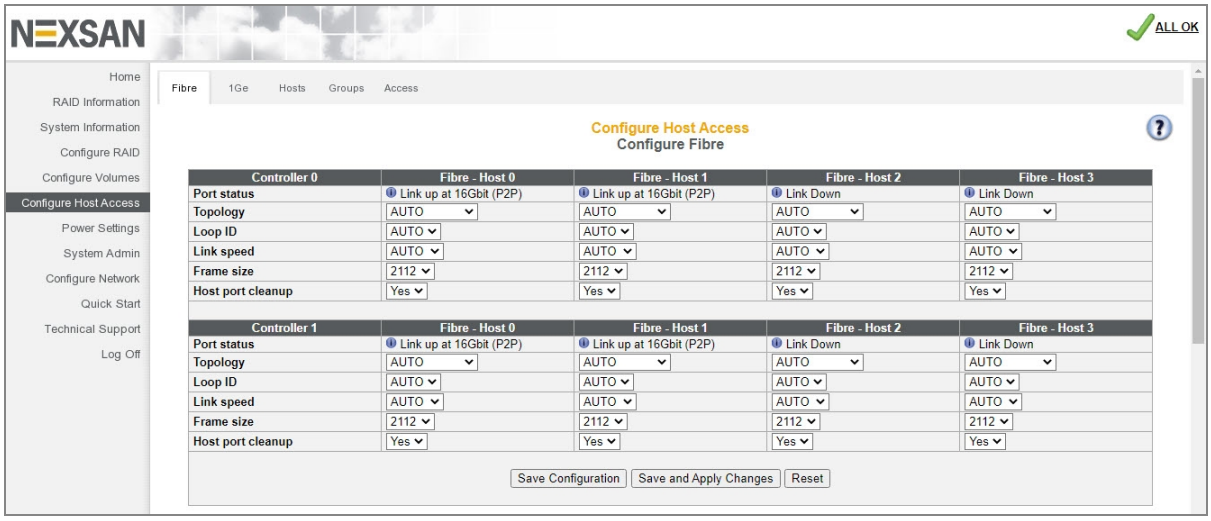
Figure 3-166: *Configure Host Access* navigation bar (10Ge iSCSI)



Configure Fibre

If your system is configured for Fibre Channel, clicking **Configure Host Access** takes you to the *Configure Fibre* page, which enables you to change settings for each Fibre Channel host port on each RAID Controller.

Figure 3-167: *Configure Fibre* page (four ports per controller)



The information is arranged by Controller and then by host port. The *Current Status* row shows the link status, speed, and topology.

▶ To change Fibre Channel host configuration:

1. For each Fibre Channel host port, configure the following settings:

   Table 3-168: Fibre Channel host port configuration

Setting	Action
Topology	Select **Loop**, **Point-to-point**, or **AUTO** (the default) from the drop-down list.
Loop ID	Select an ID number from **0** to **126**, or **AUTO** (the default), from the drop-down list.
Link speed:	Select **2Gbit**, **4Gbit**, **8Gbit**, **16Gbit**, **32Gbit**, or **AUTO** (the default) from the drop-down list. **Note** The available link speed options may vary by model.
Frame size	Select **512**, **1024**, **2048**, or **2112** from the drop-down list.
Host port cleanup	This option is only used in full-fabric topologies where RSCN notification is enabled on the connected Fibre switch. RSCN notification is a switch function which can inform other devices on the FC fabric that a host has been disconnected without logging off. Select **No** if you are not using a full-fabric topology or if RSCN notification is disabled. Select **Yes** if you are using a full-fabric topology with RSCN notification.

Note If at any time you wish to return the *Configure Fibre* page to its initial state, click **Reset**.

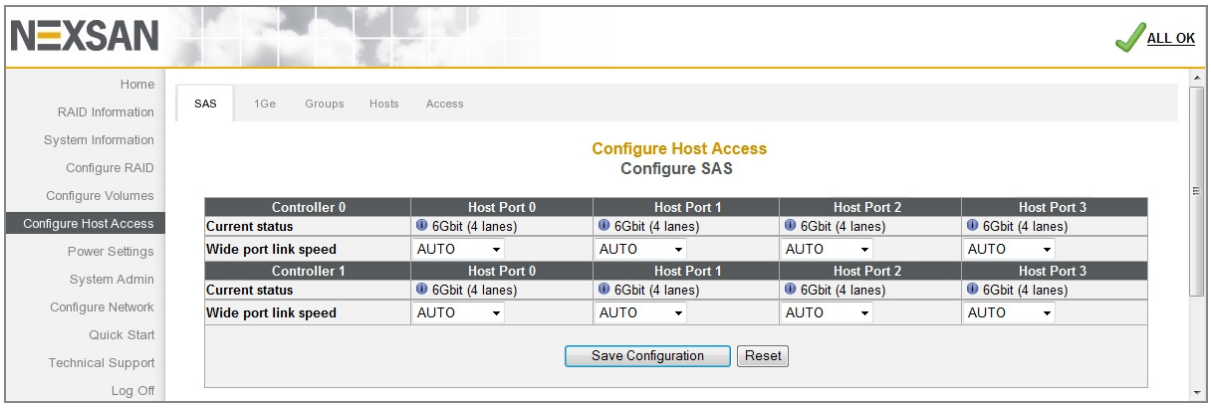
2. When you have selected the desired new settings, do one of the following:
   - Click **Save Configuration**. The settings are saved and are applied after the system is restarted (see Reboot System on page 203).
   - Click **Save and Apply Changes**. The settings are saved and applied immediately.

Configure SAS

If your Nexsan Storage System is configured for SAS-to-Host connectivity, clicking **Configure Host Access** takes you to the *Configure SAS* page.

On Nexsan Storage Systems with four SAS ports per controller, the *Configure SAS* page looks like this:

Figure 3-169: *Configure SAS* page (four ports per controller)



Current status displays the current status of the link, its speed, and the number of active lanes.

► To change SAS-to-Host configuration:

1. Using the **Wide port link speed** drop-down list, select the maximum link speed for the host connection: **1.5Gbit**, **3Gbit**, **6Gbit**, **12Gbit**, or **AUTO** (the default).

   Selecting **AUTO** tells the Nexsan Storage System to discover and select the data rate of the attached host or SAS device.

   The available link speed options may vary by model.

   If at any time you wish to return the *Configure SAS* page to its initial state, click **Reset**.

2. Click **Save Configuration** to update the settings.

A message displays, indicating that the settings have been updated. Click the **Back** button to return to the *Configure SAS* page.

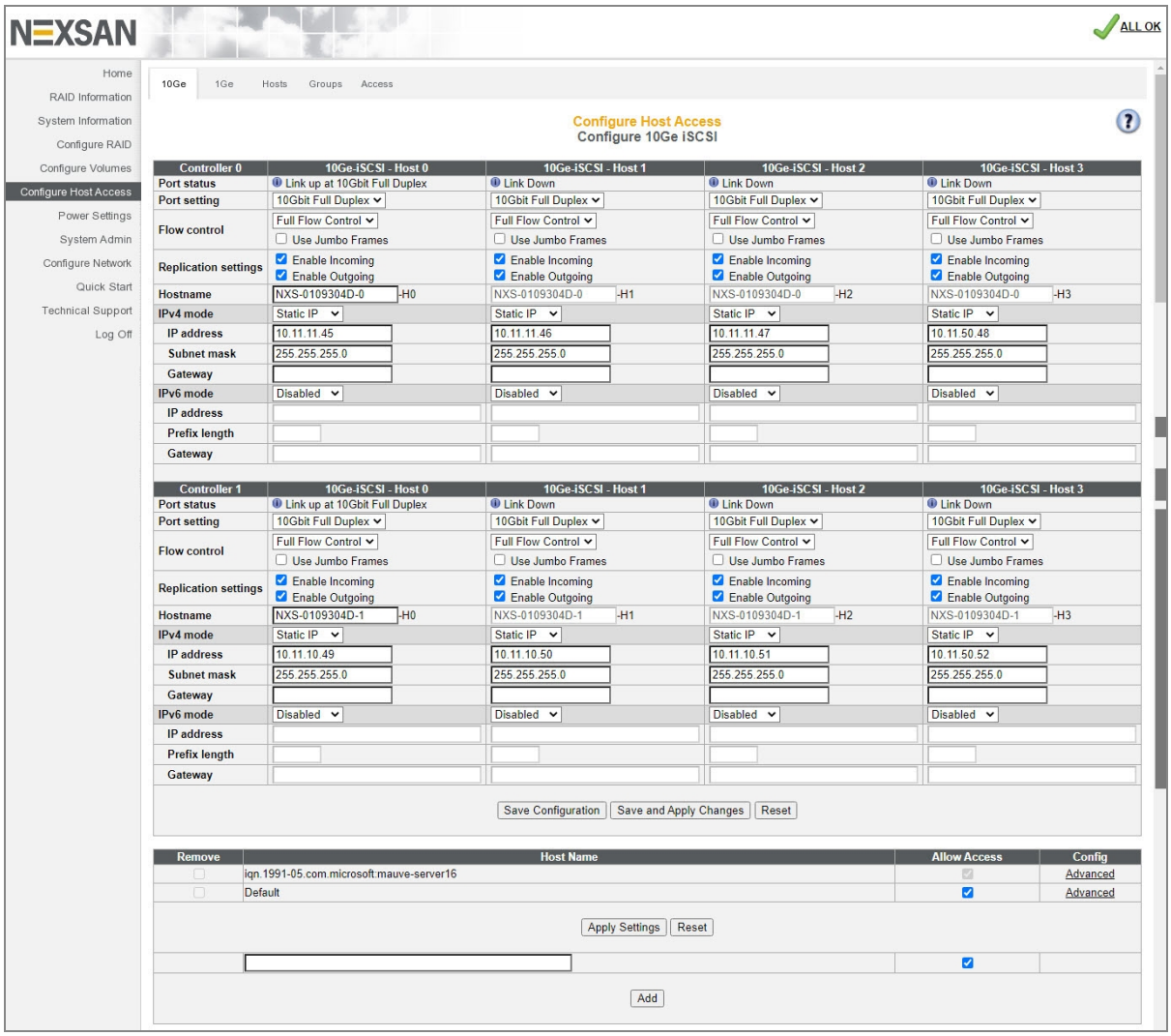
Note New SAS settings don't take effect until the RAID Controller has been rebooted (see Reboot System on page 203).

Configure 10Ge iSCSI

If your Nexsan Storage System is configured for 10Gb Ethernet iSCSI connectivity, clicking **Configure Host Access** takes you to the *Configure 10Ge iSCSI* page.

The *Configure 10Ge iSCSI* page looks like this:

Figure 3-170: *Configure 10Ge iSCSI* page (four ports per controller)



The information is arranged by Controller and then by host port.

▶ To change 10Ge Ethernet iSCSI port configuration:

1. In the **Port Setting** section, do the following:

Table 3-171: Configure 10Ge iSCSI

Setting	Action
Port status	Displays the link up or link down status and setting.
Port setting	Displays the port setting: **10Gbit Full Duplex** The port speed is fixed at **10Gbit Ethernet**.
Flow Control	Do the following: • Configure **Flow Control**. The options are **Full Flow Control** or **No Flow Control**. • Check the **Jumbo Frames** check box if you wish to enable jumbo frames (9000 bytes, including all header information) for the 10Gb Ethernet port.
Replication Settings	Check or uncheck the boxes next to **Enable Incoming** and **Enable Outgoing** for each port to enable or disable incoming and outgoing replication for that port. **Note** If at any time you wish to return the *Configure 10Ge iSCSI* page to its initial state, click **Reset**.
Host name	Displays the current host name.
IPv4mode	Select **Automatic**, **Static IP** to enable IPv4 for both controllers on the Nexsan Storage System. If you are not using IPv4 mode, select **Disable** to disable it. • If you select **Automatic**, then the system will use DHCP and no other configuration is needed. **Note** To use automatic IP assignment, your network must be configured for DHCP. If it is not, you MUST use a static IP address. • If you select **Static IP**, then you must fill in the **IP Address** and **Subnet Mask**.
IPv6mode	Select **Automatic**, **Static IP** to enable IPv6 for both controllers on the Nexsan Storage System. If you are not using IPv6 mode, select **Disable** to disable it. • If you select **Automatic**, then no other configuration is needed. IPv6 will be configured automatically from router advertisements (SLAAC), and a fixed link-local IPv6 address will be assigned. **Note** To use automatic IP assignment, your network must be configured SLAAC. If not, you MUST use a static IP address. • If you select **Static IP**, then you must fill in the **Static IP Address** and **Prefix length**.

2. Do one of the following:
   - Click **Save Configuration**. The settings are saved and are applied after the system is restarted (see Reboot System on page 203).
   - Click **Save and Apply Changes**. The settings are saved and applied immediately.

The *Host Name* list shows the hosts which are currently logged in and have previously logged in (unless the list has been manually cleared). Any hosts which are not logged in will not be listed. If a host's name is gray, the host is offline. Only the settings of offline hosts and for **Default** can be changed. The *Host Name* section also contains a field for manually adding new hosts.

Each entry has an **Allow Access** check box (to allow or deny host access to this system) and an **Advanced** link (for setting host authentication settings; see Configure 10Ge iSCSI on page 175).

▶ To change host access:

1. Check or uncheck the **Allow Access** check box to either permit or prevent access to the Nexsan Storage System from this host. This box is checked by default.

   Note New iSCSI hosts are detected automatically by the Nexsan Storage System and added to the host list the first time they attempt to log in.

2. Click **Apply Settings**.

▶ To manually add an iSCSI host:

Note New hosts are detected automatically by the Nexsan Storage System and added to the host list, and iSCSI hosts are detected the first time they attempt to log in. Hosts may be added manually, but this is not generally required for normal operation.

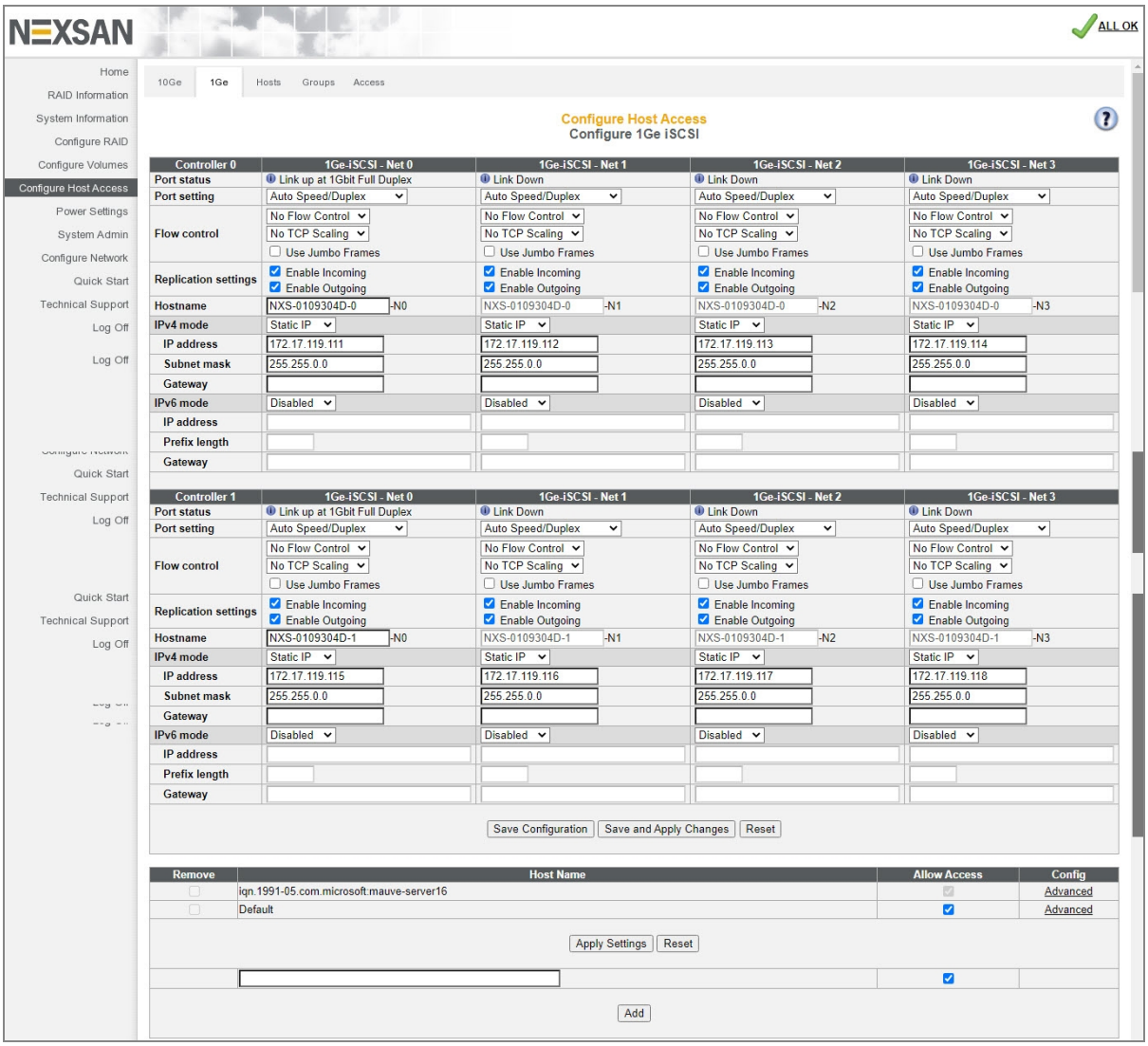
1. Enter the host name into the text field. The name should be entered in full "eui" or "iqn" format, exactly as it is configured on the host.
2. Click the **Add** button.

Configure 1Ge iSCSI

Clicking **Configure Host Access > 1Ge** takes you to the *Configure iSCSI* page, which enables you to change settings for each host attached to your Nexsan Storage System via 1Ge iSCSI. The tools on this page differ depending on the Nexsan Storage System configuration.

The *Configure 1Ge iSCSI* page looks like this:

Figure 3-172: *Configure 1Ge iSCSI* page



The information is arranged by Controller and then by host port. *Current Status* lists the link status (up or down), link speed, and topology.

To configure 1Ge iSCSI:

1. Use the following table for help with configuring 1Ge iSCSI:

Table 3-173: Configure 1Ge iSCSI

Setting	Action
Port status	Displays the link up or link down status and setting.
Port setting	**Note** For most iSCSI networks, the default setting of **Auto Speed/Duplex** is recommended. However, if your switch doesn't support auto-negotiation, you can "force" one or both settings. Select the port speed using the drop-down list. The possible selections are: **Auto Speed/Duplex** (the default) **Auto Speed, Full Duplex** **Auto Speed, Half Duplex** **1Gbit Full Duplex** **100Mbit Full Duplex** **100Mbit Half Duplex** **10Mbit Full Duplex** **10Mbit Half Duplex**
Flow Control	Manages the flow of packets between the source and target ports. The source and target ports use pause frames to pause and control the rate of packet transmission, which ensures the target is not saturated or overwhelmed by network traffic. The options are: • **No Flow Control** • **TX Flow Control** • **RX Flow Control** • **Full Flow Control**
	TCP scaling increases the receive window size so that more data can be sent between the source and target ports before an acknowledgement is returned. The options are: • **No TCP Scaling** • **TX TCP Scaling** • **RX TCP Scaling** • **Full TCP Scaling**
	Check the **Use Jumbo Frames** check box to enable jumbo frames for the iSCSI port. Jumbo frames are typically used to boost performance of iSCSI traffic. Normal frames can contain data up to 1,500 bytes in length. Jumbo frames can contain larger data payloads (up to 9,000 bytes on Nexsan Storage Systems), and are supported on 1Gb/s and 10Gb/s Ethernet (10GbE) networks.

Setting	Action
Replication Settings	Check or uncheck the boxes next to **Enable Incoming** and **Enable Outgoing** for each port to enable or disable incoming and outgoing replication for that port. **Note** If at any time you wish to return the *Configure 10Ge iSCSI* page to its initial state, click **Reset**.
Host name	Displays the current host name.
IPv4mode	Select **Automatic**, **Static IP** to enable IPv4 for both controllers on the Nexsan Storage System. If you are not using IPv4 mode, select **Disable** to disable it. • If you select **Automatic**, then the system will use DHCP and no other configuration is needed. **Note** To use automatic IP assignment, your network must be configured for DHCP. If it is not, you MUST use a static IP address. • If you select **Static IP**, then you must fill in the **IP Address** and **Subnet Mask**.
IPv6mode	Select **Automatic**, **Static IP** to enable IPv6 for both controllers on the Nexsan Storage System. If you are not using IPv6 mode, select **Disable** to disable it. • If you select **Automatic**, then no other configuration is needed. IPv6 will be configured automatically from router advertisements (SLAAC), and a fixed link-local IPv6 address will be assigned. **Note** To use automatic IP assignment, your network must be configured SLAAC. If not, you MUST use a static IP address. • If you select **Static IP**, then you must fill in the **Static IP Address** and **Prefix length**.

2. Do one of the following:
   - Click **Save Configuration**. The settings are saved and are applied after the system is restarted (see Reboot System on page 203).
   - Click **Save and Apply Changes**. The settings are saved and applied immediately.

Note Saving and applying these changes will restart the network services, which may cause hosts to disconnect and then reconnect.

The *Host Name* list shows the hosts which are currently logged in and have previously logged in (unless the list has been manually cleared). Any hosts which are not logged in will not be listed. If a host's name is gray, the host is offline. Only the settings of offline hosts and for **Default** can be changed. The *Host Name* section also contains a field for manually adding new hosts.

Each entry has an **Allow Access** check box (to allow or deny host access to this Nexsan Storage System) and an **Advanced** link (for setting host authentication settings; see Host authentication settings on the facing page).

▶ **To change host access:**

1. Check or uncheck the **Allow Access** check box to either permit or prevent access to the Nexsan Storage System from this host. This box is checked by default.

Note New iSCSI hosts are detected automatically by the Nexsan Storage System and added to the host list the first time they attempt to log in.

2. Click **Apply Settings**.

► To manually add an iSCSI host:

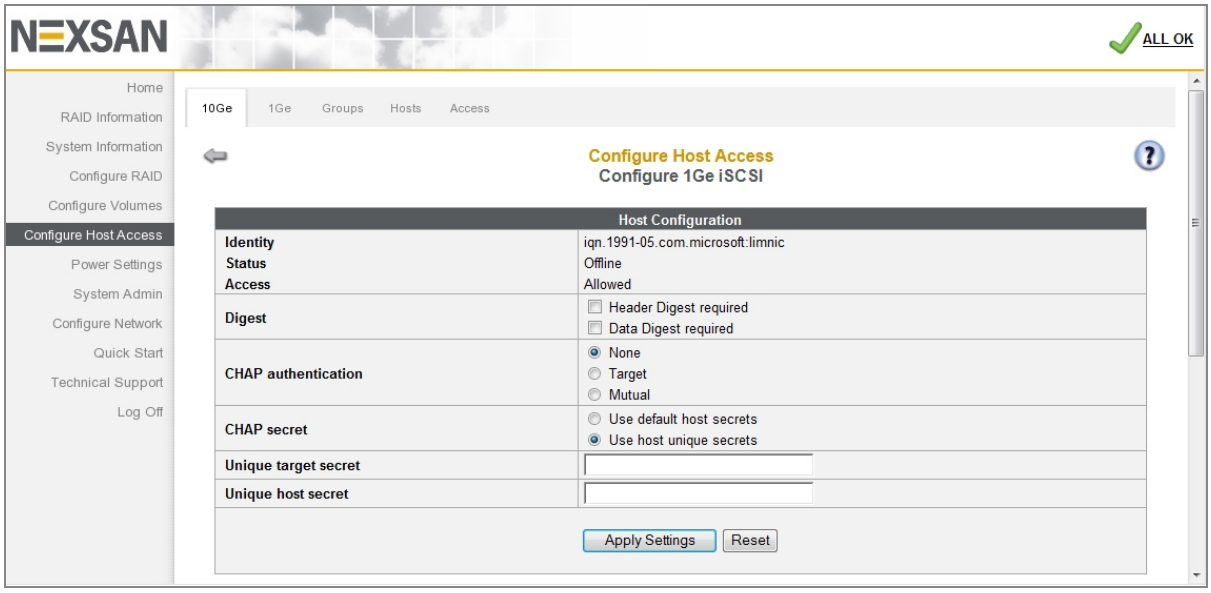
Note New hosts are detected automatically by the Nexsan Storage System and added to the host list, and iSCSI hosts are detected the first time they attempt to log in. Hosts may be added manually, but this is not generally required for normal operation.

1. Enter the host name into the text field. The name should be entered in full “eui” or “iqn” format, exactly as it is configured on the host.
2. Click the **Add** button.

Host authentication settings

Clicking **Advanced** for an entry in the *Host Name* list takes you to the *Host Configuration* page, which enables you to set host authentication settings.

Figure 3-174: Configure 1Ge iSCSI



► To require CRC32 digests:

1. Check **Header Digest required** or **Data Digest required**, or both.

   Note This setting requires that the host support the appropriate CRC32 digests. If it doesn’t, the target rejects the login.

2. Click **Apply Settings**.

► To require CHAP authentication:

1. Select the **CHAP authentication** mode (**Target** or **Mutual**; **None** is the default).
2. Select the **CHAP secret** mode (**Use default host secrets** or **Use host unique secrets**).

If you select **Use host unique secrets**, enter a **Unique target secret** and a **Unique host secret**. Each must be 12–32 characters long. The same host and target secrets must also be configured on the host interface prior to iSCSI login.

Note This setting requires that the host support the appropriate CHAP authentication mode. If it doesn't, the target rejects the login.

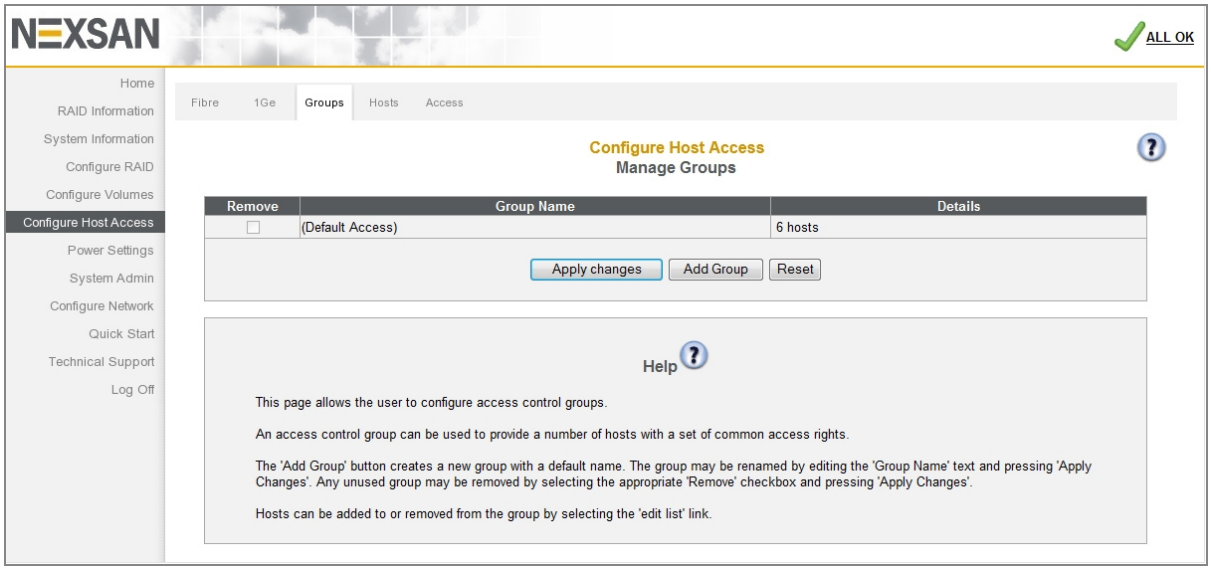
Note If at any time you wish to return the *Host Configuration* page to its initial state, click **Reset**.

3. Click **Apply Settings**.
4. Click the gray arrow to return to the *Configure 1Ge iSCSI* page.

Manage Host Groups

Clicking **Configure Host Access > Groups** takes you to the *Manage Groups* page, which enables you to create access control groups. Access control groups provide a set of hosts with common access rights.

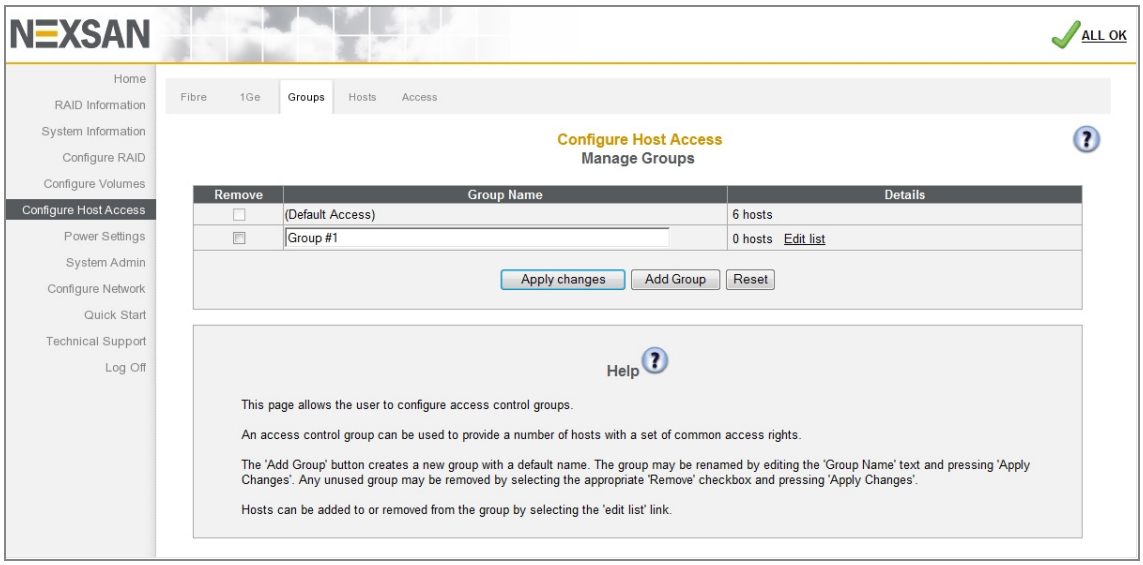
Figure 3-175: *Manage Groups* page



► To add a group:

1. Click the **Add Group** button. The new group displays as a new line in the group list:

Figure 3-176: *Manage Groups* group list page

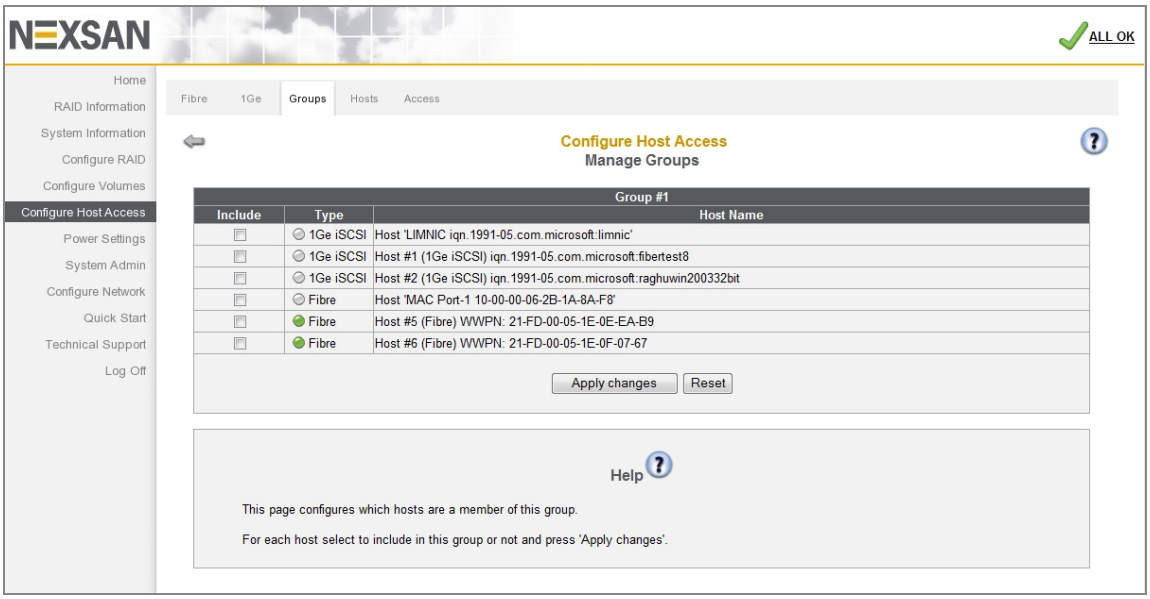


2. Under **Group Name**, edit the default name if you wish, then click **Apply changes**.

► To edit a group's hosts:

1. Click the **Edit list** link. A list of hosts displays:

Figure 3-177: *Manage Groups* edit group page



2. For each host you want to include in the group, click the **Include** check box.

   Note If at any time you wish to return the *Manage Groups* page to its initial state, click **Reset**.

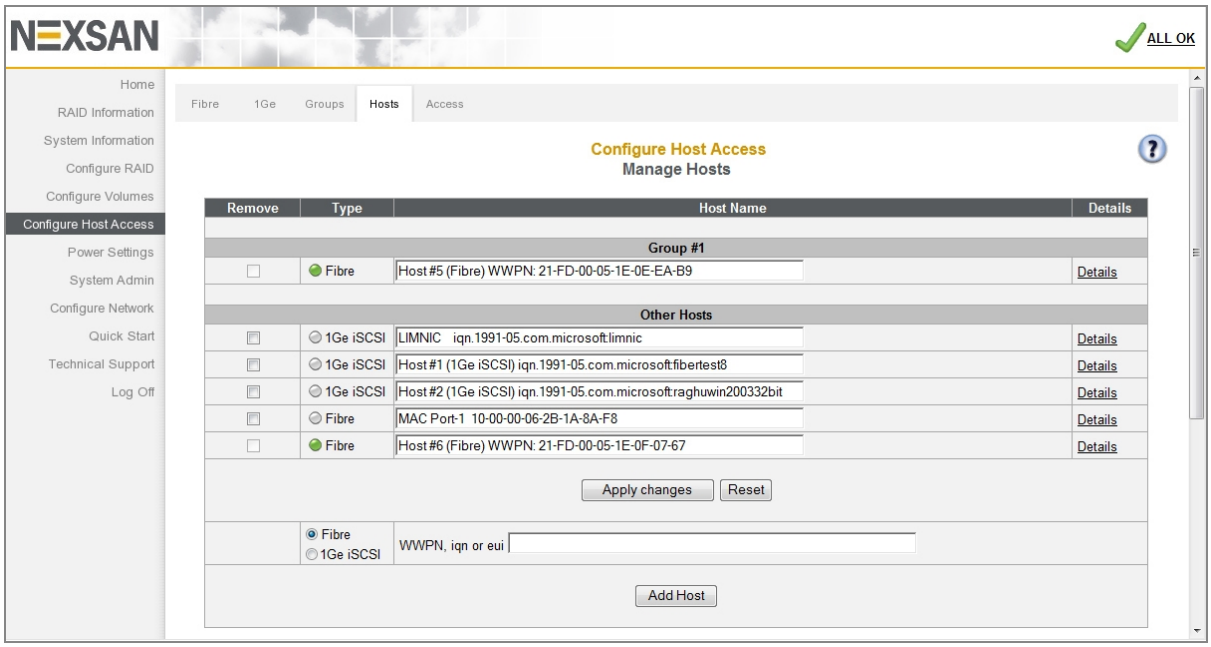
3. Click **Apply changes**.

A message displays, informing you that the host group settings have been updated. Click the **Back** button to return to the *Manage Groups* page.

Manage Hosts

Clicking **Configure Host Access > Hosts** takes you to the *Manage Hosts* page, which enables you to add, rename, remove, and configure settings for host groups and individual hosts.

Figure 3-178: *Manage Hosts* page



The **Host Name** field, which defaults to the host's address, can be edited to give the host a "friendly" name.

To change the name of a host:

1. Enter the desired name in the **Host Name** field.
2. Click **Apply changes**.

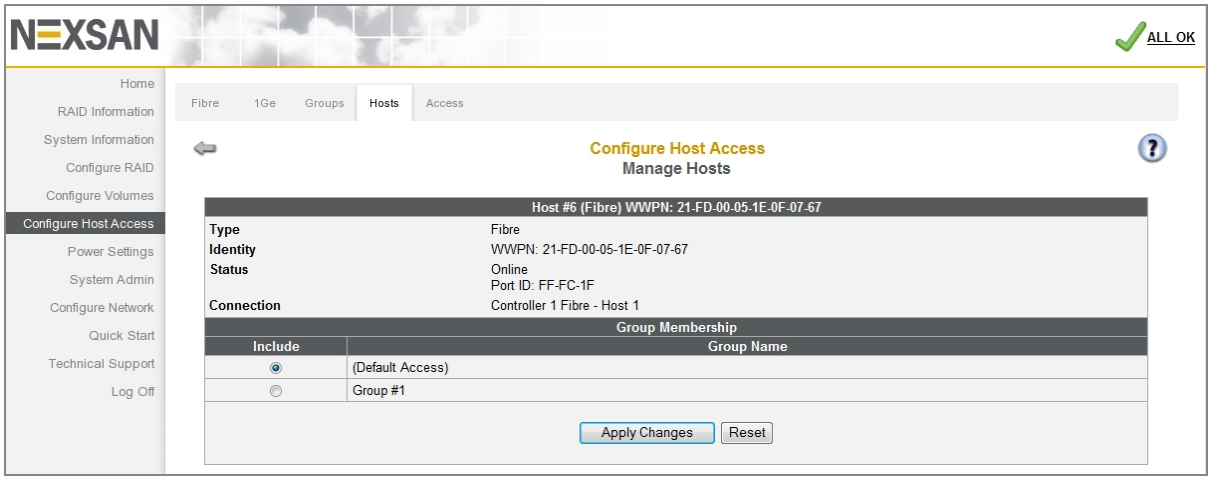
The **Remove** check box can be checked to remove unconnected hosts (designated by a gray icon under *Type*) that are no longer relevant.

To remove an unconnected host:

1. Check the host's **Remove** check box.
2. Click **Apply changes**.

Further information about each host is available by clicking the **Details** link:

Figure 3-179: *Manage Hosts* detail page



The upper section lists the host's name, its *Type* (Fibre, SAS, iSCSI), its *Identity* (usually a WorldWide Port Name), it's *Status* (whether online or offline, and the port ID), and the *Connection* that it is liked to.

The host's group membership can be changed in the *Group Membership* section.

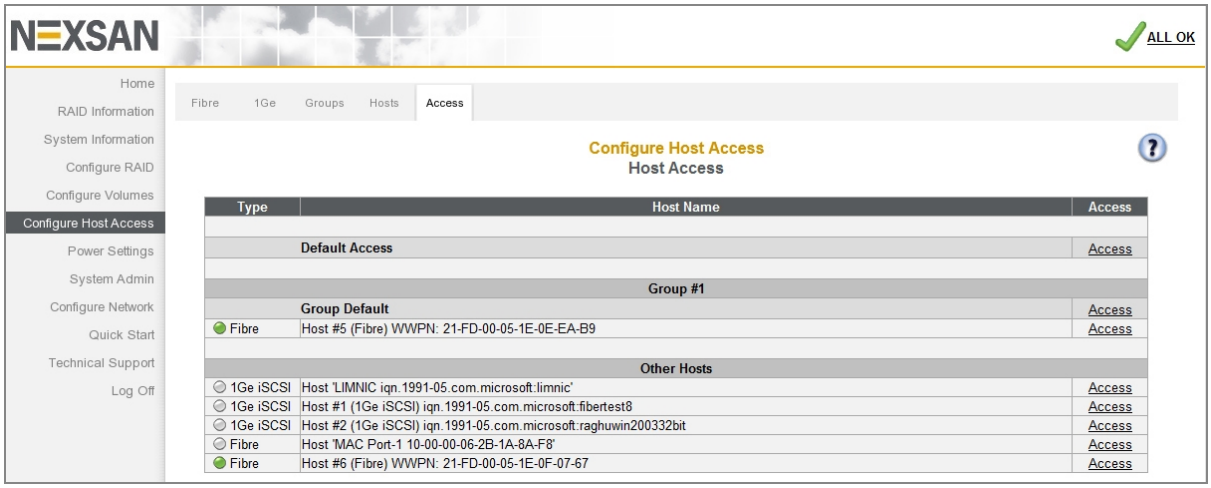
► To change a host's group membership:

1. Select the **Include** selection button next to the group that you wish the host to be a part of.
2. Click **Apply Changes**.

Host Access

Clicking **Configure Host Access > Access** takes you to the *Host Access* page, which enables you to configure volume access to specific hosts. It also enables you to set the default host access and the default group host access.

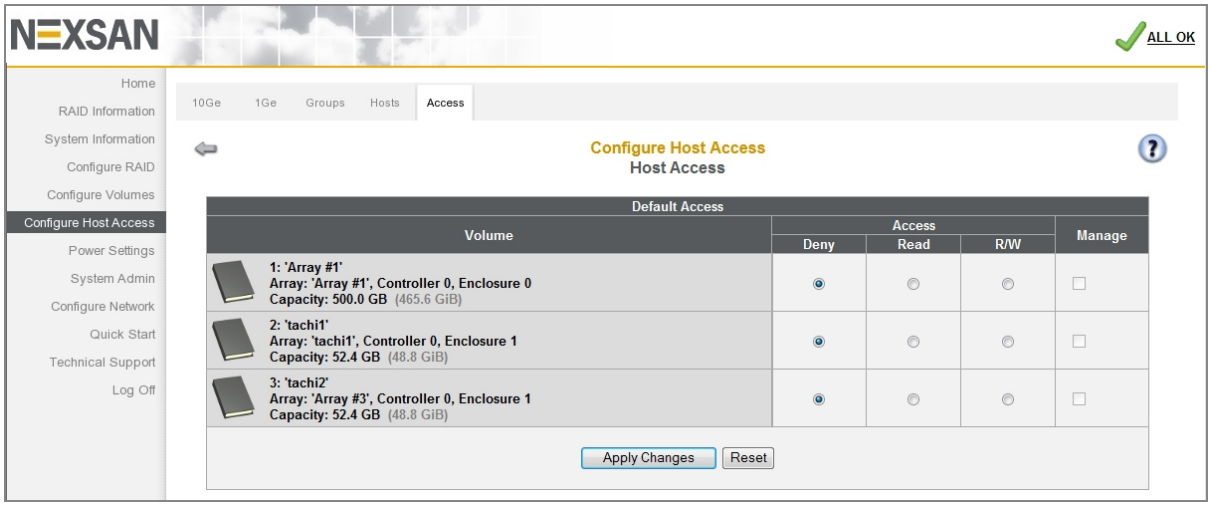
Figure 3-180: *Host Access* page



The host access links are arranged in order, starting with *Default Access*, then each *Group Default*, then each host within each group, and then any hosts that are not in a group. Each **Access** link takes you to the host access configuration page for that host or category.

If you click the **Access** link for *Default Access* or for *Group Default* under a group name, the host access configuration page looks like this:

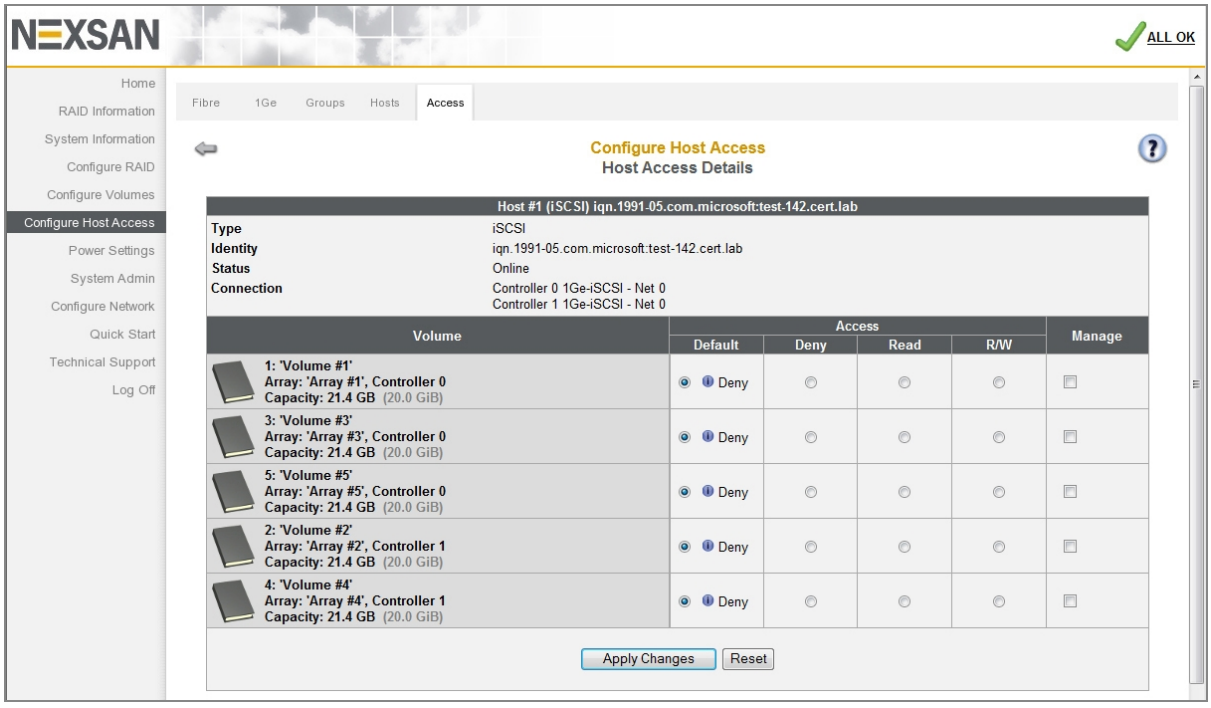
Figure 3-181: *Manage Hosts*, *Default Access* page



The *Default Access* setting controls access by new or unknown hosts. The *Group Default* setting overrides the *Default Access* setting.

If you click the **Access** link for a specific host, the host access configuration page looks like this:

Figure 3-182: *Host Access Details* page



Settings for individual hosts override the *Default Access* and *Group Default* settings.

To set host access privileges for Default Access, Group Default, or individual hosts:

1. For each listed *Volume*, select **Default** (for a specific host), **Deny**, **Read**, or **R/W** access.
2. For each listed *Volume*, check **Manage** to allow this host to send in-band SCSI NMP (Nexsan Management Protocol) commands to the target ports that it is mapped to. Uncheck it to have the target ports ignore NMP commands sent by this host. Refer to SSL Configuration on page 230 and the *Nexsan Storage Tools Guide*, available at https://www.nexsan.com/support/e-series-and-beast/

   Note If at any time you wish to return the *Host Access* page to its initial state, click **Reset**.
3. Click **Apply Changes**.

A message displays, informing you that the settings have been updated. Click the **Back** button to return to the *Host Access* page.

Power Settings

Clicking **Power Settings** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-183: Power Settings navigation bar



Refer to Table 3-184 for help with the Nexsan E-Series/BEAST power settings firmware:

Table 3-184: Power Settings pages

Nav bar button	GUI pages and documentation links
AutoMAID	A brief overview of the AutoMAID power saving feature. See AutoMAID on the facing page
AutoMAID Stats	AutoMAID Statistics on page 190
AutoMAID Con-fig	Configure AutoMAID Settings on page 192

AutoMAID

AutoMAID is Nexsan's HDD and SSD power management system, that can provide up to 87% energy savings. MAID stands for Massive Array of Idle Disks. When drives are not in use, AutoMAID enables you to automatically put them into one of several power saving states. The drives are still accessible, however, and are automatically brought back up to full power levels when data needs to be accessed.

Notes:

- Not all disk drives support all levels of AutoMAID. Disks that do not support a specific AutoMAID level will stay at a previous, usable level until the system reaches an AutoMAID level that the disk supports (see Configure AutoMAID Settings on page 192).
- If any drives are set to use AutoMAID Level 3 or 4, host timeout values should be set to a default of between 120 and 150 seconds to avoid the host requests timing out before the disk drives can power on and spin up to full speed.

Use the following table for a breakdown of the differences in the AutoMAID levels:

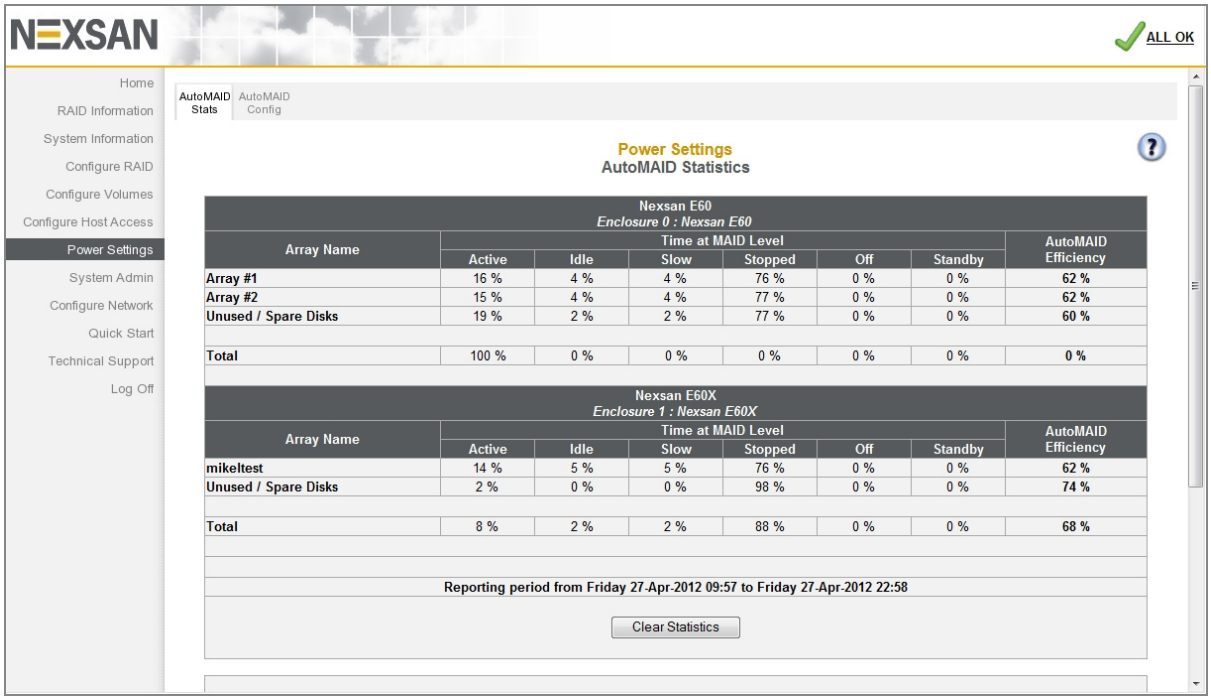
Table 3-185: AutoMAID levels

AutoMAID Level	Description
Level 1	The read/write heads of hard disk drives are parked. If access to an HDD is requested when it is at AutoMAID level 1, the HDD will be fully powered and data accessible in under a second. AutoMAID level 1 provides a 15–20% energy savings.
Level 2	The read/write heads of hard disk drives remain parked, and disk rotation slows down. If access to an HDD is requested when it is at AutoMAID level 2, the HDD will be fully powered and data accessible in approximately 15 seconds. AutoMAID level 2 provides a 35–45% energy savings.
Level 3	The read/write heads of the hard disk drives remain parked, and disk rotation stops. If access to an HDD is requested when it is at AutoMAID level 3, the HDD will be fully powered and data available in approximately 30–45 seconds. AutoMAID level 3 provides a 60–70% energy savings.
Level 4	The electronics in HDDs and SSDs are powered off. If access to an HDD or SSD is requested when it is at AutoMAID level 4, the disks will be fully powered and data available in approximately 45–60 seconds. AutoMAID level 4 provides up to an 87% energy savings.
Level 5	The Nexsan Storage Expansion powers down, except for the power supplies, which go into standby mode. For AutoMAID level 5 to occur, all disks in the storage expansion must first be at AutoMAID level 4 for a period of time. If access to a disk is requested when the storage expansion is at AutoMAID level 5, the disk will be fully powered and data available in approximately 50–70 seconds.

AutoMAID Statistics

Clicking **Power Settings** takes you to the *AutoMAID Statistics* page, which shows you details about the disk drives' AutoMAID power savings. For more information about AutoMAID, see AutoMAID on the previous page.

Figure 3-186: *AutoMAID Statistics* page



The *AutoMAID Statistics* page reports power savings since the **Clear Statistics** button was last clicked. The exact reporting period is shown above the **Clear Statistics** button. Statistics are listed first by enclosure and then by array. The statistical categories are listed in Table 3-187: "AutoMAID statistics" on the facing page.

Table 3-187: AutoMAID statistics

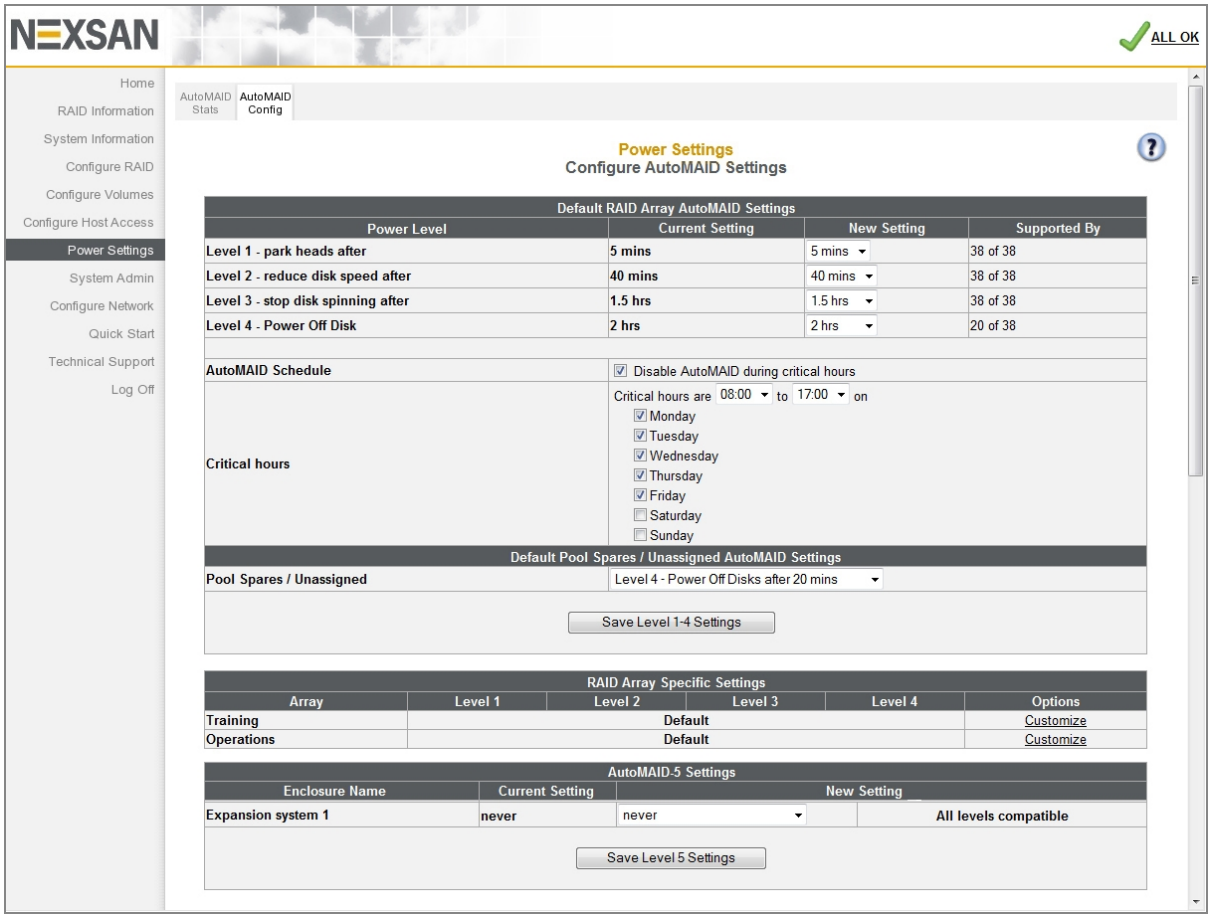
Setting	Description
Array name	The name of each array in the Nexsan Storage System, plus a row for unused and spare disks. There is also a *Total* line that summarizes statistics across all disk drives. This list can include names of arrays that no longer exist, but did exist at any time during the reporting period.
Time at MAID Level	The percentage of time during the reporting period that the drives in each array or category have been at the specified AutoMAID level: • *Active*: The percentage of time that the drives have been active and at full power. • *Idle*: The percentage of time that the drives' read/write heads have been parked (AutoMAID level 1). • *Slow*: The percentage of time that the drives' disk platters have been spun down to a slower speed (AutoMAID level 2). • *Stopped*: The percentage of time that the drives' disk platters have been spun down completely (AutoMAID level 3). • *Off*: The percentage of time that the drives' electronics have been completely powered down (AutoMAID level 4). • *Standby*: The percentage of time that the Nexsan Storage Expansions attached to the Nexsan Storage System have been completely powered down (AutoMAID level 5).
	Notes: • Not all disk drives support AutoMAID levels 1, 2, or 4. • AutoMAID 5 settings apply only to the Nexsan BEAST BT60X, Nexsan E48X and Nexsan E60X Storage Expansions. The Nexsan E18X and Nexsan E32X Storage Expansions do not have AutoMAID 5 capability.

You can clear the statistics for the reporting period by clicking the **Clear Statistics** button. The AutoMAID statistics are cleared, and new statistics are recorded beginning immediately.

Configure AutoMAID Settings

Clicking **Power Settings > AutoMAID Config** takes you to the *Configure AutoMAID Settings* page, which enables you to specify when HDDs and SSDs should enter each AutoMAID level. The page also enables you to specify times and days of the week when AutoMAID is disabled, maximizing data accessibility. AutoMAID power levels 1 to 3 do not apply for SSDs. For more information about AutoMAID, see AutoMAID on page 189.

Figure 3-188: *Configure AutoMAID* Settings page



The AutoMAID configuration settings page includes the following subsections:

- *Default RAID Array AutoMAID Settings*
- *Default Pool Spares/Unassigned AutoMAID Settings*
- *RAID Array Specific Settings*
- *AutoMAID 5 Settings*

Default RAID Array AutoMAID Settings

This section of the AutoMAID settings page provides the following controls for the default settings for disk drives assigned as RAID array members or dedicated array spares.

Table 3-189: Default RAID Array AutoMAID settings

Setting	Description
Power Level	Displays each AutoMAID power level: • *Level 1: park heads after* • *Level 2: reduce disk speed after* • *Level 3: stop disk spinning after* • *Level 4: Power Off Disk* The default is *Never* for all levels, so power savings are turned off until you enable them. For AutoMAID 5 settings, see AutoMAID 5 Settings on page 195.
Current Setting	Displays the current *Power Level* setting.
New Setting	Displays drop-down lists with the available settings for each AutoMAID power level: *Level 1:* Never, 2 mins, or 5 mins. *Level 2:* Never, 10 mins, 20 mins, 30 mins, 40 mins, 50 mins, 60 mins. *Level 3:* Never, 15 mins, 30 mins, 1 hr, 1.5 hrs, or 2 hrs. *Level 4:* Never, 20 mins, 30 mins, 1 hr, 1.5 hrs, or 2 hrs.
Supported by	Displays the number of disk drives out of the total that support each AutoMAID level. **Note** Disk drives that do not support a specific AutoMAID level will stay at a previous, usable level until the system reaches an AutoMAID level that the drive supports.

▶ To configure AutoMAID power level settings:

1. For each AutoMAID power level, use the drop-down list under *New Setting* to select the amount of time that a disk must be inactive before that AutoMAID level is activated. For details, refer to Table 3-189.

   Notes:

   - Any AutoMAID levels set to **never** will be ignored by the system.
   - NL-SAS drives are not compatible with AutoMAID Level 4. Arrays with NL-SAS drives set to use AutoMAID Level 4 will remain at AutoMAID Level 3.
   - If any drives are set to use AutoMAID Level 3 or 4, host timeout values (set for the host HBA either through the HBA BIOS or a management application) should be set to a default of between 120 and 150 seconds to avoid the host requests timing out before the disk drives can power on and spin up to full speed.

2. Click **Save Level 1-4 Settings**.

A message displays, informing you that the settings have been changed. Click the **Back** button to return to the *Configure AutoMAID Settings* page. For AutoMAID 5 settings, see AutoMAID 5 Settings on page 195.

To deactivate AutoMAID during critical hours:

1. Check the **Disable AutoMAID during critical hours** check box.
2. Click **Save Level 1-4 Settings**.

A message displays, informing you that the settings have been changed. Click the **Back** button to return to the *Configure AutoMAID Settings* page.

To define the critical hours schedule:

1. Use the drop-down lists to specify the daily start and end times for critical hours, so that power saving is paused during these hours.
2. Use the radio buttons next to the days of the week to specify the days where critical hours will be specified.
3. Click **Save Level 1-4 Settings**.

A message displays, informing you that the settings have been changed. Click the **Back** button to return to the *Configure AutoMAID Settings* page. For AutoMAID 5 settings, see AutoMAID 5 Settings on the facing page.

Default Pool Spares/Unassigned AutoMAID Settings

Default Pool Spares/Unassigned AutoMAID Settings controls the AutoMAID settings for all pool spare (but not dedicated spare) disks and all disks that are currently unassigned as either spares or array members.

To set AutoMAID settings for pool spares and unassigned disks:

1. Use the **Pool Spares/Unassigned** drop-down list to select the AutoMAID level you wish pool spares and unassigned disks to go to:

   Table 3-190: AutoMAID settings for pool spares and unassigned disks

Setting	Description
Never	The default setting.
Level 1	Park heads after 2 minutes.
Level 2	Reduce disk speed after 10 minutes.
Level 3	Stop disks spinning after 15 minutes.
Level 4	Power off disks after 20 minutes.

2. Click **Save Level 1-4 Settings**.

A message displays, informing you that the settings have been changed. Click the **Back** button to return to the *Configure AutoMAID Settings* page.

Note NL-SAS drives are not compatible with AutoMAID Level 4. Pool spare or unassigned NL-SAS drives set to use AutoMAID Level 4 will remain at AutoMAID Level 3.

RAID Array Specific settings

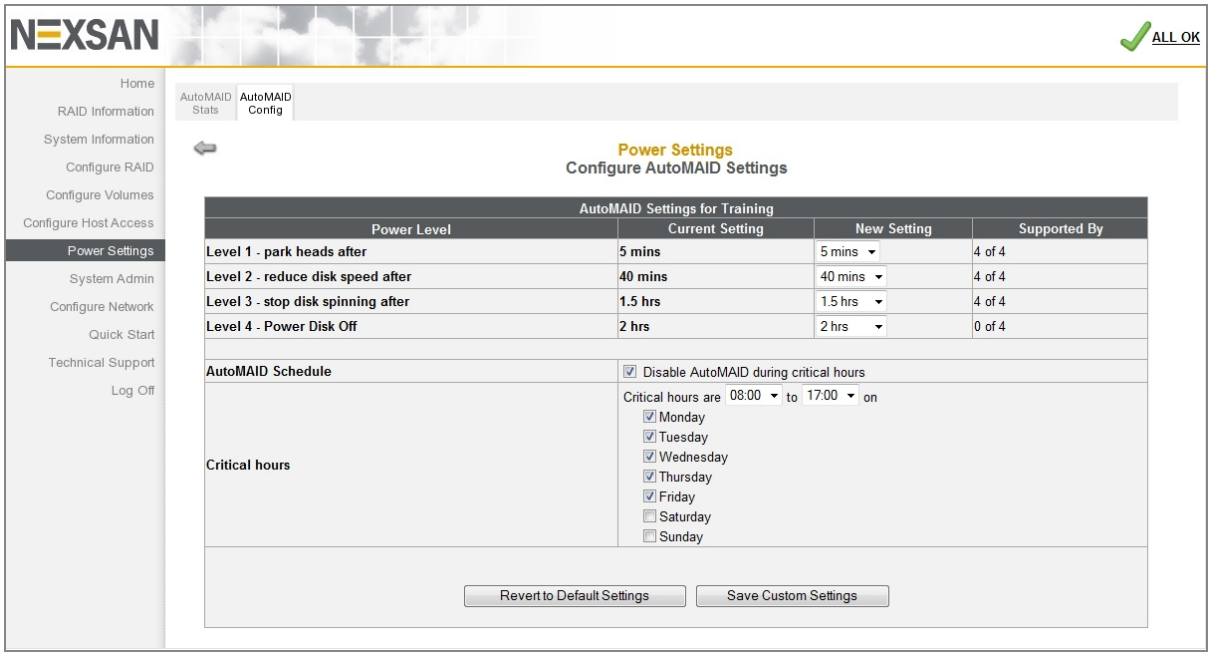
In the *RAID Array Specific Settings* section, the default Power Level setting is *Never*. Power savings are turned off until you enable them.

Figure 3-191: *RAID Array Specific Settings*

RAID Array Specific Settings					
Array	Level 1	Level 2	Level 3	Level 4	Options
Training	Default				Customize
Operations	Default				Customize

Click the **Customize** link to open the *Configure AutoMAID Settings* page for a specific RAID array:

Figure 3-192: *Configure AutoMAID Settings* page for a specific RAID array



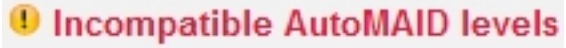
Choose the settings in this section exactly as you would in the *Default RAID Array AutoMAID Settings* section, then click **Save Current Settings**. A message displays, informing you that the new power settings have been saved.

If you wish to return an array to default settings, click **Reset Default Settings**. A message displays, informing you that the new power settings have been saved.

AutoMAID 5 Settings

The *AutoMAID 5 Settings* section controls how soon the Nexsan Storage Expansions power completely down after all disks in the storage expansion are at AutoMAID level 4.

AutoMAID level 5 is only available if all disks in the Nexsan Storage Expansion are configured to go to AutoMAID 4. If some of the disks are not configured for AutoMAID level 4, a warning appears:



AutoMAID 5 settings apply only to the Nexsan BEAST BT60X, Nexsan E48X and Nexsan E60X Storage Expansions. The Nexsan E18X and Nexsan E32X Storage Expansions do not have AutoMAID 5 capability.

There is one row for each Nexsan Storage Expansion and four columns per row.

Table 3-193: AutoMAID 5 Settings

Label	Description
Enclosure Name	Lists the “friendly” name of the Nexsan Storage Expansion.
Current Setting	Displays the amount of time that the system is currently set to wait before activating AutoMAID level 5.
New Setting	Displays a drop-down list with possible settings for AutoMAID level 5.
All levels compatible	Displays the message if all disks in the enclosure are configured to go to AutoMAID level 4. It displays the message **Incompatible AutoMAID levels** if any disks in the enclosure are not configured for AutoMAID level 4.

► To set the AutoMAID 5 settings for a Nexsan Storage Expansion:

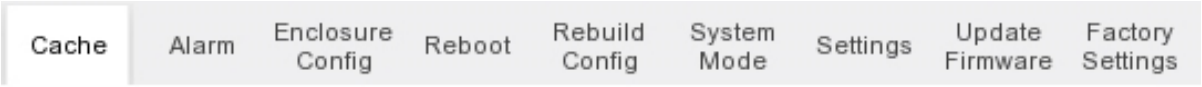
1. Using the New Setting drop-down list, select one of the following:
   - **never** (the default)
   - **All disks in level 4 + 5 mins**
   - **All disks in level 4 + 30 mins**
   - **All disks in level 4 + 1 hr**
2. Click the **Save Level 5 Settings** button.

A message displays, informing you that the settings have been changed. Click the **Back** button to return to the *Configure AutoMAID Settings* page.

System Administration

Clicking **System Admin** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-194: System Administration navigation bar



Refer to Table 3-195 for help with the Nexsan E-Series/BEAST RAID system administration firmware:

Table 3-195: System Administration pages

Nav bar button	GUI pages and documentation links
Cache	Configure Cache on the next page
Alarm	Audible Alarm on page 201
Enclosure Config	Configure Enclosures on page 202
Reboot	Reboot System on page 203
Rebuild Config	Configure Rebuild Priority on page 206
System Mode (not in E48P and E60P)	System Mode on page 207
Settings	Download & Upload System Settings on page 210
Update Firmware	Update Firmware on page 213
Factory Settings	Reset to Factory Defaults on page 215

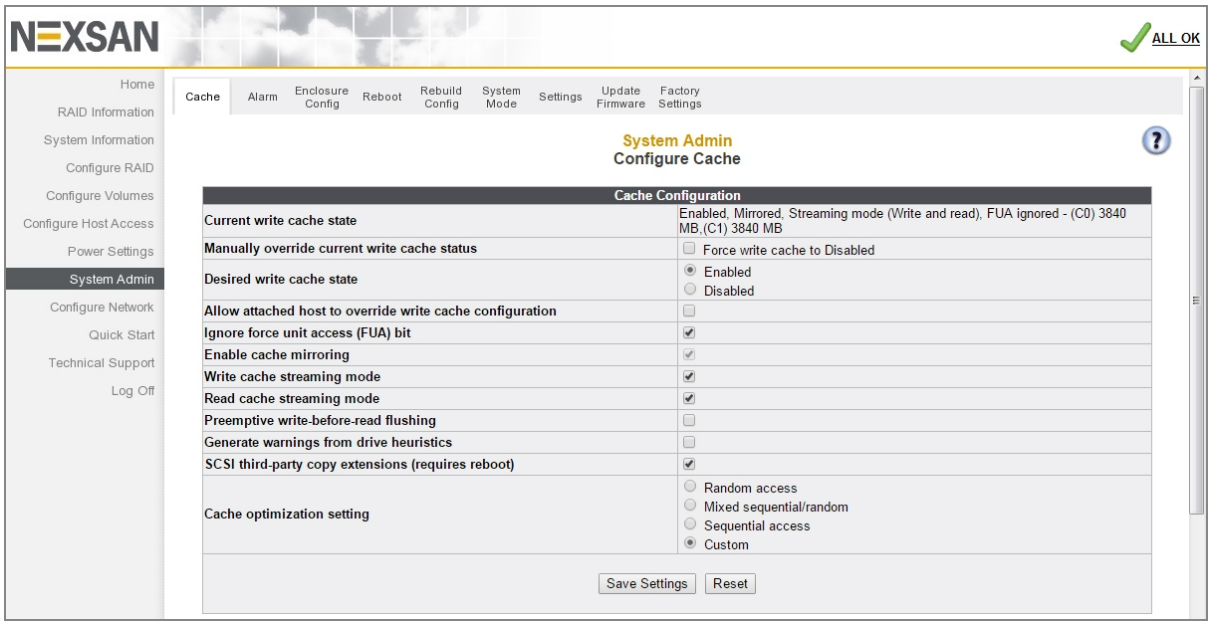
Configure Cache

Clicking **System Admin** takes you to the *Configure Cache* page, which enables you to configure settings for the Nexsan Storage System's cache memory.

Cache memory holds data that is being written to one or more disks, which enables the RAID Controller to confirm that a command has been completed before the data has been written to disk. The cache is also used to temporarily store data for replying to read requests, which will help to improve performance and reduce the number of times the drives are accessed.

In the event of a power interruption, when the power is restored to the Nexsan Storage System the RAID Controller will automatically complete any write operations using the data held in the cache.

Figure 3-196: *Configure Cache* page



The *Configure Cache* page displays the current cache settings and enables you to configure them, as described in the following table:

Table 3-197: Cache settings

Setting	Description
Current write cache state	Shows whether the cache is currently enabled or disabled, mirrored, and in streaming mode, plus its "force unit access" (FUA) status and the size of the cache in megabytes (MB) for each RAID Controller.
Manually override current write cache status	Normally, when the user enables or disables the cache, the Nexsan Storage System must be rebooted for it to take effect. Using this check box, you can force the cache to become *Enabled* (if it is disabled) or *Disabled* (if it is enabled) without rebooting the system.
Desired write cache state	By default, this is **Enabled**.

Setting	Description
Allow attached host to override write cache configuration	Some hosts can issue commands that force the cache to not be used. When this box is unchecked (the default), the system does not allow this.
Ignore force unit access (FUA) bit	Some SCSI commands contain an FUA bit, which forces the Nexsan Storage System to bypass cache memory and perform read and write operations directly from and to the disks. When this box is checked, the storage system ignores the FUA bit and always uses the cache memory for command execution.
Enable cache mirroring	On Nexsan Storage Systems in a dual-controller active-active failover or APAL mode (see System Mode on page 207), this setting is on by default. It tells the system to duplicate the contents of the cache of one RAID Controller to the other, thus ensuring that cache contents are not lost in the event of a controller failure.
Write/Read cache streaming mode	When the cache streaming mode is active, the system continuously flushes the cache memory, which provides maximum cache buffering to protect against delayed command responses. When the streaming mode is not active, the system runs with a full cache, which helps reduce disk access and maximizes random I/O performance.
Preemptive write-before-read flushing	When preemptive write-before-read flushing is active, the system automatically flushes all outstanding write commands from the cache to the disks prior to reading data.
Generate warnings from drive heuristics	When this setting is enabled, the system will raise a warning-level log message and beacon any drive passing a preset threshold level based on the rate of media retries, the drive I/O response time, and other key drive metrics.
SCSI third-party copy extensions (requires reboot)	This setting enables support for the SCSI (LID1) third-party copy extensions, and the WRITE SAME and COMPARE AND WRITE commands. If supported, these can be used by the host operating system to accelerate some storage functions (for example, migrating data within an array or zeroing blocks). Changing this setting requires a system reboot (see Reboot System on page 203).
Cache optimization setting	This setting tells the write cache how best to access data for your particular data usage. There are three settings: **Random access**: This setting is best for systems that access a large number of files or many different areas of its volumes, such as systems with many individual users or that house frequently accessed databases. **Mixed sequential/random** (default): This setting is best for systems that are “mixed use”, sometimes accessing many smaller files and sometimes accessing a few larger files. **Sequential access**: This setting is best for systems that access a small number of large files sequentially, such as an archive of manuscripts or videos. **Note** The **Cache optimization setting** settings can be changed in real-time. We encourage you to experiment with this setting to determine which configuration works best for your environment.

To configure the write cache:

1. Use the following table for help with configuring the write cache:

Table 3-198: Write cache settings

Setting	Actions
Write cache state	Enable or disable **Desired write cache state**.
Note To force the write cache into the desired state without having to reboot the system, use the **Manually override current write cache status** check box.	
Host override of cache configuration	To enable hosts to issue commands that prevent the write cache from being used, check **Allow attached host to override write cache configuration**.
	To prevent hosts from issuing commands that force the write cache to not be used, uncheck **Allow attached host to override write cache configuration**.
Forced unit access (FUA) cache bypass	To enable FUA commands to bypass the cache, uncheck the **Ignore force unit access (FUA) bit** check box.
	To prevent FUA commands from bypassing the cache, check **Ignore force unit access (FUA) bit**.
Cache mirroring	Check or uncheck **Enable cache mirroring**.
CAUTION: If cache mirroring is turned off, data stored in the write cache may be lost if a RAID Controller fails. It is therefore NOT RECOMMENDED that you disable cache mirroring.	
Read/write ache streaming	Check or uncheck **Write/Read cache streaming mode**.
Preemptive write-before-read flushing	Check or uncheck **Preemptive write-before-read flushing**.
Warnings for drive heuristics	Check or uncheck **Generate warnings from drive heuristics**.
Third-party SCSI copy extensions	Check or uncheck **SCSI third-party copy extensions (requires reboot)**.
Note If you change this setting, you will need to reboot the system after clicking the **Save Settings** button. See Reboot System on page 203.	
Cache optimization	Select thesetting that is most appropriate for your installation: • **Random access** • **Mixed sequential/random**, or • **Sequential access**.
Note This setting can be changed in real-time. We encourage you to experiment with this setting to determine which configuration works best for your environment.	

2. Click the **Save Settings** button.

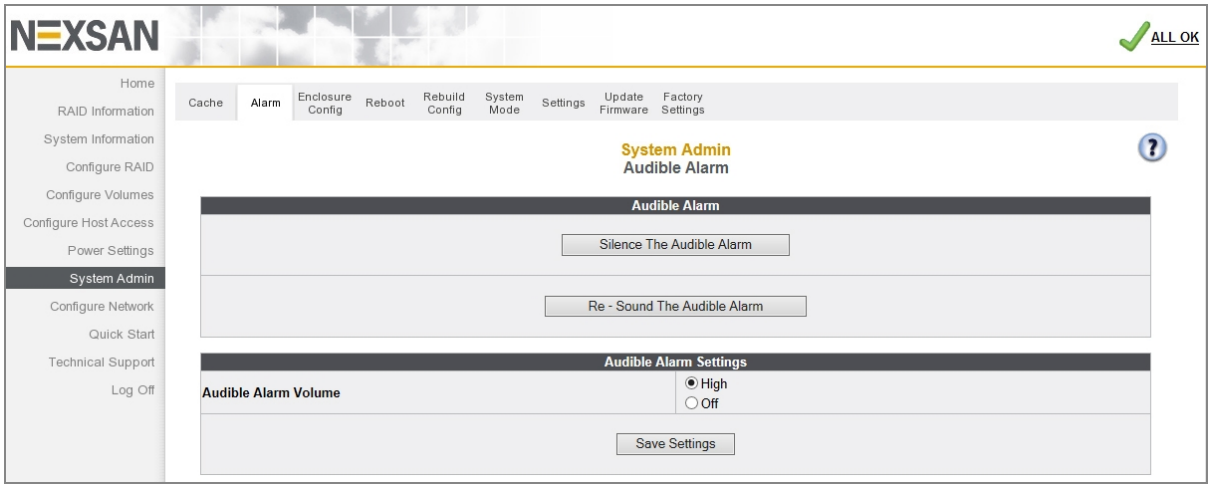
A message displays, informing you that the settings have been updated. Click the **Back** button to be returned to the *Configure Cache* page.

Note Some settings require the Nexsan Storage System to be rebooted before they take effect. See Reboot System on page 203.

Audible Alarm

Clicking **System Admin > Alarm** takes you to the *Audible Alarm* page, which enables you to silence or sound the audible alarm on the Nexsan Storage System.

Figure 3-199: *Audible Alarm* page



If the alarm is sounding, click **Silence the Audible Alarm** to silence the alarm. (To find out why the alarm is sounding, click the notification in the upper right corner to be taken to the *Problem Summary* page. See Summary of System Problems on page 111 for more information.)

Note If further problems occur, the audible alarm will sound again.

If the alarm is not sounding, click **Re-Sound the Audible Alarm** to sound the alarm (if a problem is present—see Summary of System Problems on page 111).

Audible alarms can be turned off entirely in the *Audible Alarm Settings* section. This may be useful if, for instance, the Nexsan Storage System is installed in an environment where an alarm would not be heard.

▶ **To activate or deactivate audible alarms:**

1. In the *Audible Alarm Settings* section, select either **High** or **Off** for the **Audible Alarm Volume**.

   Note If the **Audible Alarm Volume** is set to **Off**, alarm indications in the graphical user interface are still displayed, but no sound will be heard from the Nexsan Storage System.

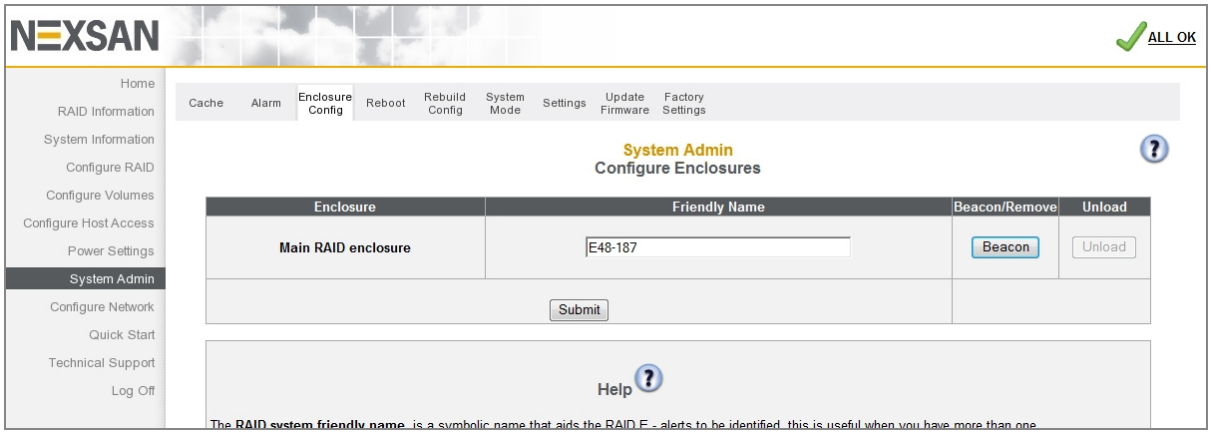
2. Click **Save Settings**.

A message appears, letting you know that the setting has been saved. Click the **Back** button to return to the *Audible Alarm* page.

Configure Enclosures

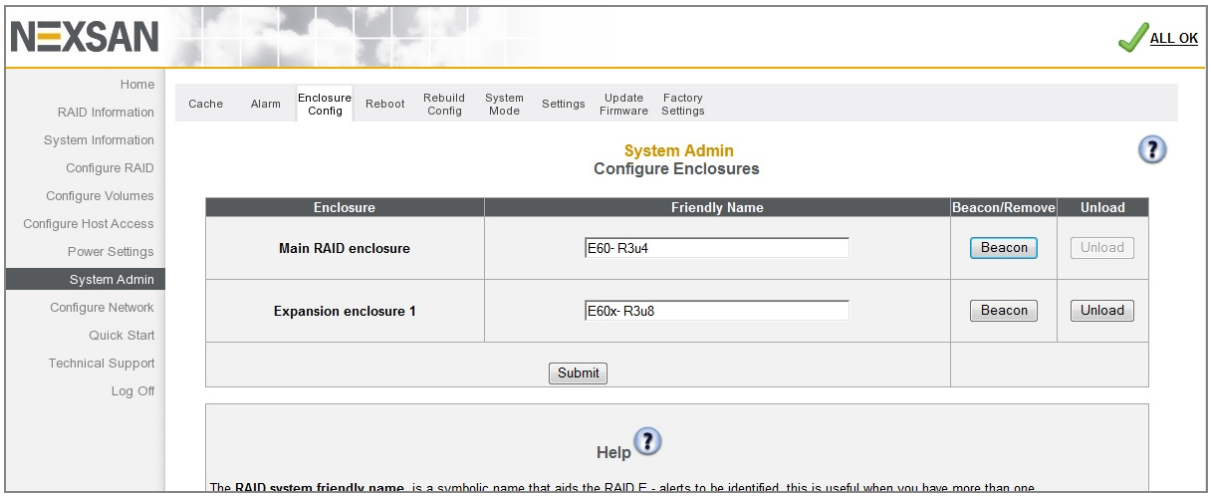
Clicking **System Admin > Enclosures Config** takes you to the *Configure Enclosures* page, which enables you to name each enclosure in your Nexsan Storage System. If you have a single-enclosure Nexsan Storage System, this page looks like this:

Figure 3-200: *Configure Enclosures* page, single enclosure



If you have a two- or three-enclosure Nexsan Storage System, there are rows for each of the enclosures in the system:

Figure 3-201: *Configure Enclosures* page, multiple enclosure (example)



To change the name of an enclosure, enter the new name in the **Friendly Name** field and click **Submit**. A message displays, informing you that the new name is saved. Click the **Back** button to return to the *Configure Enclosures* page.

Clicking the **Beacon** button causes the LEDs on the front of the enclosure and the SAS expansion port LEDs on the back of the expansion to flash for one minute. This can help in locating a specific enclosure in a large installation where multiple Nexsan Storage Systems are located.

Clicking the **Unload** button unloads all the RAID sets on this Nexsan Storage System. This takes all volumes on those RAID sets offline—they are no longer accessible by connected hosts.

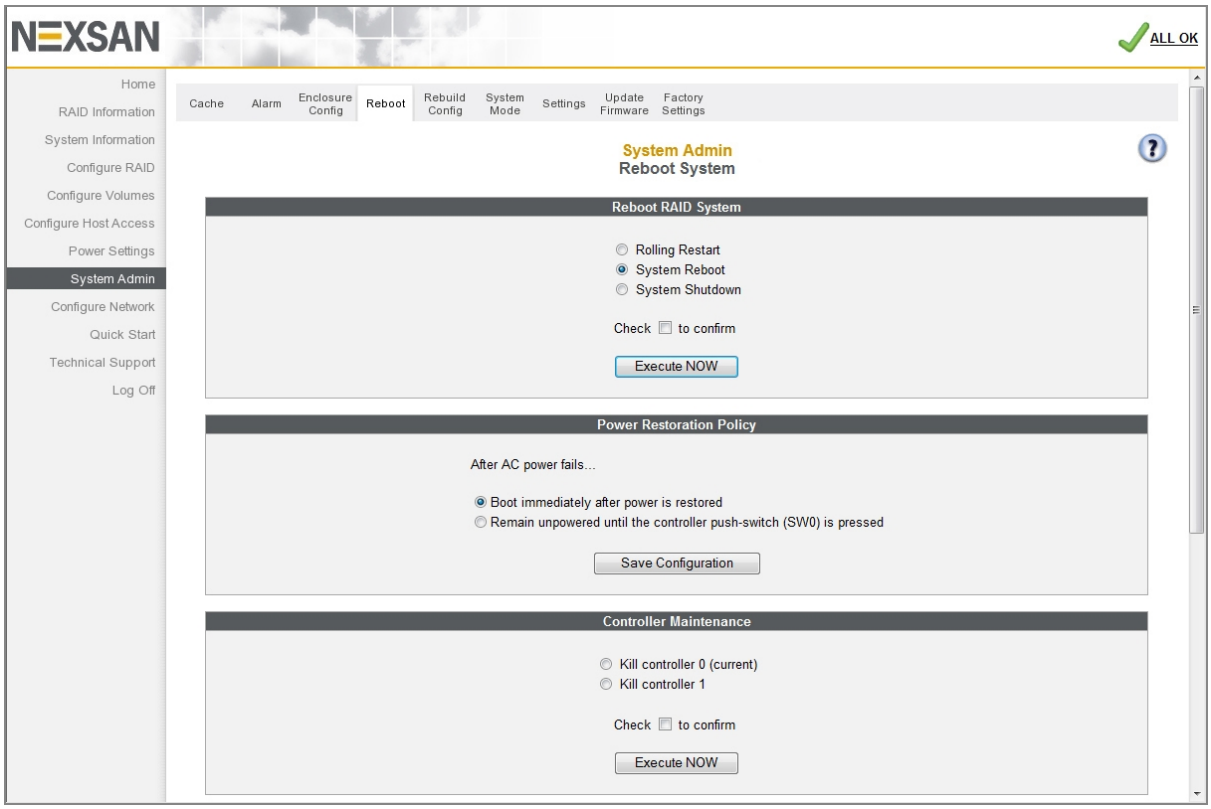
Note It is advised that you stop any host activity to all affected volumes before unloading the enclosure.

When a Nexsan Storage Expansion is offline, the **Beacon** button is replaced by a **Remove** button. Clicking **Remove** deletes this Nexsan Storage Expansion from the current configuration. Only offline storage expansions can be removed. The Nexsan Storage System must be restarted for this setting to take effect. See Reboot System below.

Reboot System

Clicking **System Admin > Reboot** takes you to the *Reboot System* page, which enables you to restart or shut down the system.

Figure 3-202: *Reboot System* page



For single-controller Nexsan Storage Systems, the *Controller Maintenance* section is not displayed, and the **Hot Restart Rolling Restart** option is grayed out.

All hosts need to have a storage path through each controller to avoid losing connectivity.

Reboot RAID System

The *Reboot RAID System* section has four options:

Table 3-203: System reboot options

Restart option	Description
Hot Restart	For dual-controller storage systems with certain configurations, this enables you to restart the RAID Controllers without losing host connectivity or data transfer capability. During a hot restart, each RAID Controller reboots individually. For a hot restart to be performed, both RAID Controllers must be fully operational and have the same firmware version (see Update Firmware on page 213), and the storage system must be in a mode that supports controller failover (**Active-Active** or **All Ports All LUNs**—see System Mode on page 207). If one or more of these conditions is not met, and on single-controller storage systems, the **Hot Restart** option is grayed out.
	Note System settings requiring a reboot will not be applied by a hot restart.
Rolling Restart	For dual-controller storage systems with certain configurations, this enables you to restart the RAID Controllers with only a brief loss of host connectivity and data transfer capability. During a rolling restart, each RAID Controller reboots individually. For a rolling restart to be performed, both RAID Controllers must be fully operational and have the same firmware version (see Update Firmware on page 213), and the storage system must be in a mode that supports controller failover (**Active-Active** or **All Ports All LUNs**—see System Mode on page 207). If one or more of these conditions is not met, and on single-controller storage systems, the **Rolling Restart** option is grayed out. **Note** To avoid host connection timeout during a rolling restart, disk timeouts for all hardware and virtual servers should be set to 150 seconds or more.
System Reboot (default)	This option executes a full restart of the storage system. While the storage system is rebooting, the system is offline, and arrays and volumes are inaccessible. Therefore, hosts should be safely shut down or disconnected before performing a **System Reboot**. After the system has finished rebooting, the arrays and volumes are once again accessible and hosts can be restarted or reconnected.
System Shutdown	This option flushes the cache data to the disks and shuts down the system. Therefore, hosts should be safely shut down or disconnected before performing a **System Shutdown**. **System Shutdown** does NOT turn the system completely off; the power supply units (PSUs) are still active, and fans may still run. To completely power off the system, or to bring the system back on line after a shutdown, follow the instructions in the system's *Installation Guide*.

To perform a reboot or shutdown:

1. Select the desired option: **Hot Restart** (if available), **Rolling Restart** (if available), **System Reboot**, or **System Shutdown**.
2. Check the confirmation check box.
3. Click **Execute NOW** to reboot the system.

A message displays, informing you that the reboot or shutdown sequence is in progress. Once the Nexsan Storage System is back online, click the **Back** button to return to the *Reboot System* page.

Note While a rolling restart or reboot operation is in progress, the system status icon may indicate a FAILURE. The FAILURE message will clear once the system is fully restarted.

Power Restoration Policy

The *Power Restoration Policy* section controls how the Nexsan Storage System behaves after A/C power has been restored after an interruption (due to power failure or the removal of the power cords).

Note This setting is not used by E-Series P models, which automatically boot when power is restored.

These are the options:

Table 3-204: Power restoration policies

Setting	Description
Boot immediately after power is restored	After power is restored, the Nexsan Storage System automatically starts up. This is the default setting
Remain unpowered until the controller push-switch (SW0) is pressed	After power is restored, the Nexsan Storage System will not start up until the **SW0** switch on either RAID Controller is pressed. This switch must be pressed for approximately 4 seconds to start the storage system, then released as soon as the storage system begins to power up.

To set the power restoration policy:

1. Select the desired power restoration policy by clicking its selection button.
2. Click **Save Configuration**.

A message displays, informing you that the settings has been saved. Click the **Back** button to return to the *Reboot System* page.

Controller Maintenance

The *Controller Maintenance* section enables you to take a RAID Controller offline for maintenance or diagnostic purposes. It also enables you to test failover settings (see System Mode on page 207) before deploying the system into your production environment. The RAID Controller that is currently being used to access the Nexsan Storage System GUI is noted by the text *(current)* after it.

Note Taking the "current" RAID Controller offline can cause the GUI to become unresponsive for up to a minute as the host connections are passed to the other controller.

▶ To take a RAID Controller offline:

1. Select the RAID Controller to be taken offline.
2. Check the confirmation box.
3. Click **Execute NOW**.

The selected RAID Controller is taken offline, and control of the arrays is passed to the other RAID Controller (if the Nexsan Storage System has two controllers and is in an **Active-Active** or **All Ports All LUNs** mode—see System Mode on the facing page). Click the **Back** button to be returned to the *Reboot System* page.

▶ To re-enable the RAID Controller:

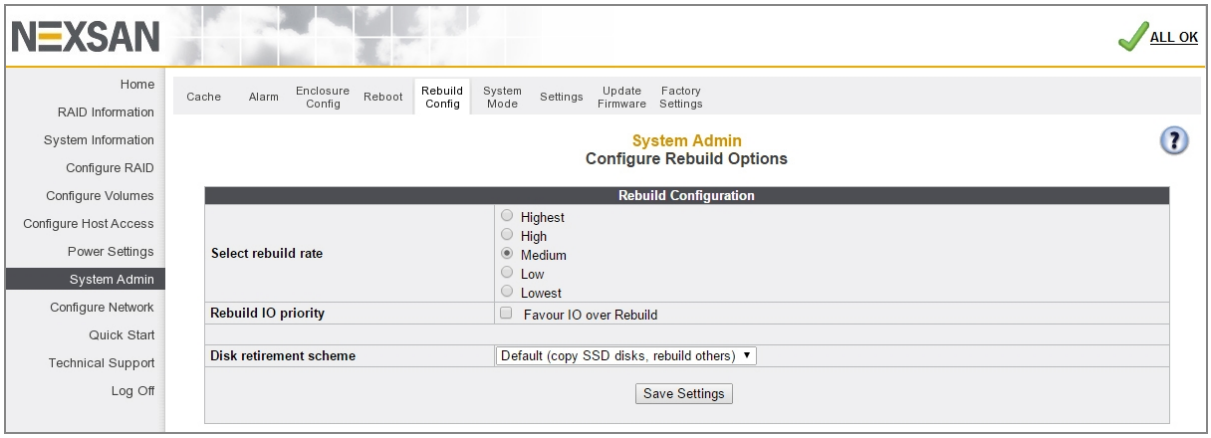
1. Click the selection button next to **Re-enable controller *N***.
2. Check the confirmation check box.
3. Click **Execute NOW**

The RAID Controller is brought back on line. Click the **Back** button to return to the *Reboot System* page.

Configure Rebuild Priority

Clicking **System Admin > Rebuild Config** takes you to the *Configure Rebuild Priority* page, which enables you to customize the amount of system time dedicated to rebuilding critical arrays and set the disk retirement scheme.

Figure 3-205: *Configure Rebuild Priority* page



There are five rebuild rates, arranged from **Lowest** to **Highest**. The default setting is **Medium**.

Checking the **Favour IO over Rebuild** check box causes the storage system to perform only I/O operations during I/O activity. This can significantly delay a rebuild in a busy environment.

Note When there is high host activity, less spare system time is available, which can result in longer rebuild times. In this situation, it may become necessary to increase the rebuild priority so that arrays are rebuilt more quickly.

The *Disk retirement scheme* drop-down list contains three options: **Copy disks** (which copies a retiring disk's data to a pool spare), **Rebuild disks** (which uses parity data to reconstruction the disk's data), and **Default (copy SSD disks, rebuild others)**.

To set the rebuild options:

1. Select the desired rebuild priority: **Lowest**, **Low**, **Medium**, **High**, or **Highest**.
2. Check or uncheck the **Favour IO over Rebuild** check box, according to your preference.
3. Select a *Disk retirement scheme* from the drop-down list.
4. Click **Save Settings**.

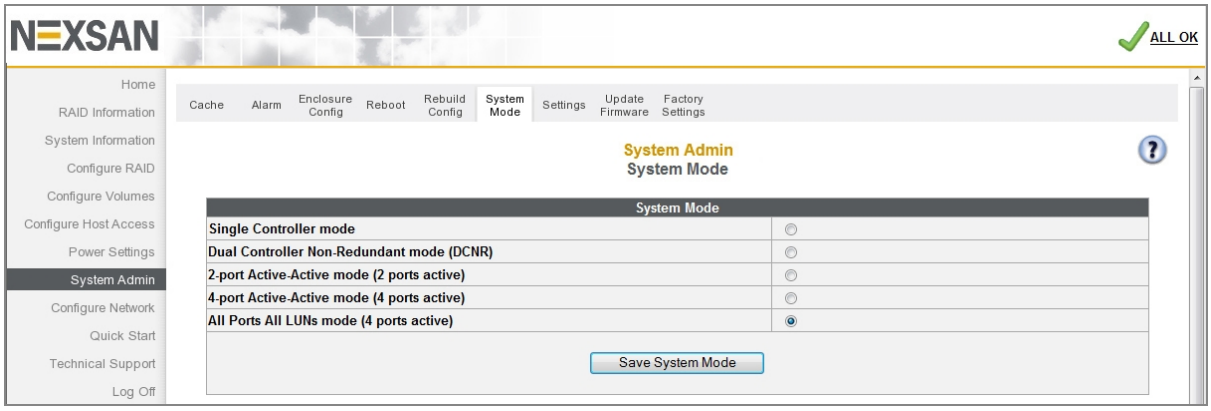
A message displays, informing you that the settings have been saved. Click the **Back** button to return to the *Configure Rebuild Options* page.

System Mode

Clicking **System Admin > System Mode** takes you to the *System Mode* page, where you can configure the failover mode for the Nexsan Storage System.

Note 'P' models use Single Controller mode for single controller installations and All Ports All LUNs for dual controller installations. Consequently they do not have a System Mode page.

Figure 3-206: *System Mode* page



"Failover" is the term used for when one RAID Controller takes over the host connections and array control of the other RAID Controller when that controller fails. There are several ways to implement failover, depending on whether the storage area network (SAN) uses switches, multiple host ports, and/or host-based multipathing software.

CAUTION: If the Nexsan Storage System is in **Single Controller** or **Dual Controller Non-Redundant (DCNR)** mode, or if cache mirroring is not enabled (see Configure Cache on page 198), data stored in the write cache may be lost if a RAID Controller fails.

Note If the *System Mode* is changed, volumes may become temporarily inaccessible. If this occurs, you must remap them (see Map Logical Volumes on page 158).

The possible settings for **System Mode** are:

Table 3-207: System mode settings

Setting	Description
Single Controller mode	In this mode, only one RAID Controller is active, and failure of this controller makes all arrays and volumes inaccessible. This is the only possible setting on single-controller Nexsan Storage Systems, but it is possible to set a dual-controller Nexsan Storage System to **Single Controller** mode.

Setting	Description
Dual Controller Non-Redundant mode (DCNR)	In this mode, both controllers are active, but each controller operates as an independent node, and all ports are independent from each other. Volumes can only be mapped to ports on the controller that owns the array. They become inaccessible if the controller fails. **Note** Although DCNR mode does not allow failover, overall system performance may increase slightly.
2-port Active-Active mode (2 ports active)	In this mode, each controller operates as an independent node, but only one port is active on each controller. The second port operates in passive mode. Port **0** is active on controller 0, and port **1** is active on controller 1. Volumes are mapped to the active port on their owning controller. When one controller fails, the passive port on the other controller activates and takes over the host port functions of the failed controller. In a switched environment, failover is completely transparent to the hosts. This mode is suitable for customers who want to be able to handle controller failover, but do not have multipathing software. **Note** For failover to occur, hosts must be connected to the same numbered port on both controllers.
	CAUTION: iSCSI connections (1Gb/s and 10Gb/s) do not failover in this mode. Should a controller fail, volumes accessed through an iSCSI network will become inaccessible. To configure failover for iSCSI, use **All Ports All LUNs mode**.
4-port Active-Active mode (4 ports active)	In this mode, each controller operates as an independent node, and all ports are active. Port **0** is the primary port on controller 0, and port **1** is the primary port on controller 1. Volumes must be mapped to at least one port on its owning controller and to the secondary port on the other controller. When one controller fails, the secondary port on the other controller takes on the host address of the primary port on the failed controller, allowing host I/O to continue; the host sees the storage become active through its second path. **Notes:** • For failover to occur, hosts to be connected to both ports on their owning controller and to the secondary port on the other controller. • If a host is connected to both ports on any one controller, the host must be running multipathing software.
	CAUTION: iSCSI connections (1Gb/s and 10Gb/s) do not failover in this mode. Should a controller fail, volumes accessed through an iSCSI network will become inaccessible. To configure failover for iSCSI, use **All Ports All LUNs mode**.

Setting	Description
All Ports All LUNs mode (all ports active)	In this mode, the entire system operates as a single node. Volumes can be mapped to any or all ports on both controllers. When a controller fails, the ports on that controller become inaccessible. However, if the volumes are mapped to ports on the other controller as well, they remain accessible to the host, which sees the storage become active through its second path. **Notes:** • For hosts to continue to have access to the LUNs after a controller failure or during a rolling restart, each volume should be mapped to at least one port on each controller (see Map Logical Volumes on page 158) and each host must have an active path to at least one port on each controller. Volumes mapped to only one controller become inaccessible if that controller fails or if a rolling restart is executed. • Because this mode presents up to eight paths to configured volumes, the host must be running multipathing software. • This is the only mode in which redundancy is available for all network types (Fibre Channel, SAS, 10Ge iSCSI, and 1Ge iSCSI).

▶ **To set the system mode:**

1. Select the desired mode by clicking its selection button.
2. Click **Save System** Mode.

   A message displays, informing you that the setting has been saved, but the new mode does not take effect until the Nexsan Storage System is rebooted.
3. Click **System Admin > Reboot** and perform a **System Reboot** (see Reboot System on page 203).

Notes:

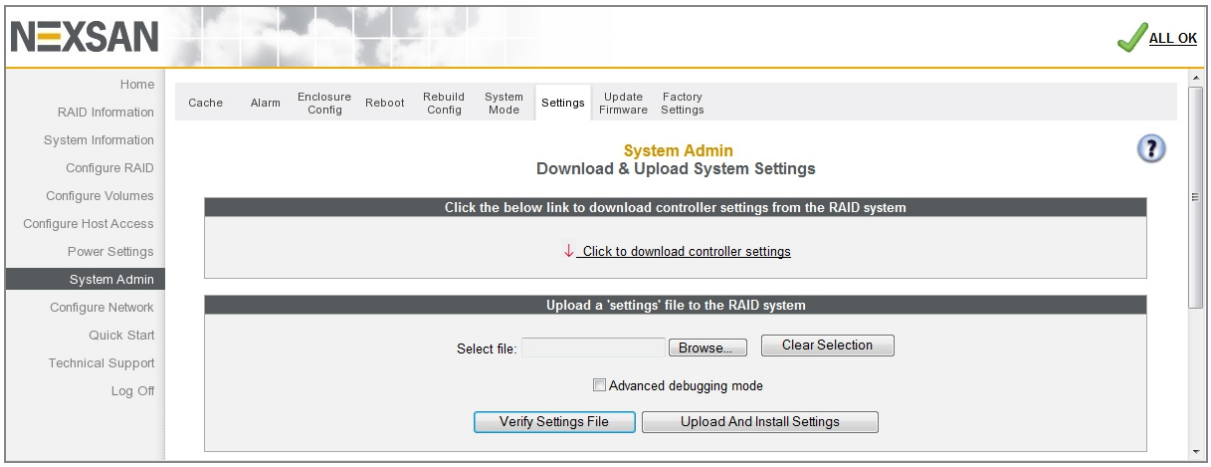
- If the **System Mode** is changed, volume mappings may also change. Always check the volume mappings (see Configured Logical Volumes on page 76) after changing the **System Mode**.
- For more information about failover ports, click the link in the *Help* section.

Download & Upload System Settings

Clicking **System Admin > Settings** takes you to the *Download & Upload System Settings* page, where you can download a file with the current controller settings or upload a new controller settings file to the system.

The Upload System Settings functionality can also be used to restore encryption keys to an encrypted system. See Restore Encryption Keys on page 212.

Figure 3-208: *Download & Upload System Settings* page



▶ To download the current `settings.dat` file:

1. Click the **Click to download controller settings** link.
2. Save the file to your computer according to the method of your operating system.

▶ To upload a new `settings.dat` file to the system:

CAUTION: Because improper or incorrect settings in the settings file can prevent the Nexsan Storage System from being accessible on the network,

ALWAYS verify the contents of a `settings.dat` file—both manually (by opening it as a text file) and by using the **Verify Settings File** button—before uploading and installing it.

1. Click **Browse**.
2. Navigate to the file according to the method of your operating system.

   Note If you select a wrong file, click **Clear Selection** and try again.
3. Click **Verify Settings File** to validate the `settings.dat` file.

   Note If you wish to see more detail, check the **Advanced debugging mode** check box before clicking **Verify Settings File**.

A *Settings File Processing Report* displays. Errors are shown in red text.

Figure 3-209: Settings file processing report



Settings File Processing Report - Test-mode

```
Uploading Settings File: File contains 15 sections

Processing section "PowerConfig"...
-- Section contains 4 key/value pairs
-- Error: Invalid or missing value for key MaxSpareLevel = 4 {1,0} (skipped)
-- Section processing failed with 1 errors

Processing section "Security"...
-- Section contains 4 key/value pairs
-- Section processed OK

Processing section "ActiveActive"...
-- Section contains 1 key/value pairs
-- Section processed OK

Processing section "GUISettings"...
-- Section contains 7 key/value pairs
-- Section processed OK

Processing section "Daytime"...
-- Section contains 5 key/value pairs
-- Section processed OK

Processing section "Network"...
-- Section contains 36 key/value pairs
-- Section processed OK

Processing section "iSCSI"...
-- Section contains 7 key/value pairs
-- Section processed OK

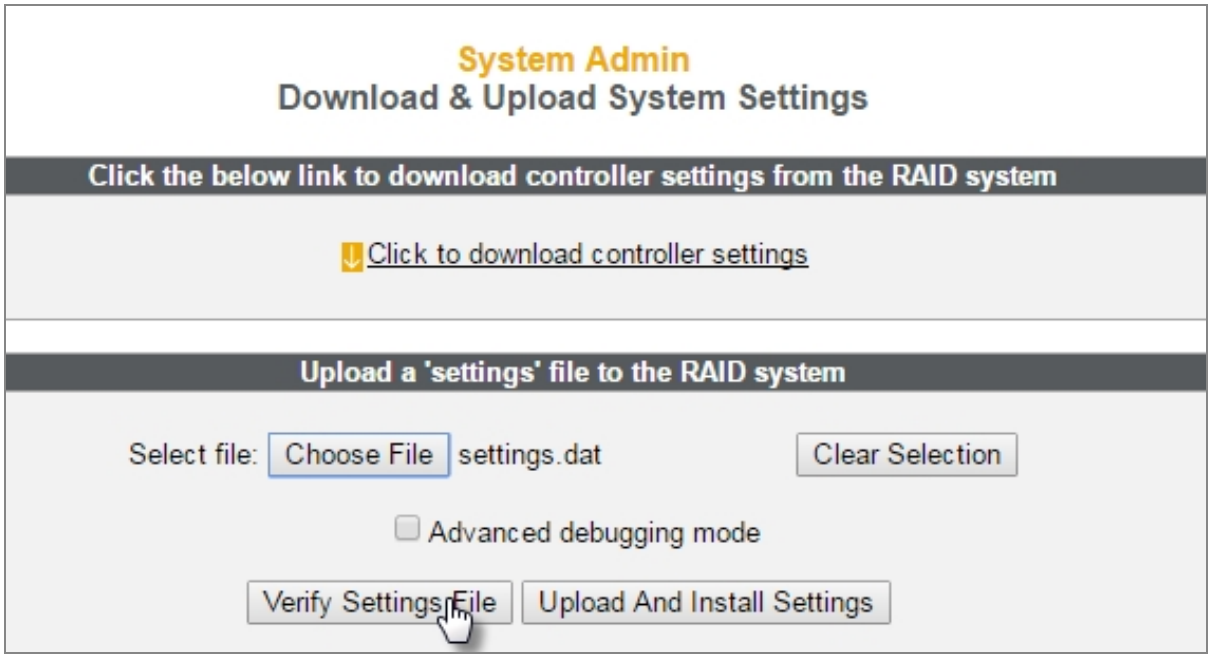
Processing section "FIBRE"...
```

4. If there are errors, fix them in the `settings.dat` file and repeat steps 1–3.
5. Click **Upload and Install Settings**. The `settings.dat` file is automatically installed, although some settings will only take effect after a system restart (see Reboot System on page 203).

Restore Encryption Keys

Clicking **System Admin > Settings** takes you to the *Download & Upload System Settings* page, which is used to restore encryption keys to a system if the drives become inaccessible. See also Configure Array Encryption on page 127 and Disks are locked and data is inaccessible on page 244.

Figure 3-210: *Download & Upload System Settings* page: Verify Settings File



▶ **To restore encryption key files to the system:**

CAUTION: Improper or incorrect settings in the encryption key file can prevent the Nexsan Storage System from being accessible on the network.

ALWAYS verify the contents of an encryption key file—both manually (by opening it as a text file) and by using the **Verify Settings File** button—before uploading and installing it.

1. Verify the contents of the encryption key file manually:
   a. Locate the encryption key file for the array that was exported previously.
   b. Open the encryption key file as a text file.
   c. Verify that the array name and generation date are correct for the array to be restored.
2. Verify the encryption key file with the **Verify Settings File** feature:
   a. On the *Download & Upload System Settings* page, click **Browse**.

      Note If you select a wrong file, click **Clear Selection** and try again.
   b. Navigate to the encryption key file according to the method of your operating system.
   c. Click **Verify Settings File** to validate the file.

      A *Settings File Processing Report* displays. Errors are shown in red text.
3. If the file is successfully validated, reselect the file and click **Upload and Install Settings**. The key is automatically installed, but will only take effect after a system reboot.

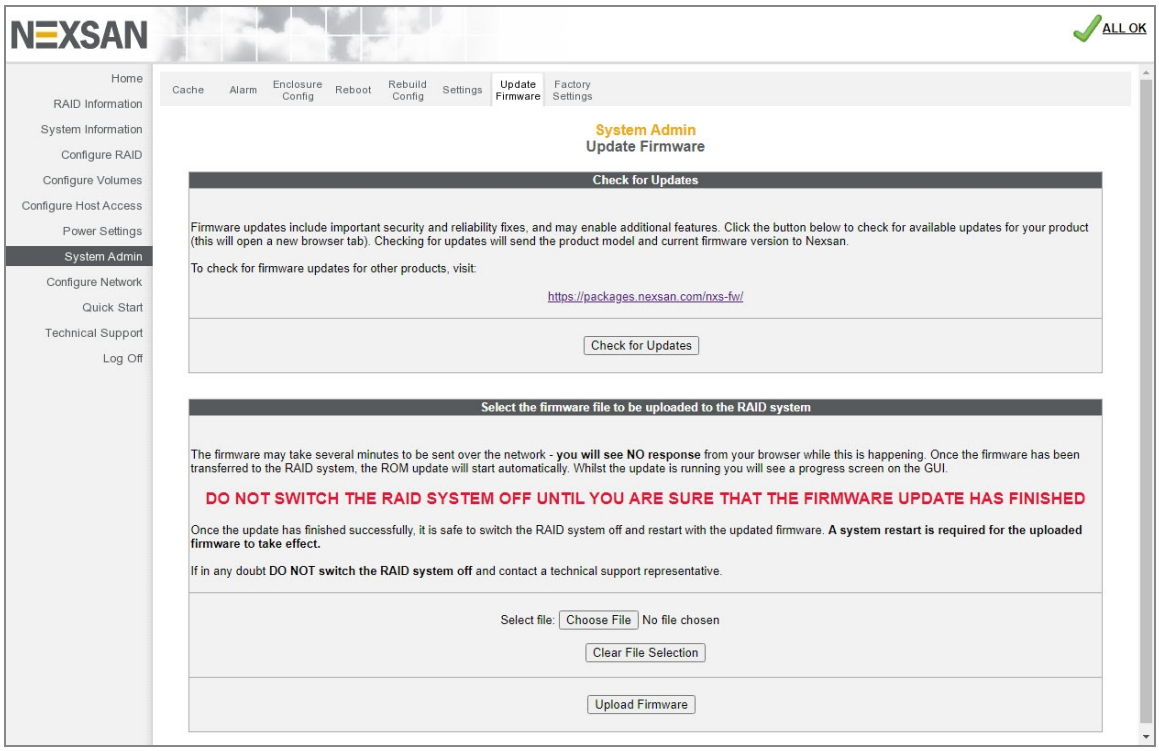
4. If you need to restore more than one key, restore them one at a time in any order. Keys will not be applied until the system is rebooted. Repeat this procedure for each of the encryption keys.
5. Reboot the system (see Reboot System on page 203).

Update Firmware

Clicking **System Admin > Update Firmware** takes you to the *Update Firmware* page, which enables you to

- Check for firmware updates, and
- Upload new RAID Controller firmware.

Figure 3-211: *Update Firmware* page



From time to time, Nexsan issues updates to Nexsan Storage System firmware to introduce new features or to solve firmware-related issues. New firmware files can be acquired by clicking **System Admin > Update Firmware > Check for Updates** or from Nexsan Technical Support (see Technical Support on page 235). Usually, the new firmware file is compressed in a .zip archive and must be extracted before uploading.

To upload new firmware to a Nexsan Storage System, do the following:

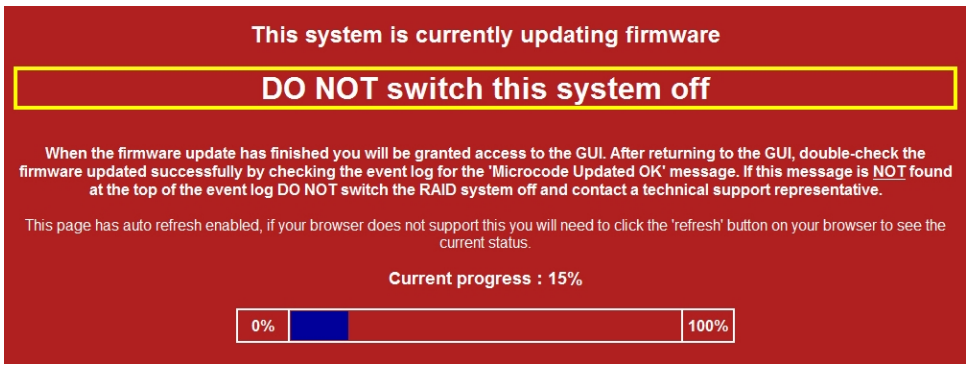
1. Ensure that both RAID Controllers on the Nexsan Storage System are up and running (if applicable).
2. Click **Browse** and navigate to the extracted firmware file according to the method of your operating system. (If you select the wrong file, click **Clear File Selection** and try again.)
3. When the file's path displays in the **Select file** field, click **Upload Firmware**.

   Note The firmware file may take several minutes to be sent over the network. You will see NO response from the browser while this is happening.

4. If the progress window is not displayed automatically, click the **Click this text ...** link.

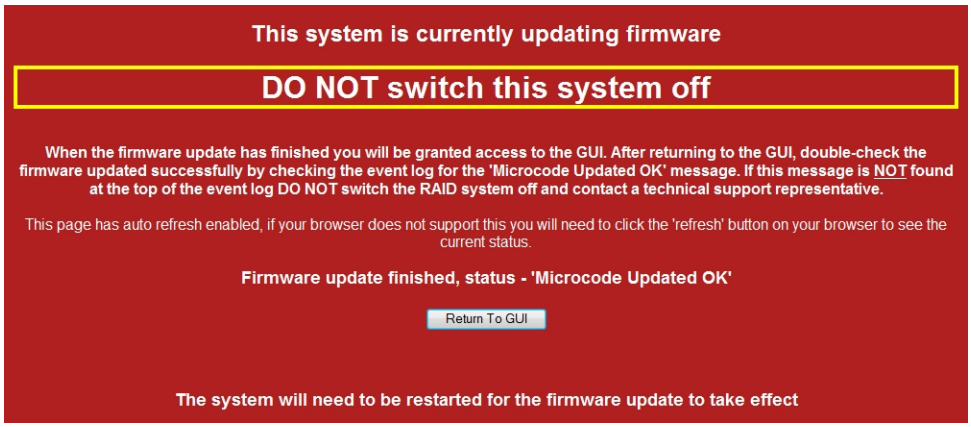
   The progress bar shows the progress of the installation.

   Figure 3-212: Firmware update progress dialog



   When the installation is complete, the following page displays:

   Figure 3-213: Firmware update complete dialog



5. Click the **Return to GUI** button to be taken to the *Reboot System* page (see Reboot System on page 203).
6. Restart the system using a **Rolling Restart** (if available) or a **System Reboot**.
7. Once the reboot has completed, verify that the update was successful:
   a. Go to **System Information > System Info** and check that the *Firmware revision* and *Build Loader revision* for both controllers are updated.
   b. If hosts were shut down or disconnected for the system reboot (see Reboot System on page 203), reconnect them to the storage system.
   c. Ensure that your volumes are visible and working as expected.
8. Update the emergency firmware, if required:

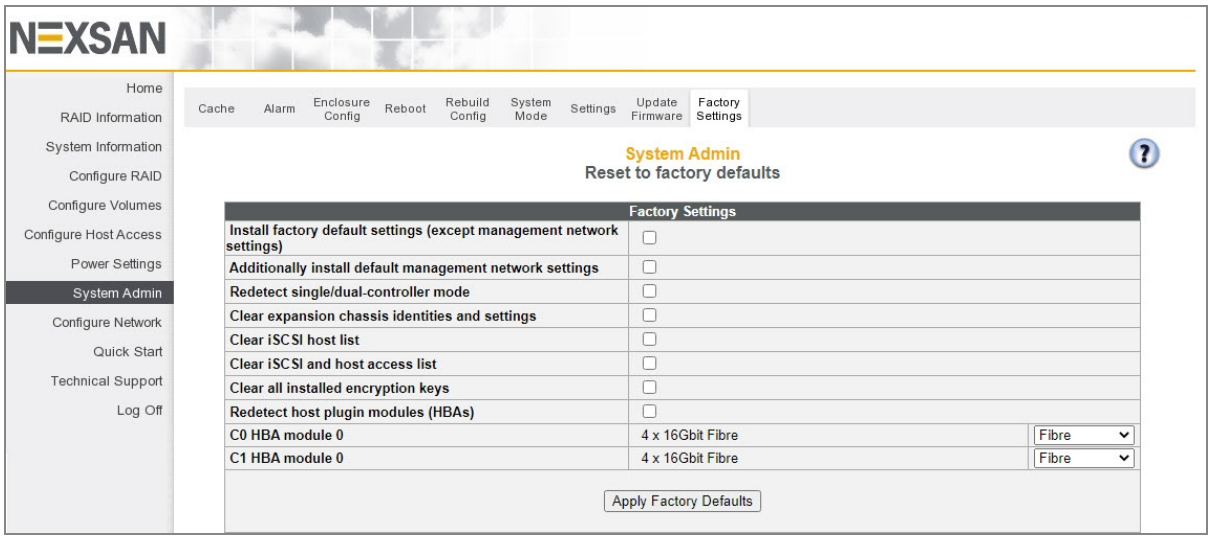
   Note This does not require a reboot and can safely be carried out at any time.

   a. Check your current *Emergency revision* on the **System Information > System Info** page.
   b. If an emergency firmware update is required, upload it by repeating the above procedure.

Reset to Factory Defaults

Clicking **System Administration > Factory Settings** takes you to the *Reset to factory defaults* page, where you can reset various settings to their factory defaults.

Figure 3-214: *Reset to factory defaults* page



► **To reset system settings to factory defaults:**

1. Select or deselect each check box as required:

Table 3-215: Factory reset settings

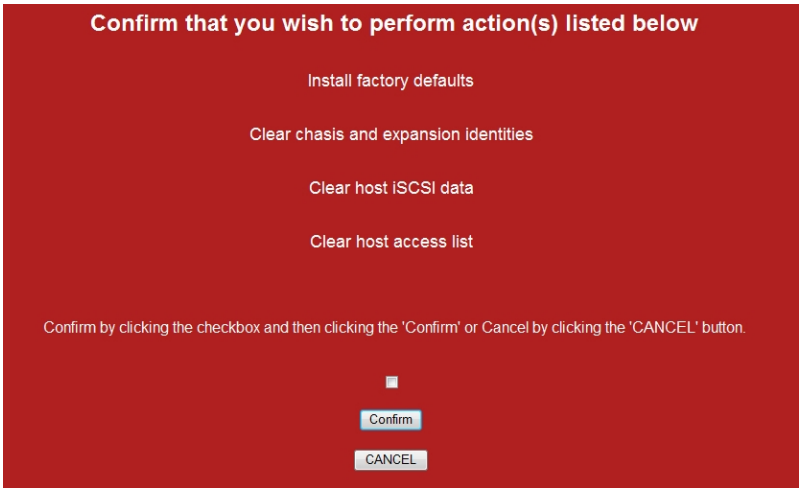
Setting	Description
Install factory default settings (except management network settings)	Installs factory default values to the system. This may take up to two minutes to complete.
Additionally install default management network settings	Installs the default management network settings. It requires **Install factory default settings** to be checked.
Redetect single/dual-controller mode	(E48P and E60P only) Causes the device to redetect the number of controllers and to set the appropriate system mode.
Clear expansion chassis identities and settings	Clears stored Nexsan Storage Expansion identifiers (including friendly names and AutoMAID 5 settings).
Clear iSCSI host list	Clears the stored iSCSI transport configurations for hosts.
Clear iSCSI and host access list	Clears the stored iSCSI transport configurations and access settings for hosts.

Setting	Description
Clear all installed encryption keys (E-Series only)	Removes all encryption keys for encrypted arrays. Ensure that you have downloaded and backed up all keys before selecting this option (see Configure Array Encryption on page 127).
Redetect host plugin modules (HBAs)	Redetects HBAs after a reset.
C*n* HBA module 0	Select the desired host transport (Fibre or 10Ge-iSCSI) if the installed HBA supports multiple transport types.

2. When you have selected the desired items, click the **Apply Factory Defaults** button.

   A confirmation screen appears:

Figure 3-216: Factory default reset warning and confirmation dialog



3. To proceed with the factory reset, check the confirmation check box and click **Confirm**.

   After a period of time, a message displays, confirming that the Nexsan Storage System has been reset. Click the **Back** button to return to the *Reset to factory defaults* page.

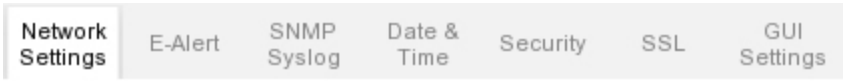
   Note To cancel the factory reset, click **CANCEL**.

   A message displays, stating that the operation has been canceled. Click the **Back** button to return to the *Reset to factory defaults* page.

Configure Network

Clicking **Configure Network** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-217: Configure Network navigation bar



Refer to Table 3-218 for help with the Nexsan E-Series/BEAST network configuration firmware:

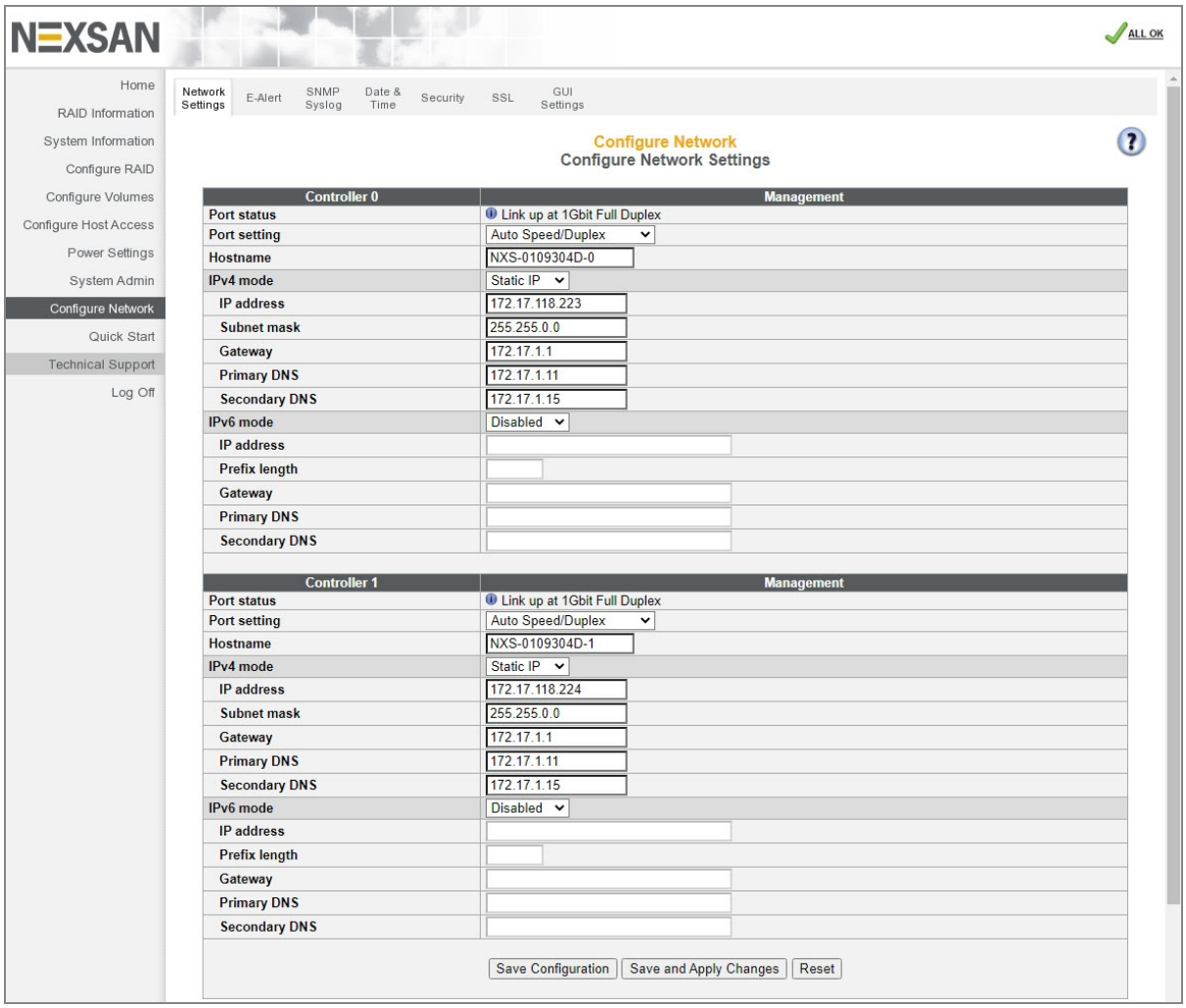
Table 3-218: Configure Network pages

Nav bar button	GUI pages and documentation links
Network Settings	Configure Network Settings on the next page
E-Alert	E-Alert Settings on page 220
SNMP Syslog	SNMP/SYSLOG Settings on page 223
Date & Time	Configure Time and Date on page 225
Security	Security on page 228
SSL	SSL Configuration on page 230
GUI Settings	GUI Settings on page 232

Configure Network Settings

Clicking **Configure Network** takes you to the *Configure Network Settings* page, which enables you to configure all of the settings on each network management port.

Figure 3-219: *Configure Network Settings* page



The information is arranged by controller, with Controller 0 at the top and Controller 1 at the bottom. **Current status** indicates whether the link is up or down. If the link is up, it displays the current link speed and duplex mode setting.

To configure network settings:

1. Apply the appropriate network settings for the **Mgmt** port on both controllers of your Nexsan Storage System:

   Table 3-220: Configure Network Settings

Setting	Action
Port Settings	For most networks, the default setting of **Auto Speed/Duplex** is recommended. However, if your LAN switch doesn't support auto-negotiation, you can "force" one or both settings. The options are: **Auto Speed/Duplex** (the default) **Auto Speed, Full Duplex** **Auto Speed, Half Duplex** **1Gbit Full Duplex** **100Mbit Full Duplex** **100Mbit Half Duplex** **10Mbit Full Duplex** **10Mbit Half Duplex**
Hostname	This defaults to the host's address. Enter a "friendly" host name for the port, if desired.
IPv4 mode	Choose **Automatic**, **Static IP**, or **Disabled** for each controller in the Nexsan Storage System. If you select **Automatic**, then the Nexsan Storage System will use DHCP and no other configuration is needed. **Note** To use **Automatic**, your network must be configured for DHCP. If it is not, you MUST use a static IP address. If you select **Static IP**, then you must fill in the **IP Address** and **Subnet Mask**.
IPv6 mode	Choose **Automatic**, **Static IP**, or **Disabled** for each controller in the Nexsan Storage System. If you select **Automatic**, then no other configuration is needed. IPv6 will be configured automatically from router advertisements (SLAAC), and a fixed link-local IPv6 address will be assigned. **Note** To use **Automatic**, your network must be configured for SLAAC. If not, you MUST use a static IP address. If you select **Static IP**, then you must fill in the **Static IP Address** and **Prefix length**.

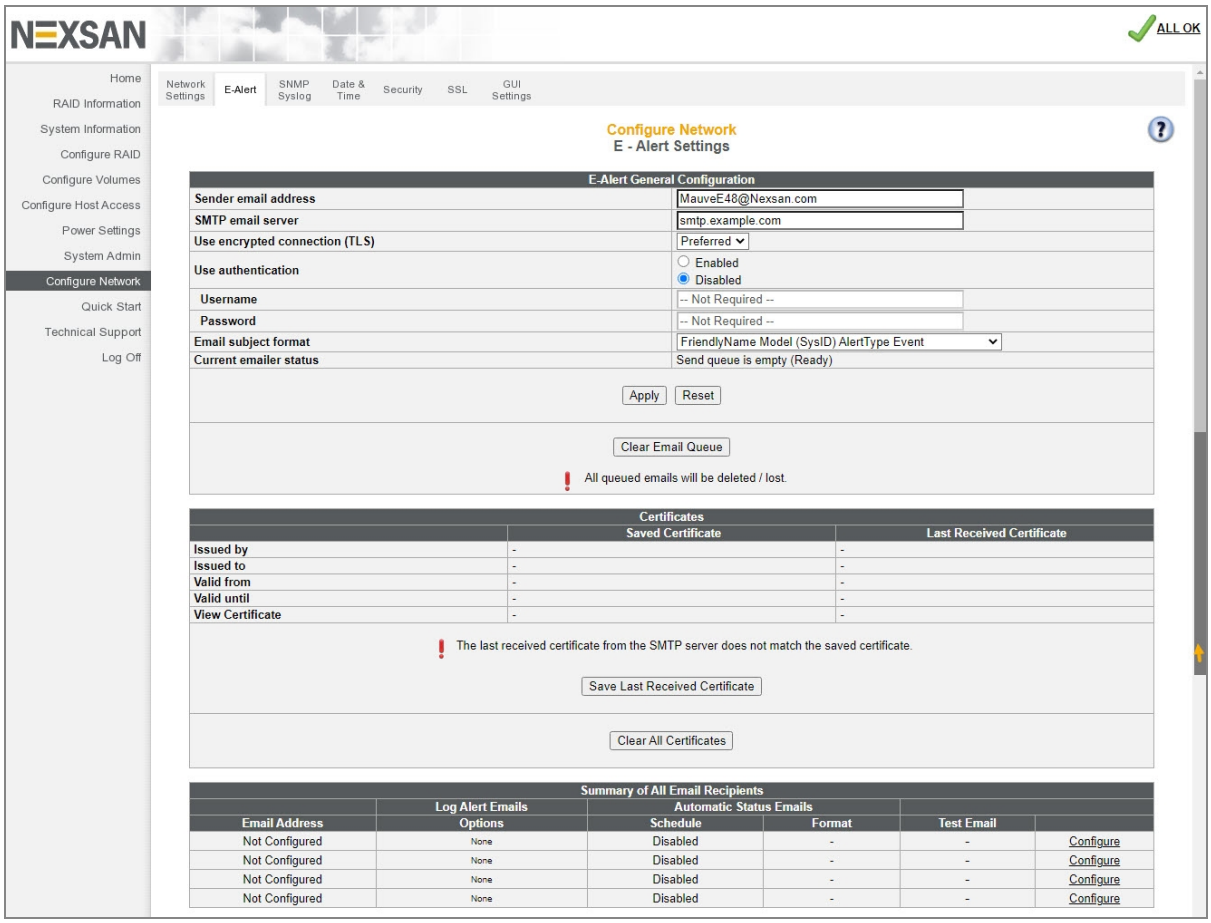
2. When you have selected the desired new settings, do one of the following:
   - Click **Save Configuration**. The settings are saved and are applied after the Nexsan Storage System is restarted (see Reboot System on page 203).
   - Click **Save and Apply Changes**. The settings are saved and applied immediately.

If at any time you wish to return the *Configure Network Settings* page to its initial state, click **Reset**.

E-Alert Settings

Clicking **Configure Network > E-Alert** takes you to the *E-Alert Settings* page, which enables you to set up automatic email alerts for RAID system events.

Figure 3-221: *E-Alert Settings* page



The *E-Alert General Configuration* section displays settings for the sender (the Nexsan Storage System).

► To verify or change E-Alert settings:

1. Click **Configure Network > E-Alert** to open the *E-Alert Settings* page.
2. Apply settings as described in the following table:

Table 3-222: Verify or change E-Alert settings

Setting	Action
Sender email address	Enter the address for the E-Alert sender. Although this can be any address that the mail server will accept as valid, you may wish to make the sender email address unique to the Nexsan Storage System.

Setting	Action
SMTP email server	Enter the SMTP server IP address or DNS host name of the mail server. You can only use a mail server name (for instance, **`smtp.example.com`**) if you have a domain name server (DNS) configured (see Configure Network Settings on page 218). Otherwise, you must use the server's IP address.
Use encrypted connection (TLS)	Choose the encrypted connection setting: **Required**, **Preferred**, or **Disabled**.
Use authentication	Choose the authentication preference, either **Enabled** or **Disabled**. **User name**: Define a user name to be used for authentication. **Password**: Define a password to be used for authentication.
Email Subject format	Select the email subject format using the **Email Subject format** drop-down list. There are three options: **FriendlyName Model (SysID) AlertType Event** — Populates the subject line with the Nexsan Storage System's friendly name, model, system ID, alert type, and a short description of the event. **FriendlyName Model (SysID) SubSystem AlertType Event** — Populates the subject line with the Nexsan Storage System's friendly name, model, system ID, specific enclosure, alert type, and a short description of the event. **FriendlyName Model (SysID) (S,A) Event** — Populates the subject line with the Nexsan Storage System's friendly name, model, system ID, abbreviated forms of the enclosure and alert type, and a short description of the event.
Current emailer status	Shows whether there are emails waiting in the queue to be sent. You can click **Clear Email Queue** to delete any emails currently in the queue. This may be necessary or useful if you need to have the Nexsan Storage System send a critical alert immediately.

3. Click the **Apply** button to save your settings. A message appears, informing you that the settings have been saved.

The *Certificates* section includes the following viewing options:

Table 3-223: Certificate valid dates

Field	Description
Issued by	Displays a list of all certificates issued by the system.
Issued to	Displays a list of all certificates issued to the system.
Valid from	Displays the certificate valid from date.
Valid until	Displays the certificate valid until date.
View certificate	Displays the certificate details.

You can perform the following actions with certificates:

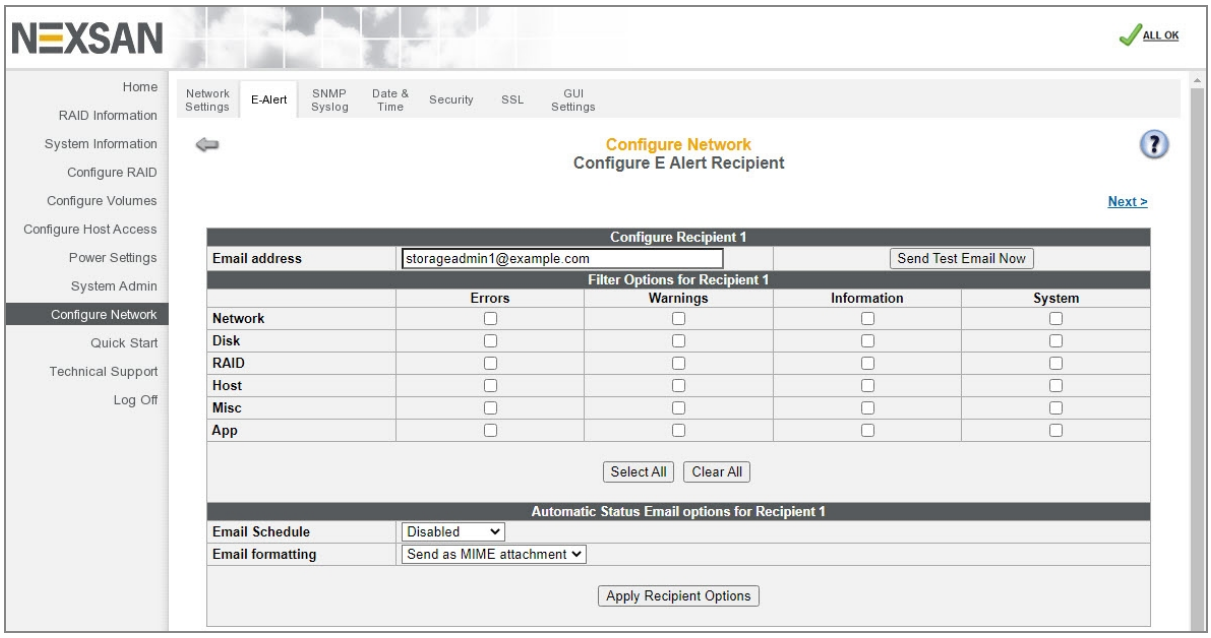
- Save the last received certificate. Click the **Save Last Received Certificate** button.
- Clear all certificates by clicking the **Clear All Certificates** button.

Next, use the *Summary of All Email Recipients* section to configure the types of alerts to be sent to Nexsan Storage System email recipients.

► To configure alert types to be sent:

1. In the *Summary of All Email Recipients* section, click the **Configure** link for an email recipient. The *Configure E-Alert Recipient* page displays:

Figure 3-224: *Configure E-Alert Recipient* page



2. You can configure up to five email addresses to receive email alerts. Configure a selected email recipient using the following table:

Table 3-225: Summary of All Email Recipients for E-Alerts

Setting	Action
Configure Recipient n **Email Address**	Enter a valid email address in the **Email address** field. You can test that the email is valid using the **Send Test Email Now** button.
Filter Options for Recipient *n* **Network, Disk, RAID, Host, Misc, and Application**	Check the boxes for the kinds of messages that you wish to notify the recipient of by email. You can select to receive **Error**, **Warning**, **Information**, or **System** alerts for each category. You can also us the **Select All** and **Clear All** buttons.

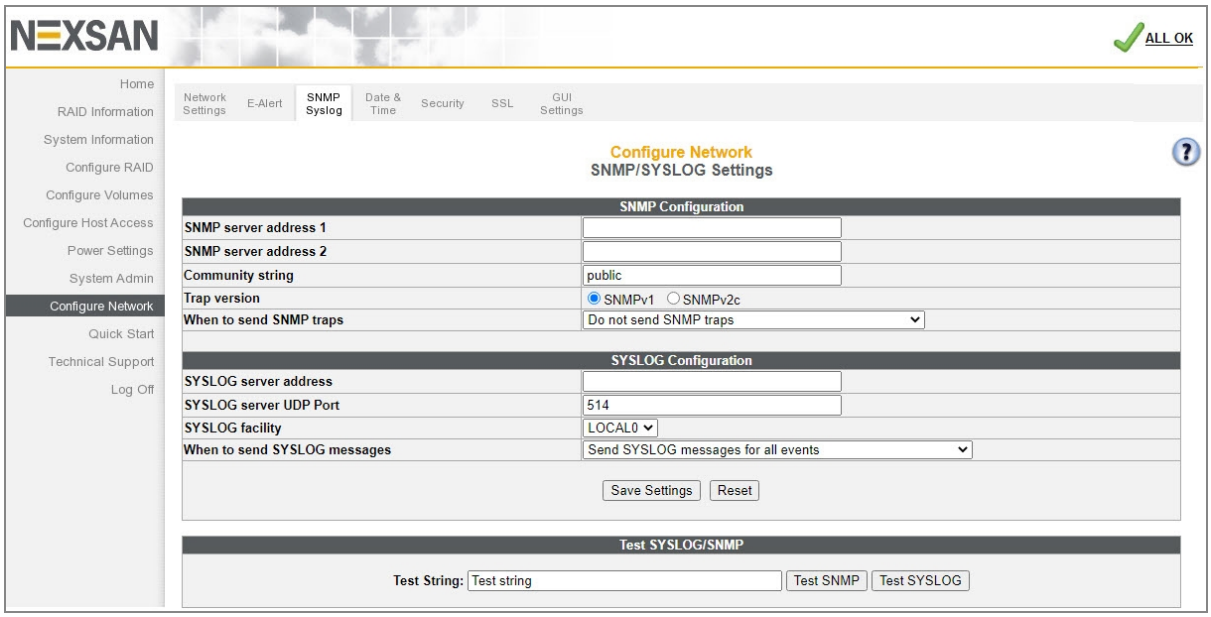
Setting	Action
Automatic Status Emails Email schedule	Select **Disabled**, **Every 1 Day**, **Every 2 Days**, **Every 4 Days**, **Weekly**, or **Monthly**.
Email formatting	Select **Send as MIME attachment** or **Send as plain-text email**.

3. Click the **Apply Recipient Options** button.
4. Click the **Back** button to return to the *E-Alert Settings* page.

SNMP/SYSLOG Settings

Clicking **Configure Network > SNMP Syslog** takes you to the *SNMP/SYSLOG Settings* page, which enables you to configure settings for SNMP traps and system log (SYSLOG) messages.

Figure 3-226: *SNMP/SYSLOG Settings* page



Information captured by an SNMP trap or a SYSLOG message is similar to the information sent in an E-Alert (see E-Alert Settings on page 220), except that it is sent to an SNMP Management Station or system log.

Notes:

- If you use SNMP traps, you must parse the trap MIB (Management Information Base) into your application. Use the **MIB** links in the Help section at the bottom of the page to download the MIB for SNMP v1 and v2c.
- Only SNMP traps are available; there is no general SNMP management capability in the Nexsan Storage System.

► To set up SNMP traps:

1. Use the following table for help with setting up SNMP traps.

Table 3-227: SNMP traps

Setting	Action
SNMP server IP address *n*	Enter the IP address that SNMP traps will be sent to. The default is `Not Configured`. The server address can either be an FQDN (domain name) or IP address. IPv6 addresses should be enclosed in "[" and "]". One or two IP addresses can be specified.
Community string	Enter the SNMP Network Management Server password. By default, this is **public**.
Trap version	Use the selection buttons to select the type of SNMP trap that is to be sent: **SNMPv1** (the default) or **SNMPv2c**.
When to send SNMP traps	Using the drop-down list, select what kinds of events (see Event Log on page 112) will be sent as SNMP traps. There are five options: **Do not send SNMP traps** (the default), **Send SNMP traps for errors only**, **Send SNMP traps for warnings and errors**, **Send SNMP traps for information, warnings and errors**, and **Send SNMP traps for all events**. **Note** If at any time you wish to return the *SNMP/SYSLOG Settings* page to its initial state, click **Reset**.

2. Click **Save Settings**.

A message displays, informing you that the settings have been updated. Click the **Back** button to return to the *SNMP/SYSLOG Settings* page.

► **To set up SYSLOG messages:**

1. Use the following table for help with setting up SYSLOG messages.

Table 3-228: SYSLOG messages

Setting	Action
SYSLOG server IP address	Enter the IP address of the host running the SYSLOG service that will receive the SYSLOG messages.
SYSLOG server UDP port	Enter the UDP port number that the management station is listening to. The default is `514`.
SYSLOG Facility	Using the drop-down list, select the designation for the part of the system the SYSLOG message originates from. This is defined by the SYSLOG protocol. Options will vary depending on your operating system.
When to send a SYSLOG message	Using the drop-down list, select what kinds of events (see Event Log on page 112) will be sent in SYSLOG messages. There are five options: **Do not send SYSLOG messages** (the default), **Send SYSLOG messages for errors only**, **Send SYSLOG messages for warnings and errors**, **Send SYSLOG messages for information, warnings and errors**, and **Send SYSLOG messages for all events**. **Note** If at any time you wish to return the *SNMP/SYSLOG Settings* page to its initial state, click **Reset**.

2. Click **Save Settings**.

A message displays, informing you that the settings have been updated. Click the **Back** button to return to the *SNMP/SYSLOG Settings* page.

► To test SNMP trap and SYSLOG settings:

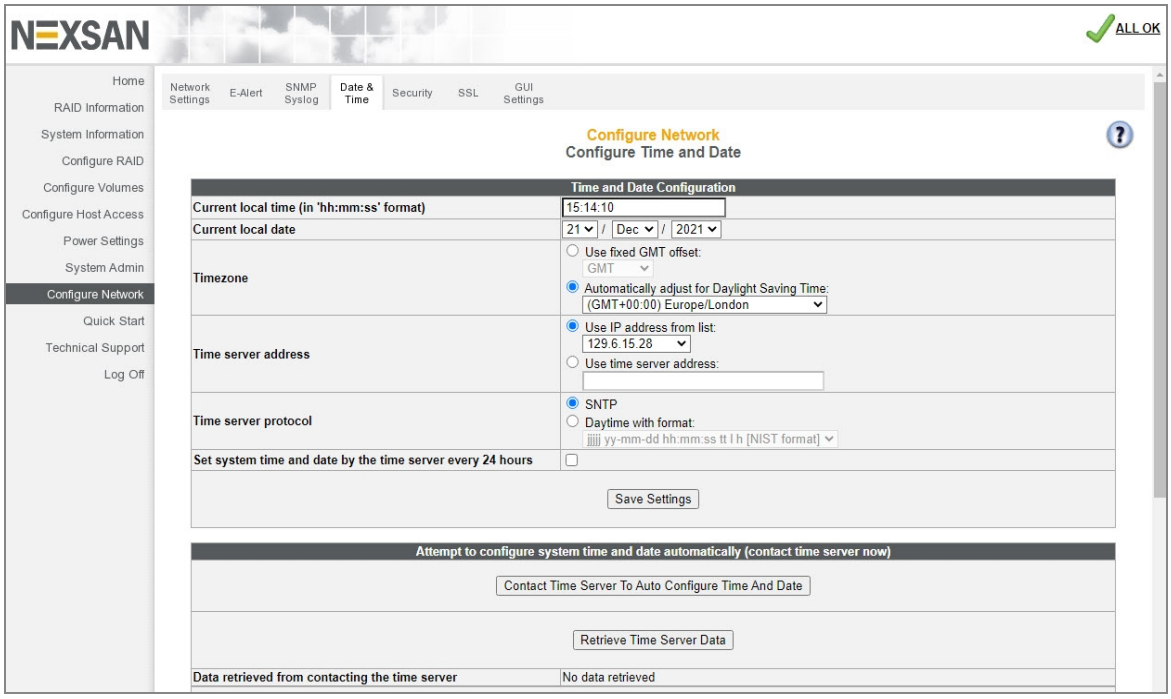
1. Enter a test phrase (default `Test string`) in the **Test String** field.
2. Click **Test SNMP** or **Test SYSLOG**.

A message displays, informing you that the test string has been sent, and the management station or SYSLOG file will receive the test string within a few minutes. Click the **Back** button to return to the *SNMP/SYSLOG Settings* page.

Configure Time and Date

Clicking **Configure Network > Date and Time** takes you to the *Configure Time and Date* page, which enables you to set the time and date used by the Nexsan Storage System's internal clock. This can be done manually or automatically.

Figure 3-229: *Configure Time and Date* page



Set time and date manually

Use this procedure to set your Nexsan Storage System time and date manually.

To set time and date manually:

1. Use the following table for details about setting the parameters:

   Table 3-230: Setting time and date manually

Setting	Action
Current local time (in 'hh:mm:ss' format)	Enter the time in the field. The time entered in the **Current local time (in 'hh:mm:ss' format)** field will be set when you click the **Save Settings** button. Therefore, it is suggested that you enter the time rounded to the next five-minute mark, then click **Save Settings** when the entered time is reached.
Current local date	Enter the date using the drop-down lists.
Timezone	In this section, do one of the following: • Select **Use fixed GMT offset** and set the GMT offset using the drop-down list. • Select **Automatically adjust for Daylight Saving Time** and select the appropriate time zone in the drop down list.
Time server address and Time server protocol	Leave the default settings in these sections. No changes are required when you are setting the time and date manually and no SNTP server is available.
Set system time and date by the time server every 24 hours	In this section, click to enable the setting as required. If no SNTP server is available, the setting remains deselected.

2. Click **Save Settings**.

Set time and date automatically

To configure the Nexsan Storage System to set time and date automatically:

1. Use Table 3-231: "Configuring time and date automatically" on the facing page for details about setting the parameters:

   Note For automatic time setting to work, you may have to configure the **Gateway** setting for your network. See Configure Network Settings on page 218 for more information.

Table 3-231: Configuring time and date automatically

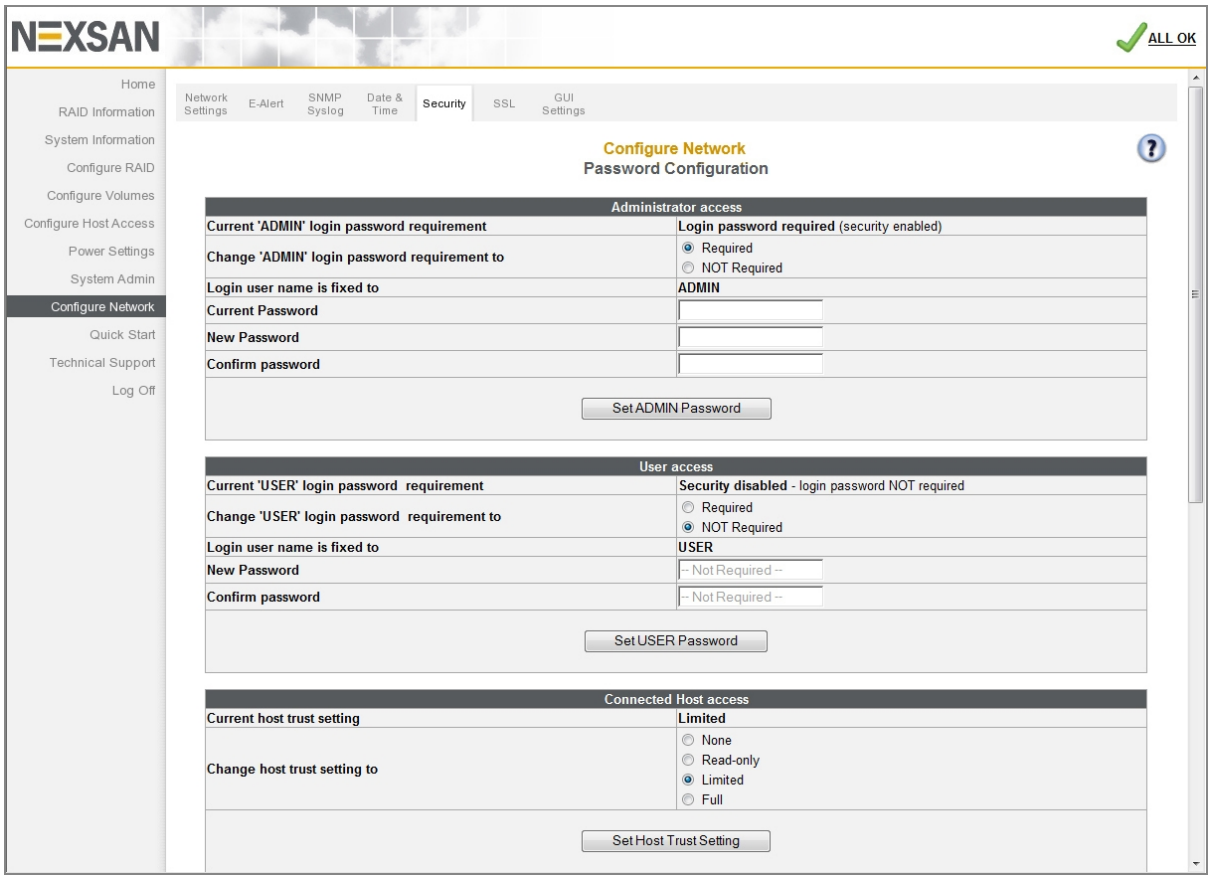
Setting	Action
Time and Date Configuration	
Timezone	In this section, do one of the following: • Select **Use fixed GMT offset** and set the GMT offset using the drop-down list. • Select **Automatically adjust for Daylight Saving Time** and select the appropriate time zone in the drop down list.
Time server address	In this section, do one of the following: • Select **Use IP address from list** and select a time server IP address from the drop-down list. • Select **Use time server address** and enter the IP address of a known time server into the text box.
Time server protocol	Select either **SNTP** or **Daytime with format**.
Daytime with format	If you entered a time server address and selected **Daytime with format**, select the time server time and date format using the drop-down list. **Note** If you do not know the format of the time server data, click the **Retrieve Time Server Data** button in the *Attempt to configure system time and date automatically (contact time server now)* section. The data is retrieved and displayed next to *Data retrieved from contacting the daytime server*. Use this data to choose the proper format in the time and date format drop-down list.
Set system time and date by the time server every 24 hours	Enable this option if you want the Nexsan Storage System to contact the time server every twenty-four hours to update the time and date.
Attempt to configure system time and date automatically	
Contact Time Server To Auto Configure Time And Date	If you want to update the time immediately, click the button in this section. The time and date are updated immediately.

2. Click **Save Settings**.

Security

Clicking **Configure Network > Security** takes you to the *Password Configuration* page, which enables you to set passwords for the administrator-level (ADMIN) and user-level (USER) accounts.

Figure 3-232: *Password Configuration* page



Administrator and User access

The *Administrator access* and *User access* sections display the following information:

Table 3-233: Administrator and User access

Setting	Description
Current "ADMIN"/"USER" login password requirements	Indicates whether a password is currently required for the ADMIN or USER account, respectively.
Change "ADMIN"/"USER" login password requirement to	Used to enable or disable password protection. Select **NOT Required** (the default) to disable password-protected login. Select **Required** to enable password-protected login.

Setting	Description
Login user name is fixed to	Displays the account user name– ADMIN or USER.
Current Password	Enter the current account password to make changes. If password-protected login is currently disabled for this account, this item is not displayed.
New Password	Enter the new account password.

To change security settings

1. Next to **Change "ADMIN/USER" login password requirement to**, select **Required** or **NOT Required**.
2. Enter the current ADMIN/USER password into the **Current Password** field.
3. If you selected **Required**, enter the password into the **New Password** and **Confirm Password** fields. Passwords should be eight characters or longer and can contain both letters and numbers, but not special characters or punctuation.
4. Click **Set ADMIN/USER Password**.

A message displays, informing you that the password has been set. Click the **Back** button to return to the *Password Configuration* page.

Passwords take effect immediately. The next time you try to access a configuration page, the GUI will ask you to enter the user name and password to gain access. Both fields are case-sensitive, and user names must be entered in all capitals ("ADMIN" or "USER").

Connected Host access

The *Connected Host access* section enables you to configure the option to allow hosts that are connected to the storage area network (SAN) to provision the Nexsan Storage System directly, without requiring the ADMIN password. This feature requires compatible storage management software (such as the Nexsan Storage Tools provisioning application—see Appendix B, Nexsan Storage Tools on page 253) to be installed on the host. This section displays the following information:

Table 3-234: Connected Host access settings

Setting	Description
Current host trust setting	The current level at which SAN-connected hosts can access the Nexsan Storage System without the ADMIN password.
Change host trust setting to	Select one of four levels **None** Host-based management access is disabled. **Read-only** Hosts can read information about the High-Density Storage System, but cannot provision storage. **Limited** (default) Hosts can create new volumes, and expand or delete any volumes to which they have read/write access. **Full** Hosts can create new volumes, modify volume access rights, and expand or delete any volumes on the RAID system.

To change connected host provisioning access:

1. In the **Change host trust setting to** section, select **None**, **Read-only**, **Limited**, or **Full**.

   CAUTION: If untrusted users have administrative access to hosts on the storage area network (SAN), we strongly recommend that you set this option to **None**.

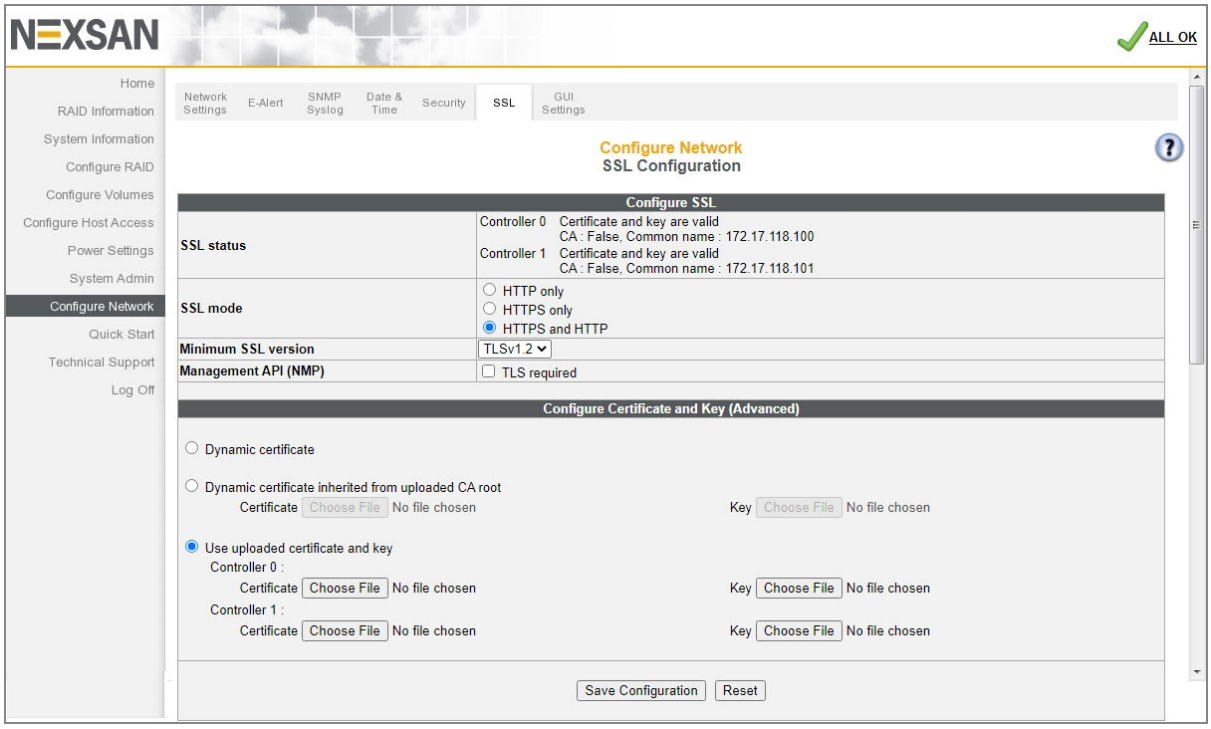
2. Click the **Set Host Trust Setting** button to save your change.

A message displays, indicating that the settings have been changed. Click the **Back** button to return to the *Password Configuration* page.

SSL Configuration

Clicking **Configure Network > SSL** takes you to the *SSL Configuration* page, which enables you to set up Secure Sockets Layer (SSL) encryption between the Nexsan Storage System and the browser accessing the system's GUI.

Figure 3-235: *SSL Configuration* page



The *Configure SSL* section displays the following information:

Table 3-236: SSL settings

Setting	Description
SSL status	The current SSL configuration. Also shows any certificate problems and a download link for the current root CA certificate (when applicable). **Note** It is recommended that you download the root CA certificate and add it to your browser's trusted certificate list to avoid certificate errors when connecting via HTTPS.
SSL mode	The type of browser connection allowed by the RAID system. There are three options: • **HTTP only** (the default) Disables SSL or HTTPS connection. • **HTTPS only** Enables SSL/HTTPS connection and disables unsecured (HTTP) connection. • **HTTPS and HTTP** Enables both SSL/HTTPS and unsecured HTTP connections.
Minimum SSL version	The minimum SSL version you need. There are three options: **TLSv1.0** **TLSv1.1** **TLSv1.2**
Management API (NMP)	Enables setting TLS for the Management API (NMP - Nexsan Management Protocol).

The *Configure Certificate and Key (Advanced)* section displays selection buttons for each of three options: **Dynamic certificate**, **Dynamic certificate inherited from uploaded CA root**, and **Use uploaded certificate and key**.

▶ **To configure SSL:**

1. Select the desired SSL mode using the selection buttons: **HTTP only**, **HTTPS only**, or **HTTP and HTTPS**.
2. Select the Minimum SSL version: **TLSv1.0**, **TLSv1.1**, or **TLSv1.2**.
3. Click to enable **Management API (NMP)**, as required.
4. In the *Configure Certificate and Key (Advanced)* section, select the desired option:

   Table 3-237: Configure Certificate and Key (Advanced) settings

Setting	Description
Dynamic certificate	This is the default mode. The SSL key and certificate are automatically generated at startup and signed with the default Nexsan root CA certificate.

Setting	Description
Dynamic certificate inherited from uploaded CA root	The SSL key and certificate are automatically generated at startup and signed with the uploaded root CA certificate. To select this mode, you must provide and select files for the **Certificate** and **Key** by clicking **Browse** and navigating to the files according to the method of your operating system. CA certificate and SSL key files must be in PEM or DER format.
Use uploaded certificate and key	Uses the uploaded certificate and key (PEM or DER format) as long as both files are valid. On dual-controller systems, you must provide different files for each controller.

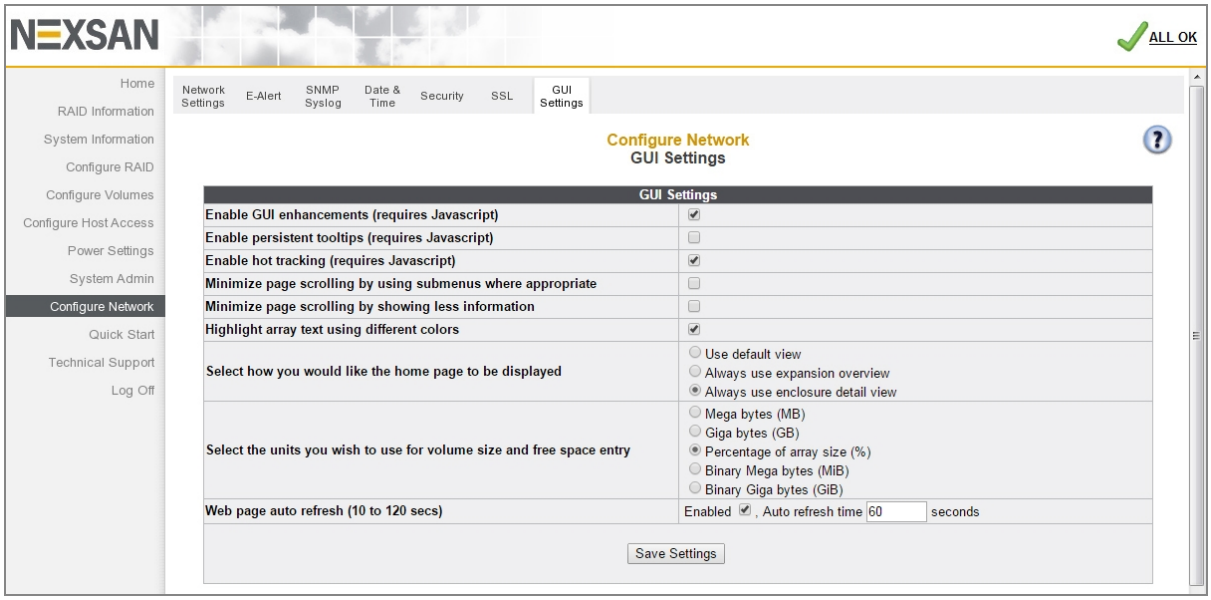
5. Click **Save Configuration**.

A message displays, indicating that the settings have been changed. Click the **Back** button to return to the *SSL Configuration* page.

GUI Settings

Clicking **Configure Network > GUI Settings** takes you to the *GUI Settings* page, which enables you to configure GUI options.

Figure 3-238: *GUI Settings* page



► To change GUI settings:

1. Adjust the default settings as described in the following table.

Table 3-239: GUI settings

Setting	Action
Enable GUI enhancements (requires Javascript)	This option is enabled by default. If your browser does not support JavaScript, or if the JavaScript enhancements cause browser problems, disable this option. **Note** Sometimes, JavaScript errors can prevent user login. If this occurs, enter `http://<IP address>/admin/guiprefs.asp` into the browser's address bar to load this page directly. JavaScript can then be turned off and login reattempted.
Enable persistent tooltips (requires Javascript)	This option is disabled by default. Enable this option to display pop-up tool tips when the mouse pointer is hovered over an icon. This option requires that the **Enable GUI enhancements** option be enabled.
Enable hot tracking (requires Javascript)	This option is enabled by default. When enabled, this option causes lines in certain tables to be highlighted when the mouse cursor is over them. Disable this option to not highlight table lines with the mouse cursor is over them. This option requires that the **Enable GUI enhancements** option be enabled.
Minimize page scrolling by using submenus where appropriate	This option is disabled by default. Enable this option to show a summary submenu of links on certain pages. This submenu reduces the need to scroll on long pages. **Note** Enabling this option may change the way in which you are able to access certain features. In such cases, the instructions in this *User Guide* may not match your experience.
Minimize page scrolling by showing less information	This option is disabled by default. Enable this option to show only essential information on each page. **Note** Enabling this option may hide certain features from view or change the way in which you are able to access them. In such cases, the instructions in this *User Guide* may not match your experience.
Highlight array text using different colors	This option is enabled by default. Text displayed below disk icons is color-coded by array to aid in visual identification of array members. Disable this option if you wish to display all disk text in black.
Select how you would like the home page to be displayed	The default setting for this option is **Use default view**, which is described in Home page on page 65. Select a different option, if desired. The three options are **Use default view**, **Always use expansion overview**, and **Always use enclosure detail view**.
Select the storage systems you wish to use for volume and free space entry	The default setting for this option is **Gigabytes (GB)**. Select a different option, if desired. The options are: **Megabytes (MB)**, **Gigabytes (GB)**, **Percentage of array size (%)**, **Binary Megabytes (MiB)**, and **Binary Gigabytes (GiB)**.

Setting	Action
Web page auto refresh (10 to 120 secs)	This option is enabled and set to **30** seconds by default. When no links or buttons are clicked in the GUI for this length of time, the page is automatically refreshed with updated information from the Nexsan Storage System. Disable this option to stop pages from automatically refreshing. Change the number in the **Auto refresh time** field to make automatic page refresh happen more or less often.

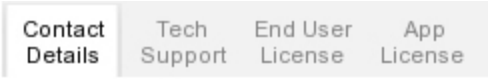
2. Click **Save Settings**.

A message displays, indicating that the settings have been changed. Click the **Back** button to return to the *GUI Settings* page.

Technical Support

Clicking **Technical Support** in the navigation pane opens the related GUI pages. The buttons at the top of these pages provide links to the pages described in this section.

Figure 3-240: Technical Support navigation bar



Refer to Table 3-241 if you need to contact Nexsan E-Series/BEAST Technical Support.

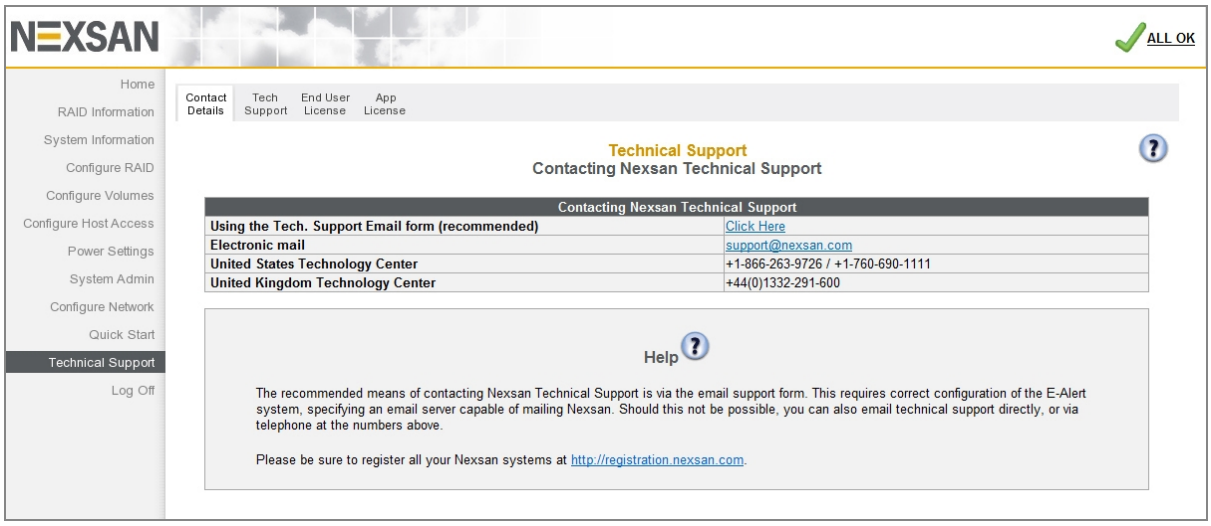
Table 3-241: Technical Support pages

Nav bar button	GUI pages and documentation links
Contact Details	Contact Information on the next page
Tech Support	Technical Support Email Form on page 237
End User License	End User License Agreement on page 238
App License	Application and Feature Licenses on page 239

Contact Information

Clicking **Technical Support** takes you to the *Contact Nexsan Technical Support* page, which provides several options for contacting Nexsan Technical Support.

Figure 3-242: *Contacting Nexsan Technical Support* page



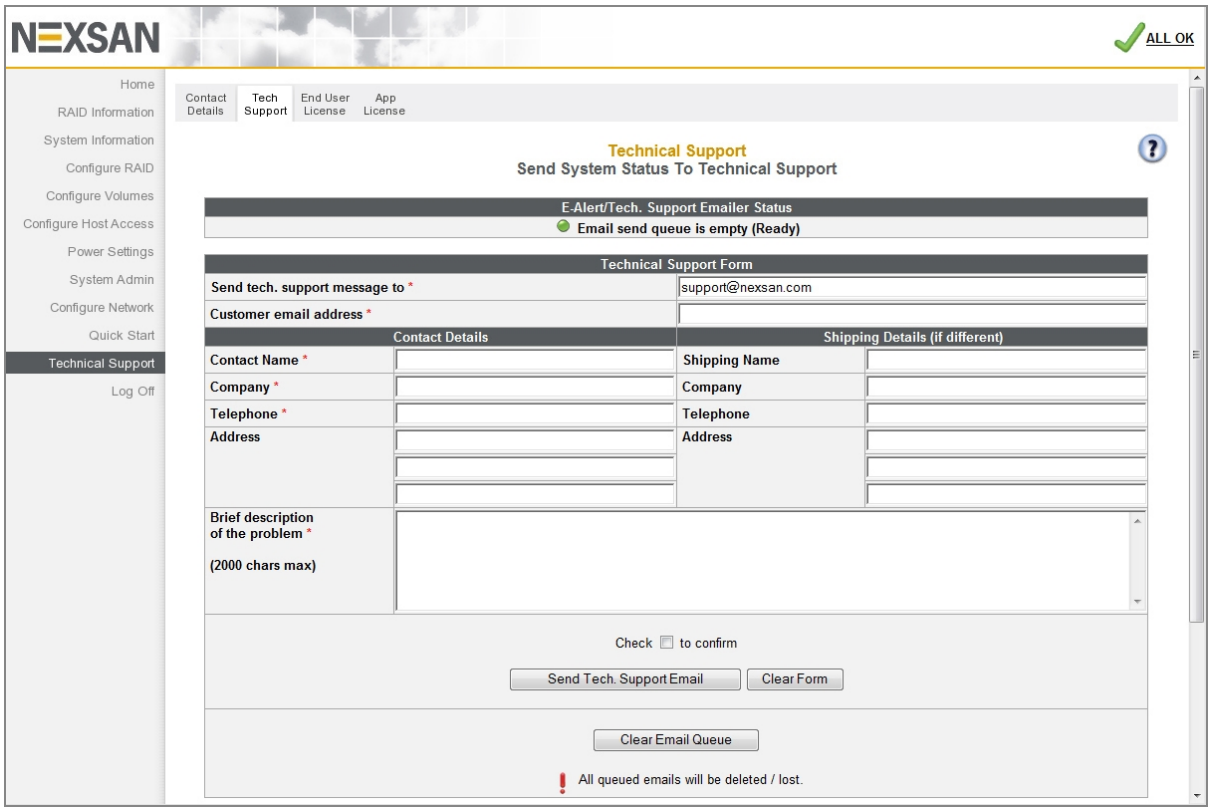
This page displays an email address and several telephone numbers for contacting Nexsan Technical Support.

If your network settings (see Network Information on page 105) and E-Alert settings (see Network Services on page 107) allow the Nexsan Storage System to send email directly, you can click the **Click Here** link next to **Using the Tech. Support Email form (recommended)** to open the email contact form (see Technical Support Email Form on the facing page).

Technical Support Email Form

Clicking **Technical Support > Tech Support** (or the **Click Here** link on the Contact Nexsan Technical Support page) takes you to the **Send System Status to Technical Support** email form.

Figure 3-243: *Send System Status to Technical Support* email form



You must fill out the fields marked with a red asterisk (*). Once you have filled out all required information, check the confirmation check box and click **Send Tech Support Email**. The email is sent, along with a system diagnostic report to help Nexsan Technical Support understand your issue.

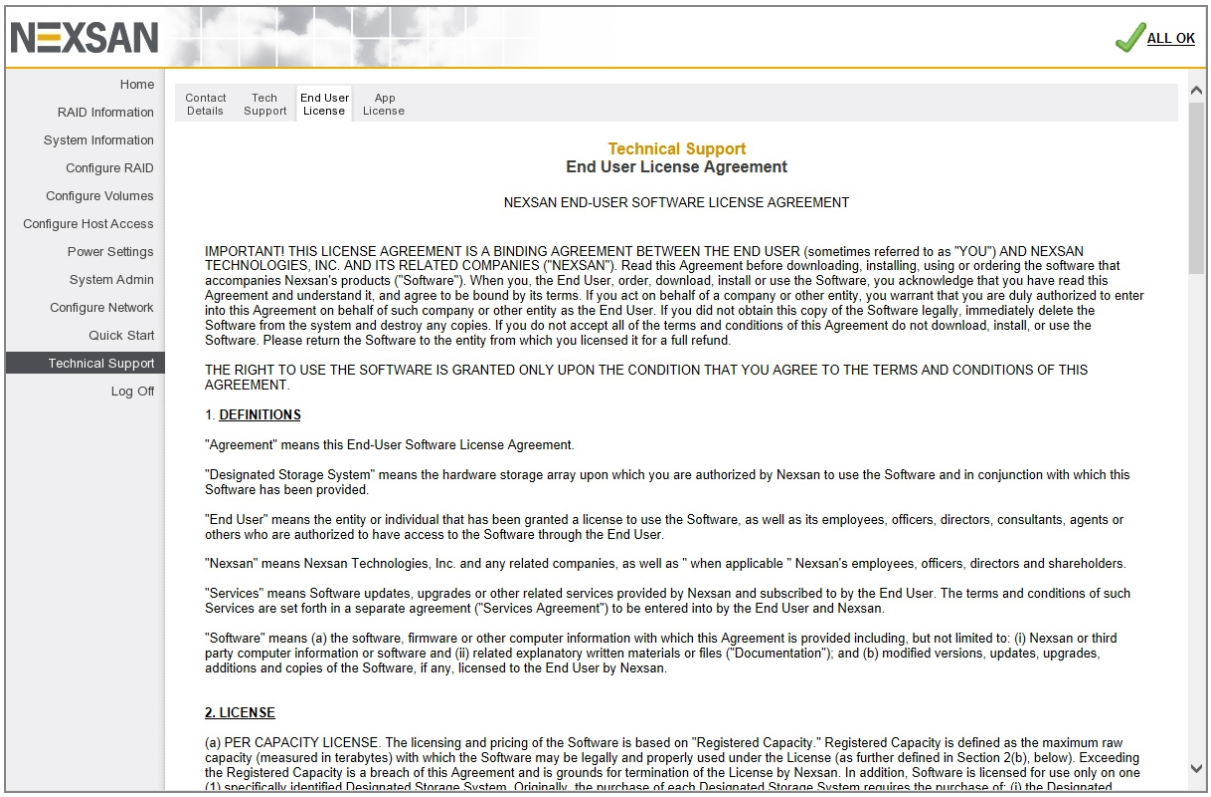
If you make errors, click **Clear Form** to erase all data in the form. You can then re-enter it.

If there are emails in the email queue, check your network settings to make sure that they are correct (see Network Information on page 105). If the settings are correct and there are still emails in the queue, you can delete them by clicking **Clear Email Queue**. (If you have already queued the Support email, this will also delete the Support email.)

End User License Agreement

Clicking **Technical Support > End User License** takes you to the *End User License Agreement* page.

Figure 3-244: End User License Agreement

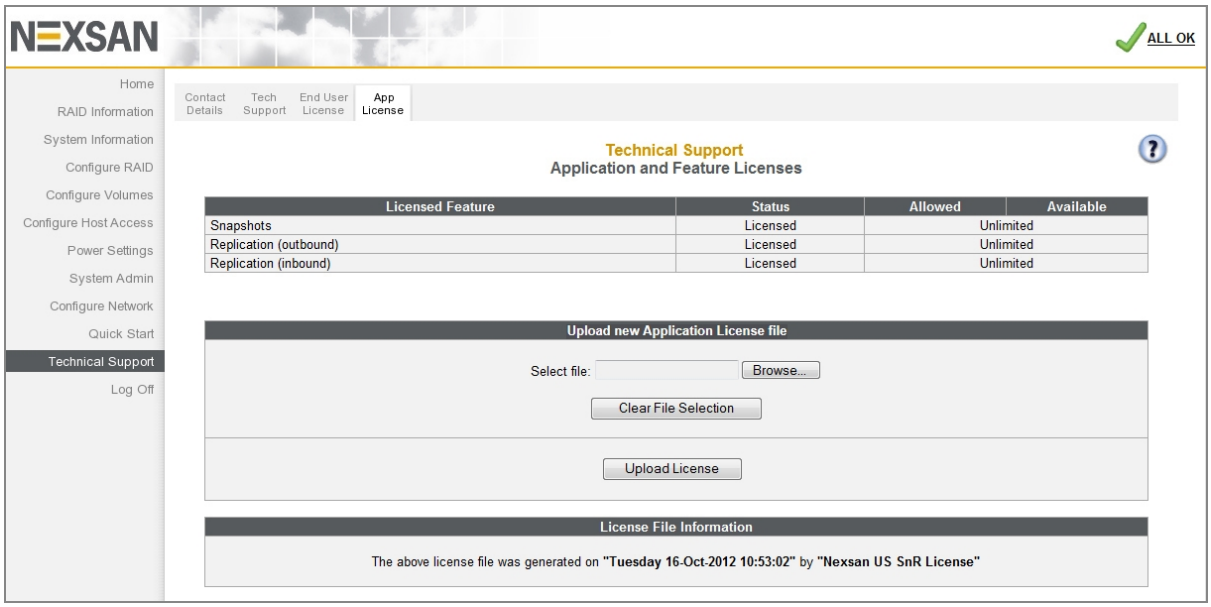


You must accept the EULA the first time you log into the Nexsan Storage System (see Accept the End User License Agreement (EULA) on page 20).

Application and Feature Licenses

Clicking **Technical Support > App License** takes you to the *Application and Feature Licenses* page, which displays licensing details for additional features for Nexsan Storage Systems.

Figure 3-245: *Application and Feature Licenses* page



The **Licensed Feature** section displays the license status for *Snapshots*, *Replication (outbound)*, and *Replication (inbound)*.

Table 3-246: Licensed Features settings

Setting	Description
Status	The column displays whether this machine is *Licensed* or *Not Licensed* for each feature.
Allowed	The column displays the number of replications allowed by the license. This can be *None*, a number, or *Unlimited*.
Available	The column displays the number of replications still available under the current license. This can be *None*, a number, or *Unlimited*.

The **Upload new Application License file** section enables you to upload a new license file.

The **License File Information** section displays when and by whom the current license file was generated. This section is only displayed if a custom license has been installed. Otherwise, it does not appear.

► To upload an Application License file:

1. Click the **Browse** button to open the *Choose File to Upload* dialog.
2. Navigate to the location of the new license file, select it, and click **Open**.

   Note If you select the wrong file, you can clear the selection by clicking the **Clear File Selection** button. Then repeat steps 1 and 2 to select the correct file.
3. Click **Upload License**.

A message appears, indicating that the license file has been uploaded. Click the **Back** button to return to the *Application and Feature License* page.

Note For detailed information regarding the snapshots and replication features, see the *Nexsan High-Density Storage Snapshots and Replication User Guide*.

Log Off

When you click the **Log Off** button in the navigation pane, the system logs you out and displays a message prompting you to close down your browser.

Do one of the following:

- Log back in to resume your work (see Log in on page 48).
- Close the browser to clear its cache and prevent unauthorized access to the Nexsan Storage System.

Chapter 4

Troubleshooting

This chapter contains troubleshooting tips and procedures for some of the more common problems encountered by Nexsan Storage System users. If you do not find your issue in this chapter, refer to Technical Support on page 235 for ways of contacting a service representative for assistance.

This chapter contains the following sections:

Web interface problems 241
Start up problems 242
Other problems 243

Web interface problems

Can't connect using my IP address.

If your browser fails to connect to the Storage System, troubleshoot the system according to the following procedure:

To check IP address settings on a Nexsan Storage System:

1. Check to see if the system is responding by "pinging" the management port (Net 0 or Management):
   a. Open a terminal window. The method for doing this varies by operating system.
   b. On the command line of the terminal window, type:

      `ping <IP address>`

      where *<IP address>* is the IP address of the Nexsan Storage System's management port.

      If the ping is successful, you will see a response similar to the following:

```
Reply from <IP address>: bytes=32 time=10ms TTL=30
Reply from <IP address>: bytes=32 time<10ms TTL=30
Reply from <IP address>: bytes=32 time<10ms TTL=30
Reply from <IP address>: bytes=32 time<10ms TTL=30

Ping statistics for <IP address>:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milliseconds:
Minimum = 0ms, Maximum = 10ms, Average = 2ms
```

If you have a successful reply, but still cannot access the home page, contact Technical Support.

If there is no reply to the ping, proceed to step 2.

2. Check the IP address of the machine you are trying to access using either Nexsan Storage Manager or IP Configuration Tool (see Appendix B, Nexsan Storage Tools on page 253). Both tools automatically detect all Nexsan Storage Systems on the same subnet.
3. If you are using DHCP, make certain that the DHCP server has allocated an address to the Nexsan Storage System management port.
4. If you are trying to connect to the Web interface from a host that is on a different network, verify that the gateway was set correctly on the Nexsan Storage System (see Network Information on page 105). This can be done by trying to access the Web interface from a host that is on the same network as the Nexsan Storage System.
5. If you still get no reply, do one of the following:
   - Use a serial port connection to set up IP addressing. Refer to Alternate IP configuration on page 245.
   - Reset the IP address of the management port manually. See Initial network address setup on page 16 for instructions.

Menus ask for a user name and password.

This means that administrator security is turned on (see Security on page 228). To access configuration pages, you must enter ADMIN as the user name and the configured administrator account password. If you haven't configured an administrator account password, use the default password: PASSWORD.

Can't access configuration pages even as admin.

Make certain that you are entering ADMIN in all caps and the password exactly as it was configured. If no password was configured, make sure you are entering PASSWORD in all caps.

If, after double checking the user name and password, you still are unable to access the Nexsan Storage System or the configuration pages, reset the password using a serial port connection to set up IP addressing. Refer to Alternate IP configuration on page 245.

If you are still unable to resolve the password issue, contact Technical Support (see Contact Information on page 236) to have them guide you through the process of resetting the ADMIN password.

Start up problems

My Nexsan Storage System beeps on startup.

The system may beep for a variety of reasons. A beep does not mean that the Nexsan Storage System is broken. However, if you are concerned, do the following:

▶ **To double-check causes for system beeping at startup:**

1. If you have E-Alerts enabled (see E-Alert Settings on page 220), check the inbox of a recipient's email account. If there is a problem, an E-Alert provides a clear explanation of any problems.
2. Log in to the GUI for the Nexsan Storage System and check the status indicator in the top right. If it says WARNING or FAILURE, click the icon to be taken to the *Summary of System Problems* page (see Summary of System Problems on page 111).
3. Check the Event and Error logs for issues (see Working with the Event Log on page 57).

4. Check the LEDs on the front and back of the Nexsan Storage System. If an LED is any color other than green, consult the storage system's *Installation Guide* to determine what the problem may be.

For further help, contact Nexsan Technical Support (see Contact Information on page 236).

Other problems

A disk has failed.

The GUI says that a disk has failed, but my data is still accessible. What should I do?

▶ **If a disk has failed:**

1. Contact your Nexsan dealer or Nexsan Technical Support (see Contact Information on page 236) to arrange for a replacement disk drive to be shipped as quickly as possible.
2. DO NOT REMOVE THE FAILED DISK DRIVE until the new disk drive has arrived and is ready to be installed. Removing a disk drive changes air flow and cooling and can result in the system overheating.
3. Once the new disk drive has arrived, follow the instructions in the Nexsan Storage System's *FRU Removal and Replacement Guide* to replace the failed disk drive. The new disk drive will either be rebuilt into the array (if the array is in a critical state) or it will be assigned as a pool spare (see Add Hot Spare on page 134).

Note Do NOT re-install a failed disk into any Nexsan Storage System, even if examination reveals no fault.

A power supply unit (PSU) has failed, but my Nexsan Storage System is still functioning. What should I do?

▶ **If a PSU has failed:**

1. Contact your Nexsan dealer or Nexsan Technical Support (see Contact Information on page 236) to arrange for a replacement power supply unit to be shipped as quickly as possible.
2. DO NOT REMOVE THE FAILED PSU until the new PSU has arrived and is ready to be installed. Removing a PSU reduces air flow and cooling and can result in the system overheating.
3. Once the new PSU has arrived, follow the instructions in the Nexsan Storage System's *FRU Removal and Replacement Guide* to replace the failed PSU with the new one.

A RAID Controller has failed. What should I do?

If a RAID Controller fails, you may not have access to your data. However, the data is still safe on the disks and will be available as soon as a new RAID Controller has been installed.

▶ **If a RAID Controller has failed:**

1. Contact Nexsan Technical Support (see Contact Information on page 236) to determine the reason for the RAID Controller failure. In many cases, the RAID Controller can be recovered and continue to work properly.
2. If the RAID Controller cannot be recovered:
   a. Contact your Nexsan dealer or Nexsan Technical Support to arrange for a replacement RAID Controller to be shipped as soon as possible.
   b. DO NOT REMOVE THE FAILED RAID CONTROLLER until the new controller has arrived and is ready to be installed. Removing a RAID Controller reduces air flow and cooling and can result in the system overheating.

c. Once the new RAID Controller has arrived, follow the instructions in the Nexsan Storage System's *FRU Removal and Replacement Guide* to replace the failed RAID Controller with the new one.

Disks are locked and data is inaccessible

The graphical user interface says that some disks are locked and my data is inaccessible. What should I do?

Locked disks are indicated by an icon on the Disk Drives tab of the RAID Information page. See "Disk Information" (page 81).

Figure 4-1: Disk Locked icons



If disks are showing as 'locked':

1. If your system is encrypted and you have saved copies of the encryption keys, upload the keys using the Upload System Settings function. See Download & Upload System Settings on page 210.
2. If the disks cannot be unlocked:

   Contact Nexsan Technical Support (see Contact Information on page 236) to determine the reason for the disks being locked. In some cases the disks can be unlocked and continue to work properly.

   DO NOT REMOVE THE LOCKED DISK DRIVES. Removing disks reduces air flow and cooling and can result in the system overheating. The disks probably will not need to be replaced.

Appendix A

Alternate IP configuration

In cases where using the Nexsan Storage Tools isn't possible, there are additional ways to set up the IP address of your Nexsan Storage System.

This appendix contains the following sections:

Add a route to access the desired IP address 246
Use the serial port to change the IP address 247

Add a route to access the desired IP address

Adding a route doesn't change the IP address of the Nexsan Storage System; it simply maps a path to the storage system's existing IP address. This method requires your workstation to be directly connected to the same Ethernet network that the storage system's management port (**Net 0** or **MGMT**) is connected to.

To add a route to access the IP address of the Nexsan Storage System's RAID Controllers, you must have access to the command line interface or a terminal window.

▶ **To add an IP address access route:**

1. At the command prompt, enter the information according to your OS:
   - Windows: **`route add 10.11.12.13 mask 255.255.255.255 <workstation IP address>`**
   - Linux: **`/sbin/route add 10.11.12.13/32 gw <workstation IP address>`**
   - Solaris: **`route add 10.11.12.13 mask 255.255.255.255 <workstation IP address>`**

   where <*workstation IP address*> is the IP address of the workstation you are using.
2. To add a path to the second controller, repeat step 1, but replace the first IP address with **`10.11.12.14`**.

Note The IP addresses 10.11.12.13 and 10.11.12.14 are the system defaults.

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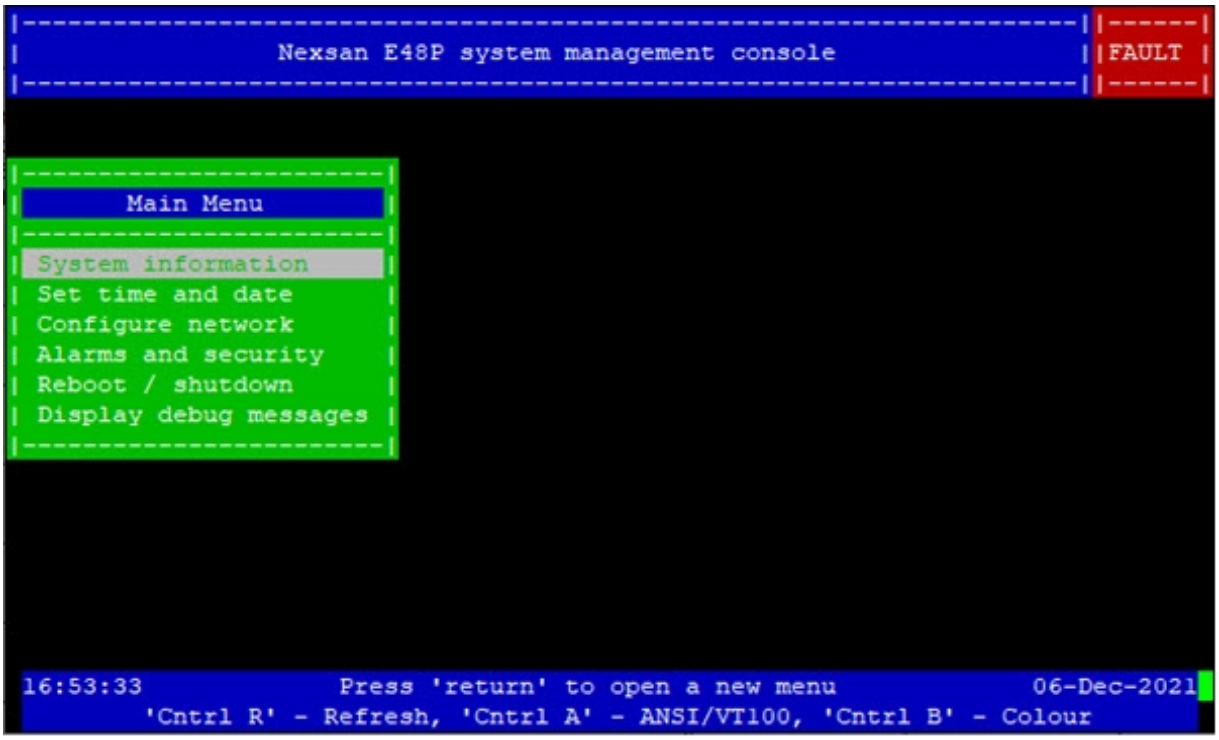
Use the serial port to change the IP address

To use the serial port on your Nexsan Storage System to configure the IP address, you must directly connect your computer to the storage system via the supplied RJ45-to-DB9 serial cable. You must also have a terminal emulation program installed on the computer.

To change the IP address via the serial port:

1. Connect the serial cable to your computer's serial (COM) port.
2. Connect the other end of the cable to the Nexsan Storage System serial port.
3. Open your terminal emulation program and set up a new connection to the system. It should be set to 115,200 bits per second, and 8 data bits, 1 stop bit, no parity bits, and no flow control.
4. Open the serial connection to the Nexsan Storage System (the command varies depending on the type of terminal emulation program you are using). The system management console displays.

Figure A-1: Serial port system management console

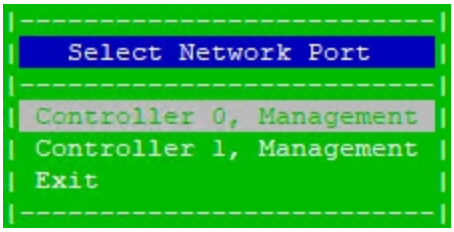


5. Using the arrow keys on your keyboard, navigate to **Configure network** and press **Enter**.

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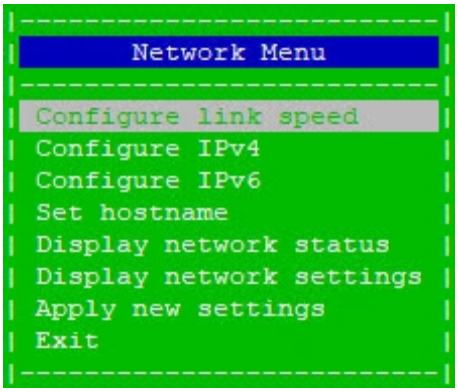
6. Next, use the arrow keys to select the appropriate network port (**Controller 0, Management** or **Controller 1, Management**).

Figure A-2: Select Network Port



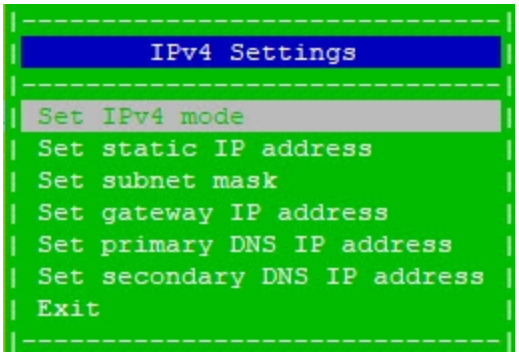
The **Network Menu** displays.

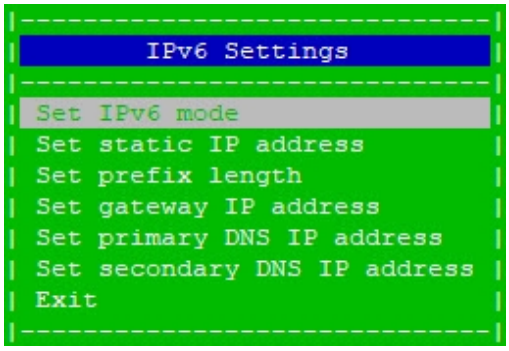
Figure A-3: Network Menu



7. Select **Configure IPv4** or **Configure IPv6** as required and press **Enter**. The **IP Settings** menu displays.

Figure A-4: IP Settings

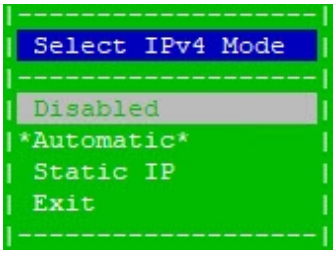




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8. Select **Set IP<*version*> mode** and press **Enter**. The **Select IP Mode** menu displays. *Asterisks* indicate the current IP mode. In the examples, IP Mode is set to **Automatic**.

Figure A-5: Select IP Mode



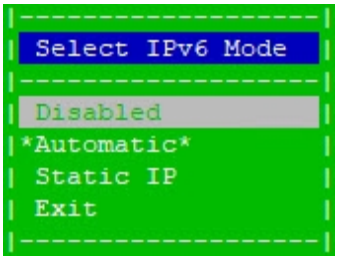


Table A-6: IP modes

IPv4	IPv6
Disabled	
Select this option to disable IPv4 addressing.	Select this option to disable IPv6 addressing.
Automatic	
Select this option if your network is configured for DHCP, in which case the Nexsan Storage firmware will use DHCP to assign IP addresses automatically. If DHCP is not enabled in your network, you MUST use **Static IP**. Use the **Hostname** field to change the name reported to the DHCP server.	Select this option to have IPv6 configured automatically from router advertisements (SLAAC). A fixed link-local IPv6 address will also be assigned.
Static IP	
Using this mode, you must set the **Static IP Address** and **Subnet Mask**.	Using this mode, you must set the values for **Static IP address** and **Prefix Length**. A fixed link-local IPv6 address will also be assigned.

9. When you have made your selection, press the **Esc** key to save your changes and return to the **IP Settings** menu.

   Note To implement your settings, you must go back to the **Network Menu**, select **Apply New Settings**, and press **Enter**.

10. If you are using **Static IP**, manually enter the IP settings for your network:

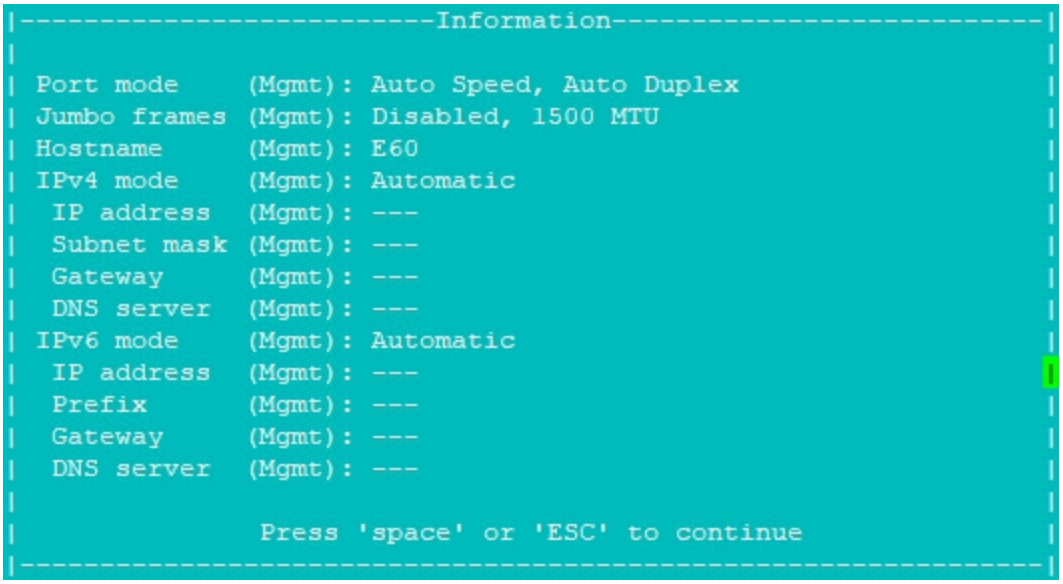
Table A-7: IP settings menu choices

IPv4 menu	IPv6 menu
Set static IP address	**Set static IP address**
Set subnet mask	**Set prefix length**

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11. Select **Set hostname** to enter a host name and press **Enter**.
12. Optionally, select **Display network settings** and press **Enter** to review the new settings, for example:

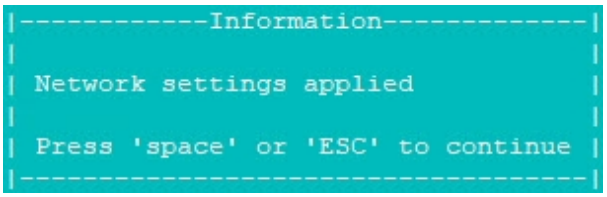
Figure A-8: Network Settings



Press **Esc** to return to the **Network Menu**.

13. Select **Apply New Settings** to complete the configuration process for this port. An information window appears. In **Automatic** mode, it may take up to 60 seconds for the system to complete the IPv4 or IPv6 configuration.

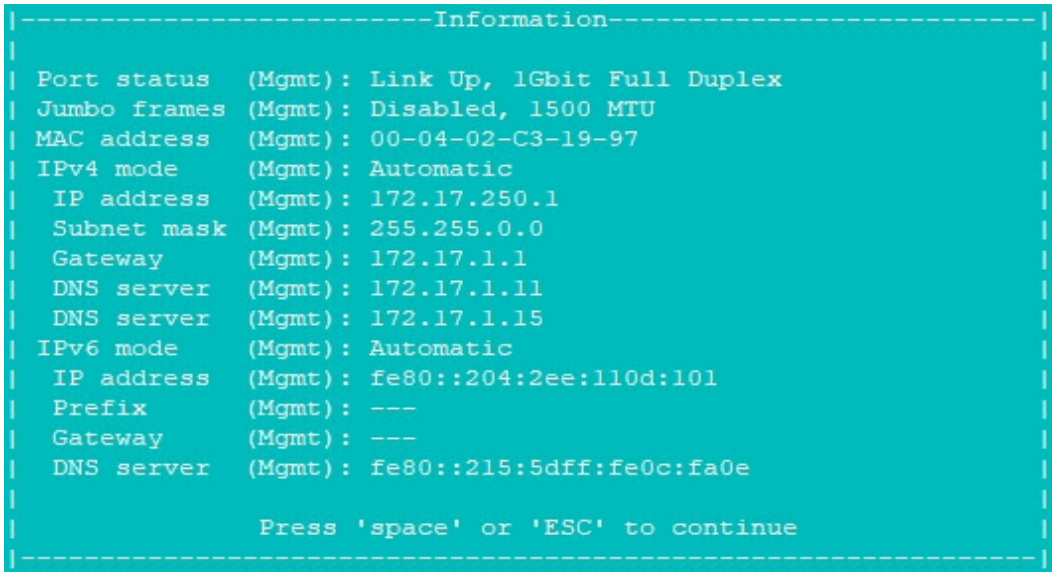
Figure A-9: Network settings applied



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14. Optionally, select **Display network status** and press **Enter**, for example:

Figure A-10: Network Status



Press **Esc** to return to the **Network Menu**.

15. Repeat this procedure for the other port on your Nexsan Storage System.

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Appendix B

Nexsan Storage Tools

This appendix provides an overview of the Nexsan Storage Tools. For a deeper understanding, please refer to the Nexsan Storage Tools Help, which is available after installation in Windows Help format from the Windows Start menu and Storage Tools interface, and in PDF format from the Storage Tools zip file.

If you completed the Initial network address setup on page 16, the Nexsan Storage Tools are already installed on your system. If not, or if you want to install them on one or more additional computers, the latest tools are always available for download from the Nexsan Support Web site at https://www.nexsan.com/support/e-series-and-beast/. The Server Features are only available for installation on Windows Server.

The Nexsan Storage Tools are tested to run on:

- Windows Vista, 7, 8, 8.1, 10, and 11 and Windows Server versions 2008, 2012, 2012 R2, 2019, and 2022 (all versions)
- Macintosh OS X 10.5 to 10.11
- RHEL 8.2 and Linux Storage Tools 1.3.5

Prerequisites

- To use these tools, your Nexsan Storage System host must have read and write access to at least one LUN.
- There must be a file system on the volume or drive.

Nexsan Storage Tools Overview

This section provides a brief overview of the basic Nexsan Storage Tools.

Figure B-1: *Custom Setup*

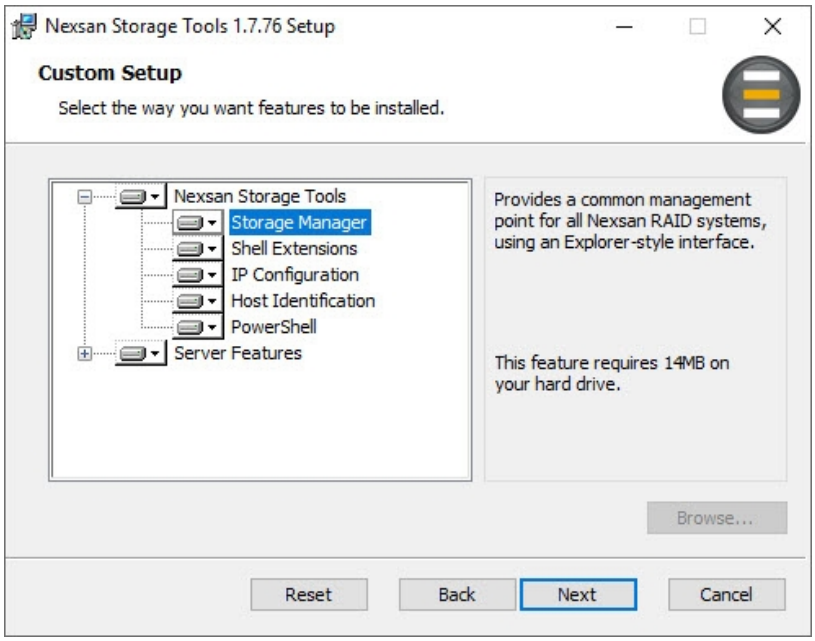


Table B-2: Nexsan Storage Tools

Tool	Description
Nexsan Storage Manager	A Windows Explorer-style interface to manage Nexsan Storage Systems. See Nexsan Storage Manager on page 256
Shell Extensions	A Windows shell extension to provide information about the Nexsan Storage System associated with a particular disk. See Shell Extensions on page 257
IP Configuration	A GUI-based tool to configure the IP address of any Nexsan Storage System on the local subnet. See IP Configuration tool on page 257
Host Identification	A GUI-based tool that displays the identifiers of local storage adapters. See Host Identification tool on page 258
PowerShell	Microsoft PowerShell cmdlets module for managing Nexsan Storage Systems. Includes Storage Management Provider (SMP) and additional tools. In Windows Server environments, Nexsan Storage Systems can also be managed within Windows Server Manager, including monitoring and end-to-end provisioning workflows. See PowerShell on page 259

Nexsan Storage Tools Server Features

This section provides a brief overview of the Nexsan Storage Tools Server Features.

Figure B-3: *Custom Setup*, Server Features

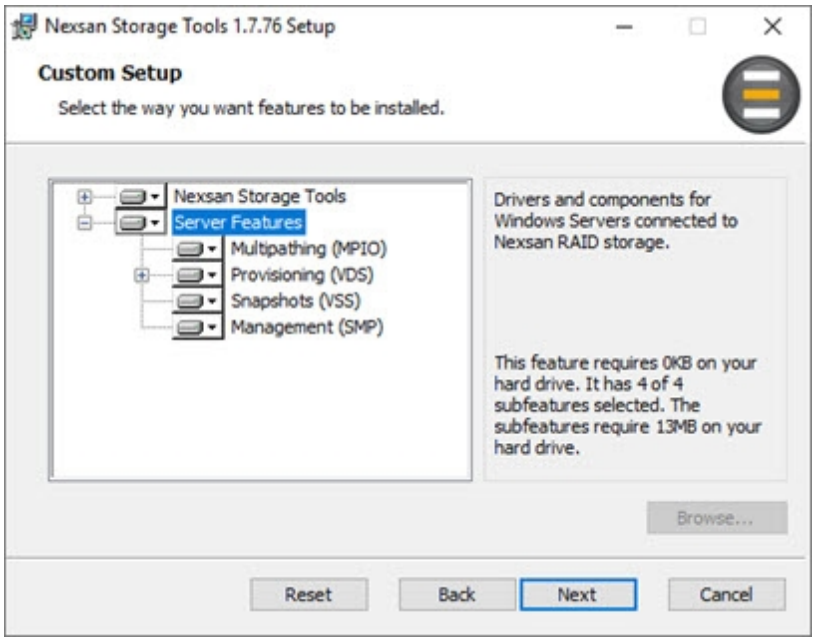


Table B-4: Server Features

Tool	Description
Multipathing (MPIO)	Enables and configures the Microsoft multipathing (MPIO) feature for Nexsan Storage Systems. See Multipathing on page 260
Provisioning (VDS)	Enables you to: • Create and manage storage volumes on connected Nexsan Storage Systems directly from a Windows-based server. • Perform advanced storage configuration tasks, including managing hot-spares and setting up clustered storage. See Provisioning (VDS) on page 261
Snapshots (VSS)	Enables you to create and manage snapshots on connected Nexsan Storage Systems directly from a Windows-based server. See Snapshots (VSS) on page 262
Management (SMP)	Enables Windows Server to run the Nexsan Storage Management Provider (SMP). The management server does not need to be connected to the SAN, but must be able to contact the Nexsan Storage System management IP addresses. See Management (SMP) on page 265

Nexsan Storage Manager

Nexsan Storage Manager provides a common management point for all Nexsan Storage Systems, either in a standalone window or directly integrated into Computer Management. The tool automatically discovers all Nexsan Storage Systems on the local area network (LAN) and displays them in the RAID Systems section, along with their status and IP address. The left-hand pane provides a tree view, enabling you to organize RAID systems into folders and favorites.

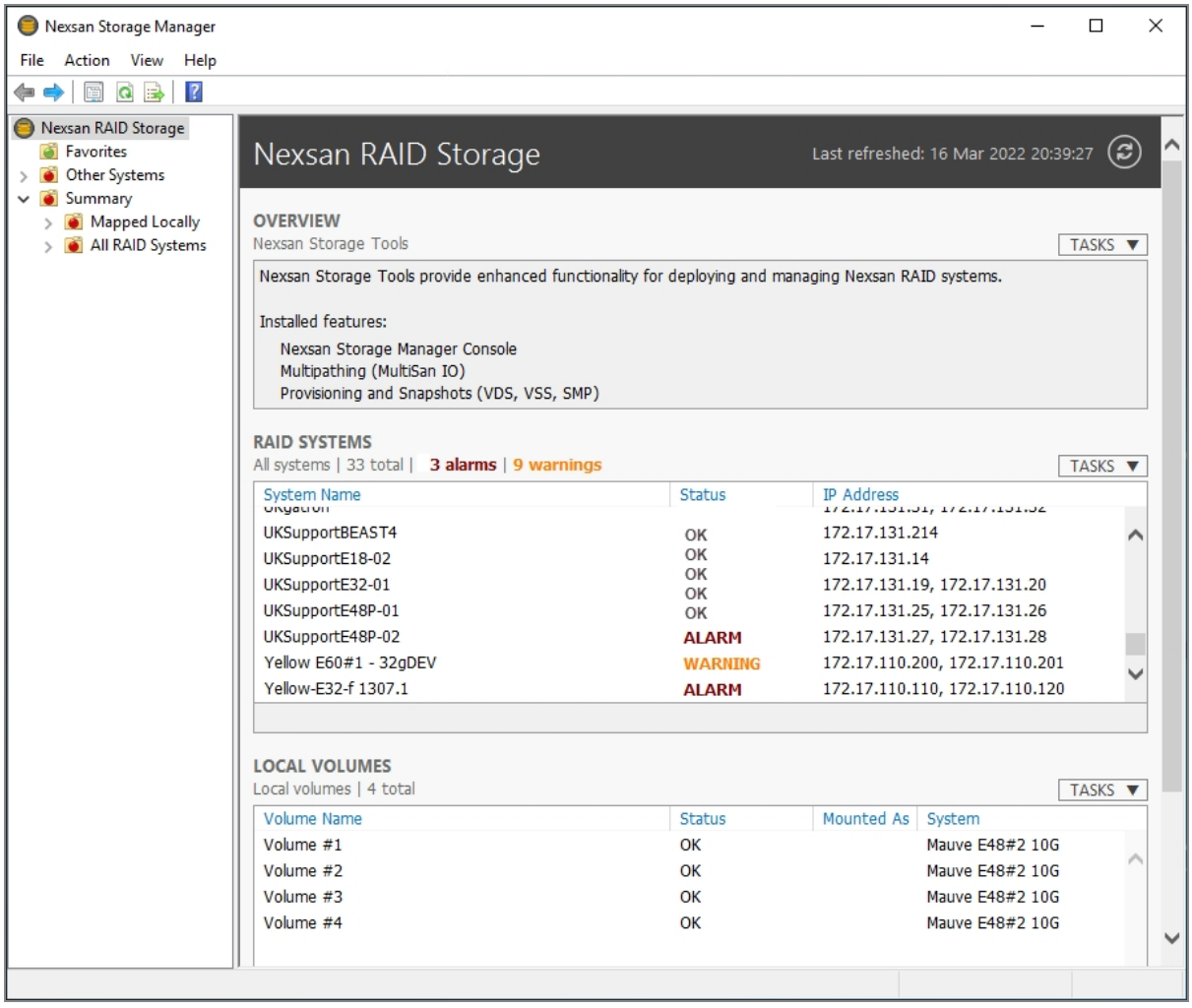
▶ **To launch the Nexsan Storage Manager:**

- On the Windows workstation where the Nexsan Storage Tools are installed, click **Start > Nexsan > Nexsan Storage Manager**.

  Selecting **Nexsan RAID Storage** returns to the default summary view.

  Click the **Help** icon or **Tasks** menu for details.

Figure B-5: Nexsan Storage Manager



B

Shell Extensions

This feature adds several additional elements to Windows:

Table B-6: Shell Extensions

Extension	Description
Explorer Disk Extension	Displays information about the Nexsan RAID volumes on the **Properties** dialog in Windows Explorer.
Disk Management Extension	Displays information about the Nexsan RAID volume on the **Properties** dialog in Disk Management (under **Computer Management > Storage**).
Computer Management Extension	Integrates the High-Density Storage Console under **Computer Management > Storage** for convenient access.

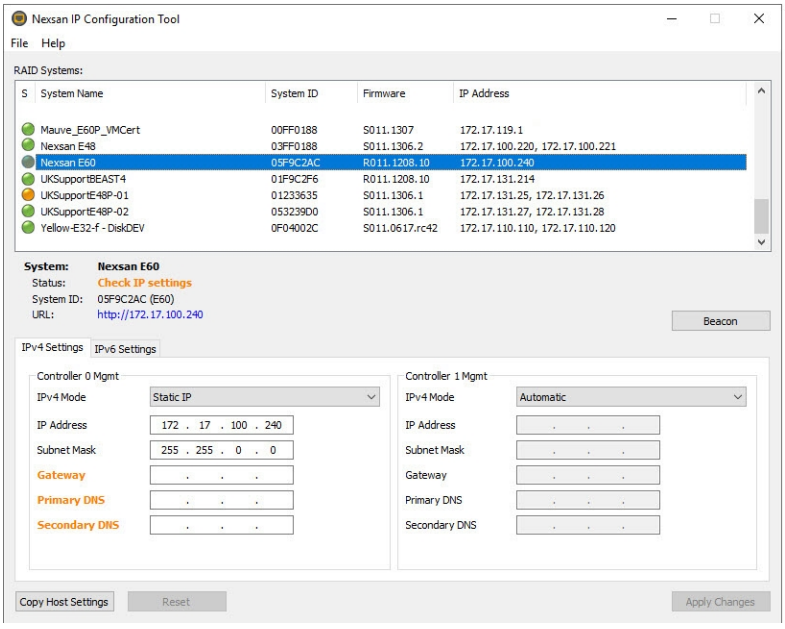
IP Configuration tool

The Nexsan IP Configuration Tool enables you to configure Nexsan Storage Systems for use on your network, as described Configure the Nexsan Storage System IP address on page 18. The tool automatically detects all systems connected to the subnet and displays their status and IP settings.

► **To launch the IP Configuration tool:**

- On the Windows workstation where the Nexsan Storage Tools are installed, click **Start > Nexsan > IP Configuration Tool**.

Figure B-7: Nexsan IP Configuration Tool



For details about the IP Settings tool and how to configure a new RAID system, see the Nexsan Storage Tools Help.

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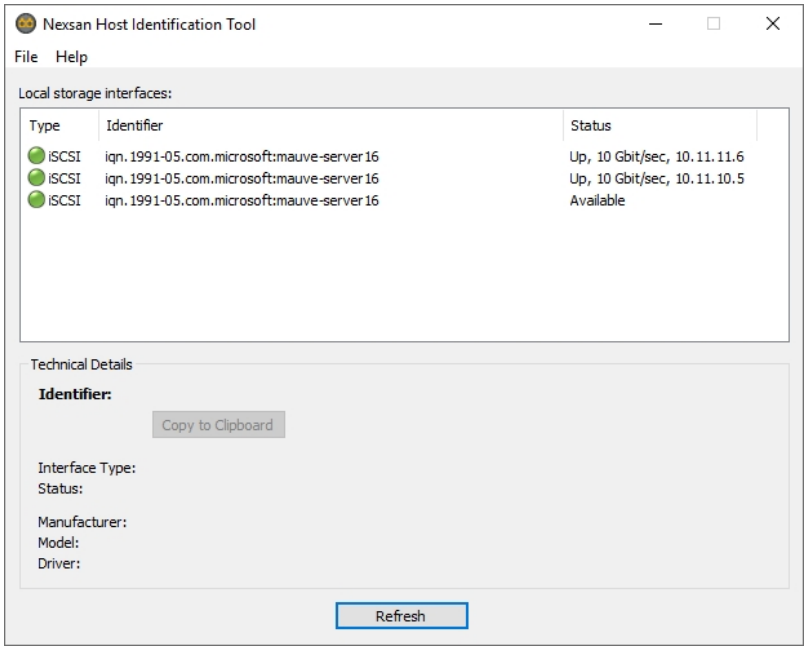
Host Identification tool

The Nexsan Host Identification tool enables you to view the status and identifiers for local storage interfaces. You must have Administrator privileges on the local computer for all adapters to be listed.

To launch the Host Identification tool:

- On the Windows workstation where the Nexsan Storage Tools are installed, click **Start > Nexsan > Host Identification Tool**.

Figure B-8: Nexsan Host Identification Tool



B

PowerShell

The Nexsan Storage Tools include a set of PowerShell cmdlets to manage Nexsan Storage Systems through the Storage Management API. These cmdlets are designed to be used in conjunction with the Windows Storage cmdlets.

To display a list of all available Nexsan PowerShell cmdlets, use the following PowerShell command:

```
Get-Command -Module NexsanRaid
```

For help and syntax information about a specific Nexsan PowerShell cmdlet, use one of the following PowerShell commands:

```
Get-Help <cmdletname>

Get-Help <cmdletname> -examples

Get-Help <cmdletname> -detailed

Get-Help <cmdletname> -full
```

Commonly-used Nexsan PowerShell commands include:

Table B-9: Common Nexsan PowerShell commands

Cmdlet	Description
`Register-NexsanRaidSubSystem`	Registers a specific Nexsan Storage System or updates security credentials. The credentials will be stored for the local computer (that is, any local administrator will also be able to administer the Nexsan Storage System).
`Unregister-NexsanRaidSubSystem`	Unregisters a specific Nexsan Storage System from the local computer.
`Get-NexsanRaidProvider`	Gets properties for the Nexsan Storage System SMP provider.
`Set-NexsanRaidProviderAttributes`	Sets attributes for the Nexsan Storage System SMP provider. The new attributes will be stored for the local computer.
`Get-NexsanRaidVirtualDisk`	Gets properties for virtual disks managed by the Nexsan Storage System SMP provider.
`Set-NexsanRaidVirtualDisk`	Sets properties for virtual disks managed by the Nexsan Storage System SMP provider.

PowerShell Storage Management requires Windows 8.1 or later, or Windows Server 2012 or later. The PowerShell session must have Administrator privileges to manage Nexsan Storage Systems.

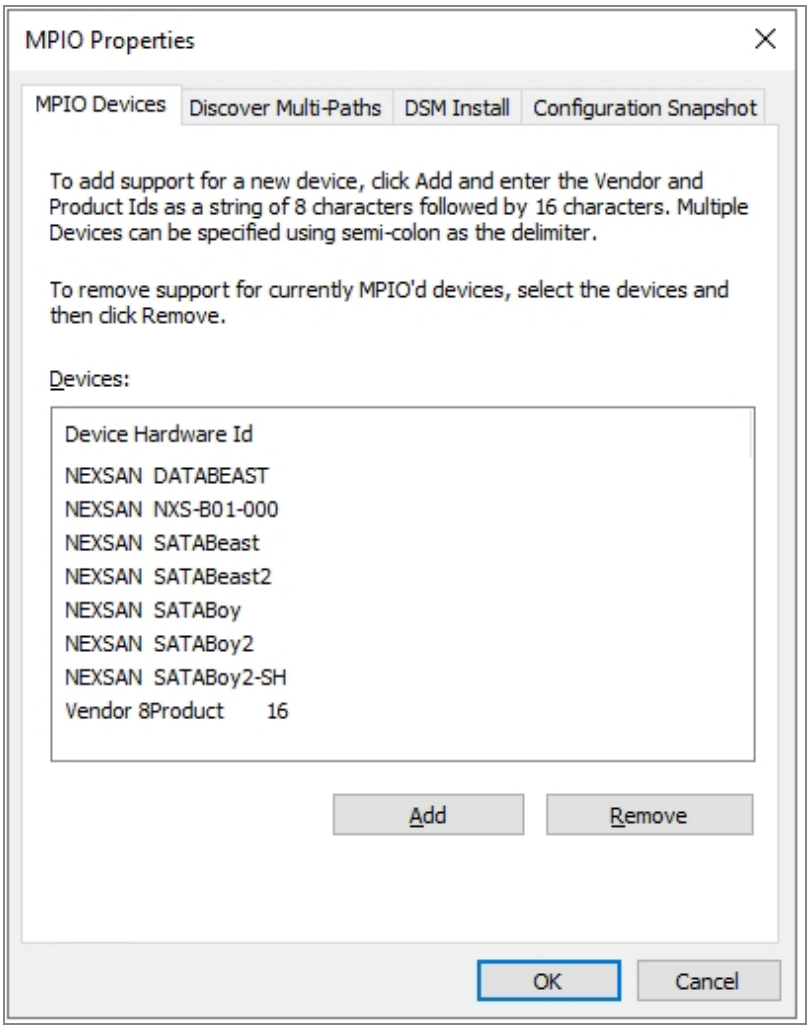
Multipathing

Multipathing enables a system to load-share over multiple host links and to switch paths in the event of problems on the storage area network (SAN).

Multipathing support depends upon the Windows operating system of the host, and is managed using Windows tools.

The Windows MPIO app shows the MPIO configuration. Click Windows **Search > MPIO**.

Figure B-10: MPIO Properties



Windows Server 2016 and later

The Multipathing (MPIO) component installs the Microsoft DSM and configures it for Nexsan Storage Systems.

Windows Server 2012 R2 and earlier

The Multipathing (MPIO) component installs a Nexsan-specific DSM and Nexsan MultiSan IO tool to manage multipathing.

For details, see the *Nexsan High-Density Storage Multipathing Best Practices Guide* and Nexsan Storage Tools Help.

Provisioning (VDS)

The Provisioning (VDS) feature enables you to create and manage storage volumes and snapshots using Virtual Disk Service on connected Nexsan Storage Systems directly on a Windows server. For storage provisioning to work, the host trust setting must be appropriately configured (see Security on page 228).

Here is an overview of the features included with these tools:

Table B-11: Provisioning (VDS) features

Features	Description
Creating Volumes	Provision new storage volumes using unallocated capacity on existing Nexsan Storage Systems.
Expanding or Migrating Volumes	Expand existing storage volumes using free space on the same Nexsan Storage System, move them between Nexsan Storage Systems or RAID levels, or from non-Nexsan storage to a Nexsan Storage System.
Deleting Volumes	Remove existing storage volumes, making the space available for other uses.
Advanced Provisioning	Perform advanced storage configuration tasks including managing hot-spares and setting up clustered storage.

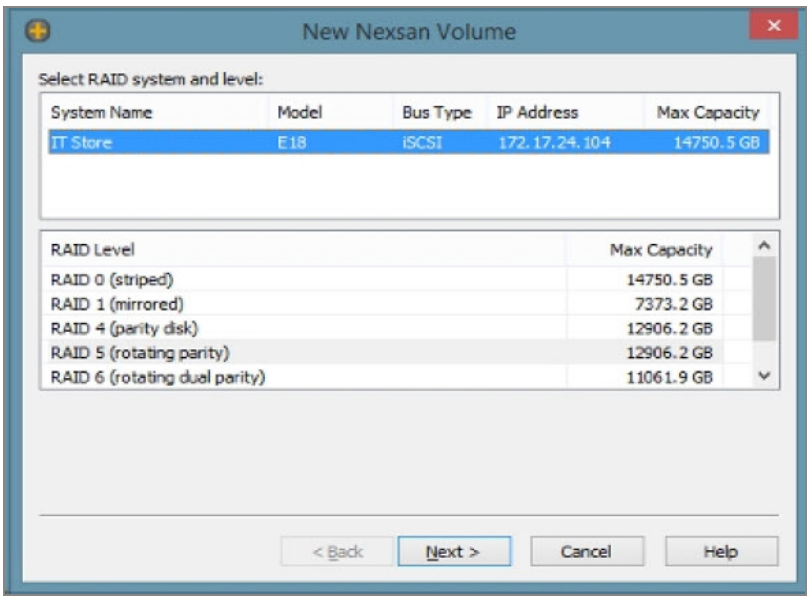
To create a new volume:

- Launch the Nexsan Provisioning wizard in either of the following ways:

  a. From the **Windows Start** menu, select **All Programs > Nexsan > Create New Nexsan Volume**, or

  b. In **Nexsan Storage Manager**, right-click a system and select **New Volume**.

Figure B-12: New Nexsan Volume window

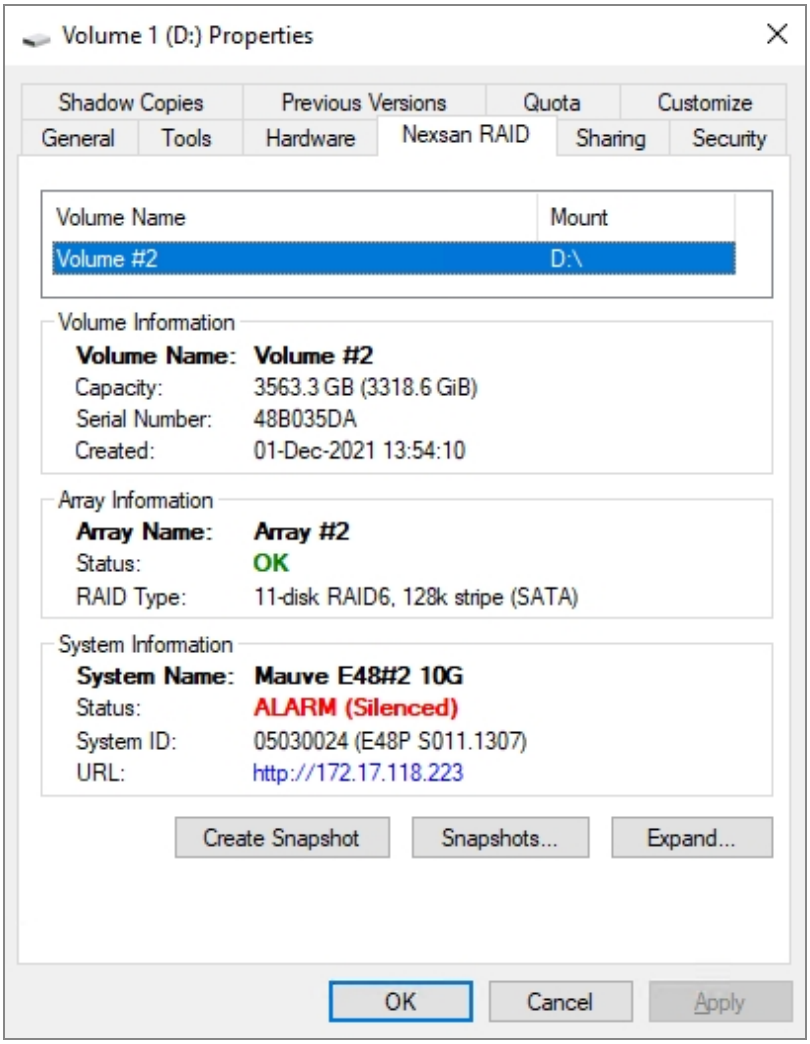


This feature is only available on Windows Server. For details, see the Nexsan Storage Tools Help.

Snapshots (VSS)

You can use the Snapshots (VSS) tool to manage volumes on Nexsan Storage Systems that support hardware snapshots. Supported operations include creating, scheduling, restoring, mounting, deleting, and offlining hardware snapshots, as shown in Figure B-14Manage Snapshots on the facing page. For detailed information and procedures, see the Nexsan Storage Tools Help.

Figure B-13: Volume Properties > Nexsan RAID tab



To create a snapshot immediately, click **Create Snapshot**.

► To launch Nexsan Snapshot Management:

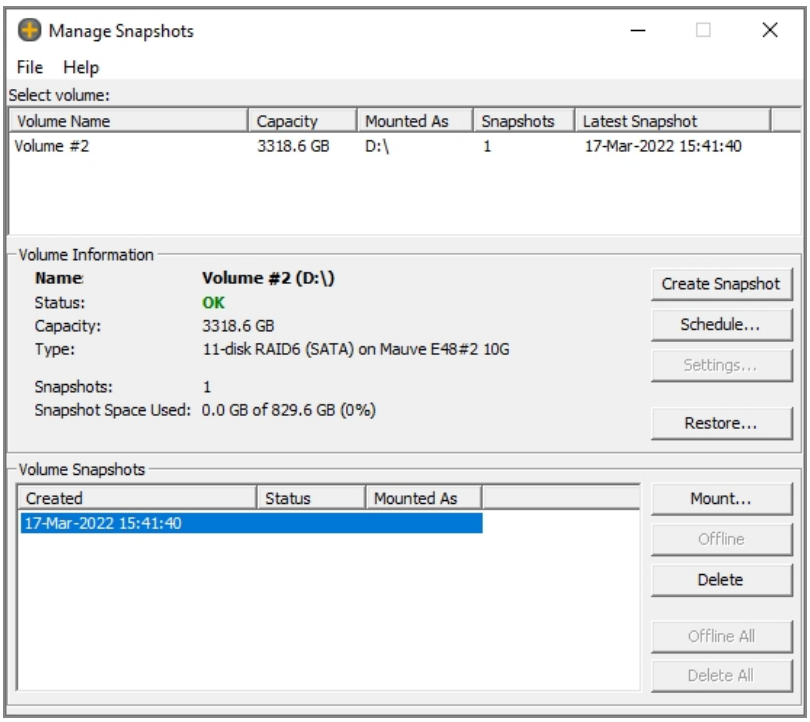
1. Do any of the following:

From Windows Explorer

a. In Windows **Explorer**, right-click the volume you want to manage, and select **Properties**. The *Volume Properties* window opens.

b. Select the **Nexsan RAID** tab and click **Snapshots**. The **Manage Snapshots** dialog opens.

Figure B-14: Manage Snapshots



From the Windows Disk Management application

a. In Windows **Disk Management**, right-click the disk or logical volume to manage, and select **Properties**.

b. Select the **Nexsan RAID** tab and click **Snapshots**. The **Manage Snapshots** dialog opens, as shown in Figure B-14.

From Nexsan Storage Manager

a. In **Nexsan Storage Manager**, right-click a system and select **Snapshots**.

b. The **Manage Snapshots** dialog opens, as shown in Figure B-14.

► To create and manage snapshots:

In the **Manage Snapshots** dialog, you can do any of the following:

- Create snapshots
- Set up a schedule for snapshot creation
- Restore snapshots

- Mount snapshots
- Delete snapshots
- Take snapshots offline

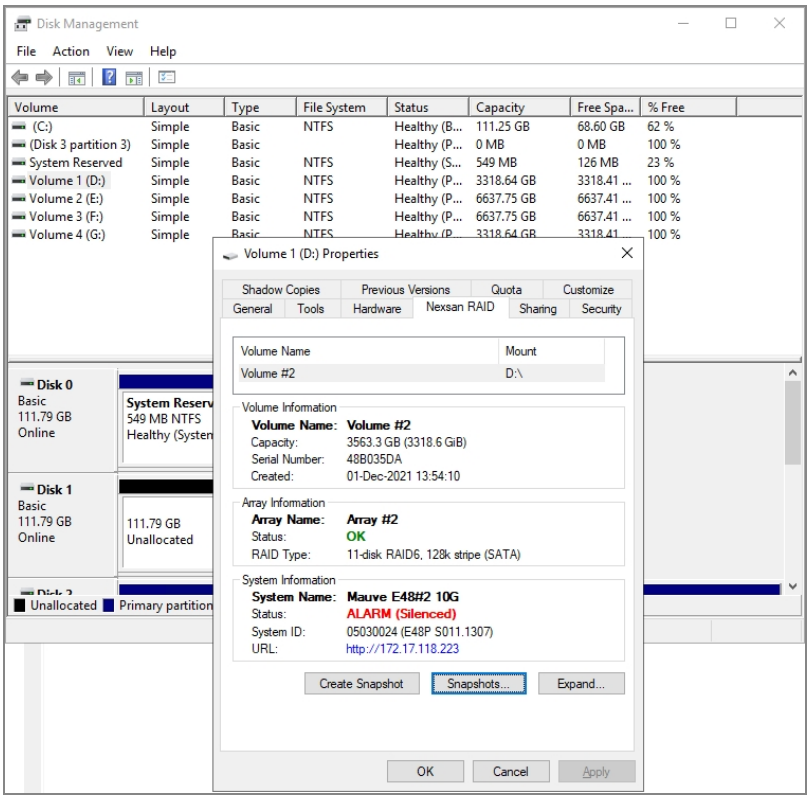
To manage a locally-mounted snapshot:

- In **Windows Explorer**, right-click the snapshot to manage, and select **Properties**.

  Select the **Nexsan RAID** tab and click **Delete** to permanently delete the snapshot, or **Rewind** to return it to its original state.

- In Windows **Disk Management**, right-click the snapshot disk or logical volume to manage, and select **Properties**.

Figure B-15: Disk Management > Properties



Select the **Nexsan RAID** tab and then click **Snapshots** to open the **Manage Snapshots** window, shown in Figure B-14. permanently delete the snapshot, or **Rewind** to return it to its original state.

- In **Nexsan Storage Manager**, right-click a system and select **Snapshots**.

For details, see the Nexsan Storage Tools Help.

This feature is only available on Windows Server.

B

Management (SMP)

The Management (SMP) feature enables Windows Server to run the Nexsan Storage Management Provider (SMP). The management server does not need to be connected to the SAN, but must be able to contact the Nexsan Storage System management IP addresses.

Nexsan Storage Tools integrate with the native storage management features of Windows Server, allowing Nexsan Storage Systems to be managed through the Server Manager console, PowerShell cmdlets, and third-party applications and tools that use the Storage Management API, such as System Center Virtual Machine Manager.

Nexsan Storage Systems are discovered and authenticated automatically and appear in the Server Manager console for standalone servers and storage using the default settings, but additional configuration may be needed if non-default security settings have been chosen. Managing clusters and multiple servers requires additional configuration.

This feature is only available on Windows Server.

For details, see the Nexsan Storage Tools Help.

B

Appendix C

RAID levels

The RAID arrays in Nexsan Storage Systems can be configured in various RAID levels. Except where noted below, all RAID levels require a minimum of two disk drives. The levels available are described in the following table:

Table C-1: RAID levels

RAID level	Description
RAID 0	Provides data striping. Blocks of data from each file are spread out across multiple disk drives. It does not provide redundancy. This improves the speed of both read and write operations, but does not provide fault tolerance. If one drive fails, all data in the array is lost.
RAID 1	Provides disk mirroring. Files are written identically to two or more disk drives. If one drive fails, the other drive still contains the data. This improves the speed of read operations, but not write operations.
RAID 10	Provides a combination of RAID levels 0 and 1. Data is both striped and mirrored. RAID level 10 is used whenever an even number of drives (minimum of four) is selected for a RAID 1 array.
RAID 4	Provides block level striping similar to RAID level 0, but with a dedicated parity disk. If a data disk fails, the parity data is used to recreate the data on the failed disk. Because there is only one parity disk, this RAID level can slow down write operations.
RAID level 5	Provides data striping at the byte level and also stripe error correction information. Parity data, instead of being stored on only one disk, is distributed among all disks in the array. This level provides excellent performance. It is one of the most popular implementations of RAID.
RAID level 5S	Provides the same level of fault tolerance as RAID 5, but stores user data on HDDs and parity data on a single SSD. This provides a significant improvement to random write performance compared to RAID 5 using a similar total number of disks. RAID level 5S requires a minimum of two HDDs and exactly one SSD disk.

RAID level	Description
RAID level 6	Provides block level data striping with parity data distributed across all disks. For additional redundancy, each block of parity data exists on two disks in the array instead of only one. RAID level 6 requires a minimum of four disk drives. RAID 6 is recommended over RAID 5 because of its increased fault tolerance of the second parity disk.
RAID 6S	Provides the same level of fault tolerance as RAID 6, but stores user data on HDDs and parity data across two SSDs. This provides a significant improvement to random write performance compared to RAID 6 using a similar total number of disks. RAID level 6S requires a minimum of three HDDs and exactly two SSDs.

Note RAID levels 2 and 3 are not available on Nexsan Storage Systems.

Glossary

1

10Gb Ethernet
: A 10 gigabit per second (Gb/s) Ethernet connection using either fibre-optic cables or twisted-pair copper wires.

10Gb iSCSI
: An iSCSI connection that runs on a 10Gb Ethernet network.

10GE
: See “10Gb Ethernet” and “10Gb iSCSI”.

2

2-Port Active-Active (2PAA) mode
: A system mode for Nexsan Storage Systems. In this mode, each RAID controller operates as an independent node, but only one port is active on each controller. The second port operates in passive mode. Port 0 is active on controller 0, and port 1 is active on controller 1. The volumes are mapped to the active port on their owning controller. When one controller fails, the passive port on the other controller activates and takes over the host port functions of the failed controller. In a switched environment, failover is completely transparent to the hosts.

4

4-Port Active-Active (4PAA) mode
: A system mode for Nexsan Storage Systems. In this mode, each RAID controller operates as an independent node, and all ports are active. Port 0 is the primary port on controller 0, and port 1 is the primary port on controller 1. The volumes must be mapped to at least one port on its owning controller and to the secondary port on the other controller, which requires the host to be configured for multipathing. When one controller fails, the secondary port on the other controller takes on the host address of the primary port on the failed controller, allowing host I/O to continue (see failover); the host sees the storage become active through its second path.

A

active drawer
: A slide-out container on the front of Nexsan E-Series Storage Systems that houses the disk drives used by the system for data storage. Also sometimes referred to as a “pod” in event logs and other internal statistics.

All Ports All LUNs (APAL) mode
: A system mode for Nexsan Storage Systems. In this mode, the entire system operates as a

single node. The volumes can be mapped to any or all ports on both RAID controllers. When a controller fails, the ports on that controller become inaccessible. However, if the volumes are mapped to ports on the other controller as well (which requires the host to be configured for multipathing), they remain accessible to the host, which sees the storage become active through its second path.

array
A linked group of one or more physical, independent hard disk drives. See also “RAID”.

AutoMAID
Nexsan’s proprietary system which reduces the energy consumption of disk drives that are in an idle state. AutoMAID is organized into four levels, which can be configured, customized, or even overridden by the customer according to performance needs. Each AutoMAID level reduces disk drive energy consumption further than the last. AutoMAID is referred to as “Nexsan AutoMAID energy-saving technology” in sales, marketing, and media. Nexsan AutoMAID technology incorporates disk protection functions not found in other MAID systems. See also “MAID”.

B

bit
The smallest unit of digital data, representing a 0 or a 1. Abbreviated “b”.

block
See “data block”.

byte
A unit of data that is 8 bits long. Often used for alphanumeric characters. Abbreviated “B”.

C

cache
Reserved areas of memory that are used to speed up instruction execution, data retrieval, and data updating. In Nexsan Storage Systems, a memory unit in the RAID controller that temporarily holds user data.

CHAP
Challenge-Handshake Authentication Protocol. A method of authenticating any two devices that wish to communicate securely over a network. CHAP uses a “shared secret”, which is a plain text key known by both devices, to authenticate the connection.

community
The administrative relationship between the SNMP agent and the SNMP manager. Community provides a means by which an SNMP agent can correlate an incoming request to an SNMP manager. Through this correlation, the SNMP agent can determine the level of authorization provided to the incoming request.

D

daisy-chain
The attachment of hardware to a computing system by connecting each component to another similar component rather than directly to the computing system that uses the component. Only the last component in the chain directly connects to the computing system. For example, up to two Nexsan Storage Expansions can be daisy-chained to the back of one Nexsan Storage System.

DAS
See “direct-attached storage”.

DAT
The file format of text-based event logs downloaded from Nexsan Storage Systems and of snapshot and replication license files uploaded to Nexsan Storage Systems.

data block
A sequence of data that is a specific number of bits (b) or bytes (B) long. When data is written to a disk drive, it is organized into data blocks so that it can be stored and retrieved

more easily. This is not the same thing as data striping, as sequential data blocks are all stored on the same disk drive. Sometimes a data block can be “bad”; this does not necessarily mean that the data is bad, only that the specific part of the surface of a storage disk is unable to be read from or written to. Most disk drives automatically quarantine bad blocks as soon as they are detected so that they do no disrupt data writing or retrieval.

data striping
: The technique of segmenting logically sequential data, such as a file, in a way that sequential segments are stored on and retrieved from different physical storage devices. Each segment is called a “stripe”. Stripes on different drives can be accessed at the same time, increasing throughput and reducing access delays. See also “stripe size” and “stripe width”.

Daytime
: Short for “Daytime Protocol”. One of two protocols for synchronizing a Nexsan Storage System’s internal clock with that of a time server.

dedicated spare
: See “spare disk”.

DHCP
: Dynamic Host Configuration Protocol. A communication protocol that centrally manages and automates the assignment of IP addresses on a network.

direct-attached storage
: A digital storage system directly attached to a server or workstation, without a storage network in between. This term is mainly used to differentiate non-networked storage from storage area networks (SAN) and network-attached storage (NAS).

DNS
: See “Domain Name System”.

Domain Name System
: A program or computer server that implements a name-service protocol. It maps a human-recognizable identifier to a system-internal, often numeric, identification or addressing component (usually an IP address).

drive drawer
: See “active drawer”.

Dual Controller Non-Redundant (DCNR) mode
: A system mode for Nexsan Storage Systems. In this mode, both RAID controller are active, but each controller operates as an independent node, and all ports are independent from each other. The volumes can only be mapped to ports on the controller that owns the Array. They become inaccessible if the controller fails.

duplex
: A communication system where data flows in both directions between two devices. There are two configurations. “Half duplex” provides communication in both directions, but not at the same time; when one device transmits, the other device can only receive, and vice versa. For example, walkie-talkies, police radios, and other two-way radio systems use half duplex communication. “Full duplex” enables both devices to send information simultaneously. For example, telephones and video-conferencing systems use full-duplex communication.

E

E-Series
: The series of Nexsan Storage Systems that includes the Nexsan E18, E48, and E60 Storage Systems (and their V, VT and P variants), the Nexsan E32V, and the Nexsan E18X, E48X, and E60X Storage Expansions (and their XV variants). Nexsan E-Series systems feature Active Drawer Technology, Anti-Vibration Design, and CoolDrive Technology.

emergency firmware
: In Nexsan Storage Systems, an extra piece of firmware that enables the Nexsan Storage System to be started up in emergency mode. Emergency firmware can be uploaded to the storage system at any time without having to restart.

emergency mode
: In Nexsan Storage Systems, a mode into which the storage system can be started if the main firmware becomes corrupt and the storage system becomes inaccessible. Emergency mode requires the presence of emergency firmware. Emergency mode enables the user to upload new firmware to the storage system so that it can operate normally.

encrypted array
: On Nexsan E-Series Storage Systems, a RAID array that is entirely composed of self-encrypting disks (SEDs) and has been encrypted at the hardware level by using the Configure Array Encryption page in the graphical user interface (GUI). User data on disks in an encrypted array cannot be read without the accompanying encryption key.

encryption
: A technology which protects information by converting it into unreadable code that cannot be deciphered easily by unauthorized people. Accessing encrypted information requires the use of an encryption key.

encryption key
: On Nexsan E-Series Storage Systems, a data file (.dat) that enables user data to be read from and written to an encrypted array.

End User License Agreement
: A type of license used for most software. It is a legal contract between the manufacturer/author and the end user of an application. It details how the software can and cannot be used and any restrictions that the manufacturer/author imposes. The user has the option of not accepting the End User License Agreement, in which case the user surrenders the rights and ability to use the software. End User License Agreements also protect both parties from liability if the software is used in a way not intended by the manufacturer/author.

Ethernet
: A system for connecting a number of computer systems to form a local area network (LAN), with protocols to control the passing of information and to avoid simultaneous transmission by two or more systems. Supports data transfer rates of 10, 100, 1,000, and 10,000 megabits per second (Mb/s). 10, 100, and 1,000Mb/s networks are often referred to as 10BASE-T, 100BASE-T, and 1000BASE-T, respectively. 10,000Mb/s networks are usually referred to as 10Gb Ethernet or 10GbE.

Ethernet address
: See “MAC address”.

EULA
: See “End User License Agreement”.

event log
: A record of system events that tracks informational, warning, and error events, such as when significant milestones are reached or when errors occur during activity.

Expansion Controller
: A module of Nexsan High-Density Storage Expansions that connects via SAS to a Nexsan Storage System’s RAID controller.

F

failover
: The capability of a system to switch over automatically to a redundant or standby system upon the failure or abnormal termination of the previously active system. In Nexsan Storage Systems, failover describes one RAID controller taking over the host connections and RAID set control of the other RAID Controller when that controller fails.

fault-tolerant
: Systems that can continue operating when one or more parts fail are said to be “fault-tolerant”. In Nexsan Storage Systems, the term can be applied to two different areas: the individual arrays and the storage system as a whole. Arrays are said to be fault-tolerant when data is preserved even if one or more disks fail. The storage system as a whole is said to be fault-tolerant if the system mode is set to 2-Port Active-Active (2PAA) mode, 4-Port Active-Active (4PAA) mode, or All Ports All LUNs (APAL) mode and volumes are properly mapped.

FC port
: See “Fibre Channel port”.

FCC
: The Federal Communications Commission; the United States federal agency that regulates electromagnetic emissions.

Fibre Channel
: A gigabit (Gb) speed network technology primarily used for storage networking and the current standard connection type for storage area networks (SANs). Despite its name, Fibre Channel signaling can run on both twisted-pair copper wire and fibre-optic cables.

Fibre Channel port
: Any entity that actively communicates over a Fibre Channel network. Usually implemented in a device such as disk storage or a Fibre Channel switch. Depending on the system, the Fibre Channel ports on Nexsan Storage Systems can support 2Gb/s, 4Gb/s, or 8Gb/s connections.

Fibre Channel switch
: A network switch compatible with the Fibre Channel protocol. Enables the creation of a Fibre Channel network, which is currently the core component of most storage area networks (SANs).

Fibre Channel topology
: The method of connecting Fibre Channel ports together. A point-to-point (P2P) topology connects two devices directly to each other, with no hub or switch in between. A loop topology usually connects two or more devices in a ring, but can also connect two devices directly to each other just like a P2P topology can. A full-fabric topology connects multiple devices in a network.

firewall
: A device or set of devices, either hardware- or software-based, designed to permit or deny network transmissions based upon a set of rules. Used to protect networks from unauthorized access while permitting legitimate communications to pass. Many personal computer operating systems include software-based firewalls to protect against threats from the public Internet.

firmware
: Small, fixed software applications, stored in read-only memory (ROM) or programmable read-only memory (PROM), that internally control various electronic devices. In Nexsan Storage Systems, each RAID controller is loaded with firmware to control its functionality. Occasionally, this firmware must be updated using the Update Firmware page in the graphical user interface.

frame
: A data packet on an Ethernet or Fibre Channel link. Each frame encapsulates a piece of data with sender and destination information, along with a data integrity check routine. Normal frames can contain data up to 1,500 bytes in length. Jumbo frames can contain larger data payloads (9,000 bytes on Nexsan Storage Systems) and are supported on 1Gb/s and 10Gb/s Ethernet (10GbE) networks. Jumbo frames are typically used to boost performance of iSCSI traffic.

FUA
: Force Unit Access. A bit in some SCSI commands which forces a storage device to bypass cache memory and directly access the storage medium.

full duplex
See “duplex”.

G

gateway
An internetworking system that joins together the different subnets of a network or two networks that use different base protocols. A network gateway can be implemented completely in software, completely in hardware, or as a combination of both.

Gb
Gigabit. Approximately one billion (1,000,000,000) bits.

GB
Gigabyte. Approximately one billion (1,000,000,000) bytes. Used to describe the storage capacity of hard disk drives. A gigabyte is usually computed as 10^9 (1,000,000,000) bytes, but can also be computed as 2^30 (1,073,741,824) bytes (often called a “binary gigabyte” and abbreviated GiB).

Gb/s
Gigabits (Gb) per second. Used to describe the speed of network data transmission.

GB/s
Gigabytes (GB) per second. Used to describe the speed of network data transmission. 1 GB/s is eight times faster than 1Gb/s.

GBIC
See “gigabit interface converter”.

GiB
A binary gigabyte, computed as 2^30 (1,073,741,824) bytes. See “GB”.

gigabit interface converter
A standard for transceivers, commonly used with Gigabit (Gb) Ethernet and Fibre Channel, with a hot-swappable electrical interface. Gigabit interface converter ports can support a wide range of physical media, from copper to optical fibre, at lengths of up to hundreds of kilometers.

graphical user interface
A type of user interface that enables users to interact with electronic devices using images rather than text commands. Nexsan Storage Systems use a graphical user interface for system configuration.

GUI
See “graphical user interface”.

H

half duplex
See “duplex”.

host
A computer, server, or other device which accesses the volumes in a Nexsan Storage System. The host can be connected to the Nexsan Storage System with a Fibre Channel connection, an iSCSI connection, or a SAS connection.

Host Identification Tool
A Nexsan Storage Tool that enables users to view the status and identifiers for local storage interfaces (Fibre Channel, iSCSI, SAS).

hot-plug
To insert a new piece of hardware into a computerized system while the system is running. See also “hot-swap”.

hot-swap
To replace a failed or faulty component of a computerized system while the system is running. See also “hot-plug”.

hot spare
A spare disk in a RAID array designated as "hot standby", available to replace a failed disk without requiring a system shutdown.

HTTP
: HyperText Transfer Protocol. A networking protocol for distributed, collaborative hypermedia information systems such as the World Wide Web.

HTTPS
: HyperText Transfer Protocol Secure. A combination of HTTP and SSL used to provide encrypted communication and secure identification of a network Web server.

I

I/O
: Input/Output. The communication between an information processing system (such as a computer or a Nexsan Storage System's RAID controller), and the outside world (either an operator or another information processing system). Inputs are the signals or data received by the system, and outputs are the signals or data sent from it.

IP address
: Internet Protocol address. A numerical label assigned to each device (such as a computer, printer, or Nexsan Storage System) on a computer network that uses TCP/IP for communication.

IP Configuration Tool
: A Nexsan Storage Tool that enables users to configure the IP address of a Nexsan Storage System on the local subnet.

IPv6
: Internet protocol v.6, which supports 128-bit addresses, was ratified by the IETF to respond to the shortage of IP addresses under the IPv4 protocol.

iSCSI
: Internet Small Computer System Interface. A transport protocol that provides for the SCSI protocol to be carried over a TCP/IP network.

J

jumbo frame
: See "frame".

K

Kb
: Kilobit. Approximately one thousand (1,000) bits.

KB
: Kilobyte. Approximately one thousand (1,000) bytes. Used to describe the storage capacity of hard disk drives and the stripe size in RAIDs. A kilobyte is usually computed as 10^3 (1,000) bytes, but can also be computed as 2^10 (1,024) bytes (often called a "binary kilobyte" and abbreviated KiB).

KiB
: A binary kilobyte. Computer as 2^10 (1,024) bytes. See "KB".

L

LAN
: See "local area network".

load balance policy
: In multipathing, a set of instructions for the multipathing software to follow in order to ensure that I/O transfers through host paths are optimally routed and that no one path gets overloaded with data.

local area network
: A computer network that links devices within a small geographic area, such as a building or group of adjacent buildings.

logical unit
: See "volume".

LUN

Logical Unit Number. An identification scheme for storage disks that supports a small number of logical units. On Nexsan Storage Systems, LUNs are assigned to volumes and are addressed as LUN 0 through 254.

M

MAC address

Media Access Control address. A unique, usually unchanging, identifier assigned to network interfaces for communications on the physical network segment. MAC addresses are most often assigned by the manufacturer of a network interface device and are stored in its hardware, read-only memory (ROM), or some other firmware mechanism.

MAID

Massive Array of Idle Disks. A storage array where each drive is only spun up on demand as needed to access the data stored on that drive.

Management Information Base

A virtual database used for managing objects that can be exchanged between the SNMP manager and any SNMP agents. These objects deal with resources (for example, links or connections) that can be managed on a node. Each object defined in the MIB is assigned a unique Object Identifier (OID) in the MIB object tree.

Management Information Base II

A specific portion of the entire Management Information Base, as defined in RFC 1213, which deals with TCP/IP-related attributes. The SNMP agent enables network management stations to retrieve or set various management objects (attributes). These objects are defined in the MIB.

Mb

Megabit. Approximately one million (1,000,000) bits.

MB

Megabyte. Approximately one million (1,000,000) bytes. Used to describe the storage capacity of hard disk drives. A megabyte is usually computed as 10^6 (1,000,000) bytes, but can also be computed as 2^20 (1,048,576) bytes (often called a “binary megabyte” and abbreviated MiB).

Mb/s

Megabits (Mb) per second. Used to describe the speed of network data transmission.

MB/s

Megabytes (MByte) per second. Used to describe the speed of network data transmission. 1 MB/s is eight times faster than 1Mb/s.

MiB

A binary megabyte. Computed as 2^20 (1,048,576) bytes. See MByte.

MIB

See “Management Information Base”.

MIB-II

See “Management Information Base II”.

MIME

Multipurpose Internet Mail Extensions. An Internet standard that extends the format of email to support text in character sets other than ASCII, non-text attachments, message bodies with multiple parts, and header information in non-ASCII character sets.

mirror

In RAID levels 1 and 10, the method of providing fault tolerance for a RAID set. All data is written to two drives in the RAID set, so that if one drive fails, the data can be read from the other write location.

multipathing

A means of presenting volumes to a particular host or hosts via redundant data paths. The intent is to maintain I/O in the event of a path failure. Multipathing may also be used to

increase performance. If not configured properly, multipathing may lead to data corruption, as an operating system may not inherently realize that the redundant paths are of the same volume and thus could treat them as different volumes.

Multipathing IO (MPIO)
: A Nexsan Storage Tool that enables Nexsan Storage Systems to load-share over multiple host links (using a load balance policy) and to switch paths in the event of problems on the storage area network.

N

NAS
: See “network-attached storage”.

network-attached storage
: File-level computer data storage connected to a computer network providing data access to clients on the network. Network-attached storage uses specialized hardware, software, or both, and is often a specialized device built from the ground up for storing and serving files.

network gateway
: See “gateway”.

Nexsan Storage Tools
: A suite of tools that, in addition to the graphical user interface, provide ways to manage Nexsan Storage Systems.

NMP (Nexsan Management Protocol)
: Nexsan’s network based protocol for configuration and monitoring of Nexsan Storage Systems.

O

Object Identifier
: In an SNMP Management Information Base, the unique number identifying a variable that can be read or set via SNMP.

OID
: See “Object Identifier”.

P

parity
: In RAID levels 2 through 6, the method of providing fault tolerance for a RAID set. RAID parity is created using either a Boolean XOR (exclusive or) operation (for RAID 2 through 5) or Reed-Solomon error correction (for RAID 6). Data from a failed disk can be reconstructed using parity data onto a spare disk, preventing data loss.

parity scrub
: A RAID data verification scheme which checks all parity data in a RAID and makes sure that it is correct. In Nexsan Storage Systems, the parity scrub utility also performs a surface scan.

pod
: See “active drawer”.

pool spare
: See “spare disk”.

power supply unit
: A module that regulates electrical power to the components of Nexsan Storage Systems.

provisioning
: Directly accessing and configuring RAIDs and volumes on a Nexsan Storage System without use of the graphical user interface. See also “VDS Storage Provisioning”.

PSU
: See “power supply unit”.

R

RAID
: Redundant Array of Independent Disks. A system using multiple hard drives organized into a single logical unit for the sharing or replication

of data in order to increase data integrity, fault tolerance, and throughput. In the event of failure of one of the RAID disks, data should not be lost. Also referred to as a RAID set. RAIDs are organized into RAID levels, which describe their architecture and configuration.

RAID controller
: A hardware device, software program, or combination of the two which manages the physical disk drives in an array and presents them as a single logical unit to attached devices. The RAID Controllers in Nexsan Storage Systems are hardware modules. Nexsan RAID Controllers also provide connections for system administration and configuration.

RAID level
: A numeric indicator of the architecture used by a RAID. RAIDs can be built using any combination of striping, mirroring, and parity. The levels are numbered from 0 through 6. Some RAID levels can also be combined, and these configurations are usually referred to with a two-digit number. For example, RAID 10 = RAID 1 + RAID 0.

RAID set
: See “RAID”.

read-only memory (ROM)
: A memory chip that stores values but cannot be changed by normal program instructions. Values in read-only memory are nonvolatile; they are retained even when the system is powered down.

reboot
: To restart a computer or computerized electronic device. See also system reboot.

redundant
: The duplication of critical components or functions of a system with the intention of increasing the reliability of the system. RAID sets are redundant when one or more spare disks are available to it.

replica
: A duplicate of a volume on a Nexsan Storage System copied onto another Nexsan Storage System. At the time of replication, replicas contain all of the data on the original volume. Replicas can be promoted to full volumes, after which replication between the two volumes is no longer possible.

replication
: A function of Nexsan Storage Systems that enables the user to make replicas of a volume onto another Nexsan Storage System to protect data in the event of a disaster or as part of a backup and restore architecture.

rolling restart
: On Nexsan Storage Systems, a method of rebooting both RAID controllers in a storage system so that host I/O is not interrupted. Rolling restart is only available if system mode is set to 2-Port Active-Active (2PAA) mode, 4-Port Active-Active (4PAA) mode, or All Ports All LUNs (APAL) mode.

S

SAN
: See “storage area network”.

SAS
: Serial Attached SCSI. A serial version of the SCSI interface. A point-to-point architecture that uses a disk controller with four or more channels that operate simultaneously. Each full-duplex channel, known as a SAS port, transfers data at 1.5Gb/s, 3Gb/s, or 6Gb/s in each direction. SAS also supports Serial ATA (SATA) drives, which can be mixed with SAS drives in a variety of configurations.

SATA
: Serial Advanced Technology Attachment. A connection standard for fixed and removable hard disk drives.

SCSI
Small Computer System Interface. A collection of standards and proposed standards for input/output (I/O) communication, primarily intended for connecting storage subsystems or devices to hosts.

self-encrypting disk (SED)
A disk drive with special firmware that enables encryption of the contents without the use of specialized encryption software. Self-encrypting disks are required for encrypted arrays to be created on Nexsan E-Series Storage Systems.

SFP
Small Form-factor Pluggable. A type of gigabit interface converter (GBIC) in a compact form factor. The Fibre Channel ports or 10Gb iSCSI ports on Nexsan storage devices are SFPs.

Shell Extensions
A Nexsan Storage Tool that adds an extension to the Windows shell to provide information about the Nexsan Storage System associated with a particular disk drive.

Single Controller Mode
A system mode for Nexsan Storage Systems. In this mode, only one RAID controller is active, and failure of this controller makes all arrays and volumes inaccessible.

SLAAC
Stateless Address Autoconfiguration was designed as a simplified approach to implementing IPv6 auto-addressing.

SMTP
Simple Mail Transfer Protocol. An Internet standard for electronic mail (email) transmission across TCP/IP networks.

snapshot
A "picture" of the data and state of a volume at a particular point in time using a copy-on-write function to capture only data that has changed since the last snapshot. Snapshots can be used for many purposes, including backups, restores, and "sandboxing".

SNMP
Simple Network Management Protocol. An Internet-standard protocol for managing devices on TCP/IP networks. SNMP is based on the manager/agent model and consists of an SNMP manager, an SNMP agent, a Management Information Base, managed SNMP devices, and the network protocol.

SNMP agent
Provides the interface between the SNMP manager and the physical devices being managed. Enables network management stations to retrieve or set the values various management objects (attributes) that are applicable to the networking environment by referencing their Object Identifiers.

SNMP manager
A software application or suite of software applications that monitor and control managed devices in an SNMP environment.

SNTP
Simple Network Time Protocol. One of two protocols for synchronizing a Nexsan Storage System's internal clock with that of a time server.

spare disk
A blank disk drive that is available to a RAID in case any of the disks assigned to the RAID should fail. If a RAID disk fails, the RAID controller rebuilds the data from the failed disk onto the spare disk, which then becomes part of the RAID. In Nexsan Storage Systems, there are two kinds of spare disk: "pool spares", which can be used by any RAID in the storage system; and "dedicated spares", which are assigned to a specific RAID.

SSD
Solid State Disk. A high-performance storage device that contains no moving parts.

SSL

Secure Sockets Layer. A method of encrypting communication between a Web server and Web browser. SSL requires the use of an SSL certificate, which binds the encryption key to the server. The SSL protocol secures input/output (I/O) and serial port data. On Nexsan Storage Systems, SSL is used to encrypt the connection between the storage system and any computer that is accessing the system's graphical user interface.

storage area network

An architecture that provides for attachment of remote computer storage devices to servers in such a way that the devices appear as locally attached to the operating system.

Storage Manager

One of the Nexsan Storage Tools. Storage Manager provides a common management point for all Nexsan Storage Systems, either in a standalone window or directly integrated into Windows' Computer Management.

stripe

See "data striping".

stripe size

The size of a data stripe (see data striping) on an individual disk.

stripe width

The storage capacity of a data stripe (see data striping) across all disks in an RAID. It is calculated by multiplying the stripe size by the number of disks that contain data that is neither mirroring nor parity data. Therefore, for example, in a four-disk RAID 0 (see RAID level) where the stripe size is set to 128KB, the stripe width will be 512KB (128KB x 4 disks = 512KB); however, in a four-disk RAID 6 with a 128KB stripe size, the stripe width is only 256KB because two of the disks contain parity information.

subnet

A subnetwork, or subnet, is a logically visible subdivision of a TCP/IP network. All computers in a subnet have IP addresses with the same prefix. Addresses in the same subnet are reachable without going through a router, and thus can be reached by broadcast.

subnet mask

A means of restricting IP addresses on a subnet to a specific range.

syslog

System log. A standard for computer data logging. It enables separation of the software that generates messages from the system that stores them and the software that reports and analyzes them.

system reboot

On Nexsan Storage Systems, a method of rebooting the unit's RAID controllers. With this method, both controllers are restarted at the same time, which can interrupt host I/O. It is therefore recommended that hosts be disconnected or shut down before performing a system reboot.

T

TB

Terabyte. Approximately one trillion (1,000,000,000,000) bytes. Used to describe the storage capacity of hard disk drives. A terabyte is usually computed as 10^12 (1,000,000,000,000) bytes, but can also be computed as 2^40 (1,099,511,627,776) bytes (often called a "binary terabyte" and abbreviated TiB).

TCP/IP

Transmission Control Protocol/Internet Protocol. The set of communications protocols used for the Internet and other similar networks. TCP provides reliable delivery of messages between networked computers. IP uses numeric IP addresses to join network segments.

TiB
: A binary terabyte. Computed as 2^40 (1,099,511,627,776) bytes. See TB.

TLS (Transport Layer Security)
: A cryptographic protocol, replaces SSL, and provides computer networking communications security. TLS is used to secure HTTPS, and in email, instant messaging and VoIP applications.

trap
: An asynchronous notification from an agent (such as a Nexsan Storage System) to an SNMP manager. Destination addressing for traps is determined in an application-specific manner, typically through trap configuration variables in the Management Information Base.

trap community
: Defines an SNMP manager to which the SNMP agent sends SNMP trap messages. Trap communities consist of community name/IP address pairs.

U

UDP
: User Datagram Protocol. A protocol that enables computer applications to send messages to other hosts on a TCP/IP network without requiring prior communications to set up special transmission channels or data paths.

UDP port
: An application-specific or process-specific software construct used by UDP as a communications endpoint. Identified by its number and the IP address with which it is associated.

V

VDS (Virtual Disk Service)
: Manages a variety of storage types, including external storage arrays. The service exposes an application programming interface (API).

VDS Storage Provisioning
: One of the Nexsan Storage Tools. Enables users to create and manage storage volumes on connected Nexsan Storage Systems directly from a Windows-based server.

volume
: An area of usable storage that is addressed as a single unit as if it were a separate, physical disk drive. Volumes can exist on a single disk drive or on a RAID that spans multiple disk drives.

VSS (Volume Shadow Copy Service)
: VSS performs actions required to coordinate creating consistent snapshots (also referred to as shadow copies) of data to be backed up.

W

WAN
: See “wide area network”.

wide area network
: A telecommunication network that covers a broad area or that links across metropolitan, regional, or national boundaries. Wide area networks are used to connect local area networks and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations.

World Wide Name
: A unique identifier which identifies a particular Fibre Channel or SAS target. Nexsan Storage Systems use two kinds of World Wide Names: World Wide Node Names (WWNN), which identify a device; and World Wide Port Names (WWPN), which identify a specific port on the device.

WWN
: See “World Wide Name”.

Z

ZIP file

A compressed data storage or archive file that uses the ZIP file format. A ZIP file contains one or more files that are compressed to reduce their size and typically ends in ".zip".

Nexsan —Sunnyvale, CA, USA

1289 Anvilwood Avenue
Sunnyvale, CA 94089
United States of America

Nexsan — European Head Office, UK

Units 33–35 Parker Centre, Mansfield Road
Derby, DE21 4SZ
United Kingdom

Worldwide Web site
www.nexsan.com

E-Series/BEAST support:
https://www.nexsan.com/support/e-series-and-beast/

Contact
https://www.nexsan.com/support

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