



Overland
Storage

SnapSAN™ S2000

User Guide



July 2011
10400277-004



©2010-11 Overland Storage, Inc. All rights reserved.

Overland®, Overland Data®, Overland Storage®, LibraryPro®, LoaderXpress®, Multi-SitePAC®, NEO®, NEO Series®, PowerLoader®, Protection OS®, REO®, REO 4000®, REO Series®, Snap Care®, SnapDisk®, SnapServer®, StorAssure®, and XchangeNOW® are registered trademarks of Overland Storage, Inc.

GuardianOS™, SnapWrite™, Snap Enterprise Data Replicator™, SnapSAN™, and SnapServer Manager™ are trademarks of Overland Storage, Inc.

All other brand names or trademarks are the property of their respective owners.

The names of companies and individuals used in examples are fictitious and intended to illustrate the use of the software. Any resemblance to actual companies or individuals, whether past or present, is coincidental.

PROPRIETARY NOTICE

All information contained in or disclosed by this document is considered proprietary by Overland Storage. By accepting this material the recipient agrees that this material and the information contained therein are held in confidence and in trust and will not be used, reproduced in whole or in part, nor its contents revealed to others, except to meet the purpose for which it was delivered. It is understood that no right is conveyed to reproduce or have reproduced any item herein disclosed without express permission from Overland Storage.

Overland Storage provides this manual as is, without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Overland Storage may make improvements or changes in the product(s) or programs described in this manual at any time. These changes will be incorporated in new editions of this publication.

Overland Storage assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of this manual, nor for any problem that might arise from the use of the information in this manual.

Version 4.4

Overland Storage, Inc.
9112 Spectrum Center Blvd.
San Diego, CA 92123
U.S.A.

Tel: 1.877.654.3429 (toll-free U.S.)
Tel: +1.858.571.5555 Option 5 (International)
Fax: +1.858.571.0982 (general)
Fax: +1.858.571.3664 (sales)
www.overlandstorage.com

Preface

This user guide explains how to install, setup, and use your new Overland Storage SnapSAN S2000 appliance and its SnapSAN Manager Suite software to perform tasks such as create arrays and logical volumes, modify configuration settings, and take snapshots.

This guide assumes that you are familiar with computer hardware, data storage, and network administration terminology and tasks. It also assumes you have basic knowledge of Internet SCSI (iSCSI), Serial-attached SCSI (SAS), Serial ATA (SATA), Storage Area Network (SAN), and Redundant Array of Independent Disks (RAID) technology.

Product Documentation and Firmware Updates

Overland Storage SnapSAN product documentation and additional literature are available online, along with the latest release of the SnapSAN S2000 software.

Point your browser to:

<http://docs.overlandstorage.com/snapsan>

Follow the appropriate link to download the **latest** software file or document. For additional assistance, search at <http://support.overlandstorage.com>.

Overland Technical Support

For help configuring and using your SnapSAN S2000, search for help at:

<http://support.overlandstorage.com/kb>

You can email our technical support staff at techsupport@overlandstorage.com or get additional technical support information on the [Contact Us](#) web page:

<http://www.overlandstorage.com/company/contact-us/>

For a complete list of support times depending on the type of coverage, visit our web site at:

http://support.overlandstorage.com/support/overland_care.html

Conventions

This user guide exercises several typographical conventions:

Convention	Description & Usage
Boldface	Words in a boldface font (Example) indicate items to select such as menu items or command buttons.
Ctrl-Alt-r	This type of format details the keys you press simultaneously. In this example, hold down the Ctrl and Alt keys and press the r key.
NOTE	A Note indicates neutral or positive information that emphasizes or supplements important points of the main text. A note supplies information that may apply only in special cases—for example, memory limitations or details that apply to specific program versions.
IMPORTANT 	An Important note is a type of note that provides information essential to the completion of a task or that can impact the product and its function.
CAUTION 	A Caution contains information that the user needs to know to avoid damaging or permanently deleting data or causing physical damage to the hardware or system.
WARNING 	A Warning contains information concerning personal safety. Failure to follow directions in the warning could result in bodily harm or death.
Menu Flow Indicator (>)	Words in bold font with a greater than sign between them indicate the flow of actions to accomplish a task. For example, Setup > Passwords > User indicates that you should press the Setup button, then the Passwords button, and finally the User button to accomplish a task.

Information contained in this guide has been reviewed for accuracy, but not for product warranty because of the various environments, operating systems, or settings involved. Information and specifications may change without notice.

Contents

Preface

Chapter 1 - Overview

SnapSAN S2000 Overview	1-1
SnapSAN S2000 Appliance	1-1
SnapSAN Manager Suite Software	1-1
Windows SnapSAN Manager	1-2
Web Management Interface	1-2

Chapter 2 - Installation and Setup

First Things First – Activate Your Warranty!	2-1
Recommended Drive Configurations	2-2
SnapSAN S2000 Rack Installation Overview	2-2
Powering Up the SnapSAN S2000	2-3

Chapter 3 - Initial Configuration

Using the Windows SnapSAN Manager	3-1
Installing an iSCSI Initiator	3-1
Installing SnapSAN Manager Suite Software	3-1
Configuring the Appliance with Windows SnapSAN Manager	3-5
Using the Web Management Interface	3-10
Assigning a Static Network Address	3-11
Finding the DHCP Network Address	3-12
Appliance Monitor Display	3-12
DHCP Server Client Table	3-12
Configuring the Appliance	3-13

Chapter 4 - Storage Management

Windows SnapSAN Manager Overview	4-1
Creating a SnapSAN Disk	4-2
Backing Up Data	4-4
Using Snapshots	4-4
Using Replicas	4-5
Creating and Replicating a New Disk Simultaneously	4-6
Using Mirroring	4-7
Synchronous Mirroring	4-8
Asynchronous Mirroring	4-8
Creating and Mirroring a New Disk Simultaneously	4-8

Chapter 5 - PC and Servers Management

Introduction	5-1
Overview Screen	5-2
Create SnapSAN Disk	5-4
Disk Create Advanced Settings	5-5
Destroy SnapSAN Disk	5-9
Extend SnapSAN Disk	5-10
Manage Disk Task	5-10
Disk Tasks	5-11
Rename Disk Task	5-11
Configure Auto Extension Task	5-12
Replicate Disk Task	5-12
Mirror Disk Task	5-13
Categories	5-15
Properties	5-15
Replication Category	5-16
Mirroring Category	5-17
Paths Category	5-18
SnapSAN Replicas Category	5-19
SnapSAN Replica Properties Management	5-20
Using the Calendar to Recover Data	5-20
Properties & Scheduler Category	5-22
Queued and Completed Tasks Category	5-23

Chapter 6 - Network Management

Overview	6-1
Setting Up Storage Groups	6-2
Discovery	6-3
Add Discovery Entry	6-4
Remove Discovery Entry	6-4
User Interface Preferences	6-5
About	6-6

Chapter 7 - Appliance Management

Overview	7-1
Hard Disks Category	7-3
SnapSAN Pools Category	7-4
Manage a SnapSAN S2000 Pool	7-6
Extend a SnapSAN Pool	7-7
Destroy a SnapSAN Pool	7-7
Create a SnapSAN Pool	7-8
SnapSAN Targets Category	7-10
Managing A SnapSAN Target	7-11
Properties Category	7-11
Security Category	7-12
Portals	7-14
Statistics	7-15
Replication	7-17
Mirroring a Target	7-18
Destroying A SnapSAN Target	7-19
Creating A SnapSAN Target	7-20

Extending A SnapSAN Target	7-22
SnapSAN Replicas Category	7-23
Manage SnapSAN Replica	7-24
Create SnapSAN Replica	7-26
Destroy SnapSAN Replica	7-27
Network Category	7-28
Network Connections Category	7-28
Properties Category	7-29
Advanced Category	7-30
Statistics Category	7-31
DNS Category	7-32
Routing Category	7-33
Properties Category	7-34
Hardware Monitoring Category	7-36
Events Category	7-37
Identification & Services Category	7-38
Initiators Category	7-40
Notification Category	7-41
Statistics Category	7-43

Chapter 8 - Web Management Interface

Accessing the Web Management Interface	8-1
Overview and Usage	8-2
Home Tab	8-3
Appliance Home Page	8-3
Content Area Links	8-3
Actions Available	8-3
System Tab	8-3
System Information	8-4
Content Area Links	8-4
Actions Available	8-4
System Tab Subpages	8-5
System Configuration	8-5
System Firmware Upgrade	8-6
Hardware Sensors Information	8-6
System Power Settings	8-7
Set Admin Password	8-7
System Diagnostics	8-8
Set System Date & Time	8-9
System License	8-10
Secure Authentication Certificate	8-11
Network Tab	8-11
Network Information	8-12
Content Sections and Links	8-12
Actions Available	8-13
Network Tab Subpages	8-13
Discovery	8-14
Network Device Information	8-16
Edit Network Device	8-17
Network Interface Information	8-17
Create Network Interface	8-18

Edit Network Interface	8-19
Delete Network Interface	8-20
Network Route Information	8-20
Create Network Route	8-21
Specific Network Item Change Pages	8-21
Network Ping	8-22
Network Traceroute	8-23
Targets Tab	8-24
Targets	8-24
Content Sections and Links	8-24
Actions Available	8-25
Target Tab Subpages	8-25
Target Information	8-25
Target Edit	8-27
Extend Target	8-28
Target Delete	8-29
Target Disable/Enable	8-29
Add ACL Entry to Target	8-30
Target ACL Entry	8-30
Edit Target ACL Entry	8-31
Remove Target ACL Entry	8-31
Create Target	8-32
Add Initiator to Target	8-33
Target Initiator View	8-34
Remove Initiator	8-34
Create Snapshot Target	8-35
Add Replicant Host to Target	8-36
Target Replicant Host Information	8-38
Edit Replicant Host Details	8-39
Remove Replicant Host from Target	8-40
Add Mirror Plex to Target	8-40
Plex Information	8-41
Remove Mirror Plex	8-42
Change (Promote to) Management Plex	8-43
Break Mirror Plex	8-43
Create Target Recovery Point	8-44
Create Target on <Pool_name>	8-45
Export to USB Devices	8-45
Pools Tab	8-46
Storage Pools	8-46
Content Sections and Links	8-46
Actions Available	8-47
Other Network Tab Subpages	8-48
Subsystem Information	8-48
Pool Information	8-49
Create Storage Pool	8-50
Add Global Hot Spare	8-51
Remove Global Hot Spare	8-52
Storage Journal Configuration	8-52
Set Neutral Storage Host	8-54
Subsystem Rescan	8-55

Delete Storage Pool	8-55
Extend Pool	8-56
Set Pool Cache	8-56
Pool Markers	8-57
Devices Tab	8-57
Devices	8-58
Content Sections and Links	8-58
Actions Available	8-58
Other Device Tab Subpages	8-59
Device Information	8-59
Events Tab	8-59
Events	8-60
Actions Available	8-61
Other Device Tab Subpages	8-61
Clear Events	8-61
Event Notification	8-61
Event Notification Setup	8-62
Add Event Notification	8-63
Remove Event Notification	8-64
Test Event Notification	8-64
Clear System Status	8-65
Replicant Tab	8-65
Replicant Information	8-65
Content Sections and Links	8-66
Actions Available	8-66
Other Device Tab Subpages	8-66
Replicant Settings	8-67
Add ACL Entry to Replicant	8-67
Create Replicant Volume	8-68
Replicant Volume Information	8-69
Recovery Point Information	8-70
Edit Replicant Volume	8-71
Delete Replica Volume	8-72
Recovery Point Target Mapping	8-72
Edit Replicant ACL Entry	8-73
Remove Replicant ACL Entry	8-73
Replicant ACL Entry	8-74

Chapter A - SnapServer Manager

Installing the SSM Software	A-1
Launching SSM	A-1
SnapSAN S2000 Discovery	A-2
Accessing Management Software	A-2
Right-Click vs. Control-Click	A-2

Chapter B - Expanding Capacity

Attaching Expansion Arrays	B-1
----------------------------------	-----

Chapter C - Licenses & Copyright

GNU General Public License	C-1
GPL Version 2	C-1

Lesser GPL	C-6
Copyright Notices and Licenses	C-13

Appendix D - VMware Plug-In

Install SnapSAN Manager Suite	D-1
Install VMware Plug-in	D-1
Create Datastore	D-2

Appendix E - VSS Hardware Provider

Overview	E-1
Theory of Operation	E-1
Installation	E-2
System Requirements	E-2
Hardware Requirements	E-2
Operating System Requirements	E-2
Software Requirements	E-2
Installation	E-2
Verifying the Installation	E-2
Uninstallation	E-3
System Setup	E-3
Using the Overland Hardware Provider for VSS	E-3
Creating a Snapshot	E-4
Listing Snapshots	E-4
Exposing a Snapshot	E-4
Example Using VSS	E-4
Storage Array Logical Drives versus Windows Volumes	E-5
Use of VSS Tools	E-6
Breaking a Snapshot Set	E-6
Event Codes	E-6
Successful Messages	E-7
Informational Messages	E-7
Error Messages	E-7

Appendix F - Mirror Example

Overview	F-1
Procedure	F-1

Overland Glossary & Acronym List

Index

This manual describes how to use the Overland Storage SnapSAN S2000 system. The appliance together with the SnapSAN S2000 software provides a flexible, intelligent, iSCSI-based storage area network (SAN) solution for virtualized server environments and the growing demand for data storage. With a SnapSAN S2000 appliance, you can store, share, protect, and manage data through a single easy-to-use Windows or web interface.



SnapSAN S2000 Overview

The SnapSAN S2000 has two main components: the appliance and its custom software.

SnapSAN S2000 Appliance

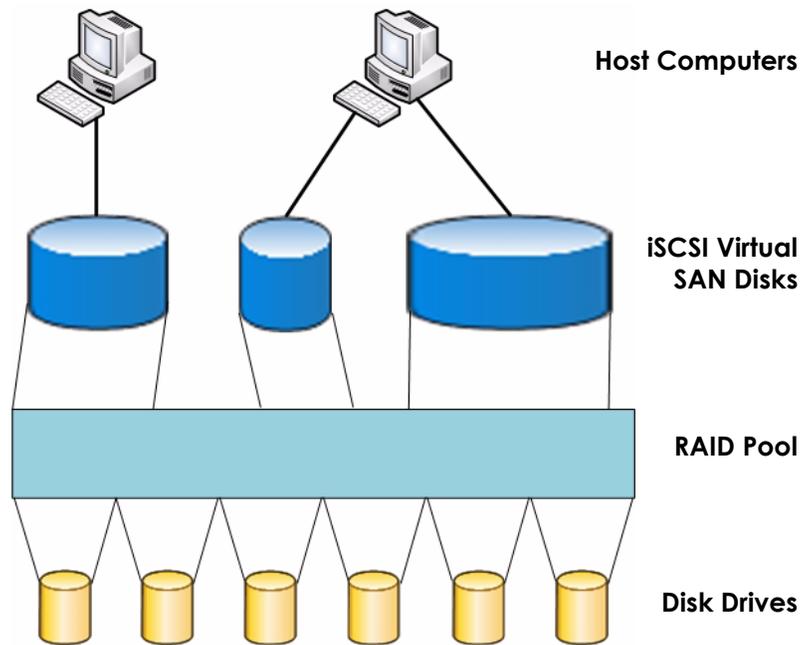
This is an appliance connected to your local storage area network running the SnapSAN S2000 software. The appliance manages a RAID controller which, in turn, manages the physical operation of a group of hard disks. The S2000 makes this networked disk storage look just like one or more local disks.

SnapSAN Manager Suite Software

This is storage management software that enables you to manage your data storage effectively and efficiently with no special knowledge about the underlying technology required. There are two versions available:

- Windows SnapSAN Manager – A Windows program run from a network computer.
- Web Management Interface – A web-based interface on the SnapSAN that is accessed by a browser.

The figure below illustrates how the SnapSAN S2000 software can map a set of independent disk drives, connected to the network by a RAID controller, to a storage pool from which seemingly “local” disks of user-defined size can be created and shared by all the users on the network.



Windows SnapSAN Manager

The Windows SnapSAN Manager is a Windows program that provides you with an easy way to manage your data storage. You can use it to perform the following storage management tasks:

- Configure your appliance
- Create new disks from storage on the SnapSAN S2000 appliance.
- Protect the data by controlling shared access to it.
- Provide a high level of data security, using the built-in reliability that comes with RAID technology.
- Monitor the way that data is used and then adapt the data storage to fit this usage pattern, giving users optimal access to their data.
- Back up data quickly and efficiently using SnapSAN S2000 support for snapshots, disk replication (optional), and mirroring (optional).

Web Management Interface

The Web Management Interface is a browser-based tool for managing your data storage. You can use the Web Management Interface to perform the following storage management tasks:

- Configure your appliance
- Create new disks from storage on a specific SnapSAN S2000 appliance.
- Check the logs for a specific SnapSAN S2000 appliance.
- Verify error or fault messages regarding a specific SnapSAN S2000 appliance.

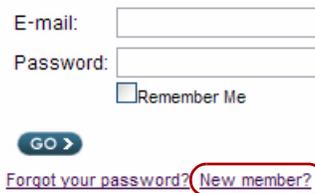
This chapter explains how to install a SnapSAN S2000 appliance. Sections in this chapter include:

- [First Things First – Activate Your Warranty!](#)
- [SnapSAN S2000 Rack Installation Overview](#)
- [Powering Up the SnapSAN S2000](#)

First Things First – Activate Your Warranty!

Before installing your new unit, it is essential that you activate your Overland warranty. Technical and warranty support are not available until this is done:

1. Go to the **Overland Storage** web site at: <http://www.overlandstorage.com/>
2. Select **Service & Support > My Products**.
3. At the [Site Login](#), enter your **email address** and **password**.



E-mail:

Password:

Remember Me

GO >

[Forgot your password?](#) [New member?](#)

NOTE: If you are not yet a member, click “New member?” and follow the instructions given. It’s free and easy!

4. Under the My Products tab, click **Register New**.
5. Fill in the information and click **Submit**.

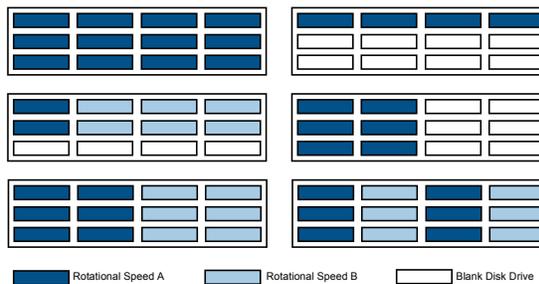
 **IMPORTANT:** You will receive an email from Overland with your warranty certificate. Review it carefully and verify that the product and address information is accurate. If any errors are found, email us at: warranty@overlandstorage.com. Otherwise, follow the instructions in the email to complete the registration process.

Recommended Drive Configurations

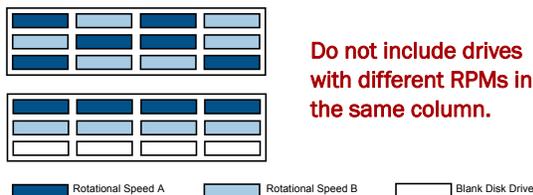
Before installing or adding drives to a SnapSAN S2000 appliance, the following must be observed:

- Different capacity drives can be installed; however, they should not be included in the same RAID array, because capacity usage for all drives in the RAID is limited to the capacity of the smallest drive member.
- Drives of different rotational speed (such as, SAS and SATA drives) can be installed, but they should not be installed in the same column. If you are combining drives with different speeds, use the figures below to plan where to place the disk drives.

Supported Configurations



Unsupported Configurations



SnapSAN S2000 Rack Installation Overview

WARNING: It is recommended that a mechanical lifter (or at least two people) be used to raise and align the unit to prevent injury during installation. Use care when inserting or removing a unit into or out of a rack to prevent the accidental tipping of the rack causing damage or personal injury.

AVERTISSEMENT: il est recommandé que la mécanique lifter (ou au moins deux personnes) soit utilisé pour élever et d'unifier l'appareil pour éviter des blessures pendant l'installation. Faites attention lorsque vous insérer ou de retirer une unité d'entrée ou de sortie d'un support pour empêcher le déversement accidentel de la crémaillère causant des dommages ou des blessures.

CAUTION: Overland strongly recommends that you install the unit in a clean, air-conditioned environment with power conditioning and an adequately rated uninterruptible power supply (UPS). The unit is intended to be grounded.

IMPORTANT: Before unpacking the unit, ensure that the area is free from conditions that cause electrostatic discharge (ESD). Discharge static electricity from your body by touching a known grounded surface. Also, avoid touching pins, leads, or circuitry.

Using the SnapSAN S2000 *Quick Install Guide* that came in the Accessory Kit, install the unit in the rack as follows:

1. Install the Rail Kit in a RETMA rack.
2. Insert the SnapSAN S2000 into the rack.
3. Connect the network and data cables.
4. Attach the power cords.

NOTE: A PDF of the Quick Start Guide is available on the Overland Storage web site:

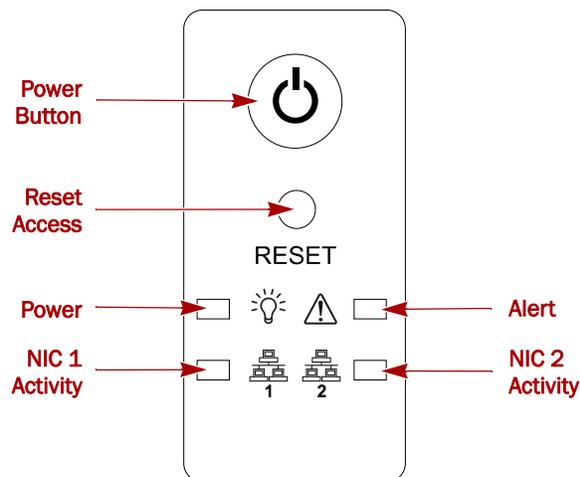
<http://docs.overlandstorage.com/snapsan>

Powering Up the SnapSAN S2000

The power switch is on the front panel located on the left side bracket. To turn the appliance **ON**, press and hold the Power button for no more than one (1) second to begin the power-up sequence.

After you turn the power **ON**, the System performs a self-test process, which takes a couple of minutes.

After the unit completes the POST sequence, check the LED indicators on the left bracket to verify the network connections are good.



After installing a new SnapSAN S2000 appliance, there are two ways to handle the initial configuration of an appliance:

- A Windows program (Windows SnapSAN Manager) is installed as part of the SnapSAN Manager Suite on a network computer and can be used to configure *any* SnapSAN S2000 appliance on the network (“[Using the Windows SnapSAN Manager](#)”). This is the recommended procedure.
- The web interface (Web Management Interface) can be accessed by a browser to configure and operate that specific appliance (“[Using the Web Management Interface](#)” on page 3-10). This can be used by any OS such as Linux or Mac.

Using the Windows SnapSAN Manager

Before you can use the Windows SnapSAN Manager, you must make sure an iSCSI initiator is installed on each Windows host and the SnapSAN Manager Suite software has been installed.

Installing an iSCSI Initiator

An iSCSI initiator must be installed on each Windows host to access the storage managed by the Windows SnapSAN Manager.

Windows Server 2003 and XP operating systems do not include an iSCSI initiator as standard, but the Microsoft iSCSI initiator is available as a free download. To find the initiator, go to <http://www.microsoft.com/downloads> and search for iSCSI. Follow the installation instructions that come with the initiator.

If you plan to use a different initiator, follow the instructions provided with it.

Installing SnapSAN Manager Suite Software

NOTE: The SnapSAN Manager Suite software can only be installed by the Administrator or a user with Administrator privileges.

The SnapSAN S2000 SnapSAN Manager Suite files along with electronic copies of all the important documents are available from download from the Overland SnapSAN website:

<http://docs.overlandstorage.com/snapsan>

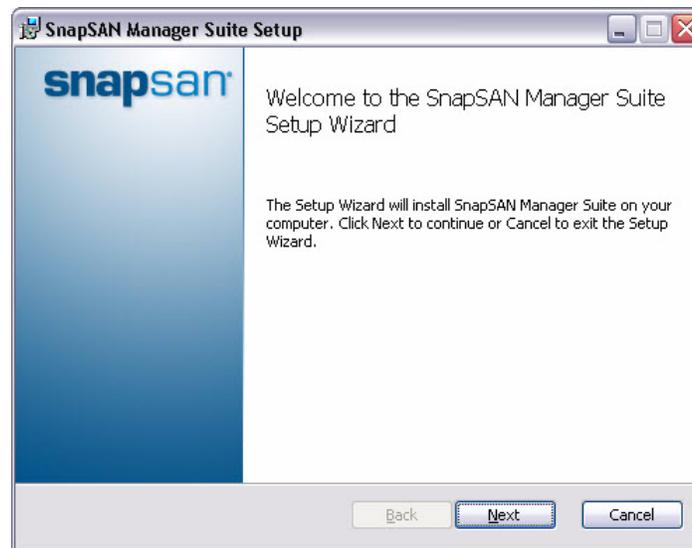
The installation procedure automatically configures the Windows Firewall to allow Windows SnapSAN Manager and its Appliance Discovery Service to access TCP and UDP port 4309 on your computer. If you are using SnapServer Manager (SSM), it configures access to TCP and UDP port 111.

IMPORTANT: If you are using another firewall, open the firewall manually to allow the Appliance Discovery Service and the Windows SnapSAN Manager incoming and outgoing access on this port. If your system is behind a NAT interface, you will have to set up port forwarding to your computer for this port.

NOTE: To install the SnapSAN Manager Suite on a VMware vSphere Client, refer to [Appendix D, "VMware Plug-In."](#)

Follow the on-window instructions to install the software:

1. Download the **appropriate version** of the SnapSAN Manager.
Choose either the 32- or 64-bit version from:
<http://docs.overlandstorage.com/snapsan>
2. Double-click **setup.exe**.
3. At the start window, click **Next**.



- Review the license agreement, click the **box** to accept, and click **Next** to continue the installation.



- At the Setup Type window, click **Typical** to continue.

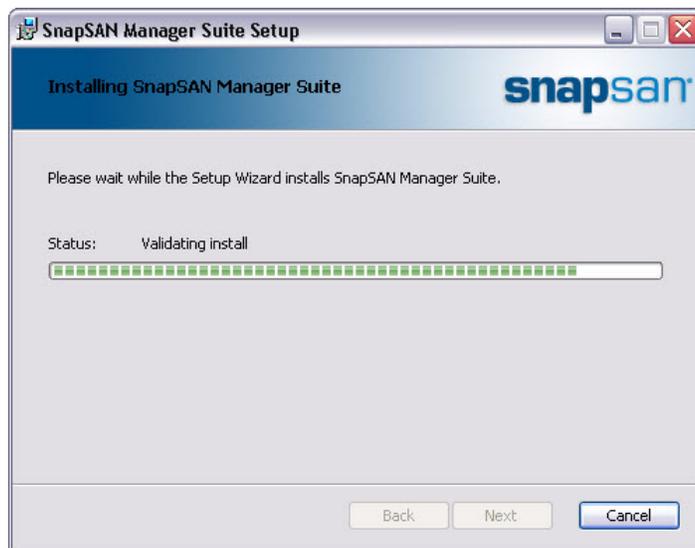


NOTE: The Typical option is recommended as the optimum configuration.

- At the confirmation window, click **Install**.

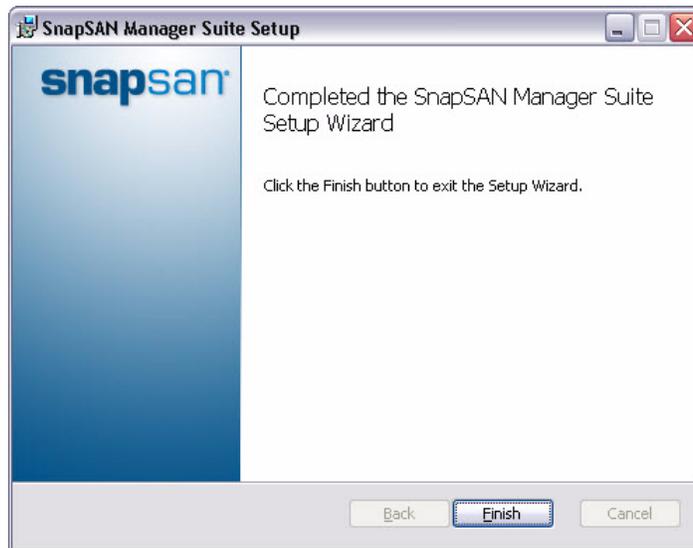


The progress window is displayed with a Status bar showing the amount completed. It may take several minutes to complete the installation. When done, the **Next** button becomes active.



- When the installation is complete, click **Next**.

- At the completion window, click **Finish** to exit.



Once the SnapSAN Manager Suite is installed and you click Finish, the program automatically launches the Windows SnapSAN Manager. Continue with [“Configuring the Appliance with Windows SnapSAN Manager.”](#)

Configuring the Appliance with Windows SnapSAN Manager

To configure a SnapSAN S2000 appliance using Windows SnapSAN Manager:

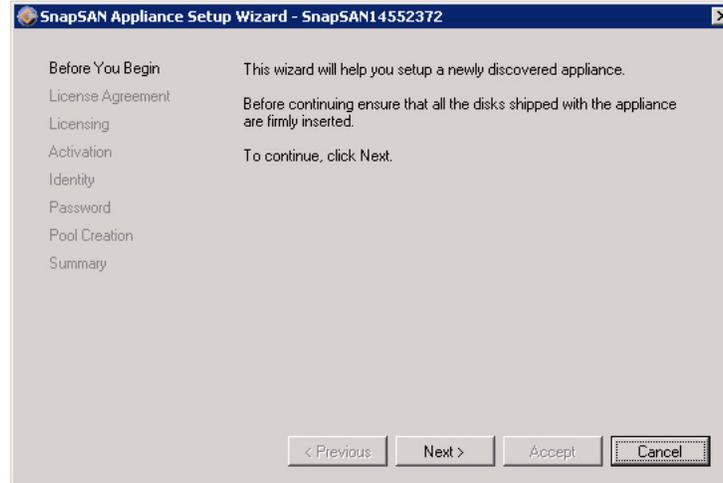
- If not already running, start the Windows SnapSAN Manager by selecting **Windows Start > All Programs > SnapSAN > SnapSAN Manager**.

Automatically, Windows SnapSAN Manager tries to discover any appliances that are connected to the network. During this discovery process, the Discovery window is displayed and Windows SnapSAN Manager attempts to connect to any SAN appliances it finds.



- If a connection succeeds, the **SnapSAN Appliance Setup Wizard** starts to guide you through the setup process.
- If **no appliances** were discovered, the Windows SnapSAN Manager Overview window will open. Recheck your network connections and verify that the computer is on the same network as the SAN appliance.

- The SAN Appliance Setup Wizard Before You Begin page reminds you to check that the appliance's **disks** are correctly inserted.

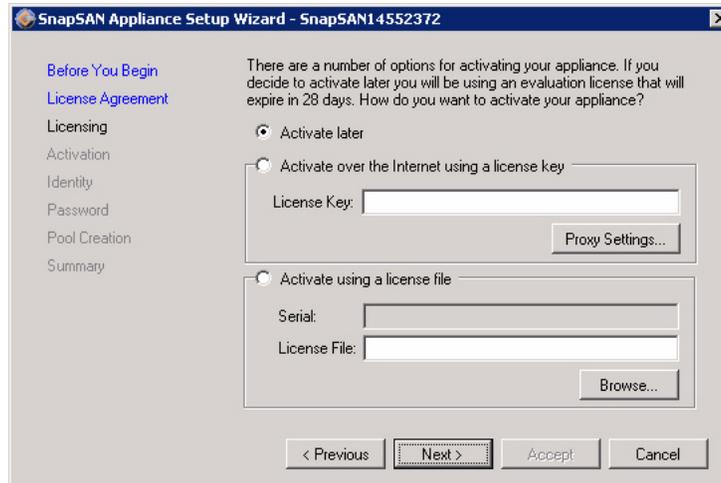


Once you have checked the disks, click **Next** to move to the next page.

- At the EULA page, review the license agreement, click the **box** to accept, and click **Next** to continue the installation.



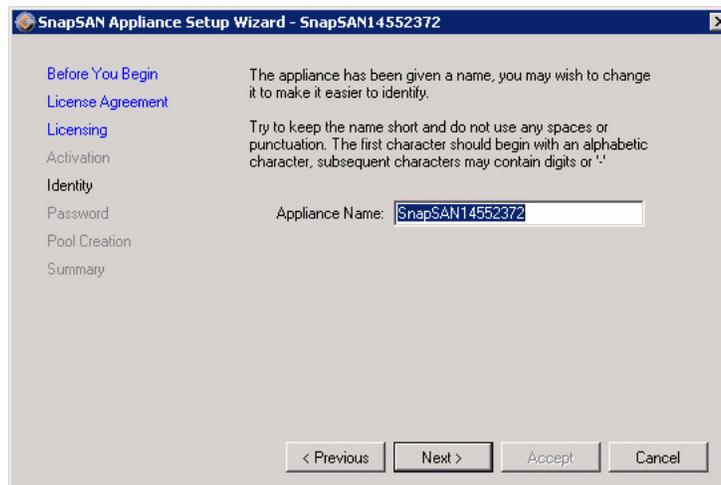
- At the Licensing window, select one of the bulleted items:
 - Activate later** – use this option if the license key is not readily available.
 - Activate over the Internet using a license key** – use this option if you have access to the Internet. Enter proxy settings if required.
 - Activate using a license file** – use this option to browse for the file with both the license key and serial number. Does not require Internet access.



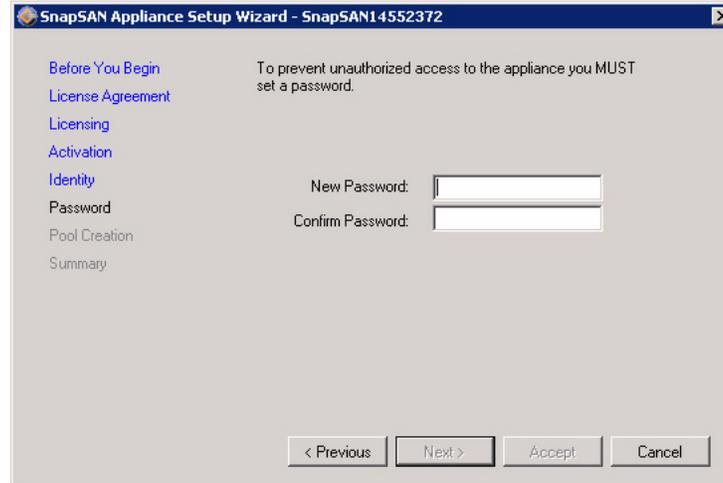
If activating now, a second window (Activation) opens. Follow the onscreen instructions to complete the activation. Click Next when done.

- At the Identity window, enter a **new name** if you want to rename the appliance, and click **Next**.

NOTE: We highly recommend changing the name to help identify the appliance on the network. The name must start with a letter; subsequent characters can only be letters, numbers, or hyphens.



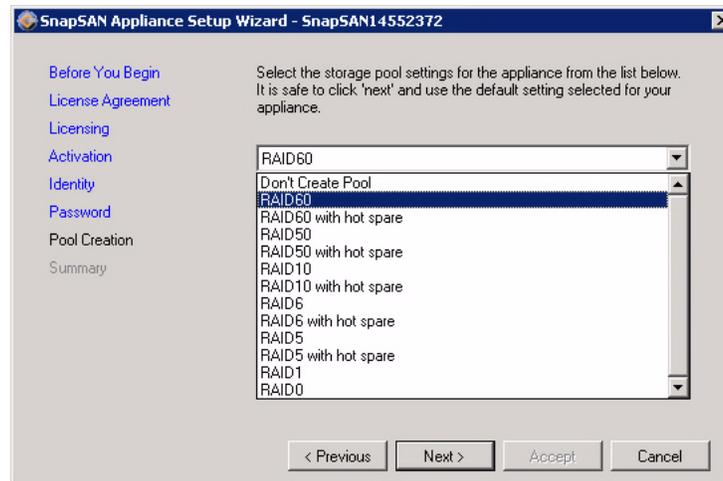
6. At the Password window, you must enter a **password** for the appliance, confirm it by re-entering it, and then click **Next**.



IMPORTANT: Overland recommends using a strong password of at least six alphanumeric characters.

7. At the Pool Creation page, select the **type** of RAID policy you want. A pool represents the storage available on a set of disks managed by an appliance. In effect, it comprises one or more of the physical disks connected to the RAID controller, managed according to a management policy of your selection. For the management policy you can specify either Typical or Custom.

NOTE: If you want to configure advanced RAID options, use the Windows SnapSAN Manager to create the pool (as described in [“SnapSAN Pools Category” on page 7-4](#)) after the wizard has completed.



The options presented for Custom vary according to the number of physical disks available and the type of RAID controller card:

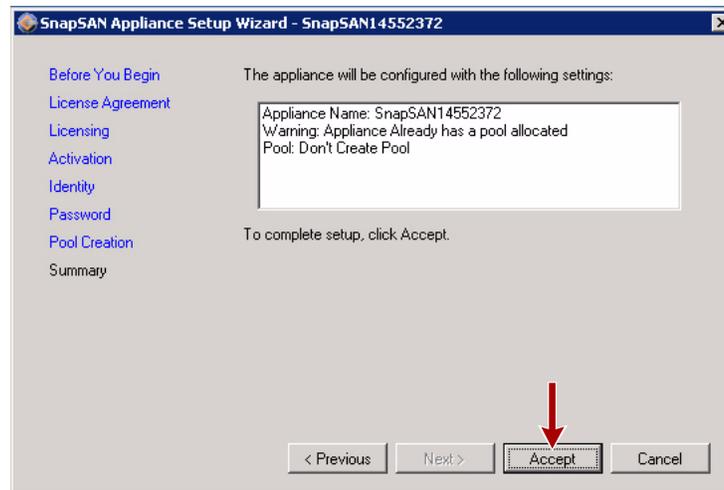
- **RAID 0** – Performance storage with no redundancy
- **RAID 1** – Mirrored storage

- **RAID 5** – High availability storage (hot spare optional)
- **RAID 6** – Very high availability storage (hot spare optional)
- **RAID 10** – Multiple duplicated performance storage (hot spare optional)
- **RAID 50** – Multiple high availability storage (hot spare optional)
- **RAID 60** – Multiple very high availability storage (hot spare optional)
- **Don't Create Pool**

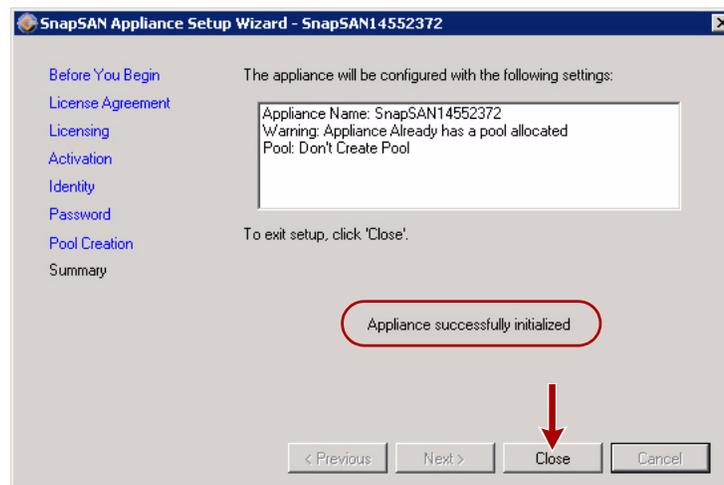
NOTE: Select **Don't Create Pool** if you want to create multiple pools or to create a pool using only selected disks in the enclosure. After the wizard has completed, use Windows SnapSAN Manager to create the pool as described in see [“SnapSAN Pools Category” on page 7-4](#).

When you have finished configuring a storage pool, click **Next**.

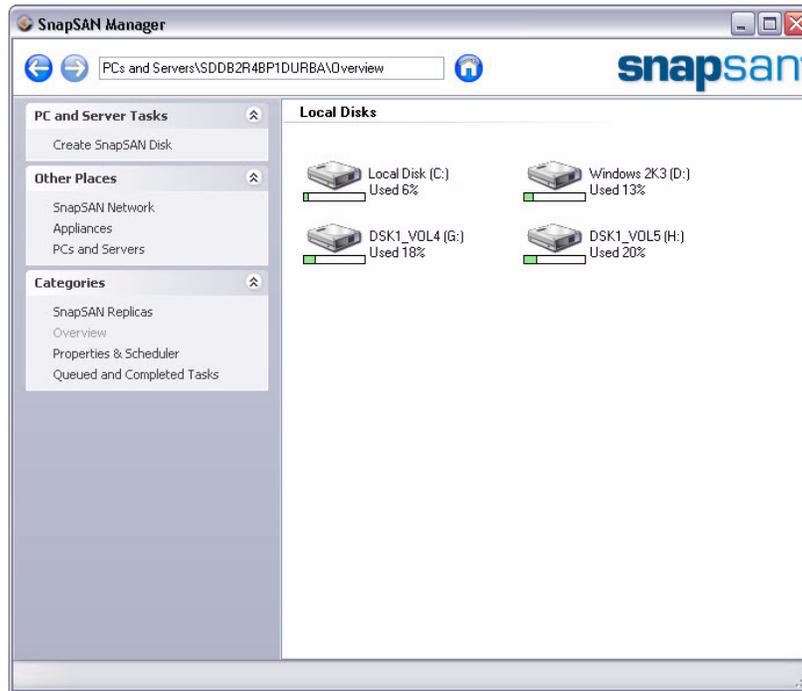
8. At the initial Summary page, review the settings you have made, and click **Accept** to configure the appliance.



9. At the secondary Summary page, verify the successful initialization, and click **Close** to quit the SAN Appliance Setup Wizard.



When the wizard finishes, the initial (default) Windows SnapSAN Manager window is displayed showing the new volumes on the S2000 (such as “DSK1_VOL4”).



[Chapter 4, “Storage Management,”](#) describes in general how to use Windows SnapSAN Manager and also how to set up and manage the SAN.

These other chapters cover specific manager features in more detail:

- [Chapter 5, “PC and Servers Management”](#)
- [Chapter 6, “Network Management”](#)
- [Chapter 7, “Appliance Management”](#)

Using the Web Management Interface

The web interface to the appliance, Web Management Interface, supports most common web browsers, including Internet Explorer 7 or 8, and Firefox 3.5. JavaScript must be enabled in the browser.

To use the built-in Web Management Interface to configure a specific SAN appliance, it is necessary to know either the **network name** or **network address** (the IP address) of the appliance. To find these, do one of the following:

- If you are **not running** a DHCP server, connect a keyboard and monitor to the appliance so that you can assign a network address to it as described in [“Assigning a Static Network Address” on page 3-11](#).
- If you are **running** a DHCP server on the network, find the network address of the appliance as described in [“Finding the DHCP Network Address” on page 3-12](#).



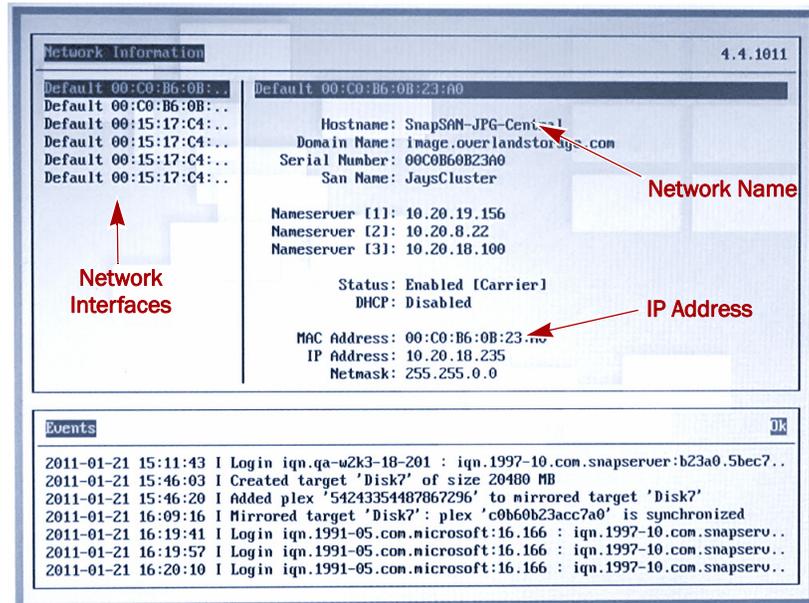
IMPORTANT: If your DHCP server supports reservations, reserve an IP address for the appliance.

Assigning a Static Network Address

As shipped, the appliance is configured to get its network address using DHCP. If you are not running a DHCP server, manually set the network address as follows:

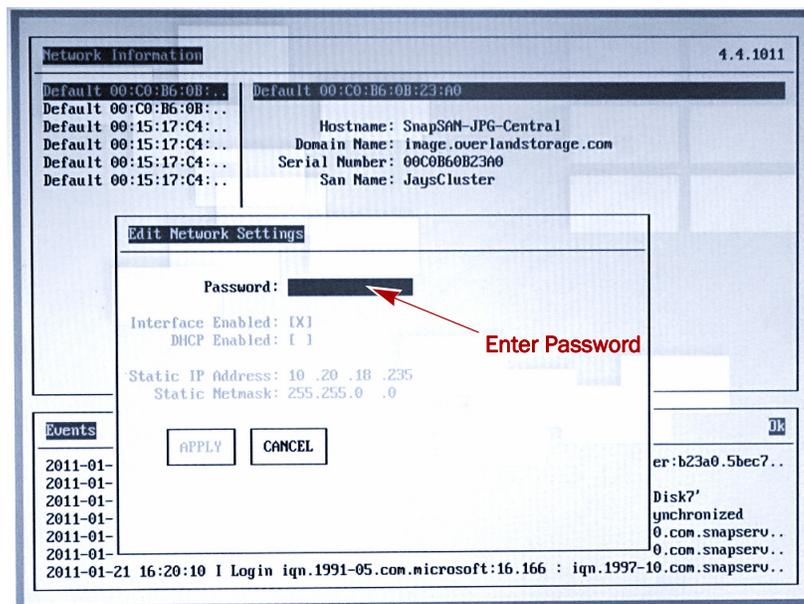
1. Connect a **monitor and keyboard** to the appliance.

The monitor will display the appliance's Network Information window. This gives the status of each network interface.



2. If necessary, use the Up and Down arrow keys to highlight the correct **network interface** on the left, and press **Enter**.

The Edit Network Settings dialog box is then displayed.



3. Enter the appliance's **password**.

NOTE: For an unconfigured system, "password" is the default preset.

4. Using Tab or the Up and Down arrow keys, move to the **DHCP Enabled** field, and press **Enter** to disable DHCP.
5. Enter the **Static IP Address** and **Static Netmask** for the appliance in the appropriate fields.
6. Apply the changes by moving to the **Apply** box and pressing **Enter**.
To quit without applying the changes, move to the Cancel box and Enter.
7. Press **Esc** to quit.

Continue with [“Configuring the Appliance” on page 3-13](#).

Finding the DHCP Network Address

You can find the DHCP network address by direct connection to the appliance or using the DHCP table.

Appliance Monitor Display

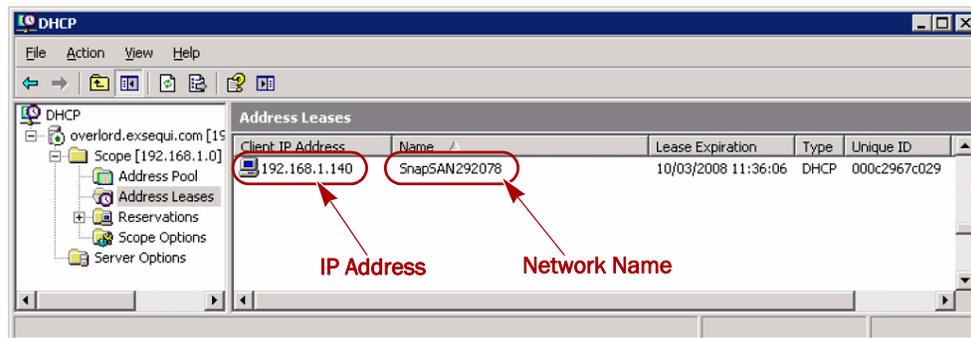
Connect a monitor to the video port of the appliance to read the appliance’s network name and IP address from the appliance information window.

The network name, in the format “SnapSAN`nnnnnnnn`,” is shown near the top of the window, and the IP address 192.168.1.140 is shown near the middle of the window.

DHCP Server Client Table

Bring up your DHCP servers client table to read the appliance’s network name and IP address. The details of doing this depend on the DHCP server being used. However, there should be an option to display DHCP clients which have been allocated addresses by the server.

For example, the client table for a Windows 2003 DHCP server:



Locate the entry with a name in the form “SnapSAN`nnnnnnnn`” and note the name and the IP address. When you configure the appliance, you can then change the network name to something more memorable.



IMPORTANT: If your DHCP server supports reservations, reserve an IP address for the appliance.

It is possible that some DHCP servers will not display network names. In this case, use the appliance monitor display to get the information as described in [“Assigning a Static Network Address” on page 3-11](#).

Configuring the Appliance

To connect your web browser to the appliance, enter either the network name or the IP address into your web browser. With some browsers, you may need to prefix the name with “https://” (for example, “https://192.168.1.140”). When you configure the appliance, you can change the network name to something more memorable if you plan to use it for connection.

To configure your SnapSAN S2000 appliance using the Web Management Interface:

1. Open the Web Management Interface:
 - a. Enter the **network name or IP address** of the appliance into the browser (with some browsers, you may need to preface the name with “http://”).
 - b. At the login dialog box, enter “**admin**” for the User Name and “**password**” for the Password (you can change this later), and click **OK**.

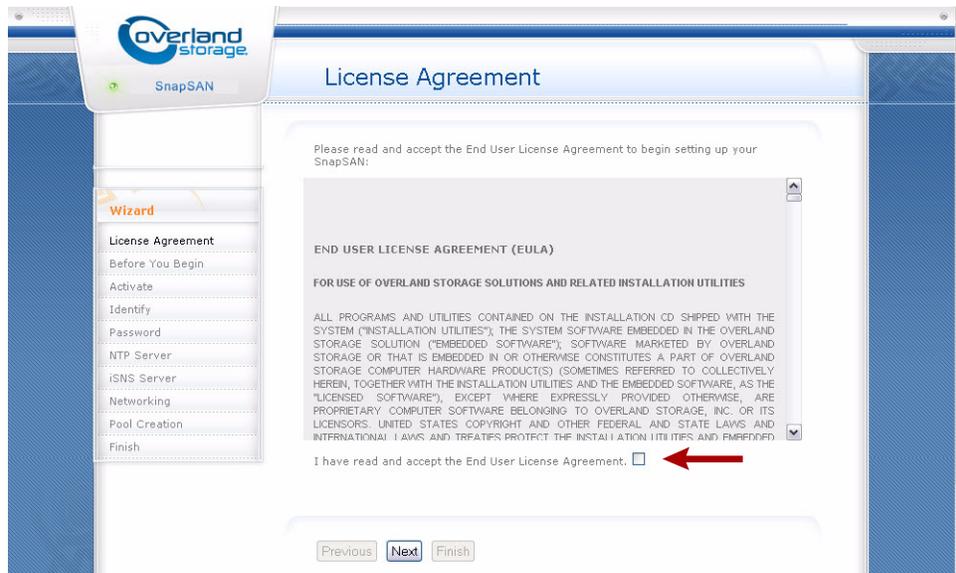


NOTE: You may see a warning saying the web site is not trusted and asking you to confirm whether you want to visit it. You can prevent this happening in future by downloading the appliance’s security certificate and installing it in your browser.

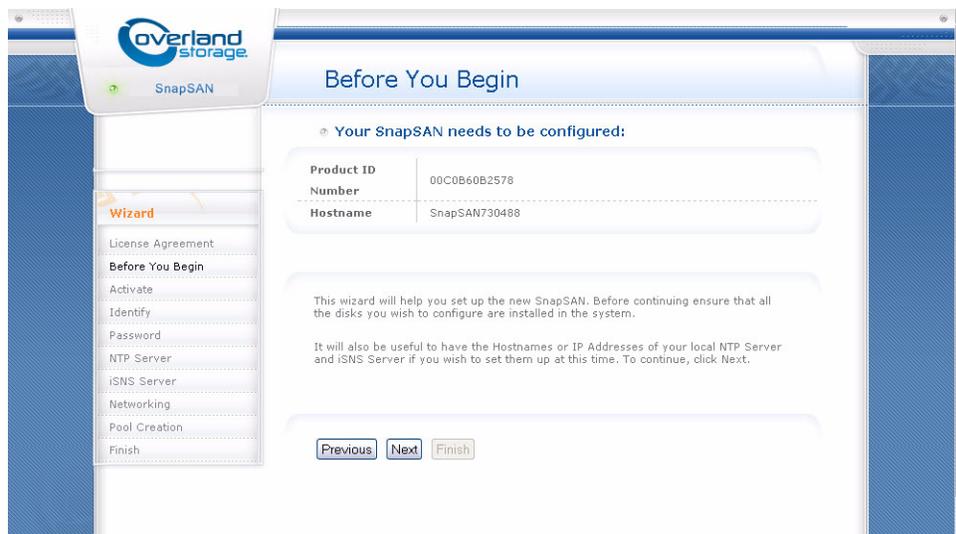
In order for your browser to trust the secure connection to your SnapSAN S2000 appliance permanently, the CA certificate must be installed in your browser. A link to the certificate can be found on the System page (see [“System Tab” on page 8-3](#)).

Installation of the certificate varies according to the browser you are using. With some browsers, you can simply click the certificate and it will be installed automatically; on others, you may have to save the certificate and then import it into the browser, for example, by dragging it to the browser. After installing the certificate, some browsers may have to be restarted for the connection to become trusted.

2. At the License Agreement page, read the license agreement, check the **Agreement box** to accept it, and click **Next**.
If you do not accept the license agreement, you will not be able to proceed.



- At the Before You Begin window, the appliance's serial number and current Hostname are displayed. To start configuring the appliance, click **Next**.



- At the Activate page, review the **activated settings** for the appliance and click **Next**.

Activate

Activated

License Key: TFAJ-LHLO-ROED
 Product ID: 00C0B60B2578
 Number: 00C0B60B2578

Features

Feature	Licensed	Evaluation time Remaining (Hours)
Replication	True	N/A
iSCSI Target	True	N/A
Target	Licensed for Unlimited	N/A
Capacity	Capacity	N/A
Mirroring	True	N/A

Previous Next Finish

5. Enter the appliance's **network name** (also known as the hostname) in the Identify window, and click **Next**.

Identify

The SnapSAN Hostname and Domain Name can be changed to make it easier to identify on your network.

Hostname: SnapSAN730488
 Domain Name:

Previous Next Finish

Optionally, you can enter your local network's Domain Name. The network name must start with a character (a-z, A-Z), use alphanumeric characters or a dash (-) character, and must not include any spaces. If you do not supply a domain name but want to specify an NTP or iSNS server name later, you will have to supply the fully qualified domain name of the server.

6. At the Password page, change the Administrator **Password** from its default value. For security reasons, you must enter a new password. Click **Next** to continue.

7. At the NTP Server page, select the option you want concerning the use of a Network Time Protocol (NTP) server, and click **Next**.

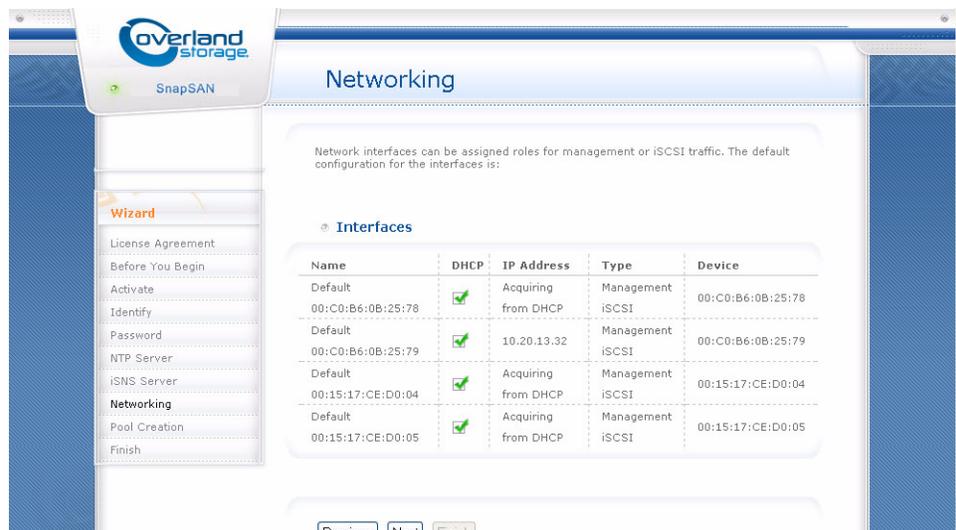
An NTP server ensures that the system time on the appliance remains synchronized with any other systems using an NTP server. If you have your own NTP server, enter its details here. Alternatively, you could specify a public server, for example pool.ntp.org, which is a pool of publicly accessible NTP servers.

- At the iSNS Server page, specify an Internet Storage Name Service (iSNS) server, and click **Next**.



The iSNS protocol aids the discovery of iSCSI hosts and targets. It is part of the iSCSI protocol suite. The most widely used iSNS server is available free from Microsoft (see <http://www.microsoft.com/downloads>). If you have your own iSNS server, enter its details at this screen.

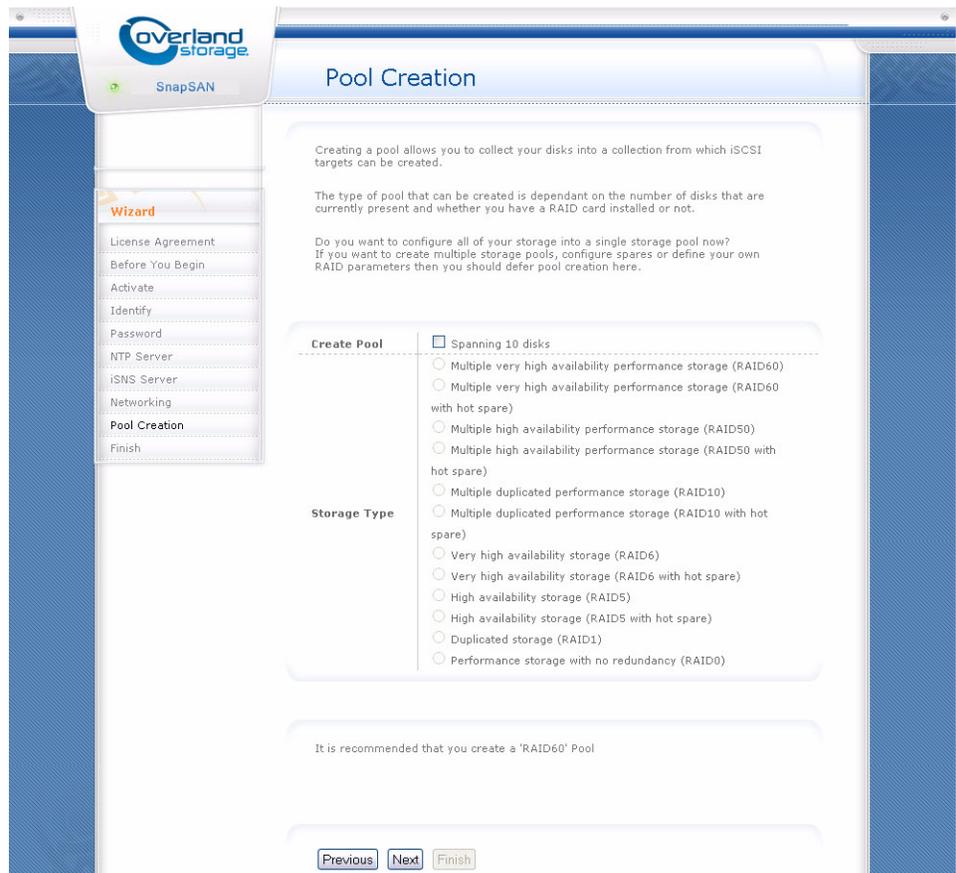
- The Networking page displays the default network configuration for the appliance. Since there is nothing to change here, click **Next** to continue.



The two Ethernet ports on the appliance can be configured later for iSCSI traffic, management traffic, or both.

NOTE: The page is for information only. You can alter the networking configuration later using the Network page (see [“Network Tab” on page 8-11](#)).

10. At the Pool Creation page, **configure** your storage and create a storage pool, and then click **Next**.



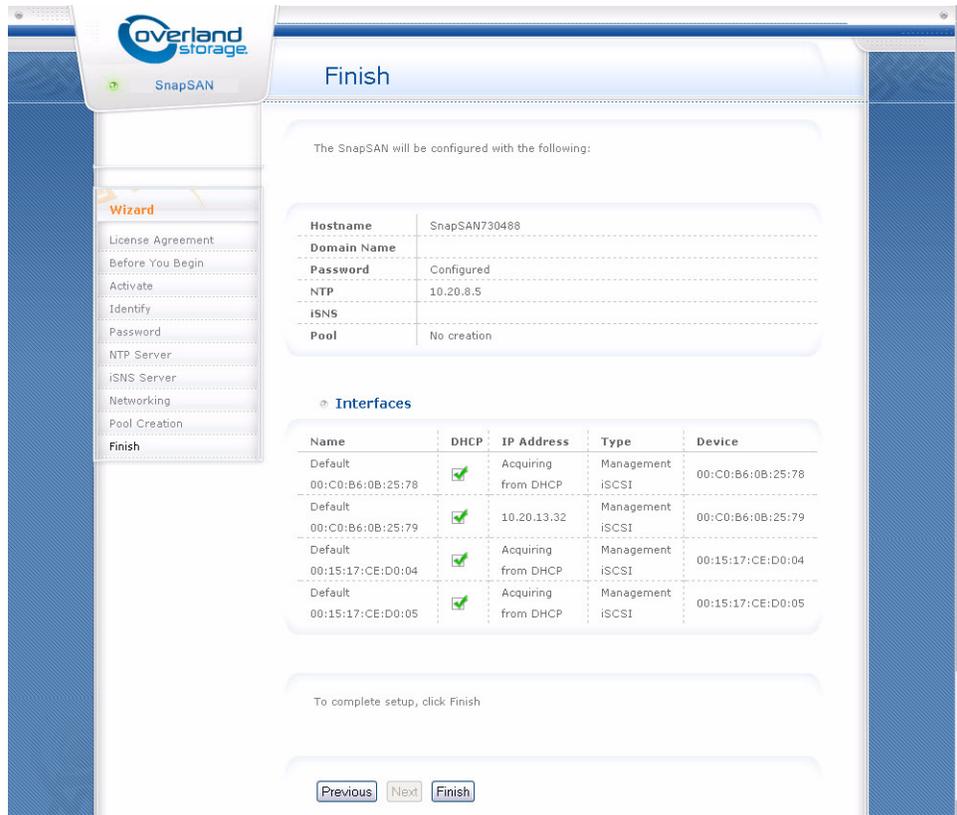
A choice of storage types is available, depending on the number of physical disks present in the system and on whether you have a hardware RAID controller installed. The storage types include:

- **RAID 0** – Performance storage with no redundancy
- **RAID 1** – Duplicated storage (on redundant disk)
- **RAID 5** – High availability storage
- **RAID 6** – Very high availability storage
- **RAID 10** – Multiple duplicated performance storage
- **RAID 50** – Multiple high availability performance storage
- **RAID 60** – Multiple very high availability performance storage

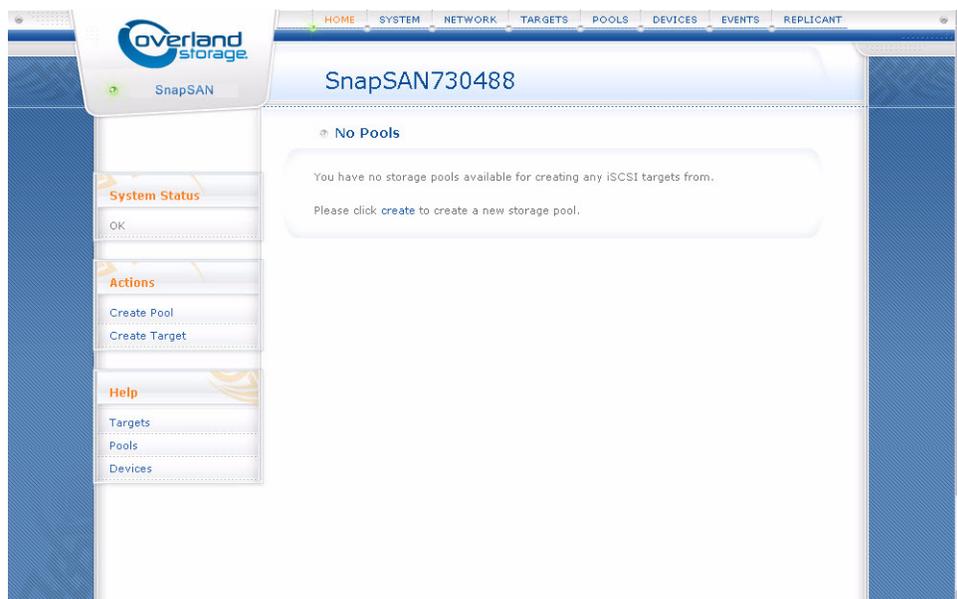
NOTE: If you want to create multiple pools or to create a pool using only selected disks in the enclosure, do not select any of the options. After the wizard has completed, use Windows SnapSAN Manager ([“SnapSAN Pools Category” on page 7-4](#)) or the Pool Creation page (see [“Create Storage Pool” on page 8-50](#)) to create the pool later.

11. The Initial Configuration Wizard displays the Finish page, click **Finish** to confirm your settings.

The wizard will configure the appliance and create any requested storage pools and volumes.



Click Home in the Tab bar to go to the appliance's home page to see an overview of the targets, pools, and devices available on the appliance.



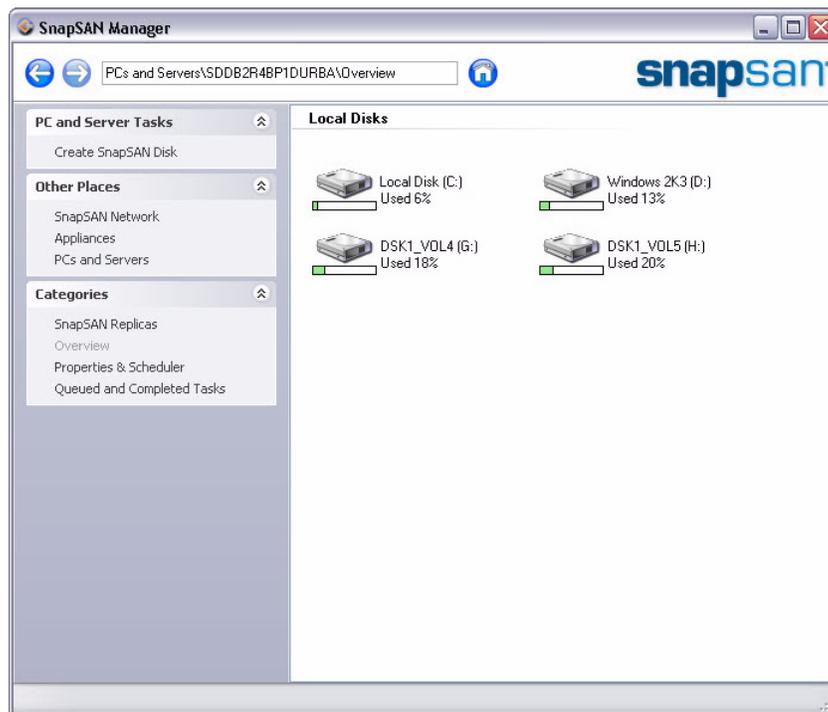
NOTE: [Chapter 8](#) describes how to use Web Management Interface.

This chapter describes how to carry out the following basic storage management tasks using the Windows SnapSAN Manager installed on a network computer that can access the SnapSAN S2000.

- Overview of the Windows SnapSAN Manager (below)
- Creating a SnapSan disk ([page 4-2](#))
- Backing up data ([page 4-4](#))

Windows SnapSAN Manager Overview

The Windows SnapSAN Manager enables you to manage your data storage using a Windows interface. When you start up the manager, you will see the Overview (or default) window. This is also accessed by clicking the Home button.



The window has a number of panels. The top panel contains buttons for moving backwards and forwards and returning home to this Overview window. It also has a text box that shows where you are in the hierarchy of windows. As the text box shows, this Overview window is actually the PCs and Servers/<host_name>/Overview window, where <host_name> is the name of the PC that is running the Windows SnapSAN Manager and to which the appliance is connected.

The right side panel (or view) represents the storage area network (SAN) and shows the objects that can be managed. The left side panel is organized as a number of lists. You can focus on different parts of the network and carry out management tasks by using the controls in the left side panel. The list contents alter dynamically to match the objects selected in the right side panel. The lists are as follows:

- **<place_name> Tasks** – This list holds the controls for carrying out operations on the objects in the right side panel.
- **Other Places** – This list holds the controls for switching focus between the network, the PCs and servers, and the appliances. It also has controls for moving backwards through a hierarchy of windows.
- **Categories** – This list holds the controls for switching between different views of an object.
- **Details** – In some views, when you select an object in the right side pane, details about it are displayed in this list.

The right side panel may display one or more buttons. The buttons mirror entries in the task lists. Hyperlinks in the right side panel provide a quick method of moving to related views.

At the bottom of the window is a status bar. This is used to provide feedback when, for example, a task completes or the system status changes.

You can find detailed information about the objects in the Other Places list as follows:

- **PCs and Servers** – [Chapter 5, “PC and Servers Management,”](#) describes how to configure and manage the storage of PCs and servers.
- **SnapSAN S2000 Network** – [Chapter 6, “Network Management,”](#) describes how to configure and manage the SnapSAN S2000 network as a whole.
- **Appliances** – [Chapter 7, “Appliance Management,”](#) describes how to configure and manage SnapSAN S2000 storage appliances.

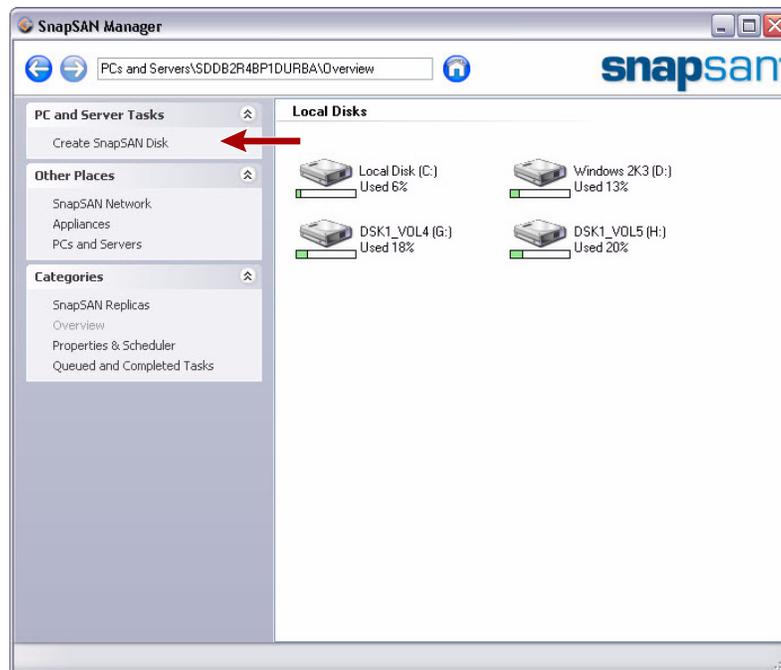
To start using Windows SnapSAN Manager for basic operations such as creating disks and backing up data, continue with [“Creating a SnapSAN Disk.”](#)

Creating a SnapSAN Disk

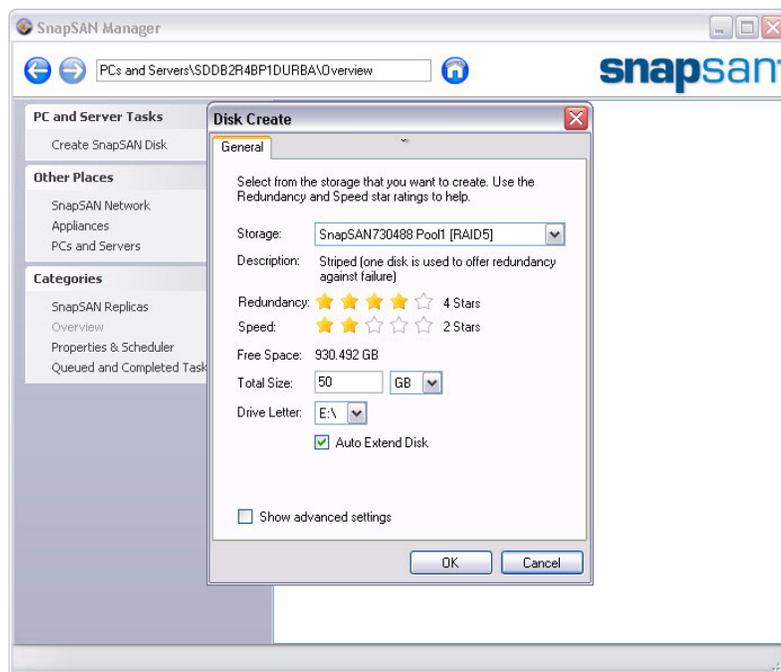
NOTE: Before you can create any iSCSI volumes, you must have one or more storage pools from which volumes are allocated. If you did not set up a disk pool using the wizard, you need to do so now (see [“SnapSAN Pools Category” on page 7-4](#)).

To create a SnapSAN disk using a previously created disk pool, follow the steps below. This creates a disk with default configuration settings. If you want to create a disk with a site-specific configuration, check the Show advanced settings box and configure the disk as described in [“Disk Create Advanced Settings” on page 5-5](#).

1. From the Overview screen, select **Create SnapSAN Disk** from the PC and Server Tasks list.



2. At the Disk Create dialog box, select your **settings**:



- a. Select from the top drop-down list the **SnapSAN pool** you want to use for the new disk. A description of the pool selected is given in the dialog box together with a star rating for its performance characteristics. One star is the lowest level and five stars are the highest level.
- b. Enter the **size** of the disk and the **unit of measurement**. Default values are preselected and the maximum amount of free space available is shown above the entry boxes.

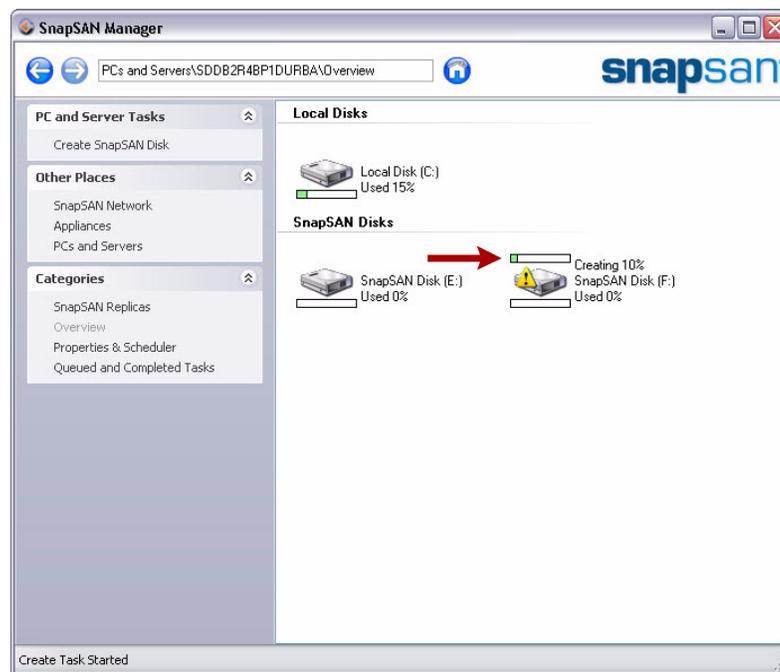
- c. Choose a Windows **drive letter** for the disk. By default, the next free drive letter is chosen.
- d. Verify that the **Auto Extend Disk** box is checked (default) if you would like Windows SnapSAN Manager to extend the size of the disk automatically as the disk fills up.

After the disk has been created, you can configure details of how Windows SnapSAN Manager automatically extends the disk (see [“Configure Auto Extension Task” on page 5-12](#)).

NOTE: If you have activated the optional mirroring, you cannot use the Auto Extend Disk feature.

3. Select **OK** to confirm your choices and close the dialog box.

An icon for the new disk appears in the lower panel of the Overview window. While Windows SnapSAN Manager configures the disk, a progress bar is shown above the disk's icon. The disk is ready when the progress bar disappears.



To confirm that the new drive is present, you can open My Computer.

Backing Up Data

Your SnapSAN S2000 appliance provides multiple ways to back up your data including snapshots, replicas, and mirroring.

Using Snapshots

The snapshot has become an essential component of a modern data storage solution. It provides a mechanism by which an (apparently) instantaneous copy can be taken of a storage volume or disk. Snapshots were originally developed to overcome the problem of volumes changing while backups were in progress. Snapshot technology allows the

backup application to work with a snapshot of the volume, effectively corresponding to the state of the volume at a single point in time. Typically the backup application would create a volume snapshot, back up the snapshot and then delete it.

For efficient backup, SnapSAN S2000 software provides support for up to 256 Windows snapshots which are read-only. Technically speaking, Windows SnapSAN Manager acts as a hardware provider in the Windows Volume Shadow Copy Service (VSS) framework.

In response to requests from third-party VSS-compliant backup software, Windows SnapSAN Manager provides a snapshot on the appliance of the data to be backed up. A Windows VSS snapshot is effectively a temporary clone of the data. The backup application then accesses the snapshot through the VSS interface to create a backup of the data. When the backup is complete, the backup software notifies Windows SnapSAN Manager that it has finished with the snapshot so that Windows SnapSAN Manager can delete it. Sufficient space must be available on the appliance to hold the snapshot for the backup to proceed.

The big advantage of using snapshots for backups is that users can continue to use the system throughout the backup procedure. Another advantage is that administrators can have “application consistent” backups using snapshots.

Using Replicas

NOTE: Replication is an add-on feature to the SnapSAN S2000 and requires a separately purchased license.

A replica is a copy of a disk that is usually stored in a separate location from the original. This location may be a different subsystem on the local area network or a remote location connected by a wide area network. Whereas a snapshot provides a one-off backup of a disk, a replica can be updated automatically at user-defined intervals or on demand. Each update provides a recovery point. The state of the disk at a recovery point can be recreated as a new disk. The recreated disk is known as a mapped storage replica or, more simply, as a mapping. The update uses the VSS service to ensure that the data is in a consistent state before it is replicated. As with snapshots, users can continue to work while the replication takes place.

When a storage disk is created, a replica can be configured at the same time. To replicate an existing storage disk, the entire contents of the original disk must be transferred to the replica first. While not be feasible in all cases, the SnapSAN S2000 also supports the export and import of replicas on transportable media, such as a USB disk ([“Export to USB Devices” on page 8-45](#)). Once the data has been imported, the replica can be updated over the network.

A replica can be removed if it is no longer required—the original disk is unaffected. Similarly, a replica can be broken away from the original so that it exists in its own right and is no longer updated when the original changes.



IMPORTANT: To enable replication, a replication storage journal must be configured using the Web Management Interface. See [“Storage Journal Configuration” on page 8-52](#) for details. The Replication Link, the interface over which the replication takes place, is the first interface listed on the Network page.

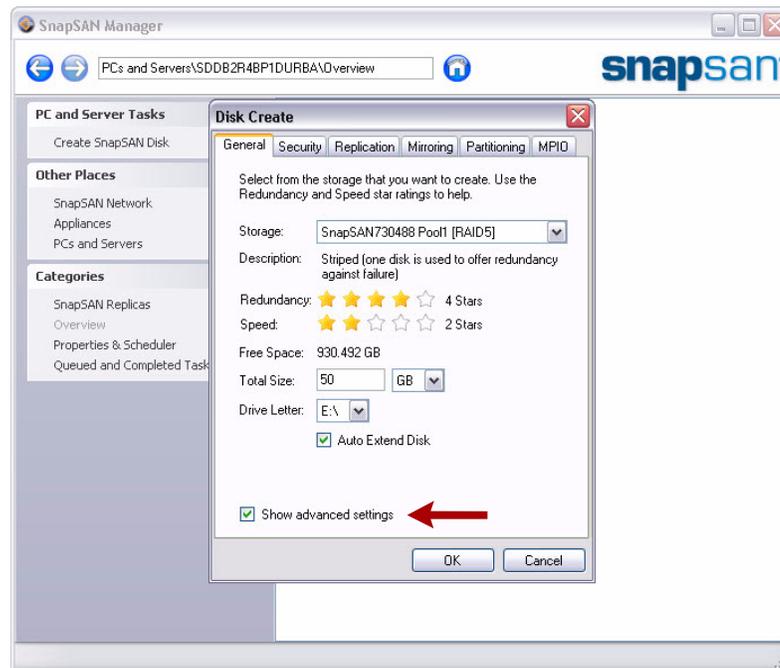
Choose from these options:

- To replicate a new storage disk, follow the instructions below ([“Creating and Replicating a New Disk Simultaneously”](#)).

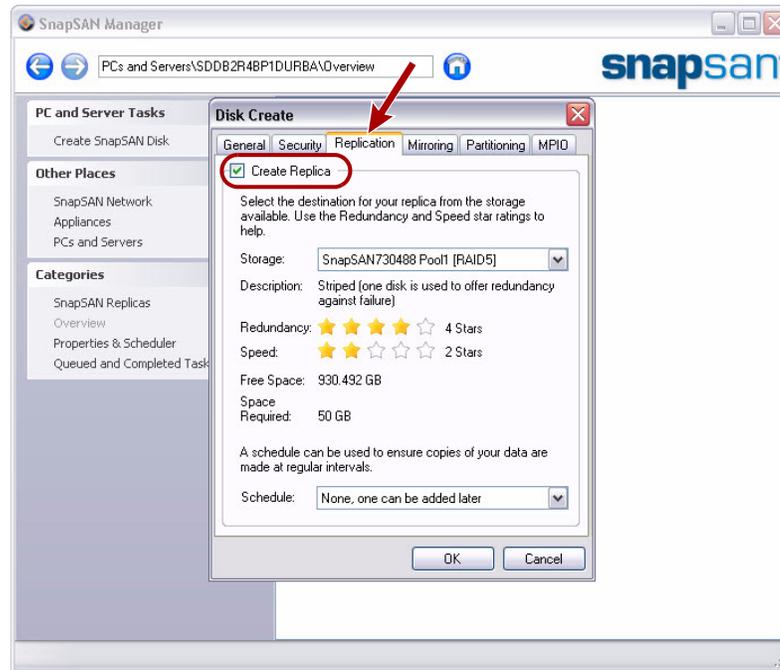
- To replicate an existing storage disk over the network, follow the instructions given in [“Replicate Disk Task” on page 5-12](#).
- To replicate an existing storage disk using export and import, follow the instructions in the Web Management Interface chapter [“Replicant Tab” on page 8-65](#).
- To schedule times for recovery points to be made, see [“Properties & Scheduler Category” on page 5-22](#).
- To set a recovery point, see [“Manage Disk Task” on page 5-10](#).
- To recover data from a replica, see [“SnapSAN Replicas Category” on page 5-19](#).

Creating and Replicating a New Disk Simultaneously

1. At the Overview screen, click **Create SnapSAN Disk**.
2. At the **Disk Create** screen, select your settings—but **DON'T CLICK** the OK button.
3. Check the **Show Advanced Settings** box to show the additional configuration tabs.



- From the new tabs, select the **Replication** tab and configure:



- Check the **Create Replica** check box to enable replication.
 - Choose a **Storage** pool from the drop-down list.
The tab shows the redundancy and speed ratings for the pool you select together with both the amount of free space available and required.
 - To set up a schedule for updating the replica, select a **Schedule** from the drop-down list at the bottom of the tab.
You can add or change the schedule later using the Properties & Scheduler view, as described in [“Properties & Scheduler Category” on page 5-22](#). See [“SnapSAN Replicas Category” on page 5-19](#) for details about managing a replica.
- Select **OK** to confirm your choices and close the dialog box.
An icon for the new replicated disk appears in the lower panel of the view. While Windows SnapSAN Manager configures the disk, a progress bar is shown above the disk’s icon. The disk is ready when the progress bar disappears.
 - Select **the disk** and then select **Manage Disk** from the PC and Server Tasks list.
The Properties view confirms that the disk is being replicated. See [“Replication Category” on page 5-16](#) for information on managing a replicated disk.

Using Mirroring

As the primary volume changes, the replica must be updated. This update can be done continuously, in which case the replica is called a mirror. With a mirror, every write issued to the primary volume must be issued to the secondary mirror. Two forms of mirroring are possible, synchronous and asynchronous.

NOTE: N-way (or symmetric multiprocessing) mirroring is not supported.

Synchronous Mirroring

With synchronous mirroring, a write to the mirrored volume is not acknowledged back to the initiating host until the data has been written to both the primary volume and to the secondary mirror. This guarantees that both primary volume and mirror contain identical data, and in the event of the primary volume failing, the host can fail over to the mirror without any interruption in service. However, unless the connection between host and the primary volume and the primary volume and the mirror have similar performance characteristics significant write latencies will be introduced. This will typically lead to unacceptable write performance for the mirrored volume.

For this reason, synchronous mirroring is generally only feasible between systems connected with a high performance, low latency link. This requires that the systems be located physically quite close, and so synchronous mirroring is not usually appropriate for disaster recovery when the replica is kept at a geographically remote site.

Asynchronous Mirroring

Asynchronous mirroring allows writes to the secondary mirror to be performed asynchronously. The write operation can be acknowledged back to the initiating host as soon as it has been written to the primary volume. Typically it will be buffered on the primary controller and then written out in the background to the remote secondary volume. This means that the connection between the primary volume and the plex can be of a lower performance and that it can be used as a disaster recovery solution between geographically remote systems.

However, because the update is asynchronous, it means that the secondary mirror is usually a little out of date compared to the primary volume. This potential disparity means that it cannot be used as a failover system, since if the host failed over, the operating systems view of the volume and the actual contents of the volume would not be quite the same. However, it should be possible to use the secondary volume by restarting the host computer and having it perform a file system integrity check before using the secondary volume as its primary volume. This is sometimes known as crash-point consistency.

Unfortunately there are other problems with asynchronous mirroring. If there is a failure, then the secondary mirror contains a version of the volume data as it was at an essentially random point in time. It suffers from exactly the same problems as a snapshot taken without using VSS, in that the data may not be self consistent as far as applications are concerned.

Creating and Mirroring a New Disk Simultaneously

NOTE: MPIO software and a Neutral Storage Host are required for mirroring.

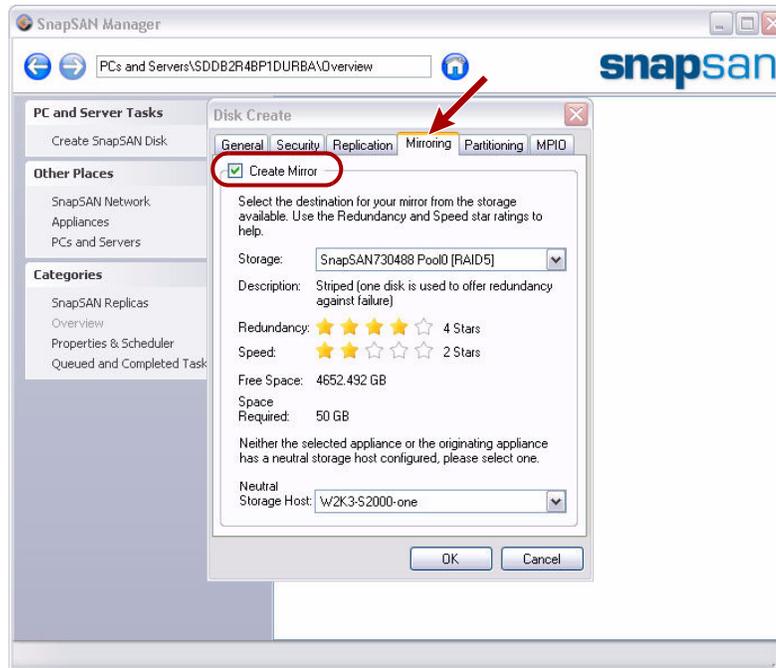
1. At the Overview screen, click **Create SnapSAN S2000 Disk**.
2. At the **Disk Create** screen, select your settings—but **DON'T CLICK** the OK button.



IMPORTANT: The Auto Extend check box on the General tab page must be UNCHECKED.

3. Check the **Show Advanced Settings** box to show the additional configuration tabs.

- From the new tabs, select the **Mirroring** tab and configure:



- Check the **Create Mirror** check box to enable mirroring.
 - Choose a **Storage** pool from the drop-down list.
The tab shows the redundancy and speed ratings for the pool you select together with both the amount of free space available and required.
 - If a **Neutral Storage Host** has not yet been created, choose one from the drop-down list at the bottom of the tab.
This option is not visible if a host has already been selected.
- At the MPIO Path Status message, click **OK** start the process.
An icon for the new SAN disk appears in the lower panel of the content area. While Windows SnapSAN Manager configures the disk, a progress bar is shown above the disk's icon. The disk is ready when the progress bar disappears.
 - Select **the disk** and then select **Manage Disk** from the PC and Server Tasks list.
The Properties view confirms that the disk is being mirrored.

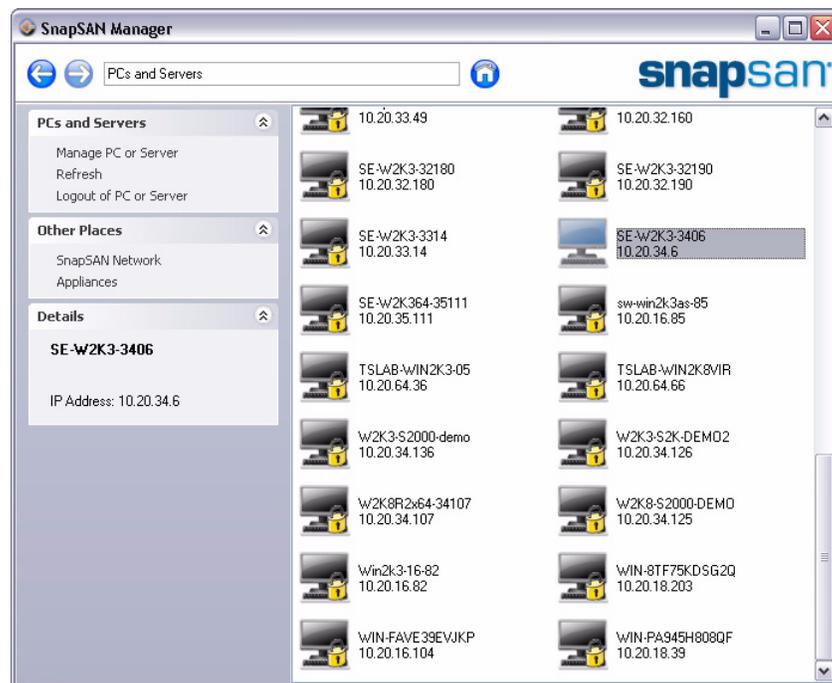
PC and Servers Management

This chapter describes the tasks you can carry out on PCs and servers using the Windows SnapSAN Manager application.

- An introduction to PC and server management (below)
- How to create a SAN disk ([page 5-4](#))
- How to extend a SAN disk ([page 5-10](#))
- How to destroy (remove) a SAN disk ([page 5-9](#))
- Managing a specific SAN disk including replication ([page 5-10](#))

Introduction

By selecting PCs and Servers from the Other Places list on the Home screen, the PCs and Servers screen is shown. Use this screen to select the PC computer or server you want to configure or manage.



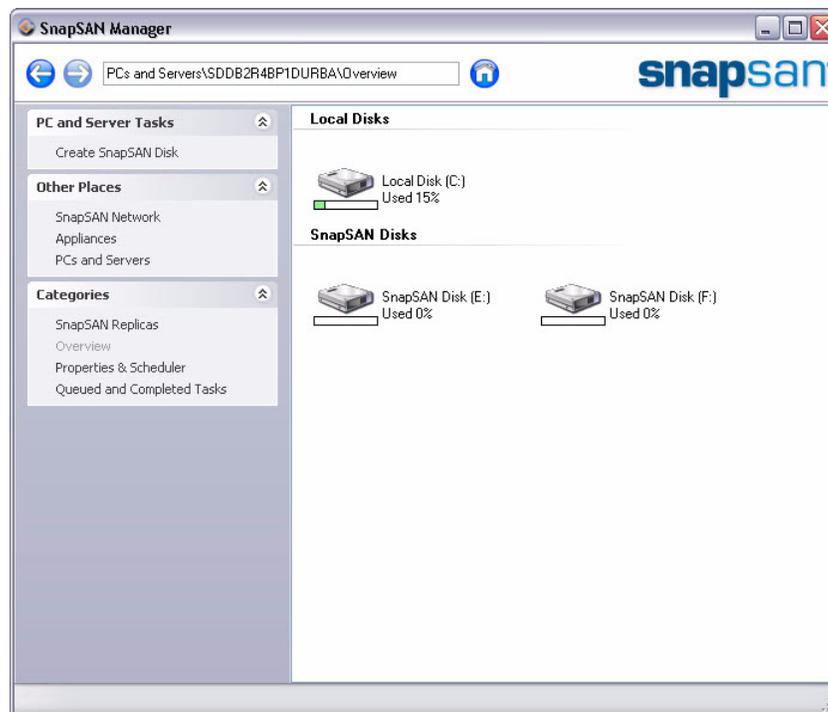
Overview Screen

To access the PCs and Servers Overview screen, do one of the following:

- Double-click an unlocked (blue) server icon.
This is the same as selecting the unlocked (blue) server icon and clicking the Manage PC or Server option on the left.
- Double-click an locked (black) server icon, enter the User Name and Password, and click OK. Then double-click (or select the Manage PC or Server option).
This is the same as selecting the locked (black) server icon and clicking the Login to PC or Server option on the left.

NOTE: When done, use the Logout of PC or Server option on the left of the Home screen.

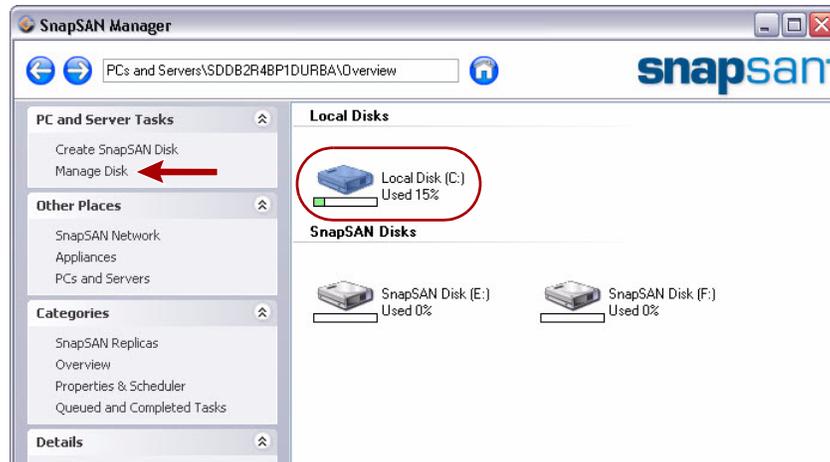
The Overview screen displays the storage options associated with this PC or managed server.



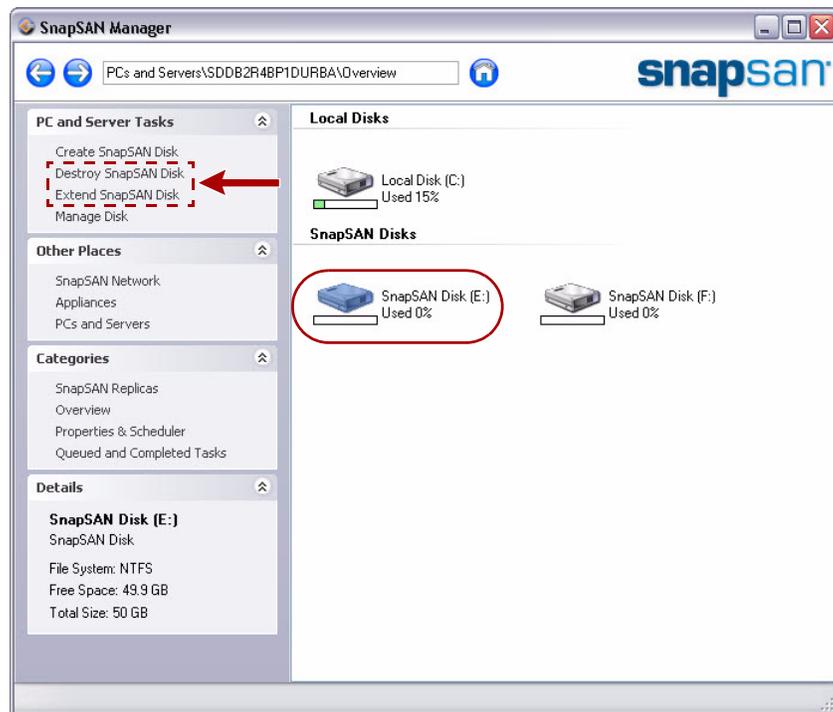
PC and Server Tasks List

The PC and Server Tasks list presents different options depending on which item, if any, is selected in the right pane:

- When **no disks** are selected, only the Create a SnapSAN Disk task (see [page 5-4](#)) is shown.
- When a **local disk** is selected, a new task called Manage Disk (see [page 5-10](#)) appears in the list.



- When a SnapSAN **disk, replica, or mirror** is selected in the content area, two more tasks appear:
 - Destroy SnapSAN Disk (see [page 5-9](#))
 - Extend SnapSAN Disk (see [page 5-10](#))



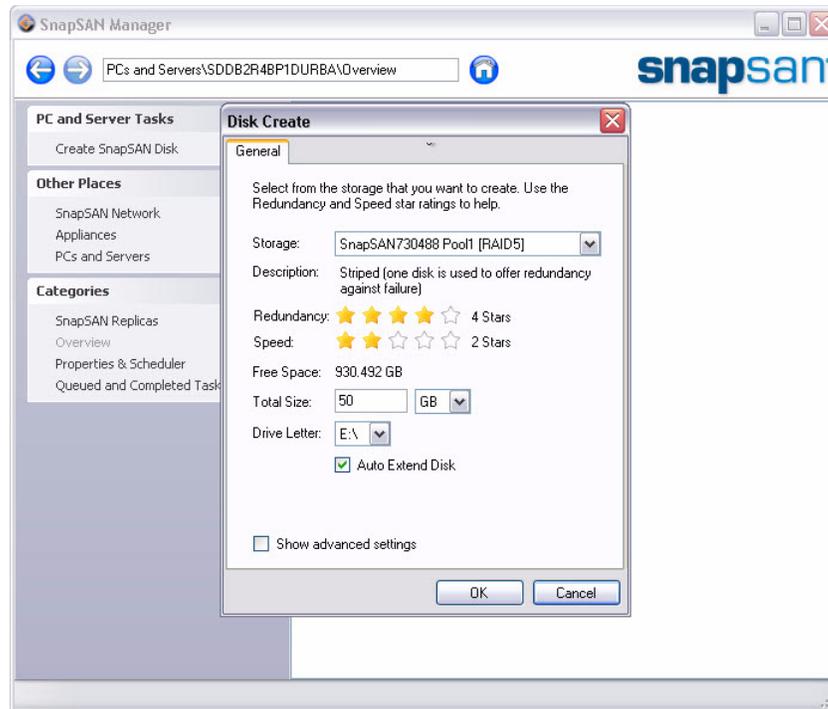
Categories List

Four options are available in the Categories list:

- SnapSAN Replicas (see [page 5-19](#))
- Overview (current screen)
- Properties & Scheduler (see [page 5-22](#))
- Queued and Completed Tasks (see [page 5-23](#))

Create SnapSAN Disk

When you select Create SnapSAN Disk from the PC and Server Tasks list, the Disk Create dialog box opens.



Choose the appropriate settings for your storage disk:

- **Storage** – From the drop-down list, select the storage pool you want to use for the new disk. A description of the selected storage pool is shown together with a star rating (one star for lowest; five stars for highest) for its performance characteristics.
- **Total Size** – Specify the total size of the disk (default values are provided) and choose the unit of measurement (GB or MB)
- **Drive Letter** – Choose a Windows drive letter for the storage disk. By default, the next free drive letter is pre-chosen.
- **Auto Extend Disk** – Check this box if you would like Windows SnapSAN Manager to extend the size of the disk automatically as the disk fills up. See [“Configure Auto Extension Task” on page 5-12](#) for more information.

NOTE: This option cannot be used with replication or mirroring.

- **Show Advanced Settings** – Check this box to display tabs to set up additional security features, disk replication, mirroring, disk partitioning, and multipath connections. See [“Disk Create Advanced Settings” on page 5-5](#) for more details.

NOTE: Replication and mirroring require additional licenses.

When you click OK, the new disk icon appears in the view. A bar at the top of the disk icon shows the progress as the Windows SnapSAN Manager prepares the new drive for use.

Windows SnapSAN Manager creates a volume on the appliance, assigns it an iSCSI target, sets up discovery controls, and configures the Windows server so the iSCSI subsystem can discover the disk. Then the Windows SnapSAN Manager logs into the disk, partitions it, creates an NTFS file system on it using Quick Format, and assigns it a drive letter. When this is complete, the progress bar disappears.

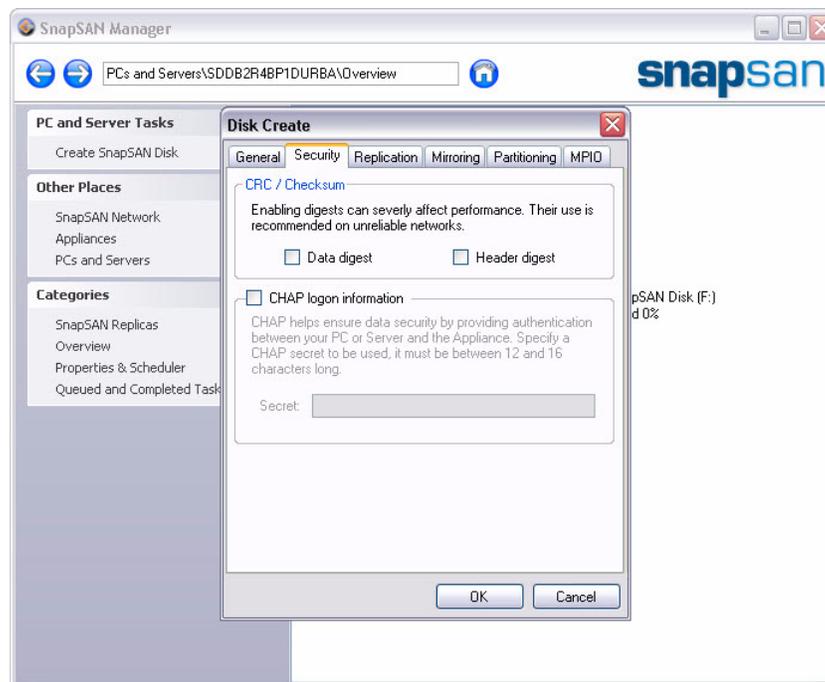
If you open up My Computer, you can confirm that the new drive is present and that it can be accessed in the same way as a local drive.

NOTE: To do a full format that scans for bad sectors, you must use Windows Disk Manager.

Disk Create Advanced Settings

To modify the default configuration of the storage disk being created, check the Show Advanced Settings box. This displays additional tabs based on licensed features:

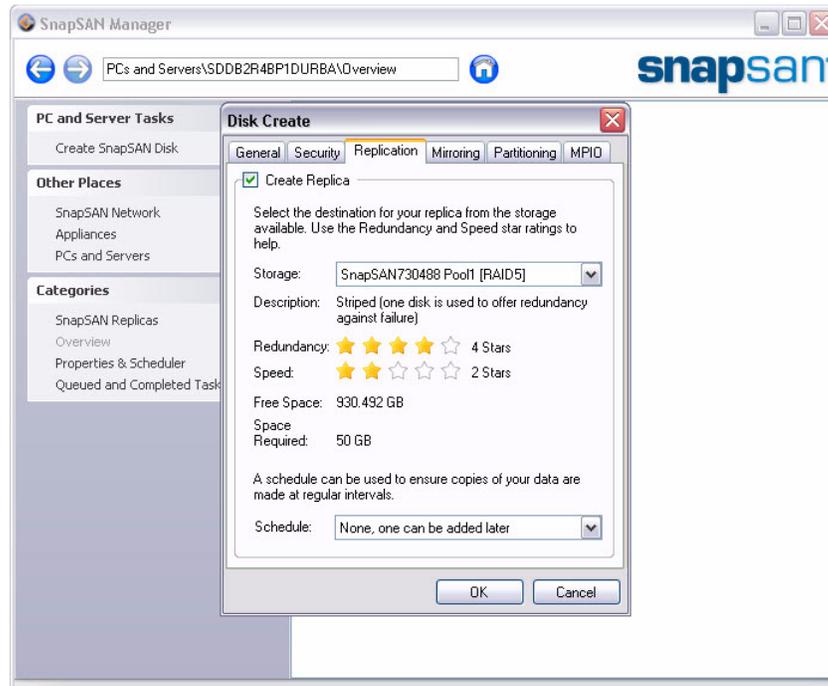
- **Security** – Select the Security tab to set additional security options.



In the CRC / Checksum area, select the check boxes to enable support for data digests and/or header digests.

In the CHAP Logon Information area, select the check box to enable CHAP authentication. Enter a secret, either as a character string or a hexadecimal string.

- **Replication** (optional licensed feature) – If licensed, select the Replication tab to configure a replica of the disk.

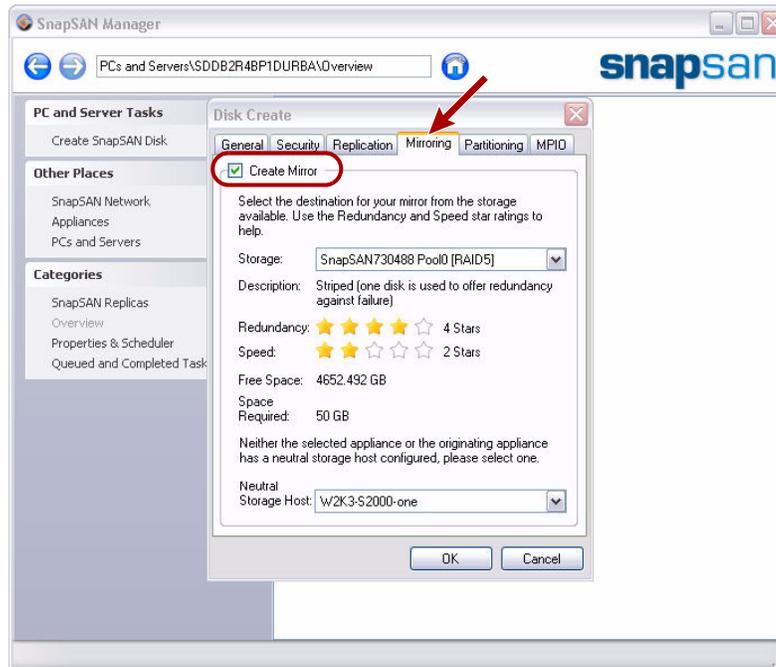


Click the Create Replica check box to enable replication and then choose a storage pool for the replica from the drop-down list. The tab shows the redundancy and speed ratings for the pool you select together with the amount of free space available and the amount required.

To set up a schedule for updating the replica, select a schedule from the drop-down list at the bottom. A schedule can be added later, if preferred, using the Properties & Scheduler view, as described on [page 5-22](#), which also contains further information about managing a replica and using recovery points to capture the state of the replica at specified times. Data can be restored from the replica at a recovery point.

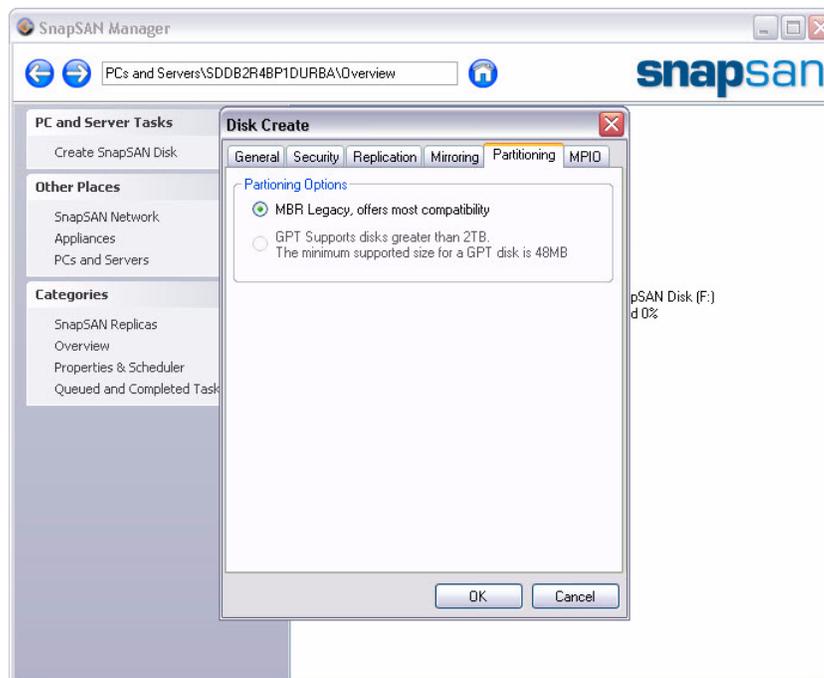
NOTE: You cannot select both replication and mirroring for a storage disk.

- **Mirroring** (optional licensed feature) – If licensed, select the Mirroring tab to configure a mirror of the replica on the disk.



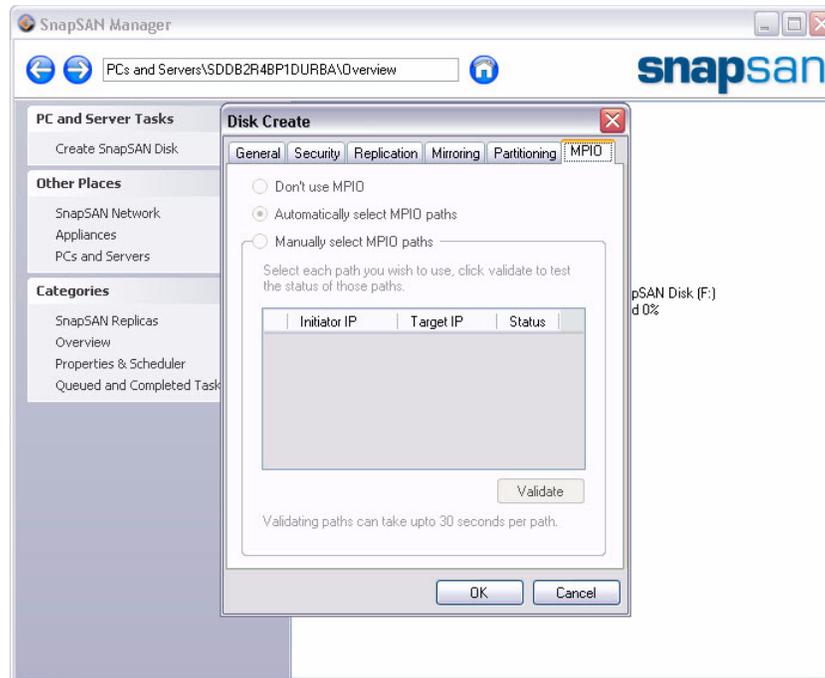
NOTE: You cannot select both replication and mirroring for a storage disk.

- **Partitioning** – Select the Partitioning tab to specify how the disk should be partitioned. The Partitioning tab displays the partitioning schemes available.



Select a partitioning scheme by clicking the button alongside it:

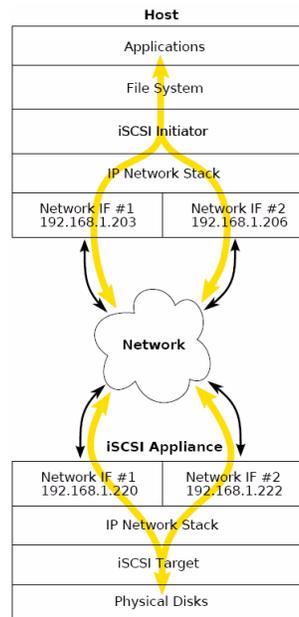
- **MBR Legacy** – The Master Boot Record scheme offers backwards compatibility with the legacy PC standard, which is limited to 4 partitions, each up to 2 terabytes in size.
- **GPT** – The GUID Partition Table scheme supports up to 128 partitions with over 2 terabytes per partition.
- **MPIO** – Select the MPIO tab to set up multiple paths (multiple connections) between initiators and targets. Having multiple paths available for network operations can enhance performance and improve reliability.



To use MPIO, choose one of the following methods of configuring the connections:

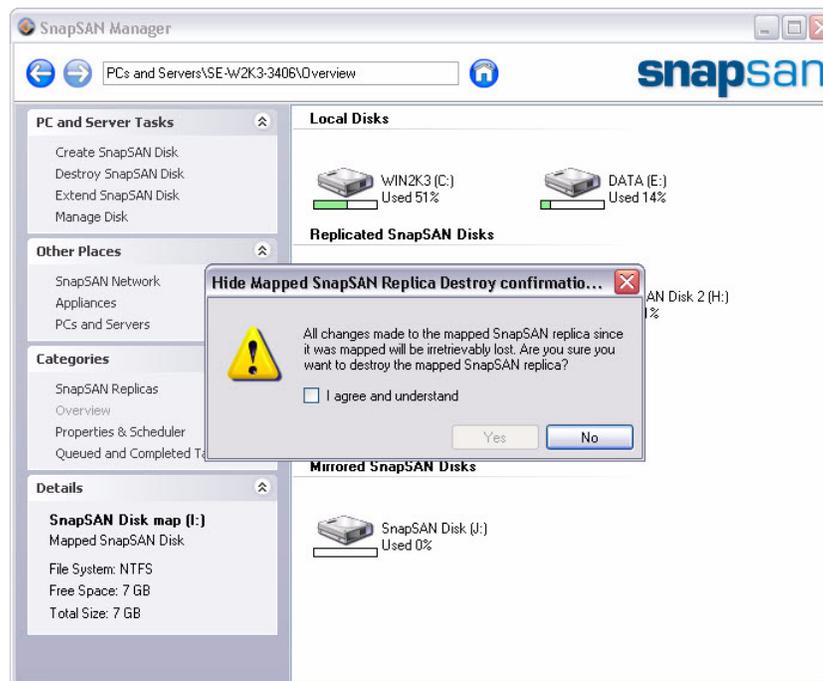
- **Automatic** – All the paths between initiators and targets will be discovered automatically and the connections between them set up.
- **Manual** – All the paths are displayed in the panel together with their status. Select the paths you want to configure and check their connectivity by clicking the Validate button.

The figure following illustrates the dataflow between the applications running on the host and the disks in the iSCSI appliance when multiple interfaces are being used.



Destroy SnapSAN Disk

To remove a selected storage disk, use the Destroy SnapSAN Disk option from the PCs and Servers Tasks list. The Confirm SnapSAN Disk Destroy dialog box is shown asking for confirmation with a warning that all data on the disk will be lost.

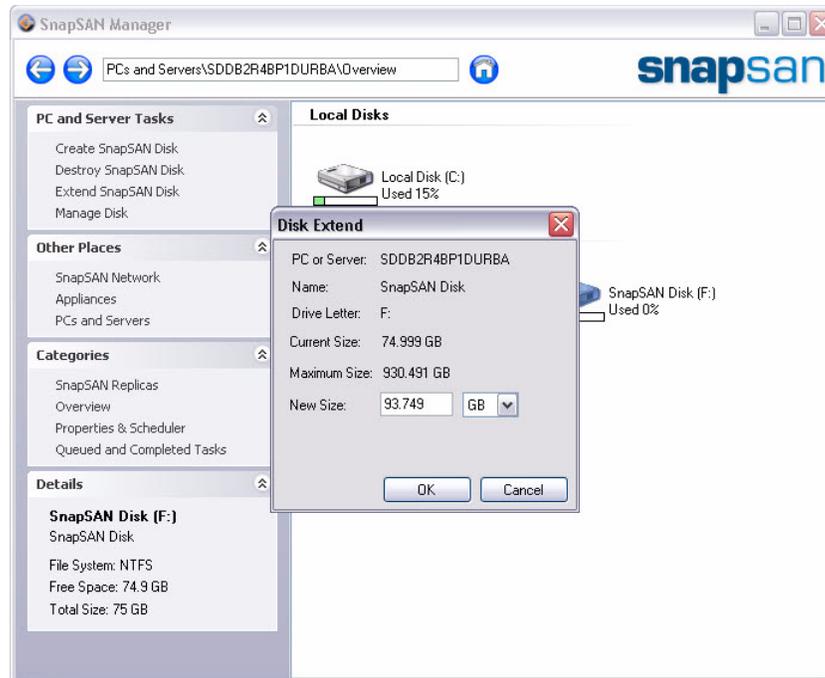


NOTE: All replicas and mirrors must be removed before a disk can be destroyed.

Extend SnapSAN Disk

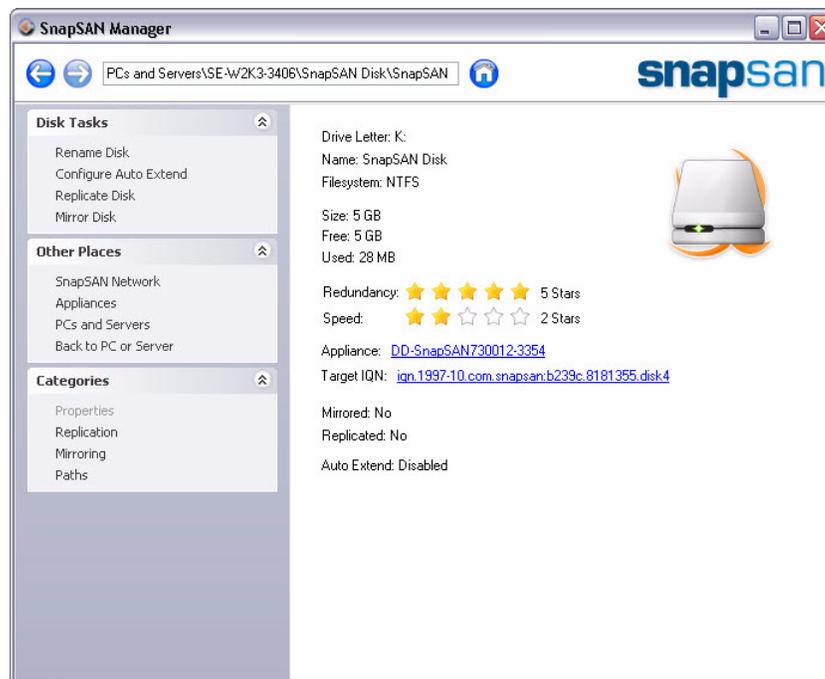
You can extend the size of a SnapSAN storage disk manually by selecting it in the view and then selecting Extend SnapSAN Disk from the PC and Server Tasks list.

The Disk Extend dialog box is shown. Enter the new size of the disk and click OK.



Manage Disk Task

To manage a selected disk, select Manage Disk from the PC and Server Tasks list. The Properties view of the disk is shown.



The Disk Tasks list shows the management tasks you can perform on the disk:

- Rename Disk (see [page 5-11](#))
- Configure Auto Extend (see [page 5-12](#))
- Replicate Disk, if licensed and not mirrored (see [page 5-12](#))
- Mirror Disk, if licensed and not replicated (see [page 5-12](#))

The Categories list for Manage Disk provides the following views of the disk:

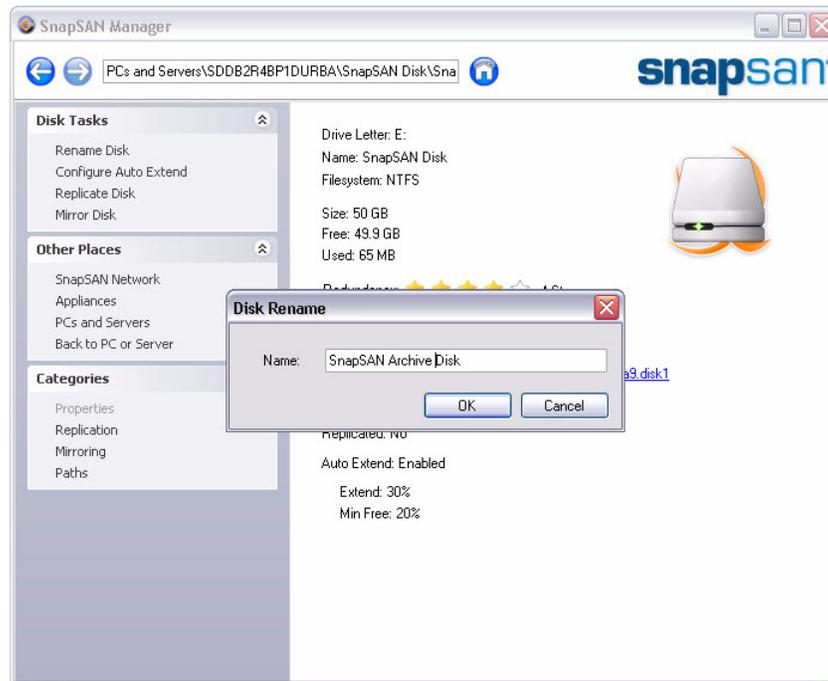
- Properties (current screen)
- Replication, if licensed (see [page 5-15](#))
- Mirroring, if licensed (see [page 5-17](#))
- Paths (see [page 5-18](#))

Disk Tasks

Up to four different tasks are available to manage a disk.

Rename Disk Task

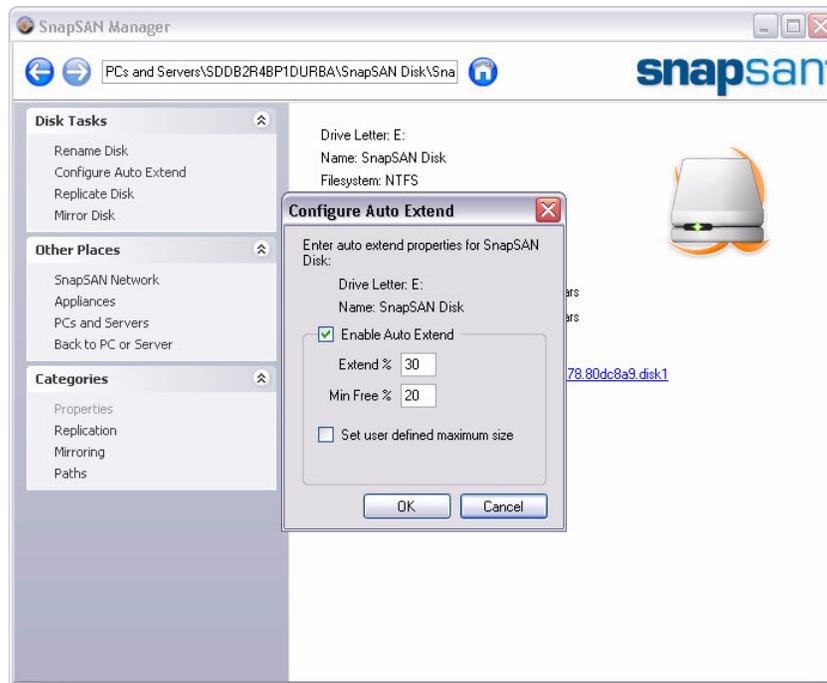
To rename a highlighted disk, select Rename Disk from the PC and Server Tasks list. The Disk Rename dialog box is displayed.



Enter a new name for the disk and click OK.

Configure Auto Extension Task

To configure the automatic disk extension, select Configure Auto Extend from the Disk Tasks list.



Use the dialog box to specify by what percentage the disk should be extended and what minimum percentage of the disk should be kept free. You can also specify a maximum size for the disk.

Replicate Disk Task

NOTE: Replication is an optional feature and requires a separate license.

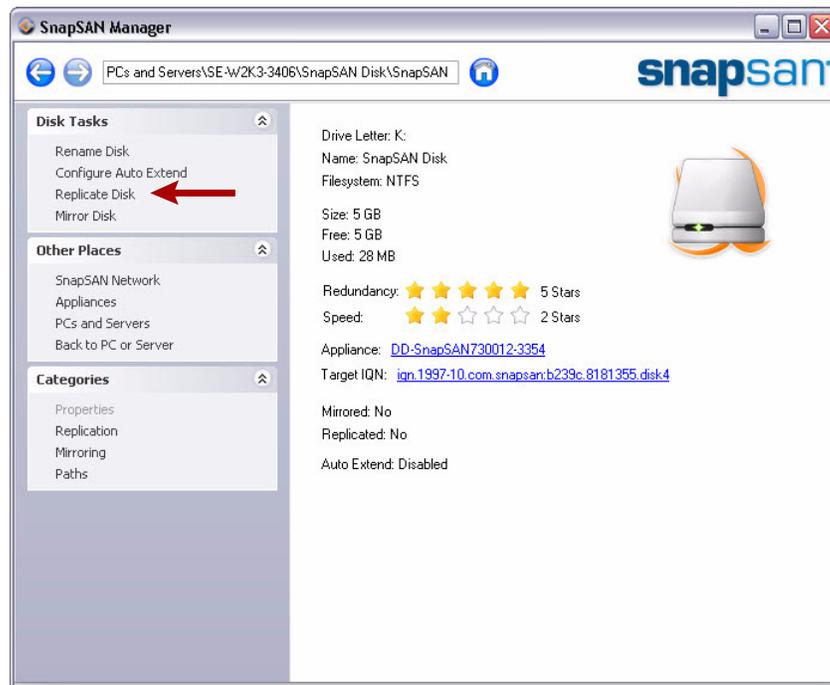
To replicate a SnapSAN Disk, select the disk and then select Manage Disk from the PC and Server Tasks list. The Properties view for the disk is displayed. Select Replicate Disk from the Disk Tasks list to get the Replicate Disk dialog box.

IMPORTANT: To enable replication, a Replication Journal drive must first be configured using the Web Management Interface. See [“Pools Tab” on page 8-46](#) for details.

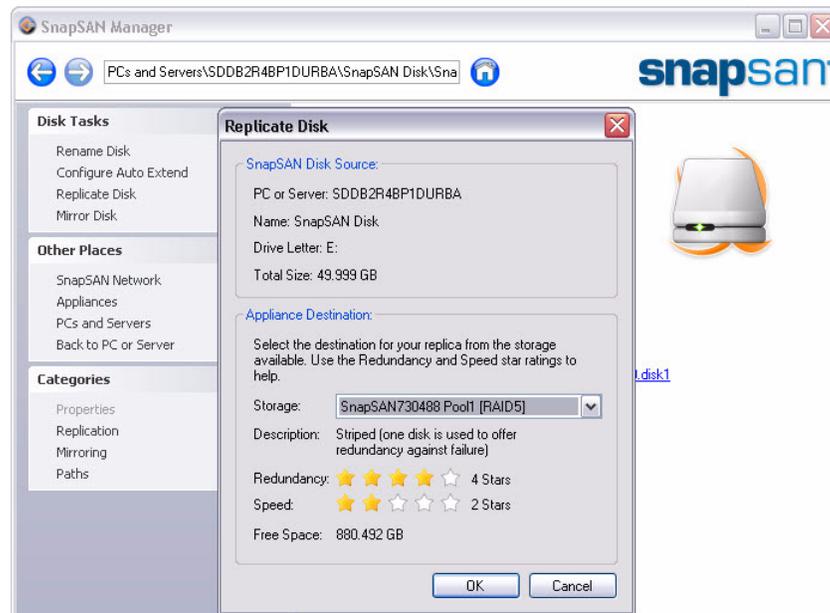
To replicate a previously created storage disk:

1. Select the newly created SnapSAN **Disk** in the content area to expand the options in the PC and Server Tasks list.
2. Click **Manage Disk** in the PC and Server Tasks list.

3. At the Manage Disk screen, click **Replicate Disk**.



4. Select the destination **Storage**.



The top panel shows details of the SnapSAN Disk to be replicated (the source). The bottom panel shows details of the replica. Use the drop-down list to select a storage pool where the replica will be created.

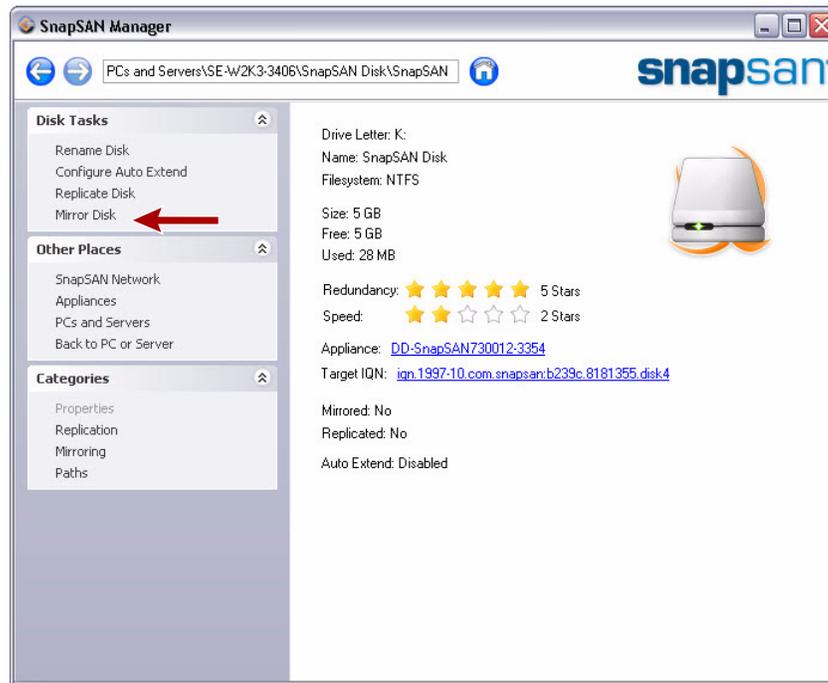
5. Click **OK**. A progress bar is displayed while the replica is being created.

Mirror Disk Task

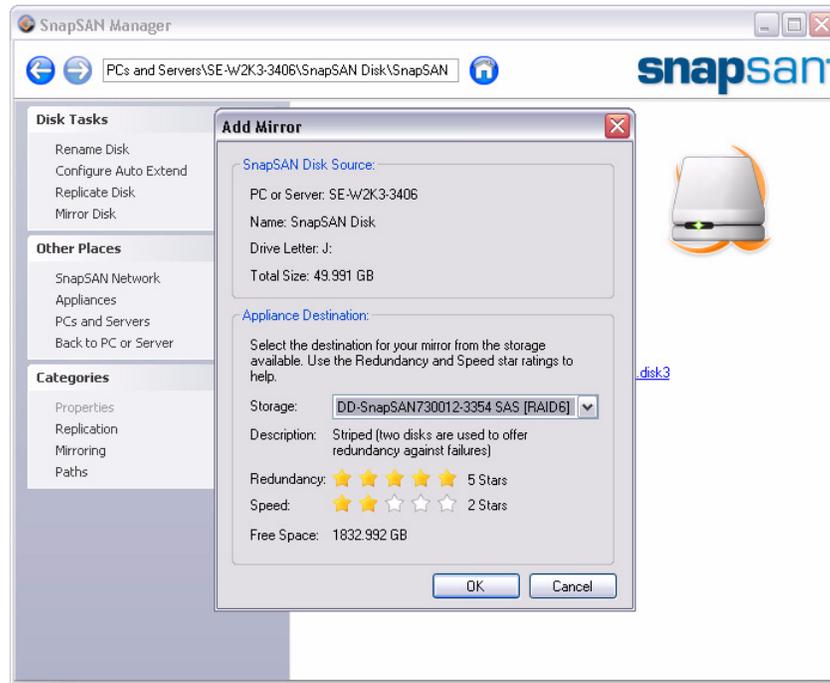
NOTE: Mirroring is an optional feature and requires a separate license.

To mirror a previously created storage disk:

1. Select the newly created SnapSAN **Disk** in the content area to expand the options in the PC and Server Tasks list.
2. Click **Manage Disk** in the PC and Server Tasks list.
3. At the SnapSAN Manage Disk screen, click **Mirror Disk**.



4. Select the destination **Storage**.



The top panel shows details of the SnapSAN Disk to be mirrored (source). The bottom panel shows details of the mirror (destination). Use the drop-down list to select a storage pool where the mirror will be created.

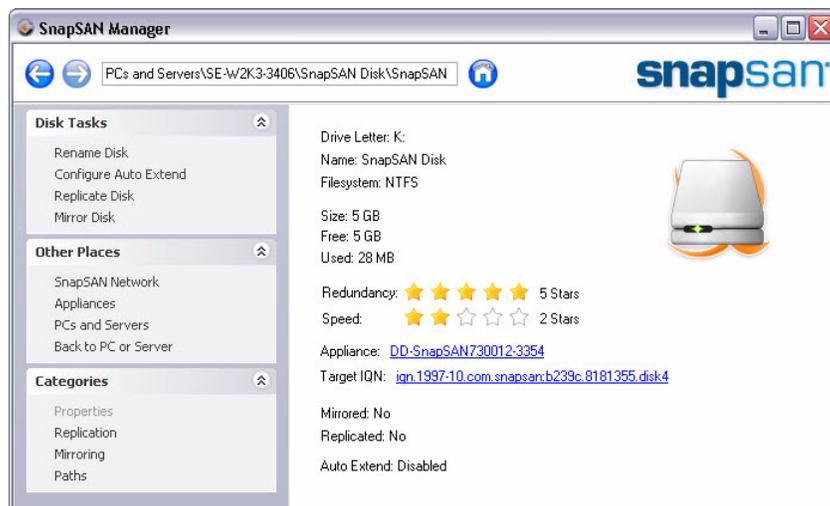
5. Click **OK**. A progress bar is displayed while the mirror is being created.

Categories

Four Category options are available under Manage Disk.

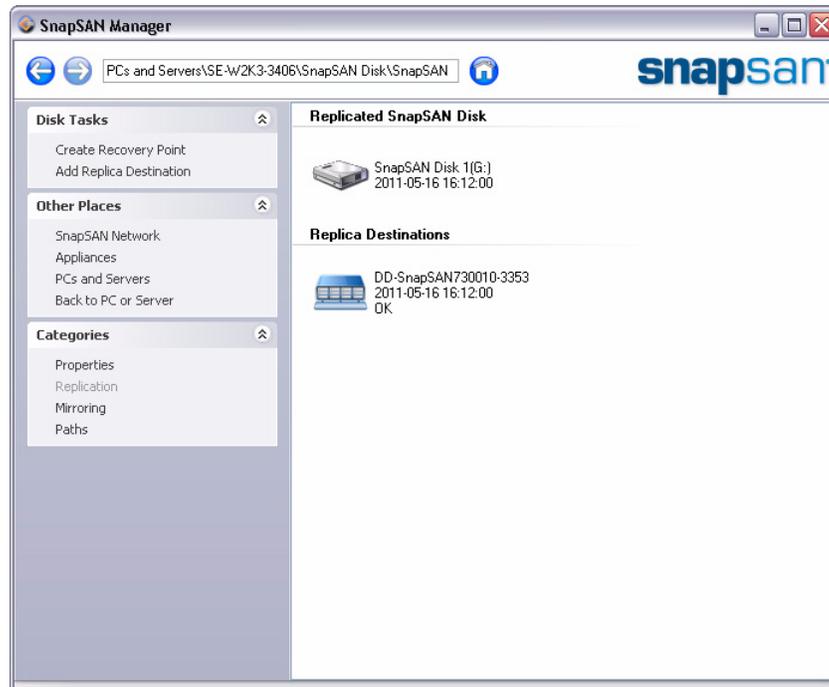
Properties

This is the default screen displayed when Manage Disk is clicked under the PCs and Servers Overview screen. It displays the current information and status of the disk.



Replication Category

Select Replication from the Categories list to manage a replicated disk. This view displays the replicated disk and the storage available for replicas.



When the **replicated disk** is selected, two tasks are shown in the Disk Tasks list:

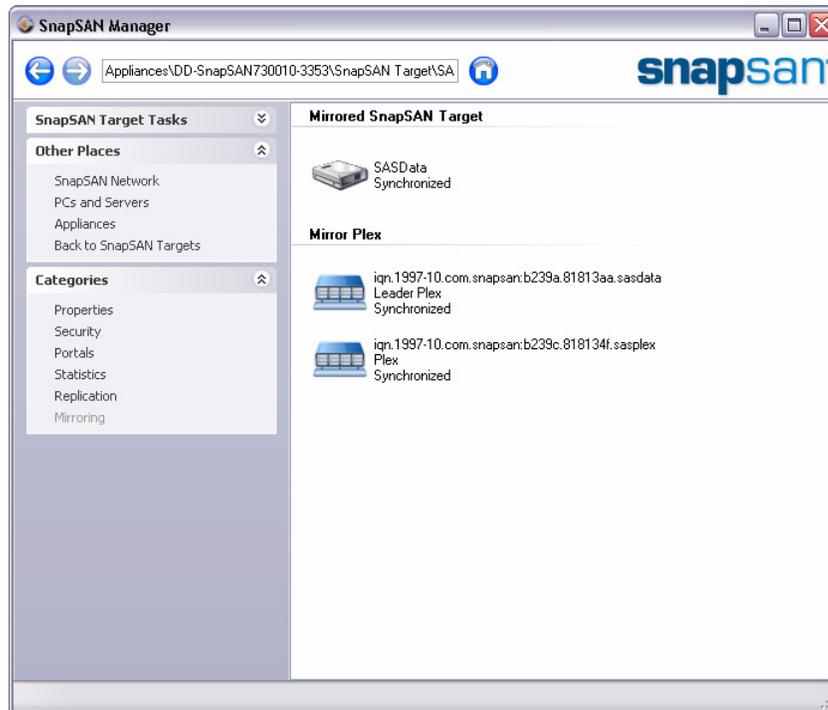
- **Create Recovery Point** – Enables you to add a new recovery point. The Creating Recovery Point dialog box appears with a bar showing the progress of the operation, which may take some time with a large disk. When the recovery point has been created, it will be listed in the Properties view of the SnapSAN Replica. (To get to the Properties view, select the replica destination in the view and then Manage Replica Destination from the Disk Tasks list. Click the arrow button to return to this Replication view.)
- **Add Replica Destination** – specifies an additional location for the replicated data. Use this to create multiple replicas of the same data and increase redundancy.

When a **replica destination** is selected, the Disk Tasks list changes to three tasks:

- **Destroy Replica Destination** – This deletes all the replicated data on this replica and stops data being replicated to it. Other replicas, created using Add Replica Destination, are not affected.
- **Break Replica Destination** – Select this task to stop the selected replica being updated. The “replica” can be used as before: any recovery points associated with it can be mapped and it remains accessible from the SnapSAN Replicas view of PCs and Servers.
- **Manage Replica Destination** – This displays the Properties view of the replica.

Mirroring Category

Select Mirroring from the Categories list to manage your storage disks that are mirrored. This view displays the mirrored disk and its plexes.



When either the mirrored disk or the Leader Plex is selected, one task is shown in the Disk Tasks list:

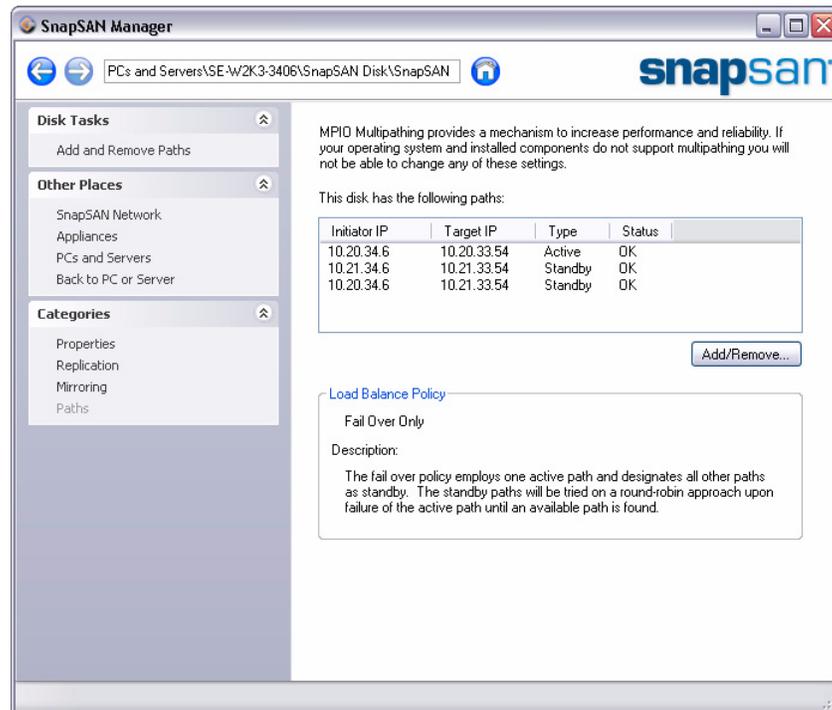
- **Add Plex** – This option lets you create another plex of the mirror.

When a Plex is selected, Disk Tasks changes to show:

- **Transfer Leadership to Plex** – This switches the Plex to become the Leader Plex of the mirror.
- **Destroy Plex** – Causes the Plex to be removed from the mirror and destroyed.
- **Break Plex** – Results in the Plex being broken away from the mirror. If this was the only plex remaining with the mirror, the mirror is destroyed.

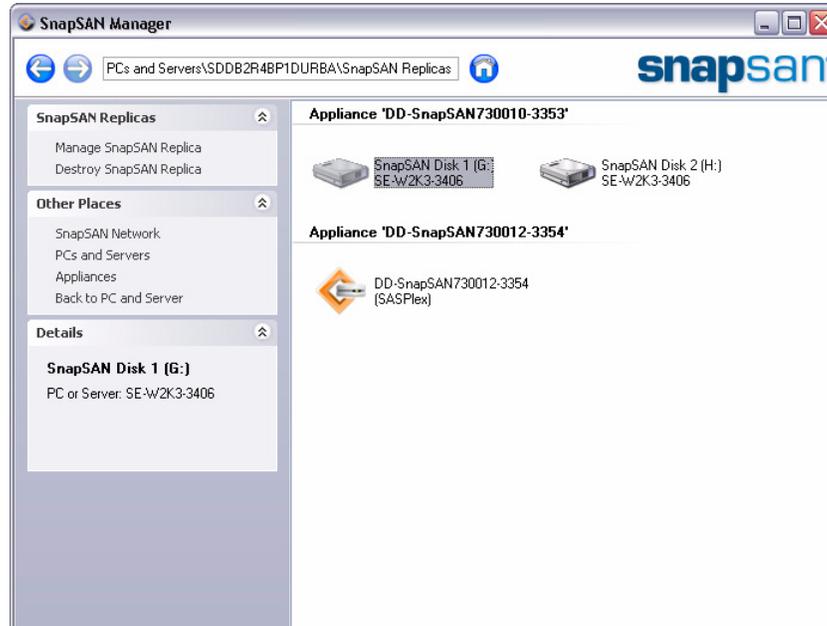
Paths Category

Select Paths from the Categories list to set up multiple paths between the PC or server (or more strictly, the initiator) and the selected disk (the target). This view displays information about the status of the paths and enables you to add and remove paths. See [“Disk Create Advanced Settings” on page 5-5](#) for more information on multiple paths.



SnapSAN Replicas Category

From the Home screen, click the SnapSAN Replicas category to view all the SnapSAN replicas that have been created. If a replica is on the same SAN as the PC or server, the drive letter and hostname of the replicated disk is displayed.

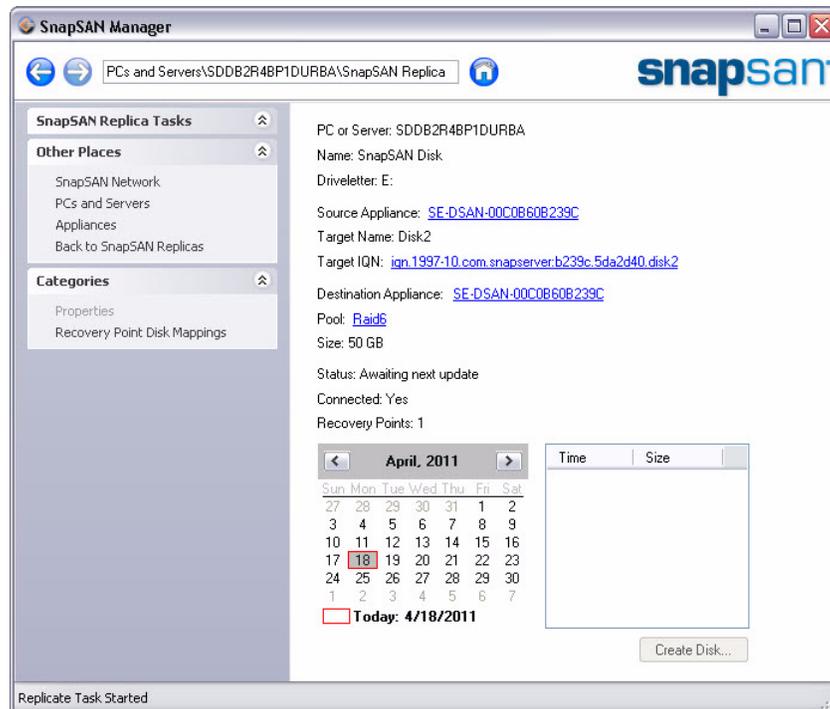


Select a replica to display the tasks in the SnapSAN Replicas list:

- **Manage SnapSAN Replica** – This displays the SnapSAN Replica Properties view for the selected replica.
- **Destroy SnapSAN Replica** – A dialog box pops up for you to confirm the destroy operation as it will delete all the replicated data. The original data (the source of the replica) remains intact.

SnapSAN Replica Properties Management

By selecting Manage SnapSAN Replica from the SnapSAN Replicas category default screen, the SnapSAN Replica properties screen is displayed.



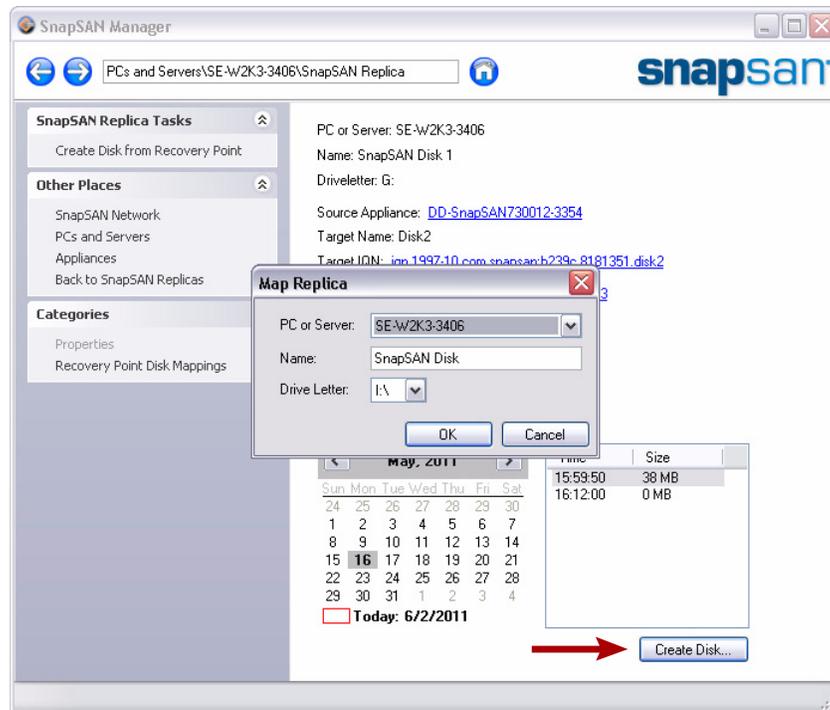
The calendar enables you to check whether any recovery points have been recorded on a selected day. The recovery points for that date (shown on the calendar in bold text) are listed in the box to the right. They correspond to scheduled updates to the replica (set up using the Properties & Scheduler view) and one-off updates (created as described in [“Manage Disk Task” on page 5-10](#)).

NOTE: The scheduler for Replication is only used on Windows Systems. Scheduled replication for any other OS is not supported through the scheduler. There is a utility, called `remote_replicate`, which works with cron on Unix systems in order to add to a schedule.

Using the Calendar to Recover Data

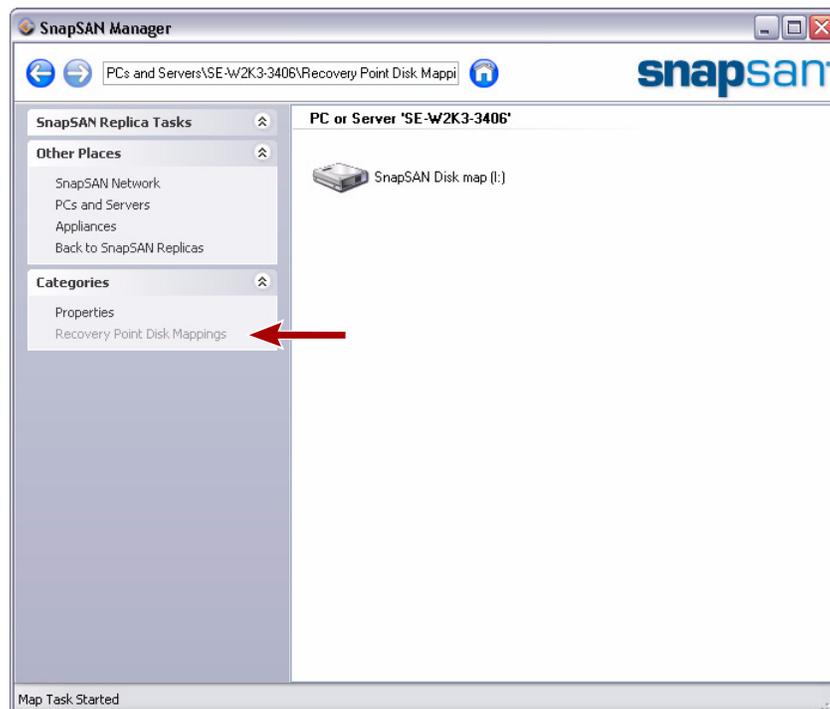
To recover the data from the replica at a given recovery point:

1. Highlight a **date** shown in bold type in the calendar (representing a day with a recovery point).
2. Select a **time** from the list next to the calendar.
3. Click **Create Disk**.
4. In the Map Replica dialog box, select a **location** and create a **name** for the new disk.
You can accept the default drive letter or choose one yourself.
5. Click **OK**.



Disks that have been created in this way are known as mappings. Changes made to a mapping do not affect the replicated disk or the replica. Similarly, changes to the replicated disk (which are reflected in the replica) do not affect any mappings.

To view all the recovery points that have been mapped, select Recovery Point Disk Mappings from the Categories list. The following figure shows a single mapping.

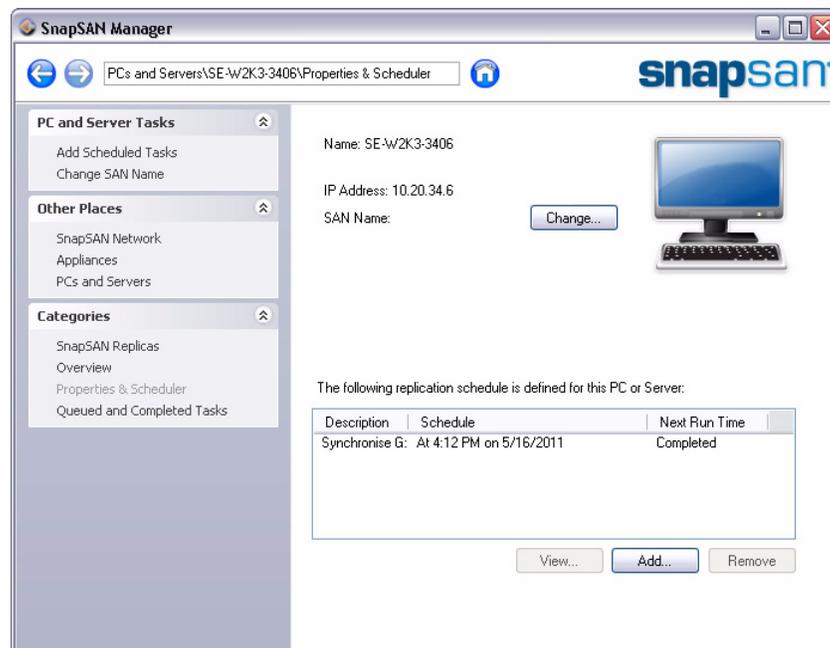


When you select a mapping, the available tasks are displayed in the SnapSAN Replica Tasks list, as follows:

- **Destroy SnapSAN Disk** – A dialog box pops up for you to confirm the destroy operation as it will delete all the data on the mapping. This means that any changes made to the mapping will be lost although the original mapping can be created again from a recovery point.
- **Manage SnapSAN Disk** – This displays the SnapSAN Disk Properties view. The only task available in the Disk Tasks list is renaming the disk, as described in [“Rename Disk Task” on page 5-11](#). If the PC or server supports multiple paths, select the Paths view from the Categories list to select the paths between the initiator on the PC or server and the target controlling access to the disk.

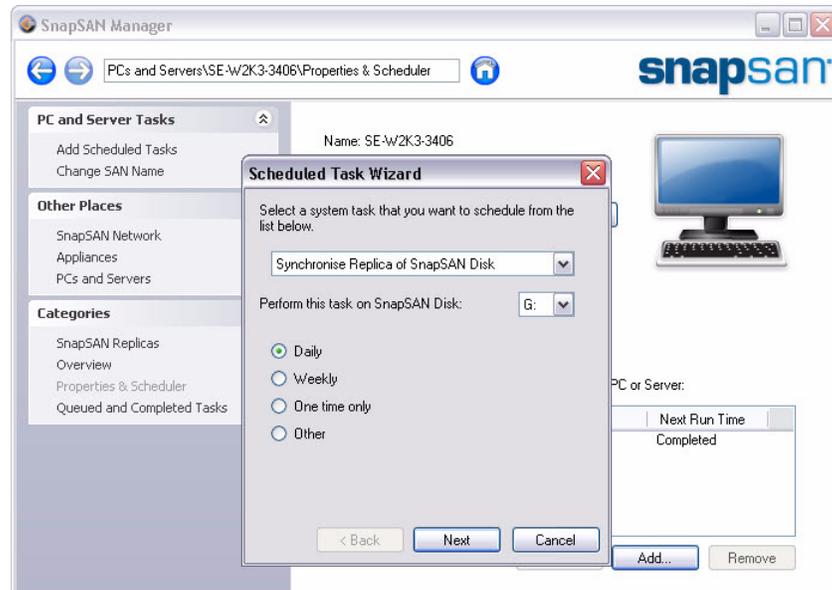
Properties & Scheduler Category

From the Home screen, click Properties & Scheduler to display the name and IP address of the PC or server.



The bottom table in the view lists any schedules that have been set up for the PC or server. Click Add (or select Add Scheduled Task from the PC and Server Tasks list) to add a scheduled item. The Scheduled Task Wizard dialog box is displayed for you to enter details of the schedule.

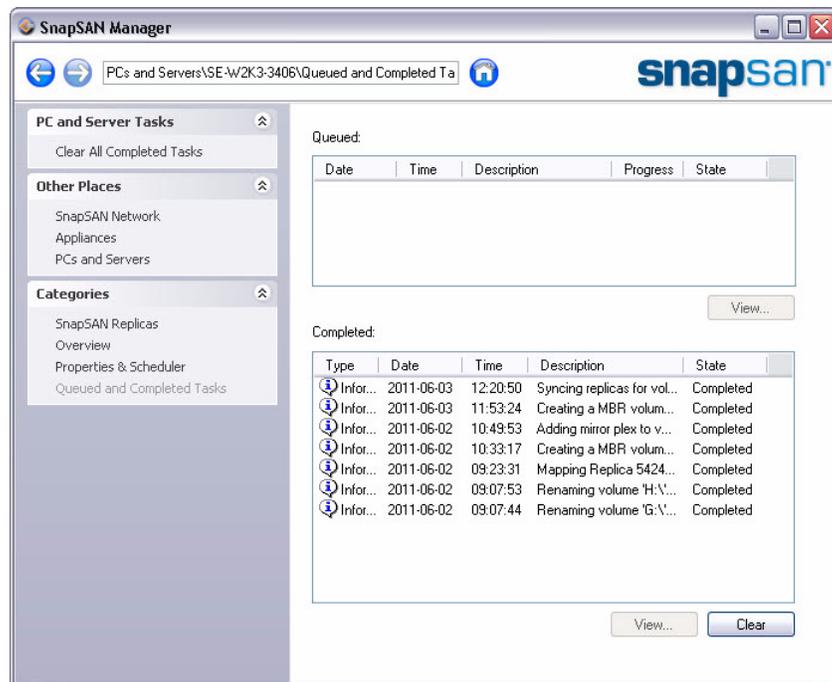
NOTE: Scheduling of a replication pair using this tool is not available for LINUX. Refer to the Overland Technical Support site and download the PDF for LINUX scheduling: [AppNote_S2000_LINUX_Remote_Replicate_Utility.pdf](#).



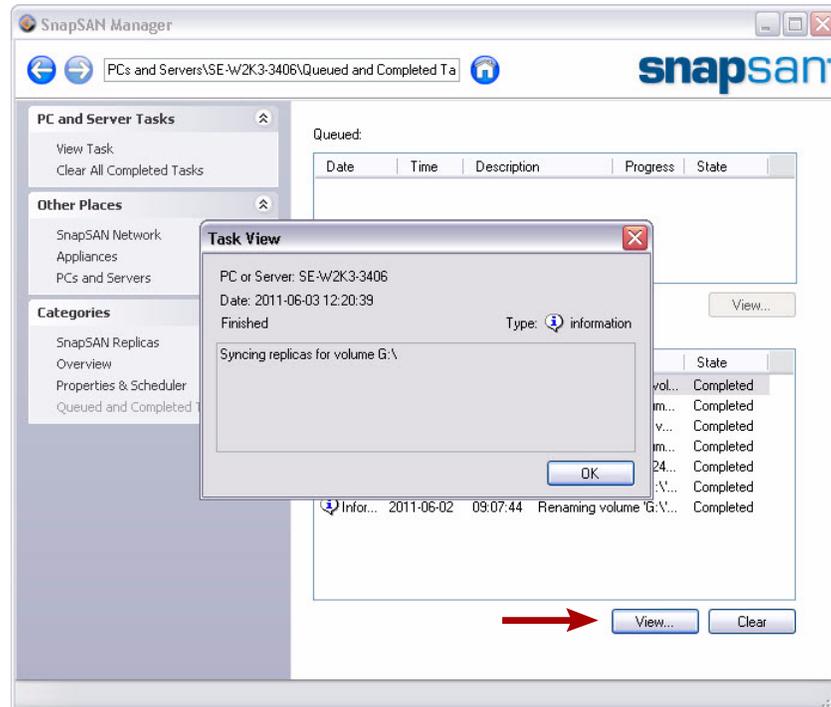
NOTE: The scheduler for Replication is only used on Windows Systems. Scheduled replication for any other OS is not supported through the scheduler. There is a utility, called `remote_replicate`, which works with cron on Unix systems in order to add to a schedule.

Queued and Completed Tasks Category

From the Home screen, click Queued and Completed Tasks to display two lists: one displays a list of tasks that are queued, and the other displays a list of tasks that have completed or failed. The most recent task is at the top of its list.



Select a task and then either click the View button or select View Task from the PCs and Server Tasks list to see the Task View window which gives more information about the task.



To clear the tasks from the log, either click the Clear button under a list or select the appropriate Clear All task option from the PCs and Server Tasks list.

This chapter describes the network management tasks you can carry out on the storage area network using the Windows SnapSAN Manager.:

- [Overview](#) of network management
- [Setting Up Storage Groups](#)
- [Discovery](#) process
- [User Interface Preferences](#)
- [About](#) page

Overview

Select the SnapSAN Network option from the Other Places list to access the networking options. The SnapSAN Network Properties window is the default view.



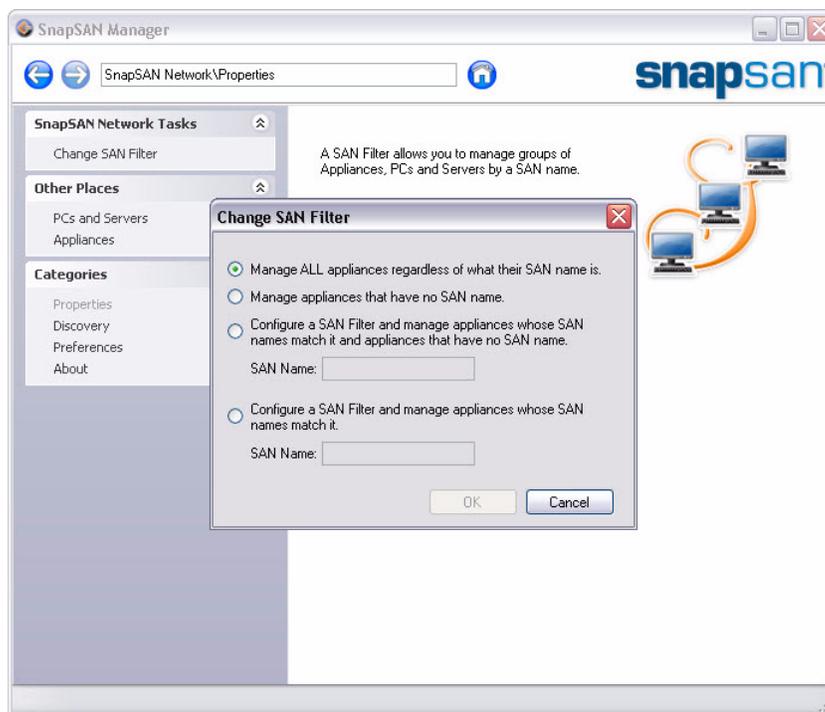
From this window, you can carry out the following network management tasks using the Windows SnapSAN Manager:

- Grouping appliances together for ease of management (see below)
- Using the Discovery service to locate appliances in the network (see [page 6-3](#))
- Specifying user interface preferences (see [page 6-5](#))
- Checking details about the Windows SnapSAN Manager software (see [page 6-6](#))

Setting Up Storage Groups

The Windows SnapSAN Manager enables you to group appliances into one or more domains for ease of management. Grouping is done by assigning SAN names to appliances and then applying a SAN Filter that filters which appliances can be seen according to their names. Assigning SAN names to appliances is described in [“Properties Category” on page 7-34](#).

To configure a SAN filter, be sure SnapSAN Network is selected from the Other Places list. At the Properties default window, click the Change button (or select the Change SAN Filter task) to open the SAN Filter Option box. Select the option you want:

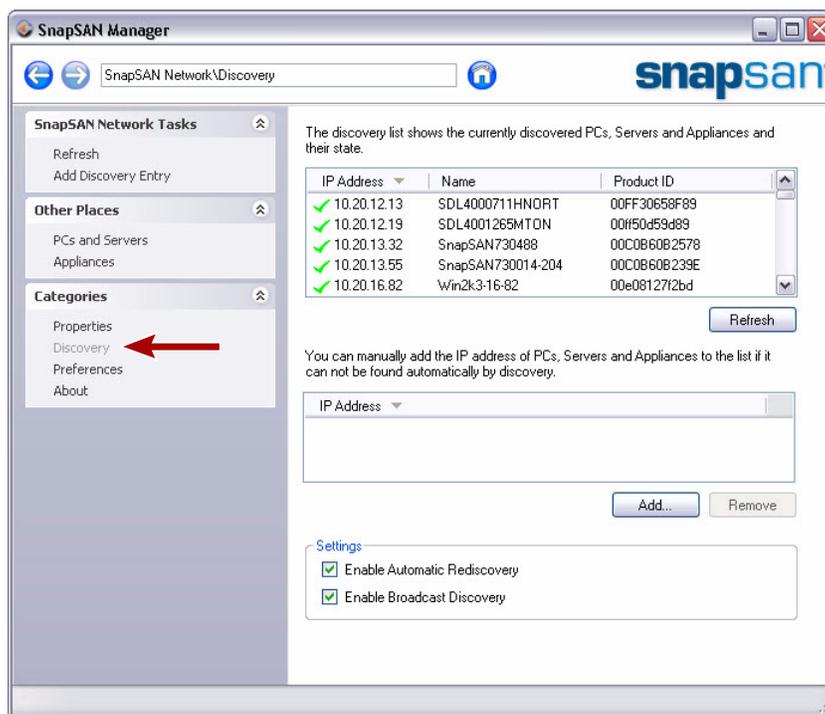


- The first bullet enables you to manage ALL unassigned appliances.
- The second bullet enables you to manage all the appliances in the SAN.
- The third bullet filters the appliances based on a specific name AND includes all unnamed appliances.
- The fourth bullet filters the appliances based on a specific name.

For example, if you set the SAN Filter to Accounts using the third button, you will only be able to see (and manage) storage assigned to the SAN-named Accounts and storage with no SAN name assigned to it. If you select the last button, you will only be able to manage storage assigned to the SAN-named Accounts.

Discovery

The Windows SnapSAN Manager is set up to discover SnapSAN appliances on your network automatically. Sometimes, however, when the network is complex (for example, where there are multiple subnets) the discovery operation may have to be configured manually. To do this, at the SnapSAN Network window, select Discovery from the Categories list.



This view shows all the PCs, servers, and appliances discovered by the Windows SnapSAN Manager. It displays their IP address, name, and unique serial number. Each IP address entry is prefixed as follows to show its status:

- **Green check** indicates that the appliance can be contacted through the IP address.
- **Red cross** indicates a connection problem.
- **The letter S**, written as a superscript, denotes a static entry (an IP address entered by the user).

Check the Enable Automatic Rediscovery box at the bottom to enable Windows SnapSAN Manager to periodically try to discover any new storage in the SAN. If you clear the check box, discovery is only carried out when manually initiated.

Check the Enable Broadcast Discovery box to enable Windows SnapSAN Manager to use broadcast addressing to discover any new storage in the SAN.

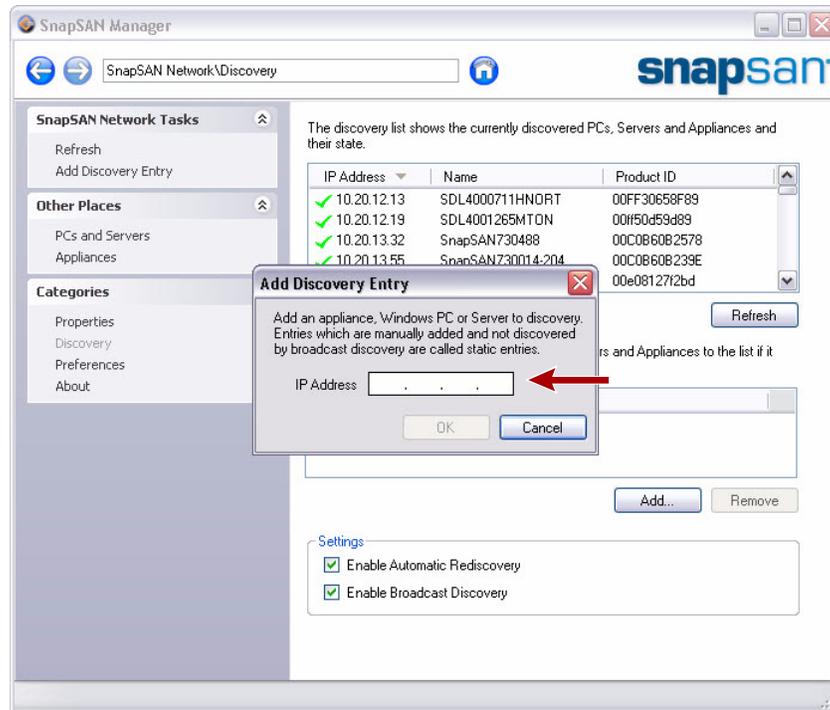
NOTE: Note that the discovery service is subject to any SAN filters that have been configured as described in [“Setting Up Storage Groups” on page 6-2](#).

The SnapSAN Network Tasks list enables you to carry out the following tasks:

- Refresh the view with up-to-date information about the SAN.
- Add an entry to the SAN (see [page 6-4](#)).
- Remove an entry from the SAN (see [page 6-4](#)).

Add Discovery Entry

Click the Add button (or select the Add Discovery Entry option from the tasks list) to add an appliance, PC, or server to the SAN. The Add Discovery Entry dialog box pops up for you to enter the IP address.



Entries that you add to the SAN in this way are referred to as static entries, those that are discovered automatically are referred to as dynamic entries. The IP addresses for dynamic entries may change over time. Static entries are differentiated from dynamic entries in the Discovery view by a superscript S next to the address.

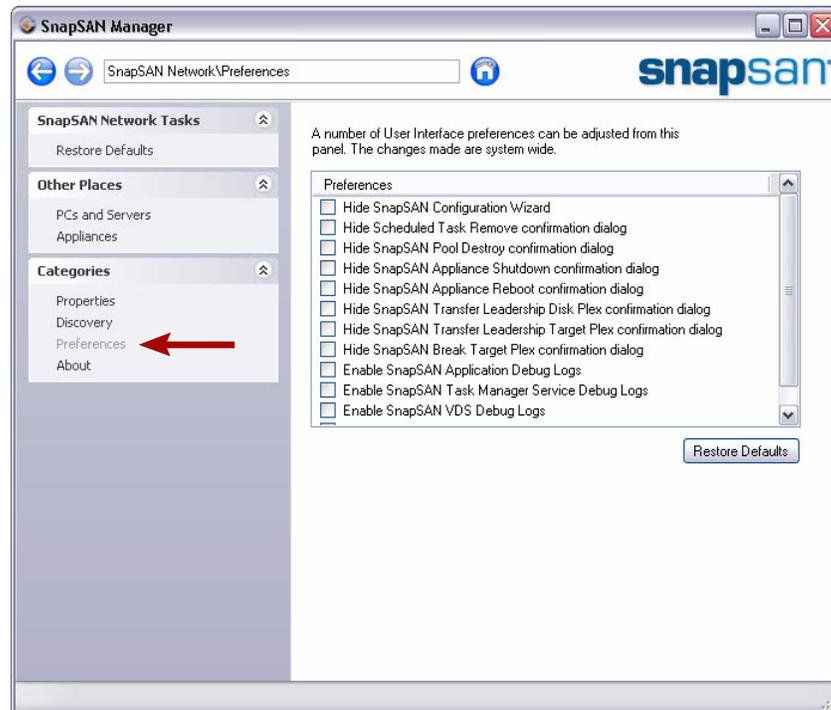
Remove Discovery Entry

To remove a static decommissioned appliance, PC, or server from the SAN, select its entry from the static list, and then click the Remove button (or select the Remove Discovery Entry option from the tasks list).

NOTE: If you try to remove a node which is physically present in the SAN, it will automatically be discovered again and added back to the list if automatic rediscovery is enabled.

User Interface Preferences

The Windows SnapSAN Manager user interface can be configured to ask for confirmation before carrying out irreversible actions, such as destroying storage pools or shutting down storage appliances. In the SnapSAN Network window, select the Preferences view from the Categories list to set your preferences.



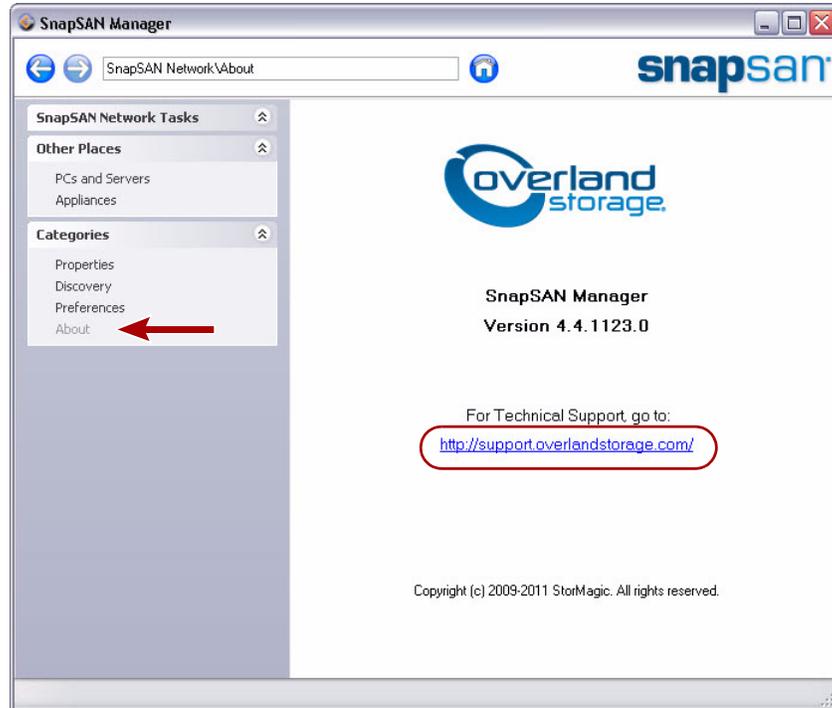
Check the boxes in the right side panel for the actions that you want to confirm. You can restore the default settings by selecting Restore Defaults from the SnapSAN Network Tasks list or by clicking the button.



CAUTION: The last four check boxes (debug options) are for use by Overland Technical Support and should not be used without their direction.

About

The About view displays the version of the Windows SnapSAN Manager and includes a link to the SnapSAN appliance support web site. In the SnapSAN Network window, select the About view from the Categories list

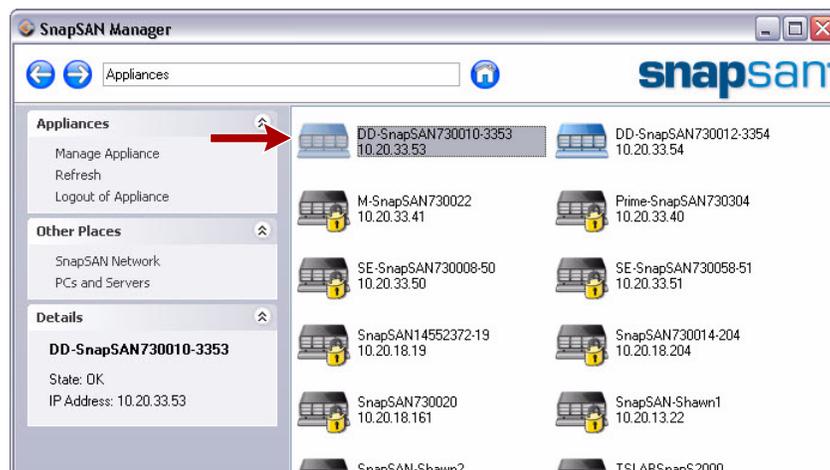


This chapter describes the appliance management tasks you can carry out on the storage area network using the Windows SnapSAN Manager:

- [Overview](#) of management options (includes Properties Category)
- [Hard Disks Category](#)
- [SnapSAN Pools Category](#)
- [SnapSAN Targets Category](#)
- [SnapSAN Replicas Category](#)
- [Network Category](#)
- [Hardware Monitoring Category](#)
- [Events Category](#)
- [Identification & Services Category](#)
- [Initiators Category](#)
- [Notification Category](#)
- [Statistics Category](#)

Overview

To manage a SnapSAN S2000 appliance, select Appliances from the Other Places list. From the Appliances view, highlight a SnapSAN S2000.

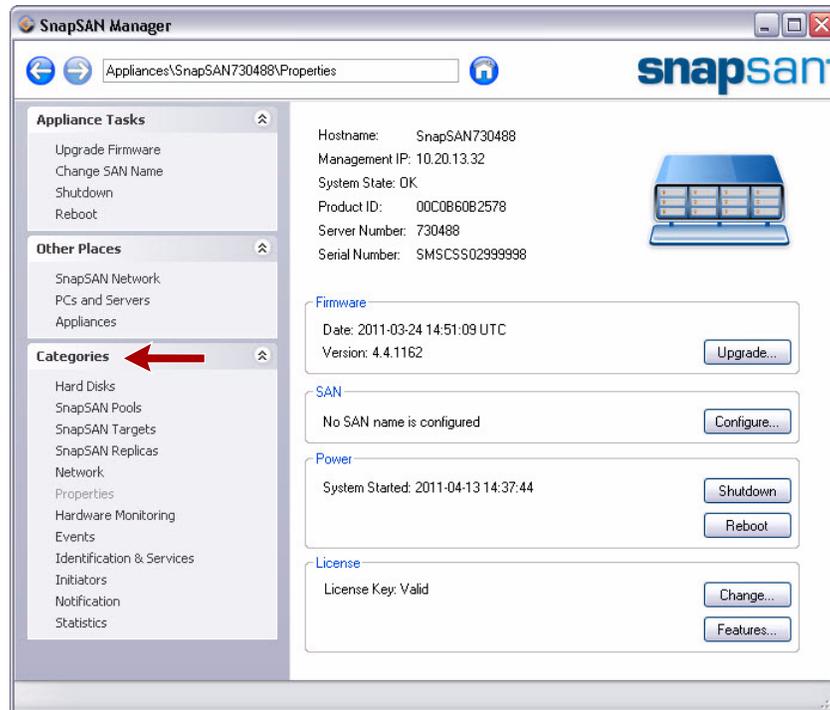


If the appliance is locked (black and with a padlock on its icon), select Login to Appliance from the Appliances list. Enter the password for the appliance in the window that pops up.

NOTE: If a Warning icon appears with the appliance icon (🔒), go to the [“Events Category”](#) view to determine what caused the problem.

To update the status of the appliance, select Refresh from the same list.

After logging back in, double-click the icon (or select Manage Appliance from the Appliances tasks list) to display the default Properties view.



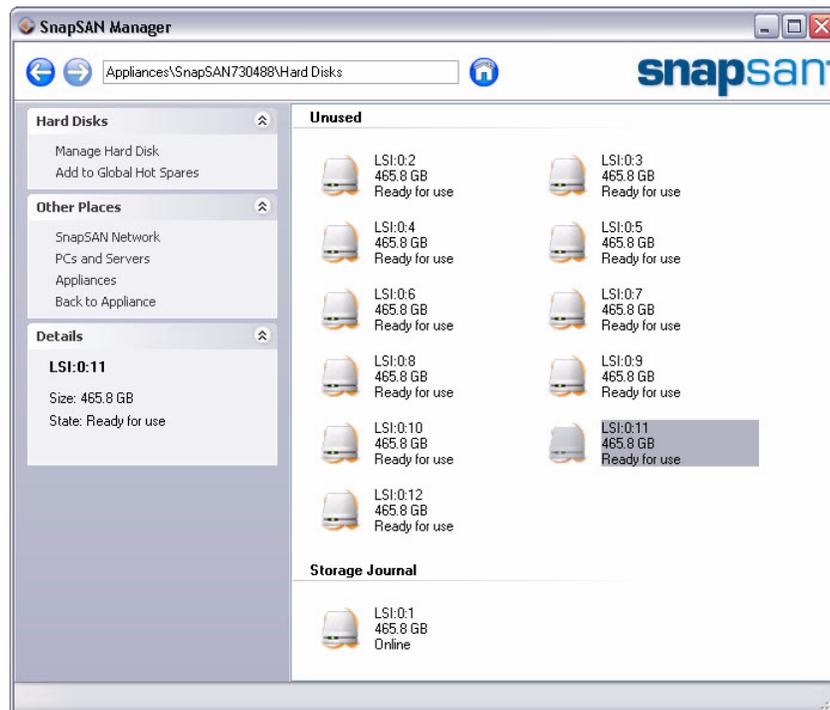
The entries in the Categories list enable you to manage the following aspects of the appliance:

- [Hard Disks Category](#) – Device management is carried out in the Hard Disks view.
- [SnapSAN Pools Category](#) – Pool management is carried out using the Pools view.
- [SnapSAN Targets Category](#) – Target management is carried out using the Targets view.
- [SnapSAN Replicas Category](#) – Replica management is carried out using the Replicas view.
- [Network Category](#) – Network management is carried out using the Network view.
- [Properties Category](#) – System management tasks specific to an appliance are carried out using the Properties view (current view).
- [Hardware Monitoring Category](#) – Where the appliance hardware supports monitoring, information such as voltages, fan speeds and temperatures are displayed in the Hardware Monitoring view.
- [Events Category](#) – Event management is carried out using the Events view.

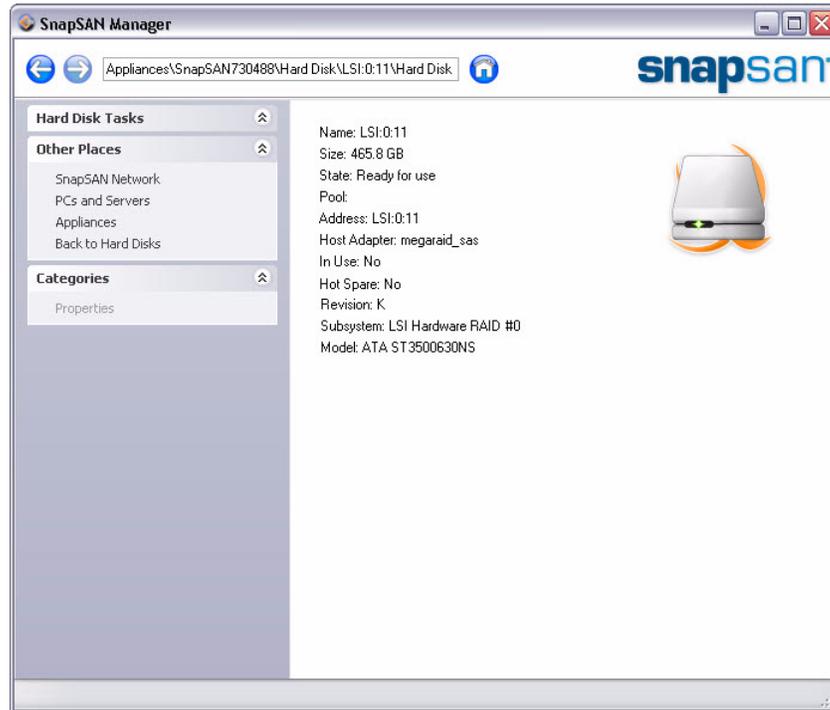
- [Identification & Services Category](#) – Configuring the domain name and password of an appliance and the services that the appliance uses is carried out using the Identification & Services view.
- [Initiators Category](#) – Management of the initiators recognized by an appliance is carried out using the Initiators view.
- [Notification Category](#) – Configuring the appliance to send messages to personnel when specified events take place is carried out using the Notification view.
- [Statistics Category](#) – Configuring the display of statistical data is carried out using the Statistics view.

Hard Disks Category

To display details of all of the physical disks in the appliance, select Hard Disks from the Categories list. The view displays all the disks in the appliance. To display the properties of a particular disk, select that disk and its basic properties are displayed in a Details list on the left side.



Select Manage Hard Disk from the Hard Disks list to see the detailed properties of a selected disk.



The details include the device name, size, status, the pool to which the device is assigned, whether it is in use, and whether it is acting as a hot spare (a redundant disk for hot backup).

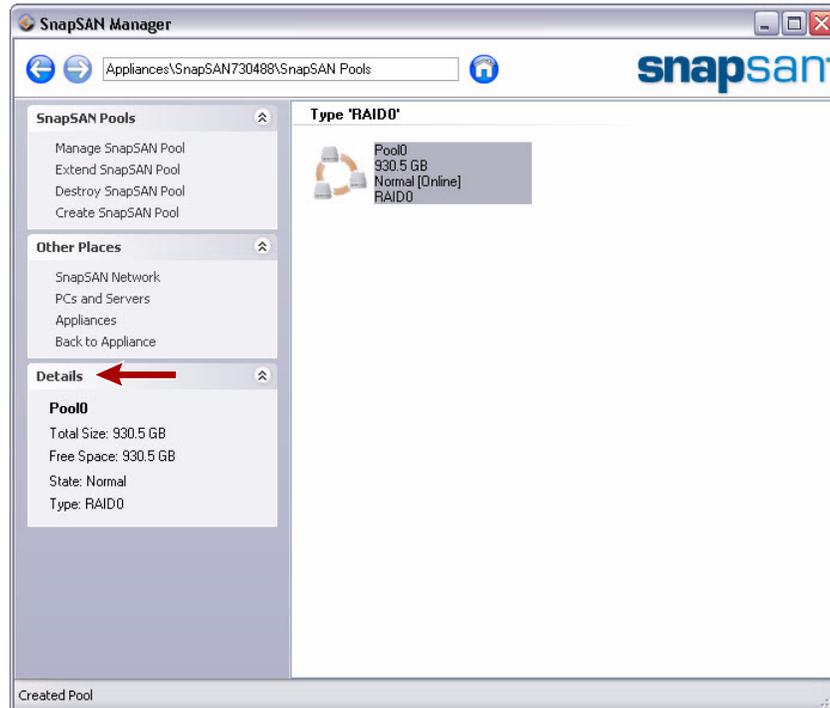
An unused disk can be designated as a Global Hot Spare if the RAID configuration supports hot spares. A global hot spare will automatically replace an equivalent failed disk in a pool that shares the same subsystem as the hot spare. See [“Manage a SnapSAN S2000 Pool” on page 7-6](#).

SnapSAN Pools Category

Before you can create any iSCSI volumes, you must create one or more storage pools from which the volumes can be allocated. A SAN storage pool is a group of physical disk drives, aggregated together using RAID.

NOTE: Storage pools may have already been created when the appliance was initially configured.

To display the SAN pools created on an appliance, select SnapSAN Pools from the Categories list on the Appliance Properties page. The existing pools are displayed.



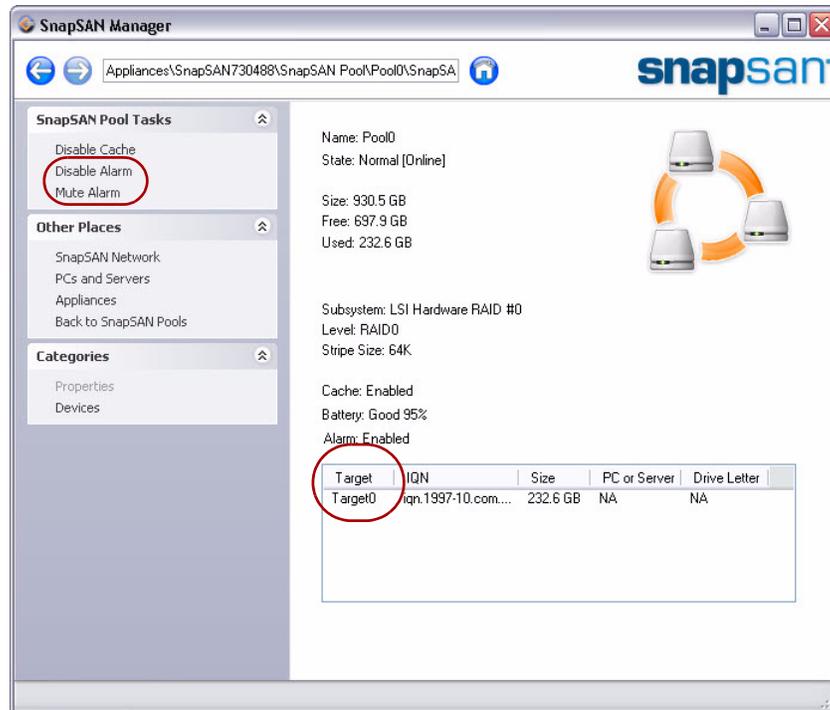
Select a SAN pool to see basic information about it in the Details list on the left.

You can perform the following tasks on a pool using the entries in the SnapSAN S2000 Pools list:

- [Manage a SnapSAN S2000 Pool](#) (see [page 7-6](#))
- [Extend a SnapSAN Pool](#) (see [page 7-7](#))
- [Destroy a SnapSAN Pool](#) (see [page 7-7](#))
- [Create a SnapSAN Pool](#) (see [page 7-8](#))

Manage a SnapSAN S2000 Pool

To manage a pool, select the pool and then double-click the icon (or select Manage SnapSAN Pool from the SnapSAN Pools tasks list). This displays the Properties view of the pool.



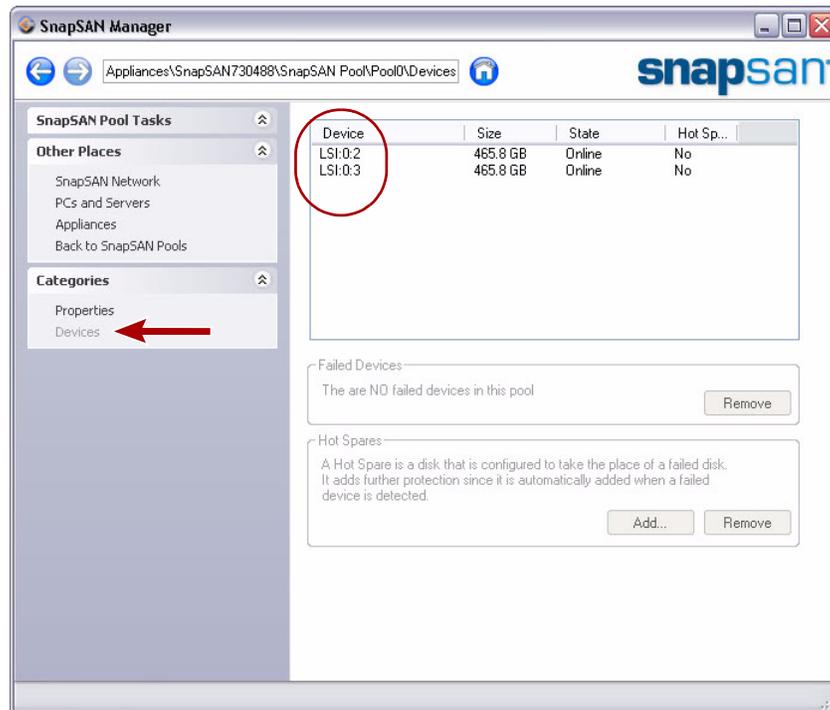
The view displays basic pool properties, such as the pool name, size, free space, size of the replication journal (if present), RAID level, and state. If a disk fails, then a pool with redundancy (RAID 1, 5, 6, 10, 50, or 60) will go into degraded mode. It will still be accessible but performance may be reduced and it is vulnerable to loss of data if another disk fails¹.

This is also the window where the alarms are managed. You have an option of disabling or muting an alarm in the SnapSAN Pool tasks list.

The table at the bottom of the view gives information on each target linked to the pool. To see more information, double-click the disk's entry in the table. This opens the SnapSAN Targets Properties page.

1. Raid 1, 5, 10, or 50 can sustain a single disk failure without data loss; RAID 6 and 60 can sustain two disk failures before loss occurs.

To manage the devices in the pool, select the Devices view.



The Devices view displays all the disk drives which make up the pool together with their state. The state of each device should be Online unless a disk has failed, in which case the disk should be removed and replaced. The replacement disk should be added as a hot spare. The hot spare will then automatically replace the failed disk.

The Failed Devices panel is only enabled if a disk has failed. It allows you to remove the failed disk from its pool.

The Hot Spares panel allows you to dedicate a hot spare disk to a specific pool. A hot spare is a disk which is normally unused except when a disk fails in a RAID 1, 5, 6, 10, 50, or 60 pool. If a disk failure takes place, the hot spare automatically replaces the failed disk and the RAID pool is automatically rebuilt to include the new disk.

Extend a SnapSAN Pool

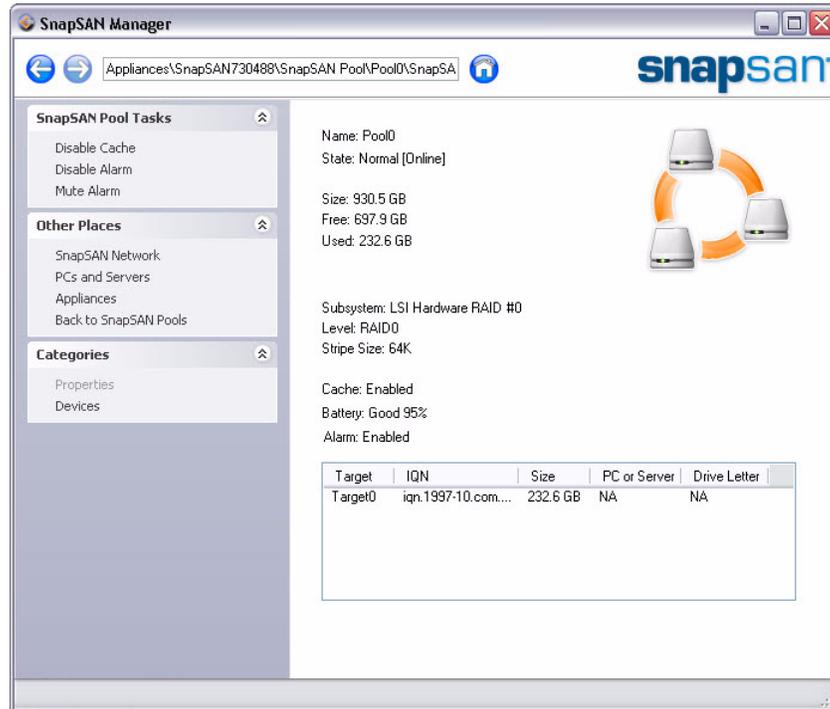
This option is available for the standard RAID levels of 0, 5, and 6. To extend a pool, select a pool and then select Extend SnapSAN Pool from the SnapSAN Pools tasks list. The Extend Pool dialog box pops up for you to select which devices you want to add to the pool. To use this option, one or more disk drives must be in a ready to use state.

Destroy a SnapSAN Pool



CAUTION: If you have changed the preferences under the SAN Network to not show a warning dialog before deleting a pool, the pool will be destroyed as soon as you click the Destroy SAN Pool link.

To destroy a pool, select it and then select Destroy SnapSAN Pool from the SnapSAN Pools tasks list. If configured, the Confirm Pool Destroy dialog box pops up to get your conformation before destroying the pool.



NOTE: A pool cannot be destroyed if it has targets associated with it. To remove a target, see [“Destroying A SnapSAN Target” on page 7-19](#).

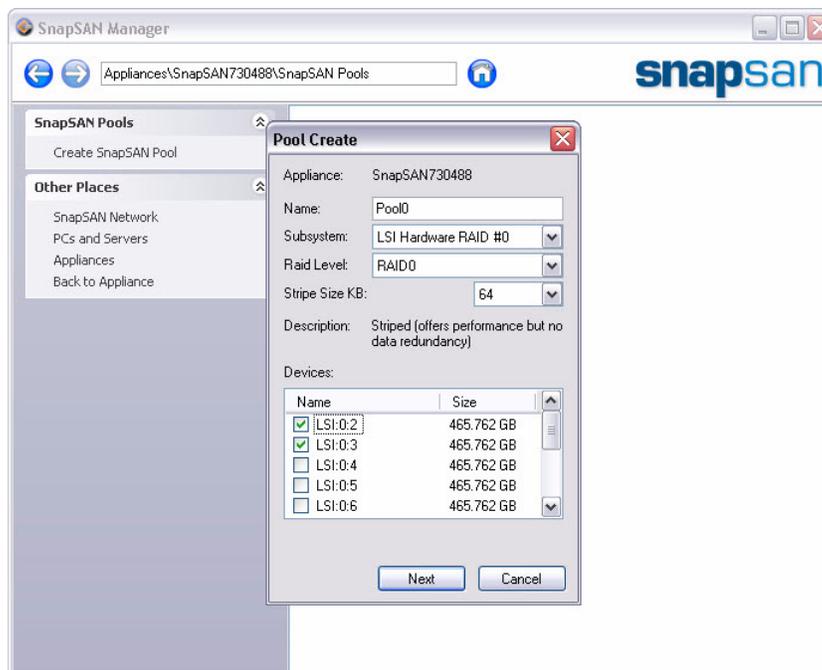
Create a SnapSAN Pool

NOTE: Having enough available disk space (free disks) is a prerequisite to performing creating a new pool.

The following types of SnapSAN pools are supported on the SnapSAN S2000:

Type	Description	Number of Disks
RAID 0	Performance storage with no redundancy	Minimum of 2
RAID 1	Duplicated performance storage	Exactly 2
RAID 5	High availability storage	Minimum of 3
RAID 6	Very high availability storage	Minimum of 4
RAID 10	Multiple duplicated performance storage	Minimum of 4
RAID 50	Multiple high availability storage	Minimum of 6
RAID 60	Multiple very high availability storage	Minimum of 8

To create a SnapSAN pool, select Create Storage Pool from the SnapSAN Pools tasks list. The Pool Create window pops up.



You can specify the following parameters for the pool:

- **Name** – The name of the pool can be anything you like, up to 32 alphanumeric characters in length. It cannot be blank.
- **Subsystem** – Select the hardware RAID controller. Since the SnapSAN S2000 only has one, it is pre-selected.
- **RAID Level** – Select a RAID level. The levels offered will depend on the number of unused disks in the appliance.
- **Stripe Size** – This parameter is only applicable to RAID levels 0, 5, 6, 10, 50, and 60. It is specified in kilobytes. Different stripe sizes may give improved performance with specific application software but in most cases the default value will suffice.
- **Devices** – The Devices list displays all the disks that are not currently assigned to pools. Add a disk to the new pool by checking its check box.

NOTE: For some RAID levels, there are restrictions on number of disks required to make the pool:

RAID Level/Span	Minimum No. of Disks
RAID 0	Minimum of 2
RAID 1	Must be 2
RAID 5	Minimum of 3
RAID 6	Minimum of 4
RAID 10	Minimum of 4
RAID 50	Minimum of 6
RAID 60	Minimum of 8

IMPORTANT: If you use RAID 5, 6, 50, or 60, the pool must be initialized by the RAID controller. This can take several hours, depending on the size of the disks. While the pool is being initialized, it can be used but performance is reduced.

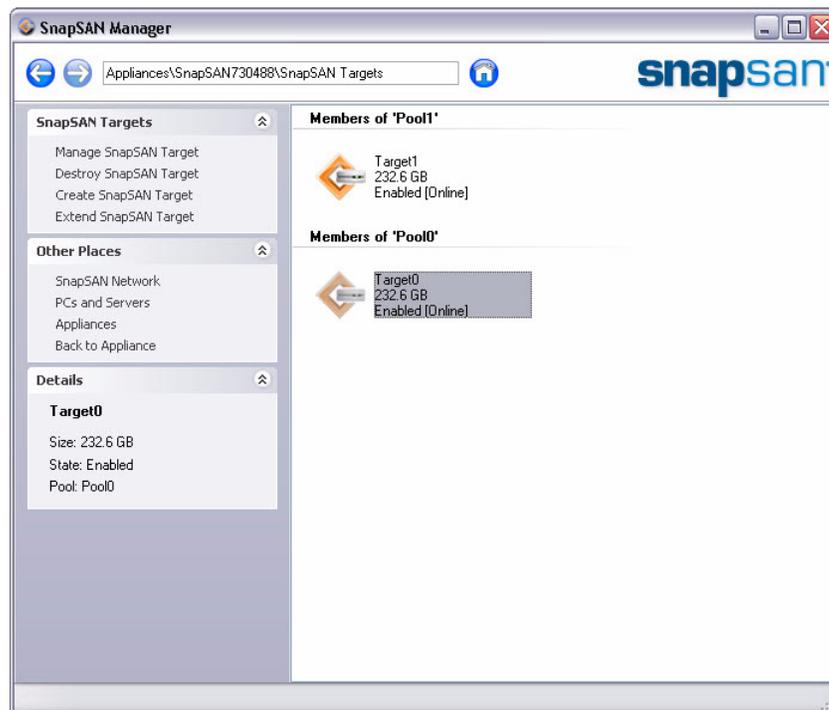
When the pool has completed initialization, the pool state, shown in the Details list, is set to Normal.

SnapSAN Targets Category

The SnapSAN S2000 provides storage to host computers in the form of iSCSI volumes. An iSCSI volume appears to the host computer just like a regular disk drive but with several important differences:

- Volumes can be created and destroyed as storage requirements change.
- Volumes can be extended dynamically as capacity requirements grow.
- A volume can easily be reassigned to a different host system without having to shut host systems down or to move any disks physically.
- A volume can be shared between multiple hosts.¹

Each volume has an iSCSI target associated with it. Windows SnapSAN Manager makes it very easy to create iSCSI targets and assign them to Windows host systems using the SnapSAN Target view.



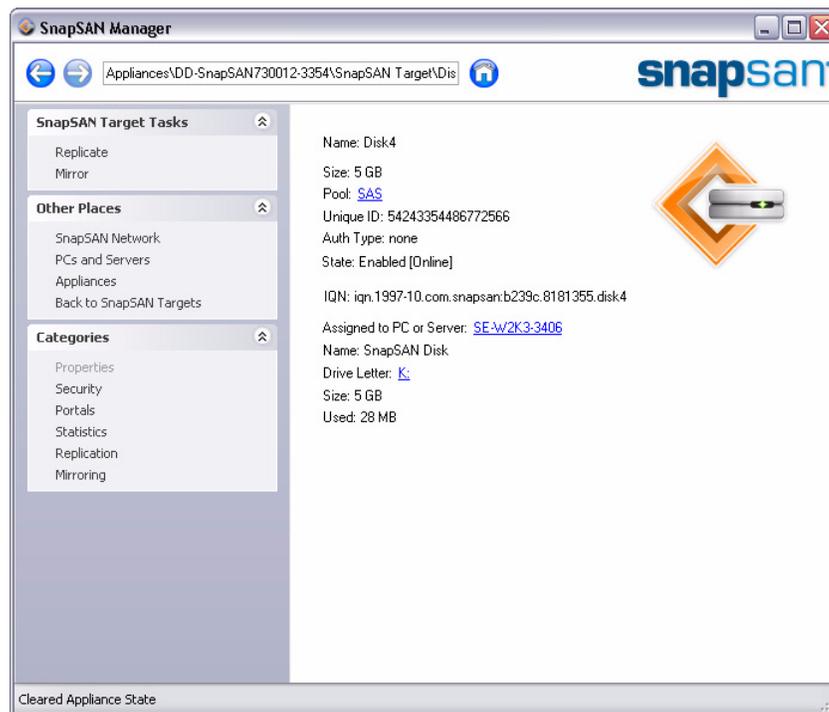
1. Volume sharing usually requires additional software running on the host, for example, clustering software.

You can perform the following tasks on a target using the entries in the SnapSAN Targets list:

- [Managing A SnapSAN Target](#) (see [page 7-11](#))
- [Destroying A SnapSAN Target](#) (see [page 7-19](#))
- [Creating A SnapSAN Target](#) (see [page 7-20](#))
- [Extending A SnapSAN Target](#) (see [page 7-22](#))

Managing A SnapSAN Target

To manage a target, select it and then select Manage SnapSAN Target from the SnapSAN Targets tasks list. This displays the default Properties view.



The SnapSAN Target Tasks list shows the tasks you can perform on the disk depending on the type of disk:

- Replicate (see [“Replicating a Target” on page 7-18](#))
- Mirror (see [“Mirroring a Target” on page 7-18](#))

You can manage a target by using the views selected from the Categories list:

- The [Properties Category](#) view
- The [Security Category](#) view ([page 7-12](#))
- The [Portals](#) view ([page 7-14](#))
- The [Statistics](#) view ([page 7-15](#))
- The [Replication](#) view ([page 7-17](#))

Properties Category

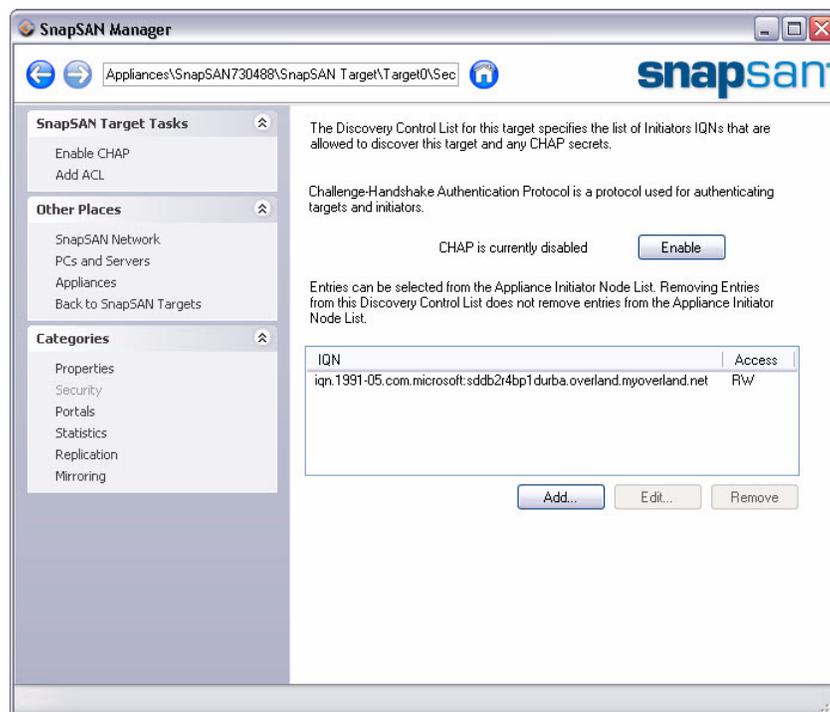
The properties of a target shown in the Properties view include the following:

- **Name** – The name assigned to the target when it was created.

- **Size** – The size of the target volume.
- **Pool** – The storage pool from which the target was created.
- **Unique ID** – A worldwide, unique identifier (called an EUI64 identifier). This is sometimes used by host-based storage applications, such as multipathing software.
- **Auth Type** – The authentication required for the target. This can be None or CHAP.
- **State** – The current state of the disk.
- **IQN** – The IQN allocated automatically to the target.

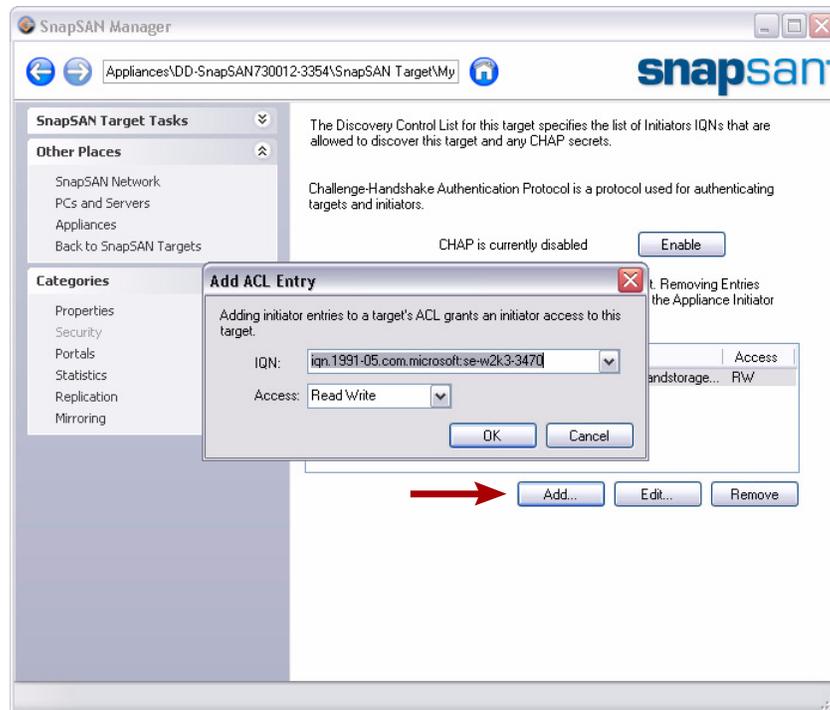
Security Category

Use the Security view to configure security measures for the target. This includes whether CHAP authentication is used and which host systems are allowed to access the target.



Enable/Disable CHAP. CHAP authentication can be enabled or disabled by clicking the button or selecting Enable CHAP / Disable CHAP from the SnapSAN Target Tasks list. If CHAP is enabled, both the initiator and the target must share a secret that is exchanged during the login process. The login will fail if the secret is incorrect.

Add ACL. To add a host to the ACL, click the Add button under the list (or select Add ACL from the SnapSAN Target Tasks list). This displays a dialog box.



Select the initiator you want to add from the drop-down list labeled IQN. The list shows the IQNs of all the initiators known to the appliance. If the initiator you want to add is not listed, you can add it using the Initiators view (see [“Initiators Category” on page 7-40](#)).

If CHAP is enabled, specify the target’s secret and, if you are using mutual CHAP, the initiator’s secret. Secrets must be between 24 and 32 hexadecimal digits long. Click the Format Secrets as ASCII box to use ASCII characters rather than hexadecimal digits. ASCII secrets must be between 12 and 16 characters long. The secrets entered in this dialog box must be the same as those entered for the initiator.

Edit ACL. To change the access type of an initiator and alter its CHAP secrets, select its IQN from the ACL and then click the Edit button (or select Edit ACL from the SnapSAN Target Tasks list.)

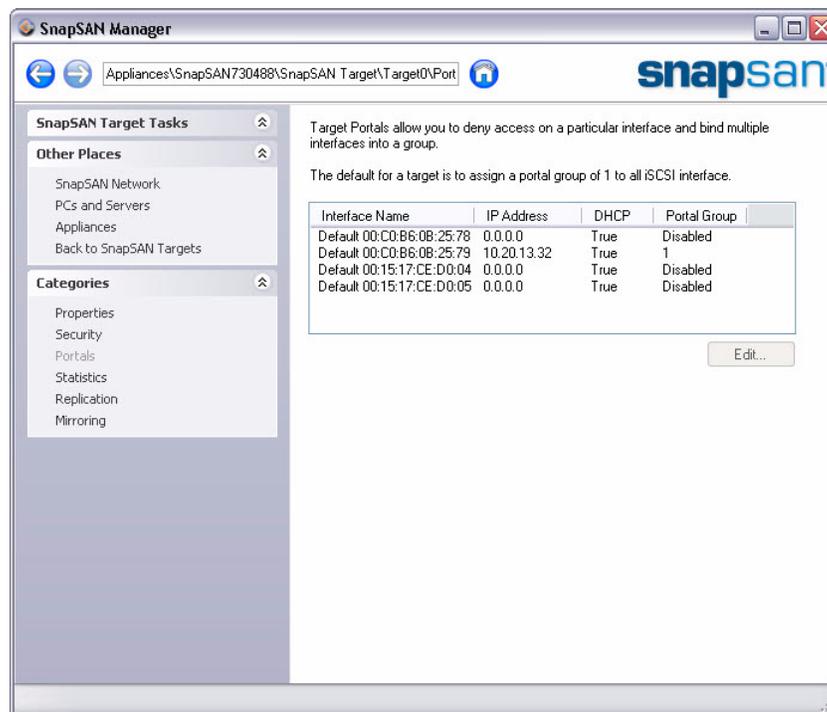
NOTE: Before changing the ACL for a target that is being managed by the local iSCSI initiator, the initiator must be logged out. The ACL modification dialog box pops up to warn you to save any data before continuing.

If the local initiator is listed in the target’s ACL, selecting Enable CHAP from the SnapSAN Target Tasks list will log the initiator out of the target, automatically assign a CHAP secret to the target, and log back into the target with that secret.

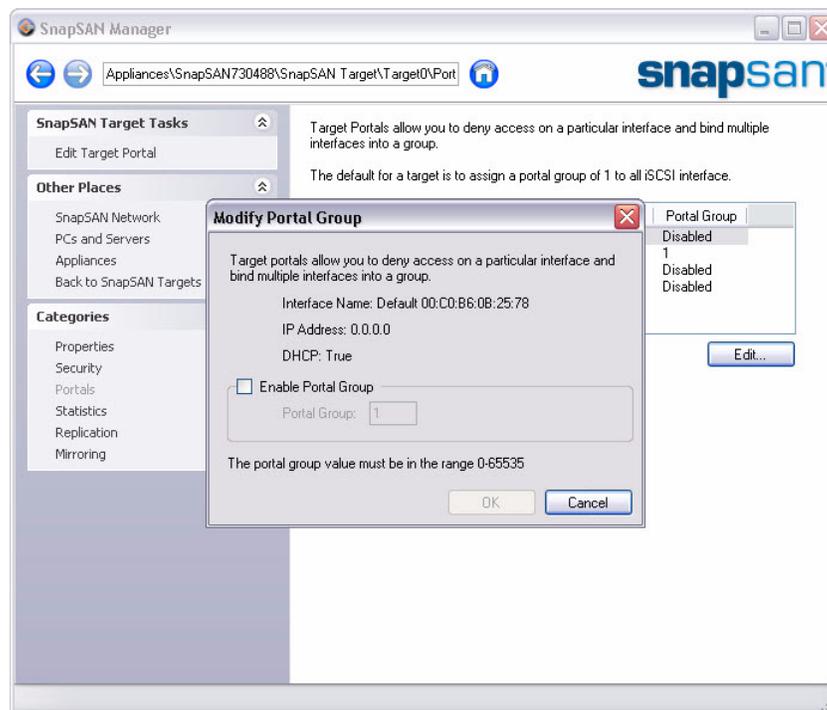
Remove ACL. To remove a selected initiator from the ACL, select its IQN from the ACL and then click the Remove button (or select Remove ACL from the SnapSAN Target Tasks list).

Portals

The Portals view enables you to deny access to the target through one or more of the target's interfaces and to group interfaces together.



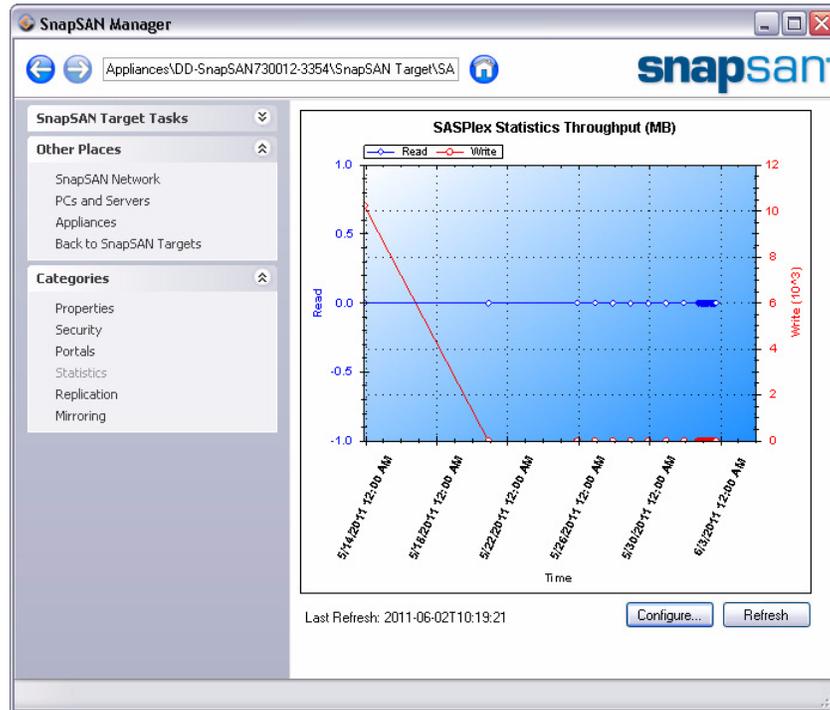
To do this, select an interface in the view and then click the Edit button (or select Edit Target Portal from the SnapSAN Target Tasks list). This opens the Modify Portal Group dialog box.



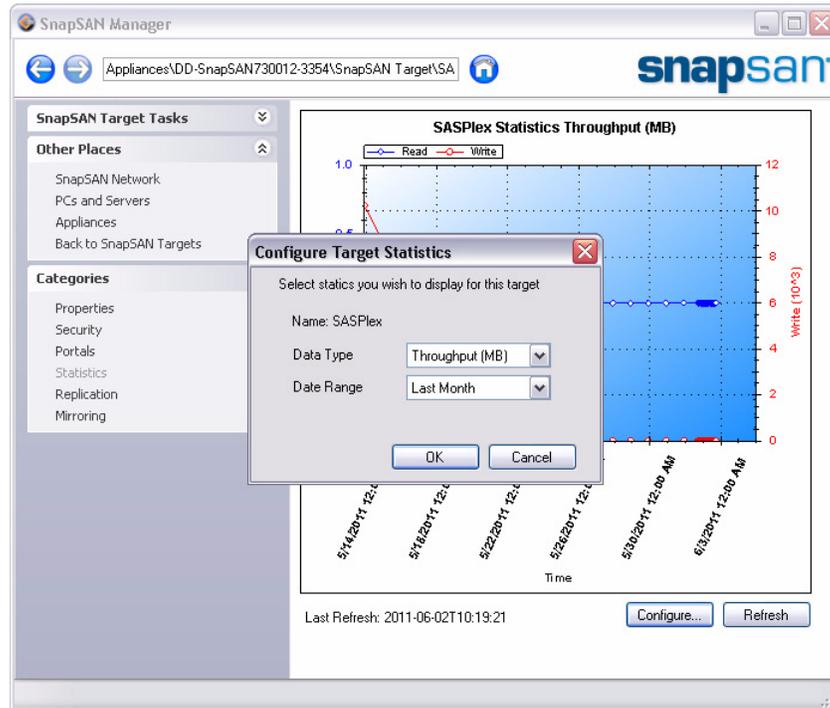
Check the box to enable portal groups for the interface and enter a group number and click OK. By default, a group number of 1 is used. Group numbers range from 0 to 65535. If the portal group is enabled, uncheck the box to disable it.

Statistics

The Statistics view enables to you to see configured statistical data in graphical form.



Click the Configure button (or select Configure Statistics from the SnapSAN Target Tasks list) to set up the graph. The Configure Target Statistics dialog box pops up.

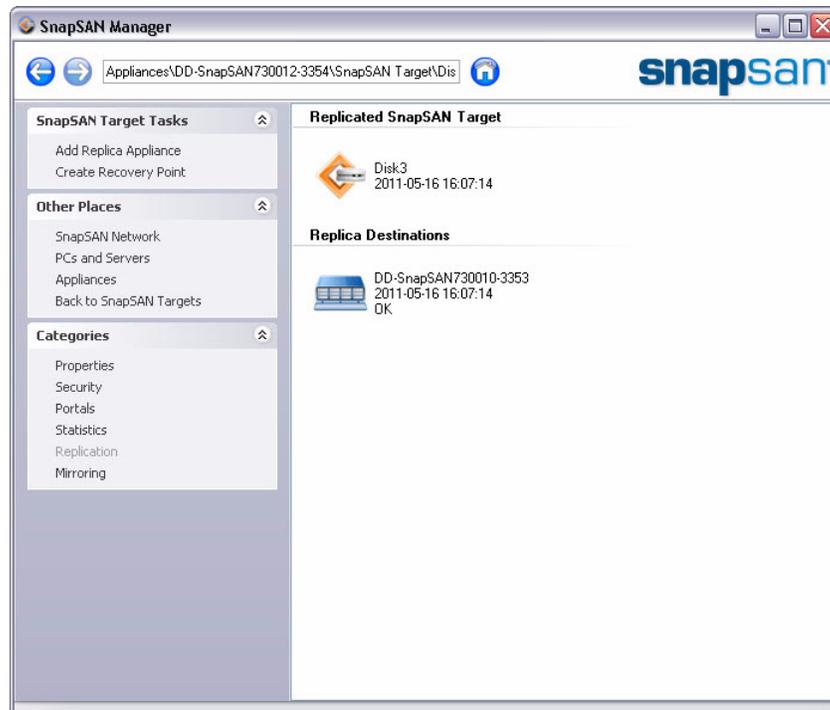


Select between statistics showing total throughput and those showing a count of read/write operations, together with the time period for which you would like to see the statistics. Click OK to display the graph.

To update the graph, click the Refresh button (or select Refresh Statistics from the SnapSAN Target Tasks list).

Replication

The Replication view enables you to manage a replicated target. The view displays the replicated target and the storage used for the replica, referred to as a replica destination.



The date and times shown below the target and the destination show when a recovery point was last made. When the replicated disk is selected, two tasks are shown in the SnapSAN Target Tasks list:

- **Add Replica Appliance**

Allows you to specify an additional location for the replicated data. Use this to create multiple replicas of the same data and increase redundancy.

- **Create Recovery Point**

Enables you to add a new recovery point.

The Creating Recovery Point dialog box appears with a bar showing the progress of the operation, which may take some time with a large target. When the recovery point has been created, it will be listed in the Properties view of the Storage Replica. (To get to this view, select the replica destination in the view and then Manage Replica Destination from the Replica Tasks list. Click the arrow button to return to this Replication view.)

When a replica destination is selected, the SnapSAN Target Tasks list changes to three different tasks:

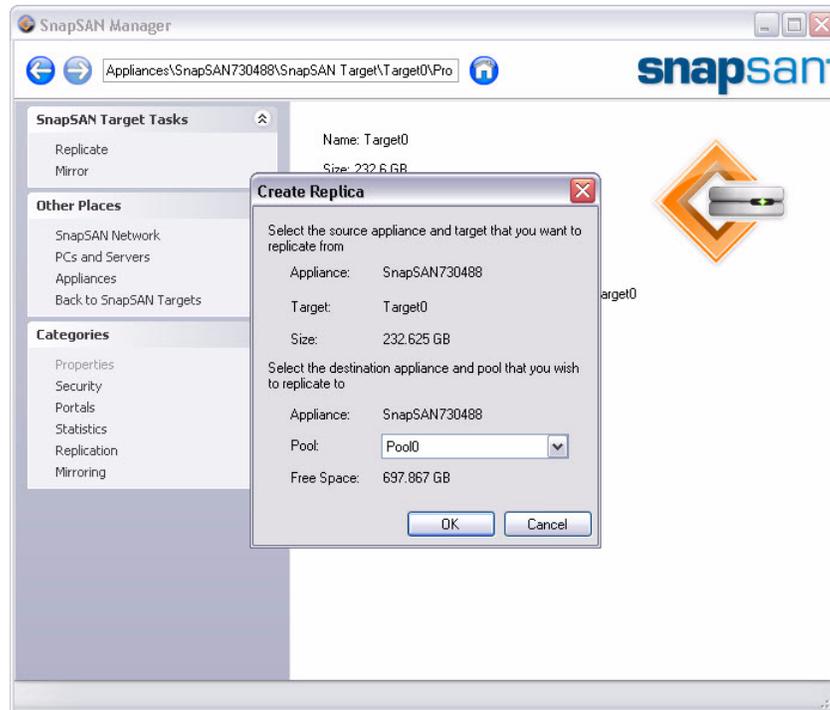
- **Break Replica Appliance**

Select this task to stop the selected replica from being updated. The replica can be used as before—any recovery points associated with it can be mapped and it remains accessible from the SnapSAN S2000 Replicas view of PCs and Servers if it has a Windows letter associated with it, showing that it has been mounted as a Windows drive (see [“Creating A SnapSAN Target” on page 7-20](#)).

- **Manage Replica Appliance**
This displays the Properties view of the replica.
- **Destroy Replica Appliance**
This deletes all the replicated data on this replica and stops data being replicated to it. Other replicas, created using Add Replica Destination, are not affected.

Replicating a Target

To replicate a target, select it and then select Add Replica Appliance from the SnapSAN Target Tasks list. The Create Replica dialog box is displayed.



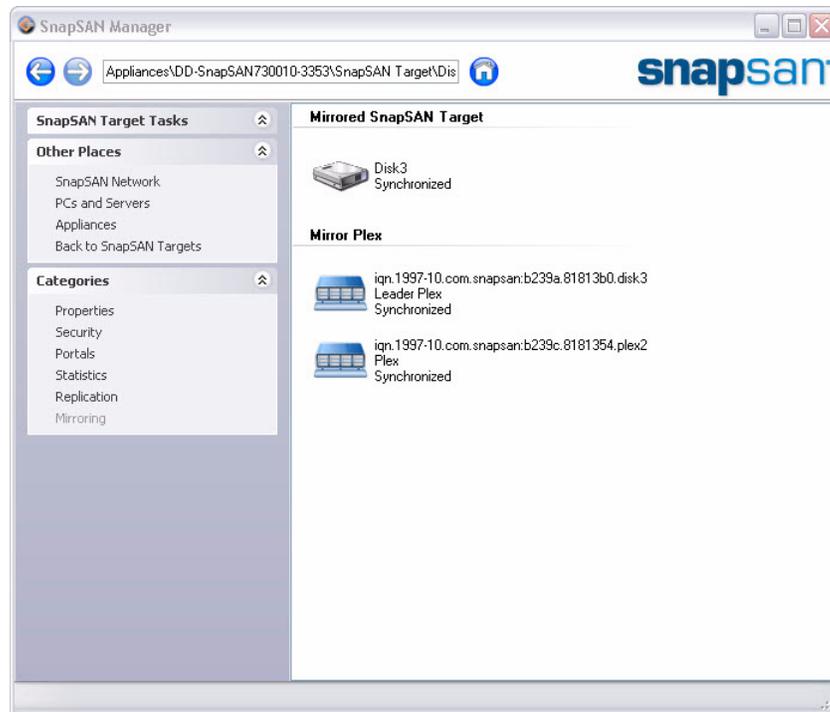
The top panel shows details of the SnapSAN Target to be replicated (the source). The bottom panel shows details of the replica (the destination). Use the drop-down lists to select the appliance and the storage pool where the replica will be created. Click OK. A progress bar is displayed in the content area while the replica is being created.

 **IMPORTANT:** To enable replication, a Replication Journal must be configured using the Web Management Interface. See [“Storage Journal Configuration” on page 8-52](#).

[“SnapSAN Replicas Category” on page 7-23](#) contains further information on managing replicas.

Mirroring a Target

The Mirroring view enables to you manage the plexes. The view displays the mirrored target and plexes.



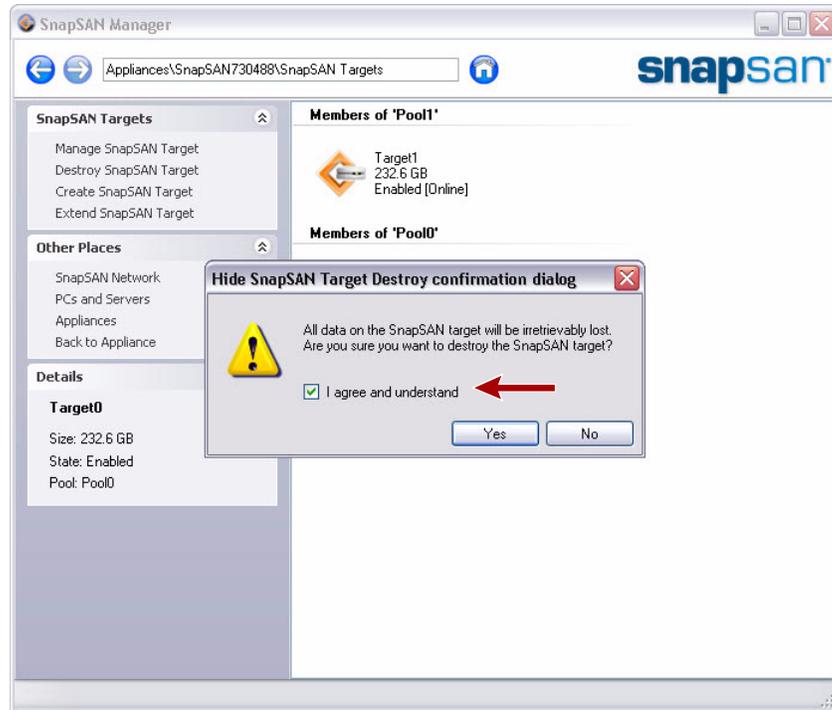
When either the target or Leader Plex is highlighted, the Add Plex option is shown in the SnapSAN Target Tasks list. It opens a dialog box that lets you choose the Appliance and pool where you want to create the plex.

When an existing plex is highlighted, two different options are shown:

- **Transfer Leadership to Plex** – this makes the selected plex the Leader Plex.
- **Break Plex** – this breaks the selected plex away from the Leader Plex preventing any future updates.

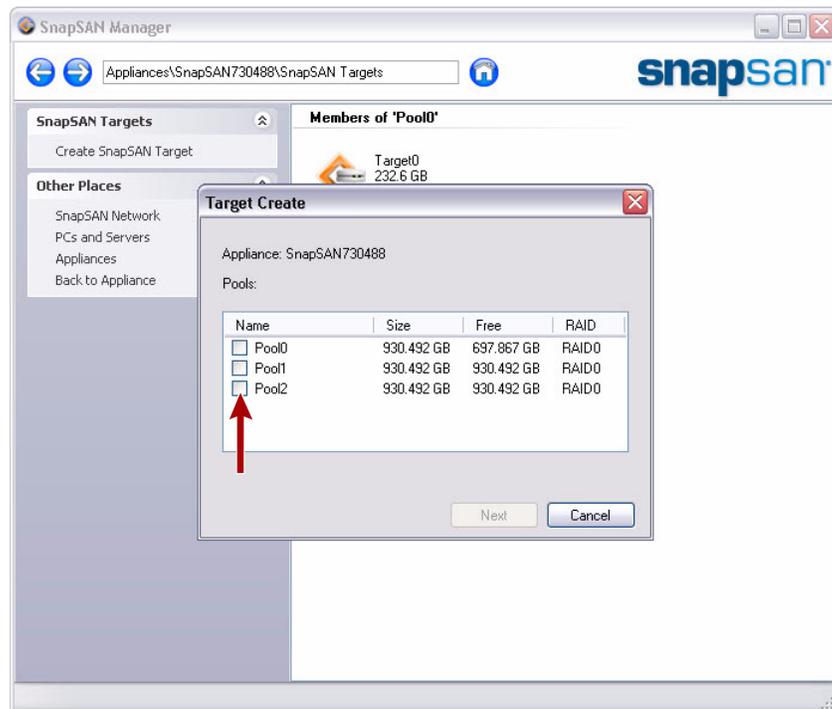
Destroying A SnapSAN Target

To destroy a target, select it and then select Destroy SnapSAN Target from the SnapSAN Targets tasks list. If configured, the Confirm SnapSAN Target Destroy dialog box appears for confirmation before destroying the target.

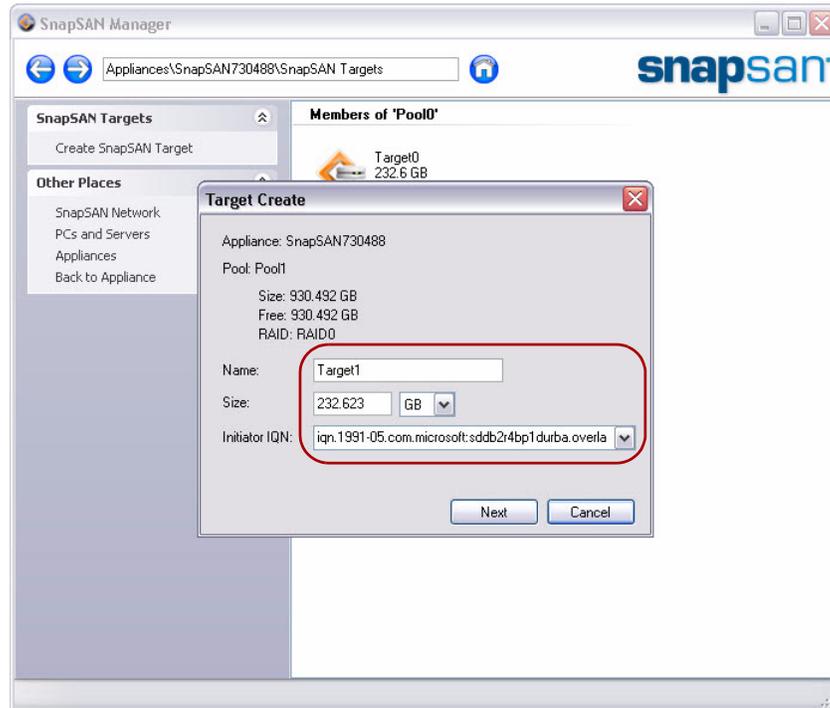


Creating A SnapSAN Target

To create a target, select Create SnapSAN Target from the SnapSAN Targets tasks list. This pops up the Target Create dialog box which lists the pools that have free capacity.

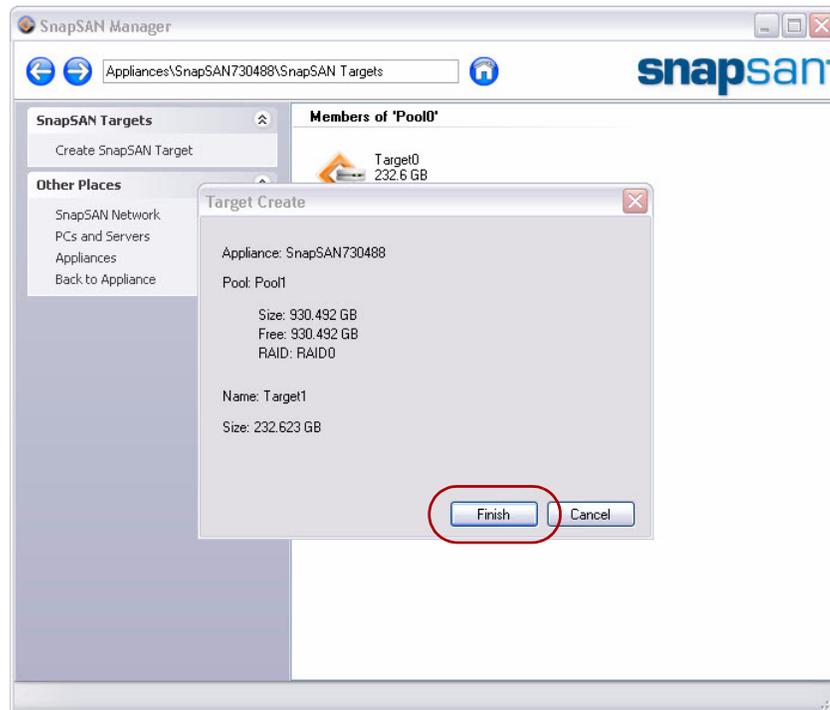


Check the box for a pool that has sufficient free capacity, then press Next. In the next dialog box enter the following details:



- **Name** – This can be a name of your choosing, up to 32 alphanumeric characters in length. An IQN is generated automatically for the target, based on standard parameters, a unique identifier assigned to the target, and the name you supply.
- **Size** – This can be any size you like, up to the amount of free capacity in the chosen pool.
- **IQN** – This is the IQN of the host to which the target is to be assigned. By default, the local host IQN (that is to say the computer running Windows SnapSAN Manager) is selected.

When you click Next, the target details are displayed. Click Finish to create the target.



The target is not automatically assigned a Windows drive letter so it can be used by hosts on the SAN that are not running a Windows operating system (for example, a Linux host). To create a target that is automatically made visible to a Windows host, use Create SnapSAN Disk from the PC and Server Tasks list, as described in [“Create SnapSAN Disk” on page 5-4](#). Alternatively, use Windows Disk Administrator.

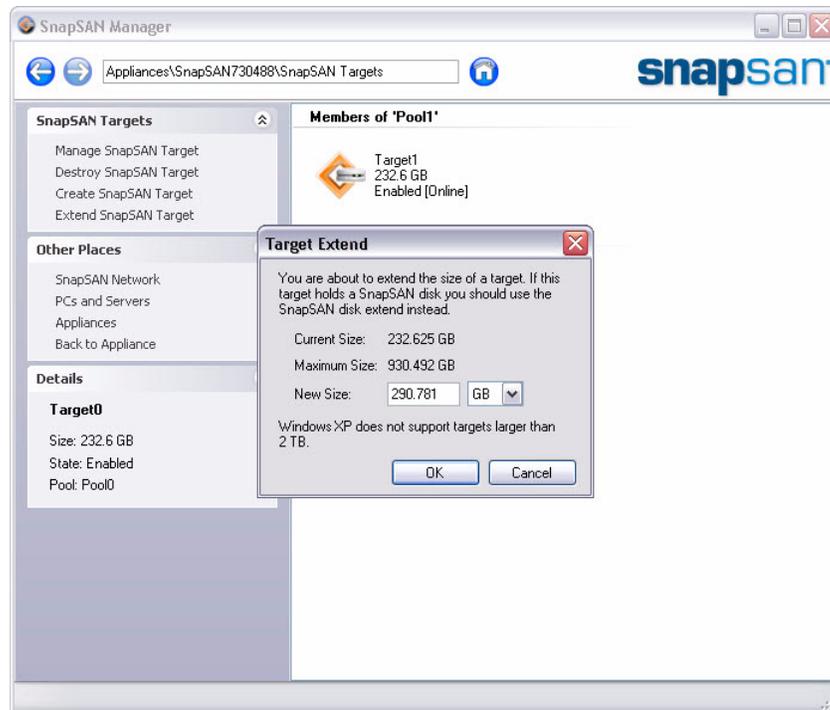
NOTE: Windows Disk Administrator

You can optionally use Windows Disk Administrator to specify a drive letter. To bring up the Windows Disk Administrator, go to the Control Panel and select Administrative Tools. From there, select Computer Management and go to the entry Disk Management under Storage. This displays a list of disks attached to the system. The new iSCSI target should appear as a new Unknown disk.

Right-click to initialize the disk: the disk will appear as Unallocated space. Right click the Unallocated space and select New Partition. The wizard guides you through the steps of creating and formatting the partition and, optionally, assigning it a drive letter. It is strongly recommended that you use NTFS rather than FAT for the file system. You should also select Quick Format, since on an iSCSI disk there is no difference between quick format and a full format but a quick format is much faster.

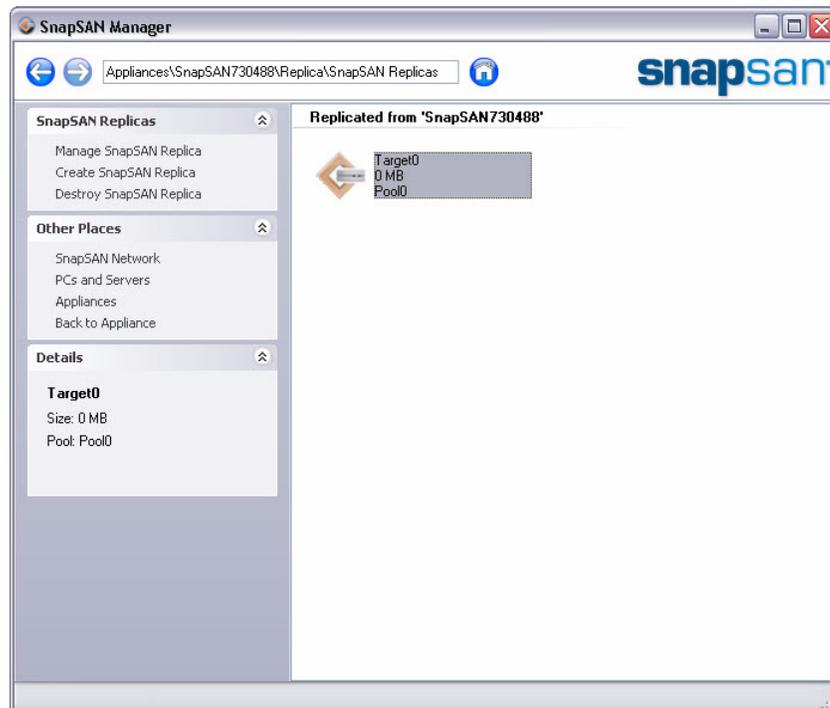
Extending A SnapSAN Target

To extend a target, select it and then select Extend SnapSAN Target from the SnapSAN Targets tasks list. Enter the new size in the SnapSAN Target Extend dialog box.



SnapSAN Replicas Category

Windows SnapSAN Manager provides support for replicating Storage Disks (volumes). The SnapSAN Replica view enables you to manage replicas created at the PCs and Servers level and at this Appliance level.



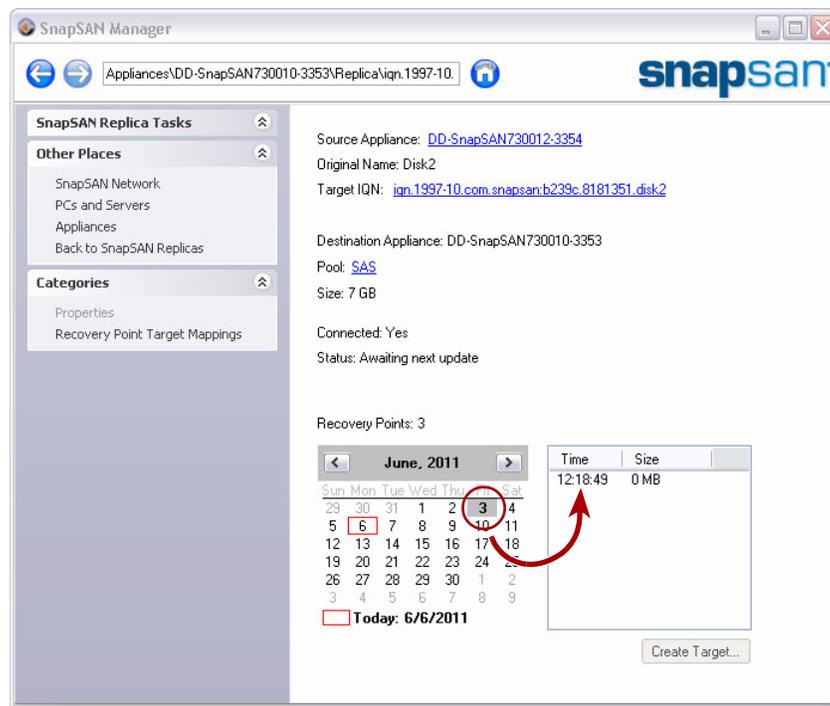
The SnapSAN Replica tasks list has three tasks (select a replica in the content area to see the Manage and Destroy options):

- [Manage SnapSAN Replica](#) (see [page 7-24](#))
- [Create SnapSAN Replica](#) (see [page 7-26](#))
- [Destroy SnapSAN Replica](#) (see [page 7-27](#))

Manage SnapSAN Replica

Select Manage SnapSAN Replica from the SnapSAN Replica tasks list to view details about the replicated target and to see whether any recovery points have been set. The Properties view of the replica is displayed. Select a day from the calendar and any recovery points made on that day are shown in the table to the right.

NOTE: Dates on which recovery points have been created are shown in bold font.

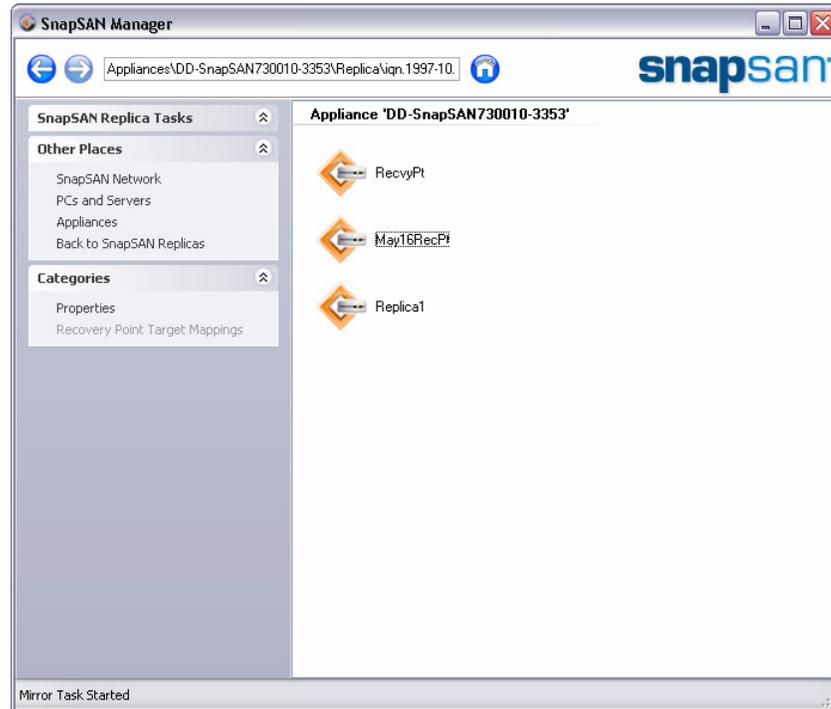


Select a Recovery Point in the table and click Create Target (or select Create Target from Recovery Point in the list) to map the replica:

- **Name** – Accept the default Name or enter a new one.
- **Access** – Choose either Read Write or Read Only.
- **Initiator IQN** – Select an initiator from the drop-down list.

Click OK to map the replica.

While still on the SnapSAN Replica screen, select Recovery Point Target Mappings from the Categories list to view all the mappings that have been made from recovery points.



Select a mapping and the tasks that you can carry out on it are displayed in the SnapSAN Replica Tasks list:

- **Destroy SnapSAN Target**

A dialog box pops up for you to confirm the destroy operation as it will delete all the data on the mapping. This means that any changes made to the mapping will be lost although the original mapping can be created again from a recovery point.

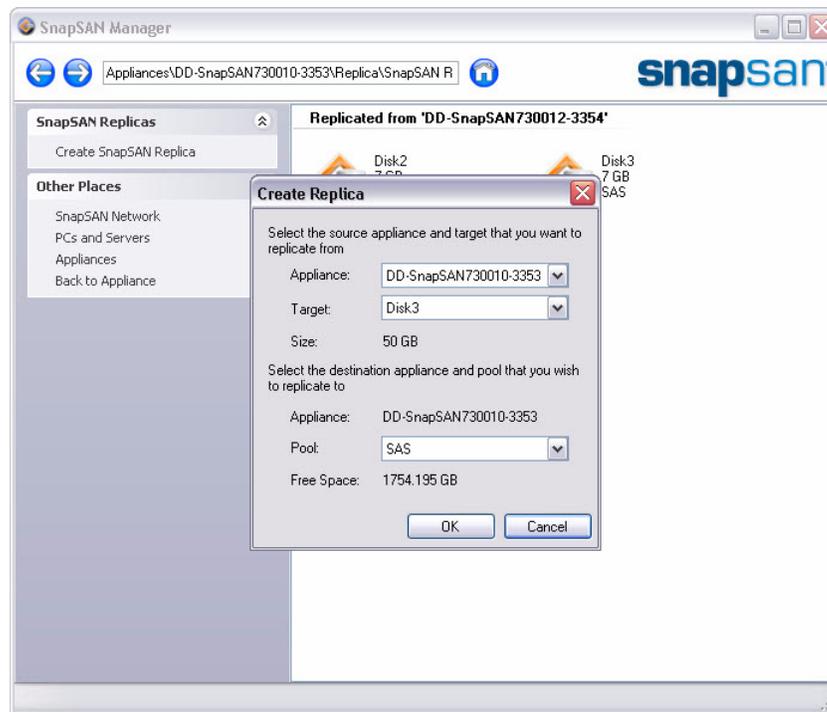
- **Manage SnapSAN Target**

This displays the SnapSAN Target Properties view, described in [“Managing A SnapSAN Target” on page 7-11](#), but with no tasks available in the SnapSAN Target Tasks list.

Create SnapSAN Replica

IMPORTANT: To enable replication, a Replication Journal must be configured using the Web Management Interface. See [“Storage Journal Configuration” on page 8-52.](#)

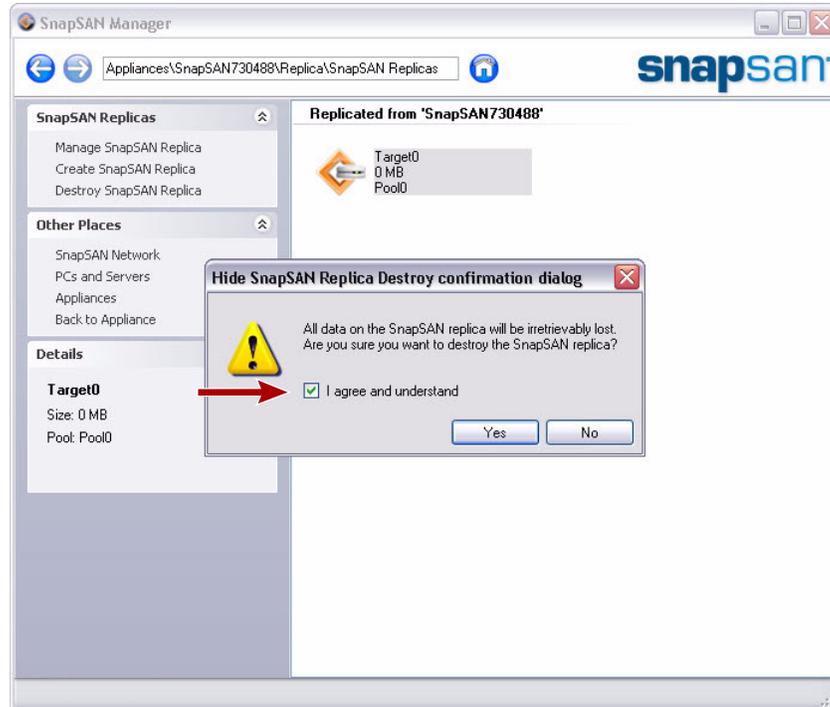
Select Create SnapSAN Replica from the SnapSAN Replica tasks list to create a replica. The Create Replica dialog box pops up for you to select (if more than one is available) an appliance, a target to replicate, and a pool in which the replica will be stored.



A progress bar appears in the status bar at the bottom of the window while the replica is being created. The replica is then displayed in the view.

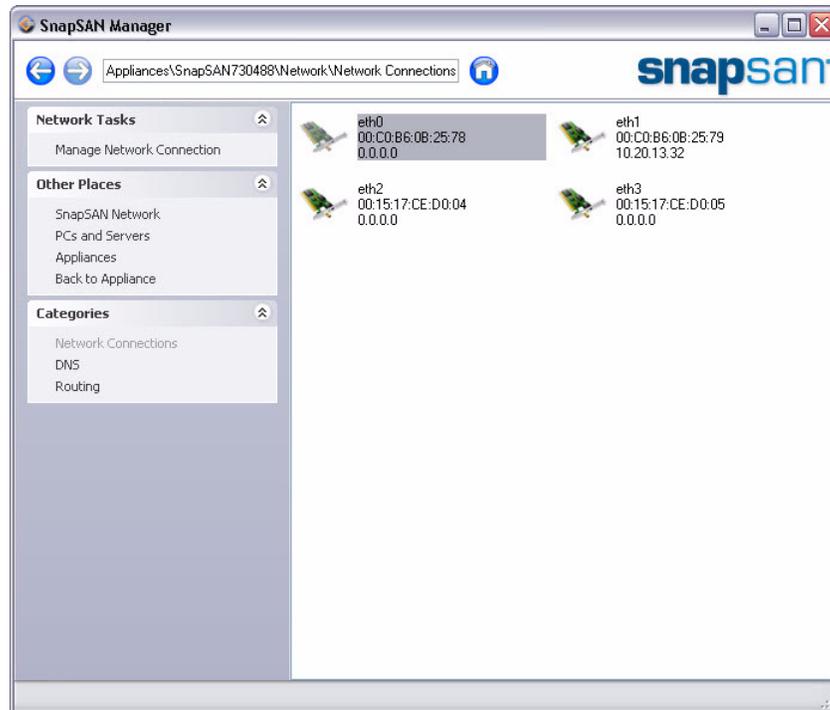
Destroy SnapSAN Replica

To destroy a replica, select it and then select Destroy SnapSAN Replica from the SnapSAN Replica tasks list. The Confirm SnapSAN Target Destroy dialog box appears for confirmation before destroying the replica. You must check the agreement box to activate the Yes button.



Network Category

The Network view, the default Network Connection View has controls for administering the network.



Three views of the network are provided in the Categories list:

- [Network Connections Category](#)
- [DNS Category](#) (see [page 7-32](#))
- [Routing Category](#) (see [page 7-33](#))

Network Connections Category

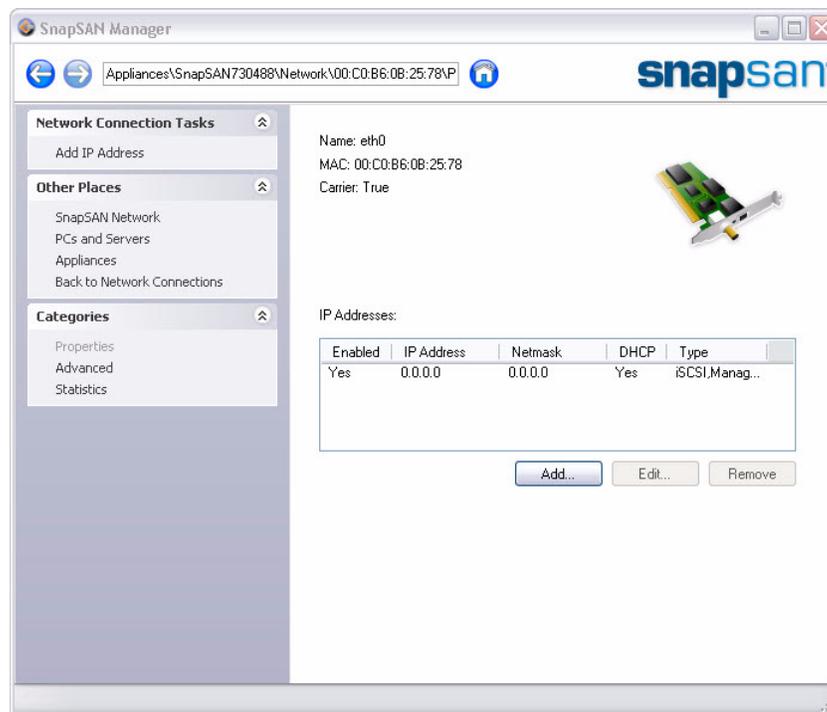
The Network Connection default view identifies the physical connections in the network, displaying their MAC addresses.

To see further details of a specific network connection, double-click the icon (or select it and then select Manage Network Connection from the Network Tasks list. There are three views (categories) for managing Network Connections:

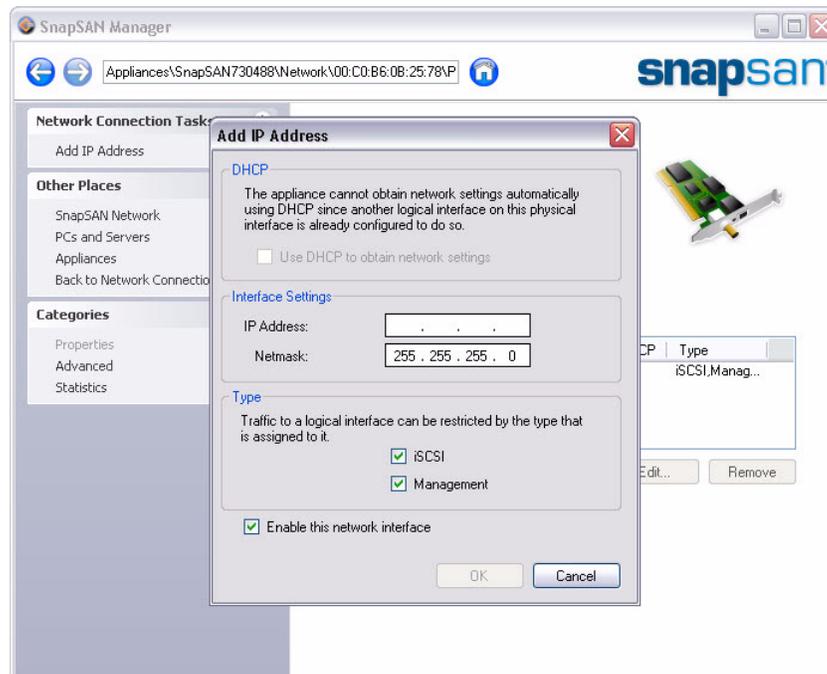
- [Properties Category](#) (see [page 7-29](#))
- [Advanced Category](#) (see [page 7-30](#))
- [Statistics Category](#) (see [page 7-31](#))

Properties Category

The Properties category of the interface shows the device type and its connection status.

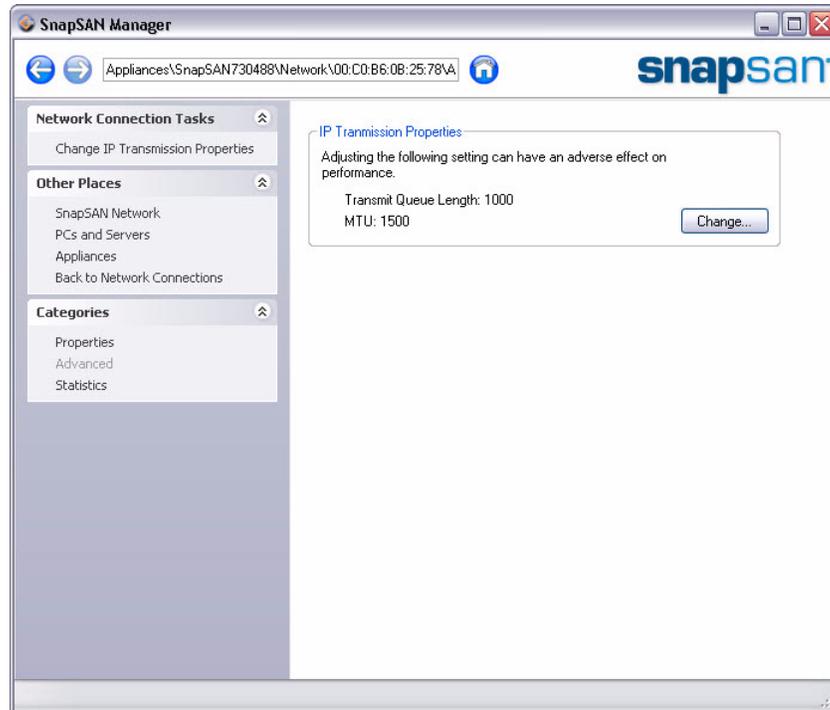


To add an IP address to the device, click the Add button (or select Add IP Address from the Network Connection Tasks list). This displays the Add IP Address dialog box. Select the IP address and interface options, then click OK.

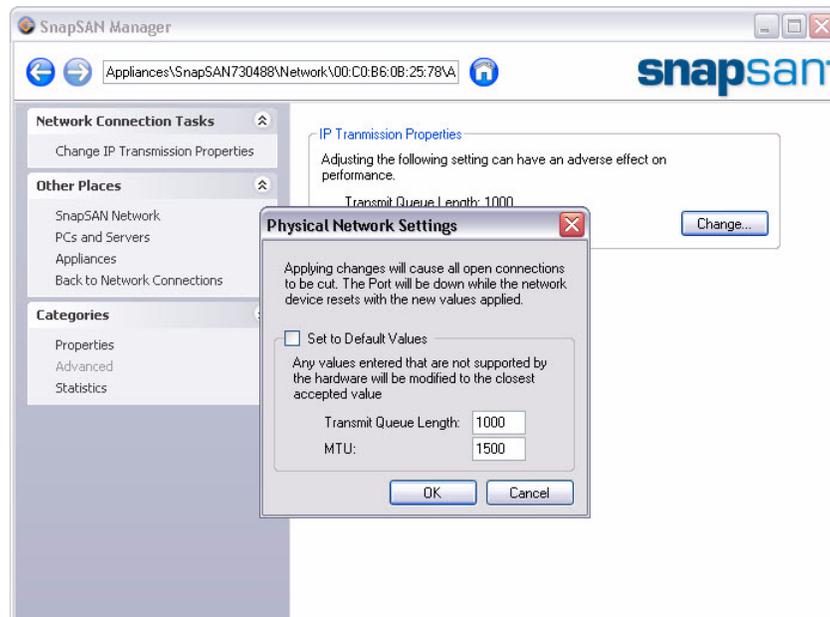


Advanced Category

The Advanced view of the interface shows the current frame size (MTU) and transmit queue length (TXQLEN) parameters. You can change these settings, especially to increase the MTU size for jumbo frames.

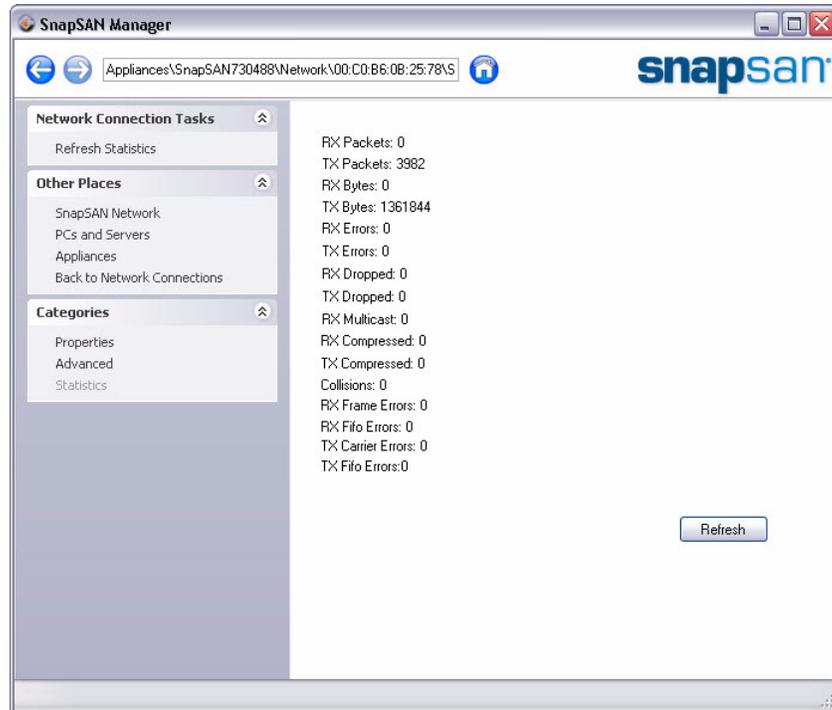


Click the Change button (or select Change IP Transmission Properties option from the Network Connection Tasks list) to change the settings.



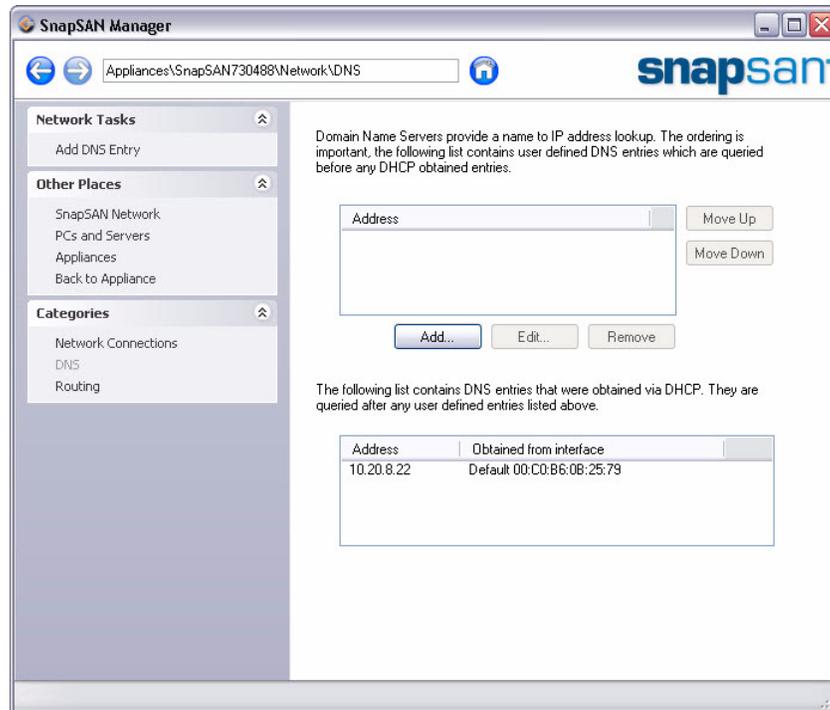
Statistics Category

The Statistics view of the network connection shows the transmission statistics for the interface. Click the Refresh button (or select the Refresh Statistics option in the Network Connection Tasks list) to update the data.

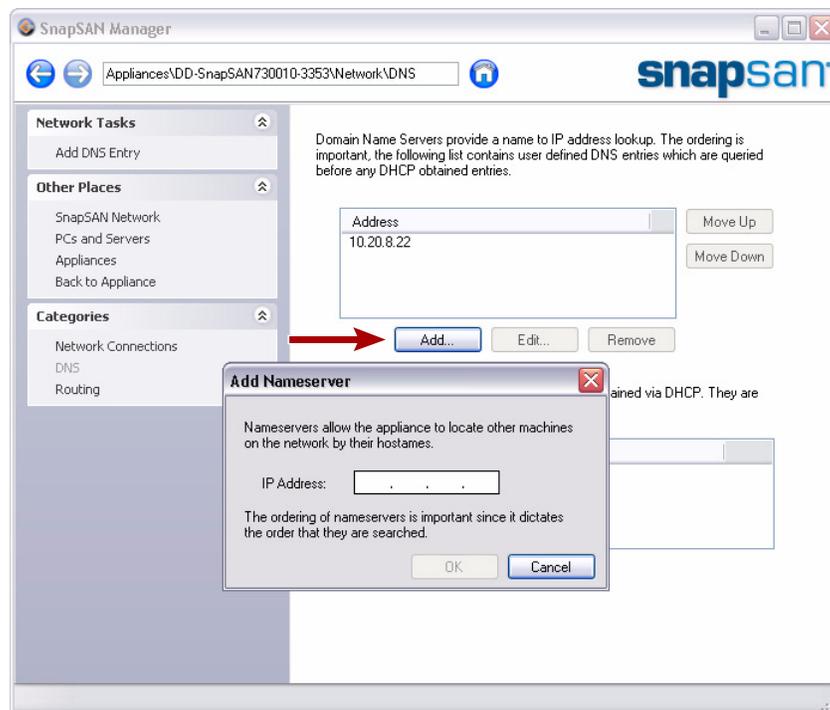


DNS Category

The DNS view enables a network administrator to modify domain name server entries. The panel at the top of the view is for user-defined entries; the panel below it shows entries that have been obtained automatically by DHCP.



To add a DNS server entry, click the Add button (or select Add DNS Entry from the Network Tasks list). The Add Nameserver dialog box pops up for you to enter the IP address of the server.



To change an IP address, highlight the address in the list and click the Edit button (or select Edit DNS Entry in the Network Tasks list).

To remove an IP address, highlight the address in the list and click the Remove button (or select Remove DNS Entry in the Network Tasks list).

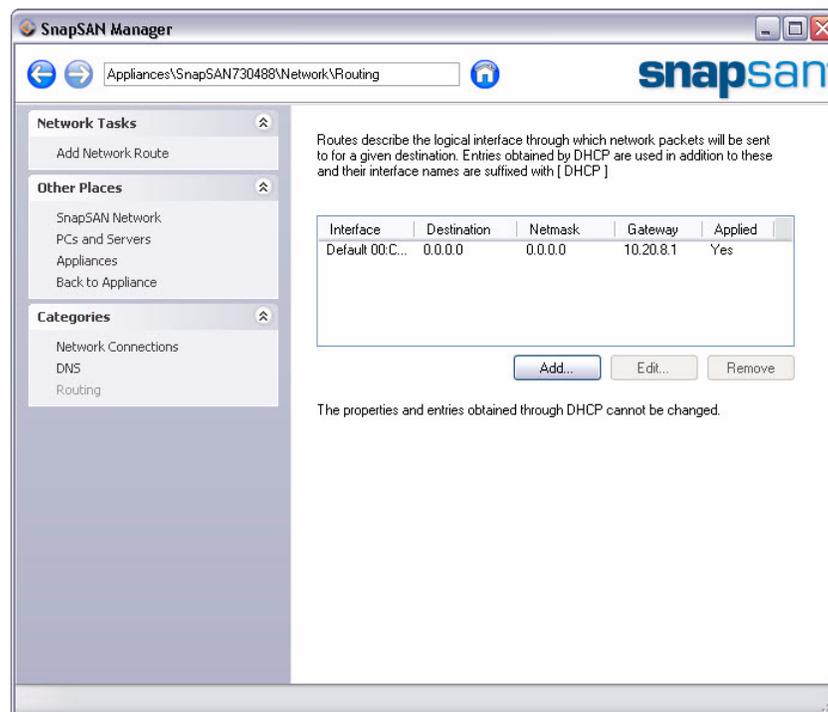
NOTE: The IP address is IMMEDIATELY deleted from the list.

The ordering of the list entries is important as it defines the search order when a name lookup is required. Use the Move Up and Move Down buttons to reorder the list. User-defined entries take precedence over those returned by DHCP.

NOTE: If invalid addresses are entered for DNS servers, there will be noticeable network delays in delivering responses to management requests.

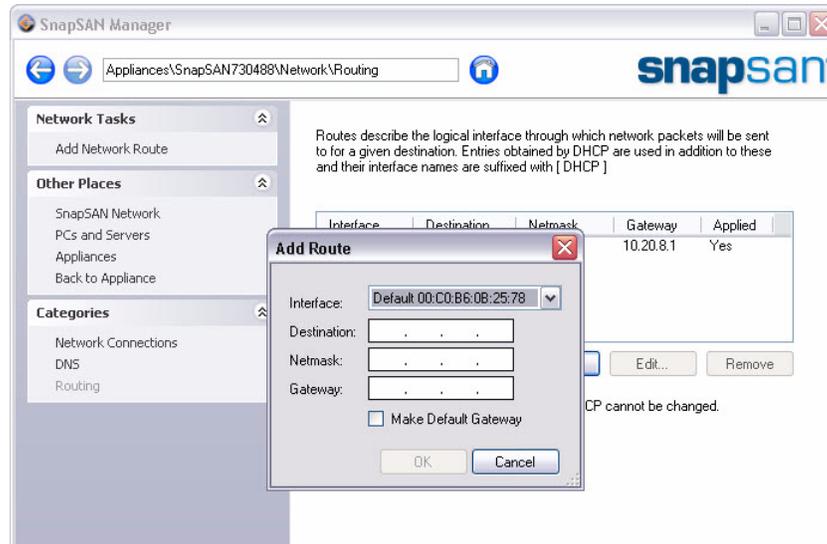
Routing Category

The Routing view describes the logical interface through which packets are routed to a specified destination.



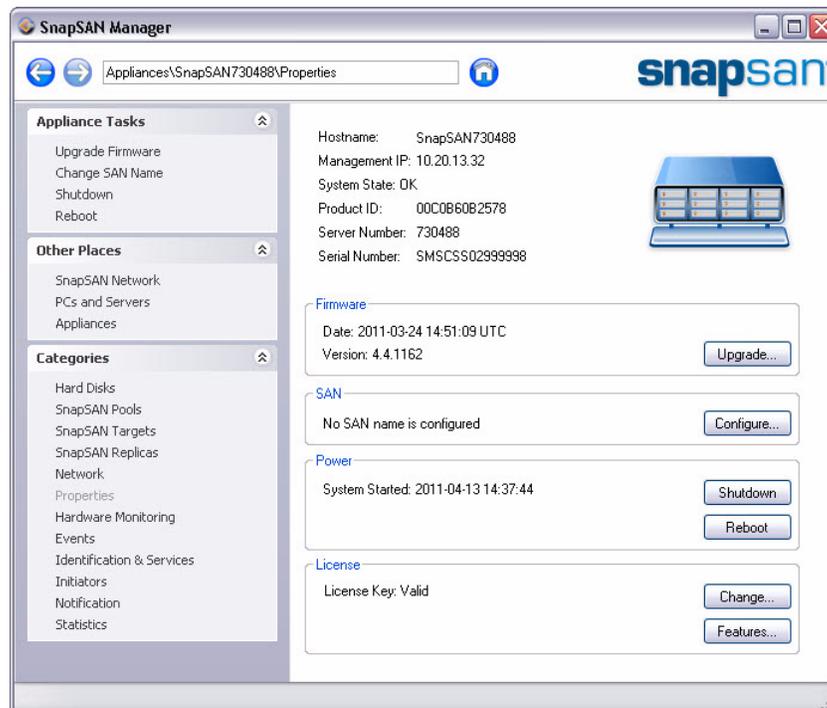
NOTE: Note that DHCP entries cannot be modified.

To add a new route, click the Add button (or select Add Network Route from the Network Tasks list). The Add Route dialog box pops up for you to select an interface and then enter destination, netmask and gateway addresses for the new route. There is also a check box for making this gateway the default.



Properties Category

The Properties view (default) summarizes the appliance's properties:



- **System Information**

The system information includes the following:

- Hostname of the appliance
- Management IP address
- System State (current)

Normally the system status will be set to OK. However, if a Warning or Error event occurs, the status will be reset to Warning or Error. To find out what caused the change of state, go to the Events view (see [“Events Category” on page 7-37](#)).

- Product ID number of the appliance
- Server Number of the appliance (needed for service)
- Serial Number of the system
- **Firmware**

The Firmware panel shows the version and build date of the firmware running on the appliance.

Firmware upgrades are supplied as image files (which have the IMG suffix) and can be download by entitled customers from the support web site.

To upgrade the firmware, click the **Upgrade** button (or select Upgrade Firmware from the Appliance Tasks list). This pops up a file browser for you to select the IMG file containing the new version of firmware to be loaded onto the appliance. The appliance will check that the image file is valid. If the file is corrupt, the upgrade will not take place.

Once the firmware has been upgraded, you must restart the appliance to activate the upgrade. To restart the appliance, select Reboot from the Appliance Tasks list.



IMPORTANT: If you have more than one iSCSI appliance, it is recommended that you upgrade them all to the same version of firmware at the same time. You may also need to upgrade the Windows SnapSAN Manager to enable it to manage controllers running newer firmware. In this case, upgrade Windows SnapSAN Manager before restarting all the appliances.

- **SAN**
This panel displays the SAN name, if one has been configured. Click the Change button (or select Change SAN Name from the Appliance Tasks list) to assign or change a SAN name. See [“Setting Up Storage Groups” on page 6-2](#) for more information on SAN names.
- **Power**
This panel shows the time the appliance was started. Click the Shutdown button (or select Shutdown from the Appliance Tasks list) to shut down the appliance. Click the Reboot button (or select Reboot from the Appliance Tasks list) to restart the SnapSAN appliance.
- **License**
License key statuses:
 - **Valid** – A license key, provided by your supplier, has been entered and the system is properly licensed.

- **Evaluation** – This option enables you to go ahead and evaluate the appliance without entering the license key. Once the evaluation period of 28 days has expired, the system reverts to being unlicensed. This means that no support is available to you although the system will continue to operate. In addition, messages will be displayed, reminding you that the system is running without a license.

This will only appear when unlicensed firmware is installed.

Click the Change button to activate your appliance. You have a choice in the Activation dialog box to activate over the Internet or locally. Click the Features button to see all the licensed features for this appliance.

Hardware Monitoring Category

The Hardware Monitoring view displays details of the voltages, fan speeds, and temperature readings obtained from the appliance.

Hardware monitoring information returned by the appliance.

Mainboard Sensor Chip			
System Fan 1	Fan Sensor	4115	RPM
System Fan 2	Fan Sensor	4115	RPM
System Fan 3	Fan Sensor	4115	RPM
System Temperature	Temperature Sensor	37	deg C
CPU 2	Temperature Sensor	40.25	deg C
CPU 1	Temperature Sensor	0	deg C

Upper Power Supply			
PSU1 Fan 1	Fan Sensor	6020	RPM
PSU1 Fan 2	Fan Sensor	5580	RPM
PSU1 Temperature	Temperature Sensor	33	deg C

Lower Power Supply			
PSU2 Fan 1	Fan Sensor	7590	RPM
PSU2 Fan 2	Fan Sensor	5750	RPM
PSU2 Temperature	Temperature Sensor	34	deg C

Last Refresh: 4/14/2011 3:02:00 PM Refresh

Events are recorded in the event log on the appliance itself. They are also forwarded to Windows SnapSAN Manager so that they can be examined even if the appliance is offline. The event logs have a finite size. When a log fills up, the oldest events will be discarded to make room for newer ones.

To clear the event logs, click the **Clear** button (or select Clear Events from the Appliance Tasks list).

To investigate an event further, select it and then click the **View** button (or select View Event Details from the Appliance Tasks list). The Event Viewer pops up. Click the Previous and Next buttons to navigate through the event log.

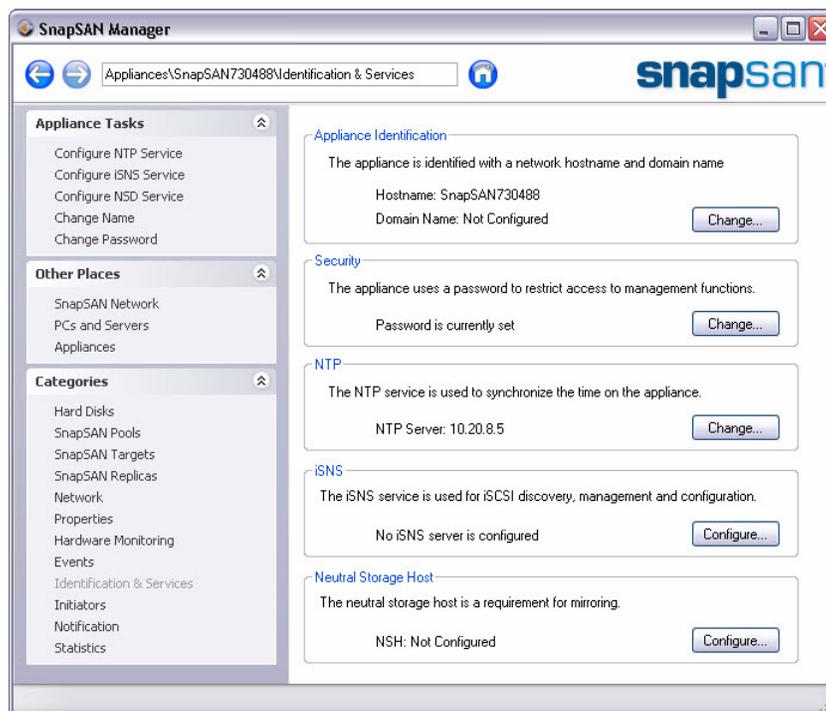
If the system is in a Warning or Error state, click the icon displayed to get the Events view. The Events view will have the last event of that type already selected in the list. Double-click the alert icon to launch the Event Viewer.



IMPORTANT: If requested by Overland Storage Support, use the Download Appliance Diagnostics link to access the TBZ file.

Identification & Services Category

The Identification & Services view provides the following options:



- **Appliance Identification**

The network identity includes a network (host) name, and a network domain name. To change these, click the Change button (or select Change Name from the Appliance Tasks list). The Configure Hostname & Domain Name dialog box pops up for you to edit the names.

- **Security**

To change the password, click the Change button (or select Change Password from the Appliance Tasks list). The Change Password dialog box pops up for you to enter and confirm the new password.

- **NTP**

The Network Time Protocol (NTP) server is used to synchronize system time.

To configure an NTP server, click the Configure button (or select Configure NTP Service from the Appliance Tasks list). The Configure NTP Server dialog box pops up. Check the Enable check box and enter a fully-qualified hostname or IP address for the server.

Once an NTP server is configured, to change or delete the service, click the Change button (or select Configure NTP Service from the Appliance Tasks list). To change the IP address, type a new address; to delete the address, uncheck the Enable NTP box. Then click OK.

- **iSNS**

The Internet Storage Name Services (iSNS) server, is used to aid storage discovery (see also [“Discovery” on page 6-3](#)).

To configure an iSNS server, click the Configure button (or select Configure iSNS Service from the Appliance Tasks list). The Configure iSNS Server dialog box pops up. Check the Enable check box and enter a fully-qualified hostname or IP address for the server.

Once an iSNS server is configured, to change or delete the service, click the Change button (or select Configure iSNS Service from the Appliance Tasks list). To change the IP address, type a new address; to delete the address, uncheck the Enable iSNS box. Then click OK.

- **Neutral Storage Host**

A neutral storage host (NSH) is a Windows system that is required to manage the mirroring and the plexes. If one is configured, its name is shown here.

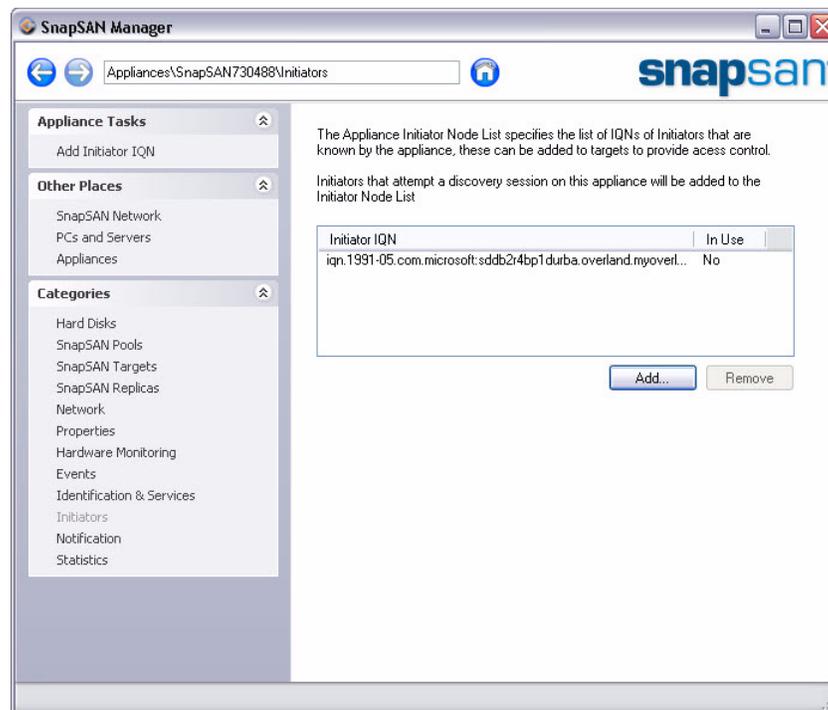
Neutral Storage Device (NSD) Service is used to reference the SnapSAN appliance providing the mirroring services.

To configure an NSH, click the Configure button (or select Configure NSD Service from the Appliance Tasks list). The Neutral Storage Host dialog box pops up. Select a host from the drop-down list and click OK.

Once an NTP server is configured, to change the NSH, click the Change button (or select Configure NSD Service from the Appliance Tasks list). Select a different host from the drop-down list and click OK.

Initiators Category

The Initiators view displays a list of the IQNs of all the host iSCSI initiators known to the appliance that can be added to the Access Control List to allow access to a target. When you create a target (see [“Creating A SnapSAN Target” on page 7-20](#)), you must specify which initiators can access it.



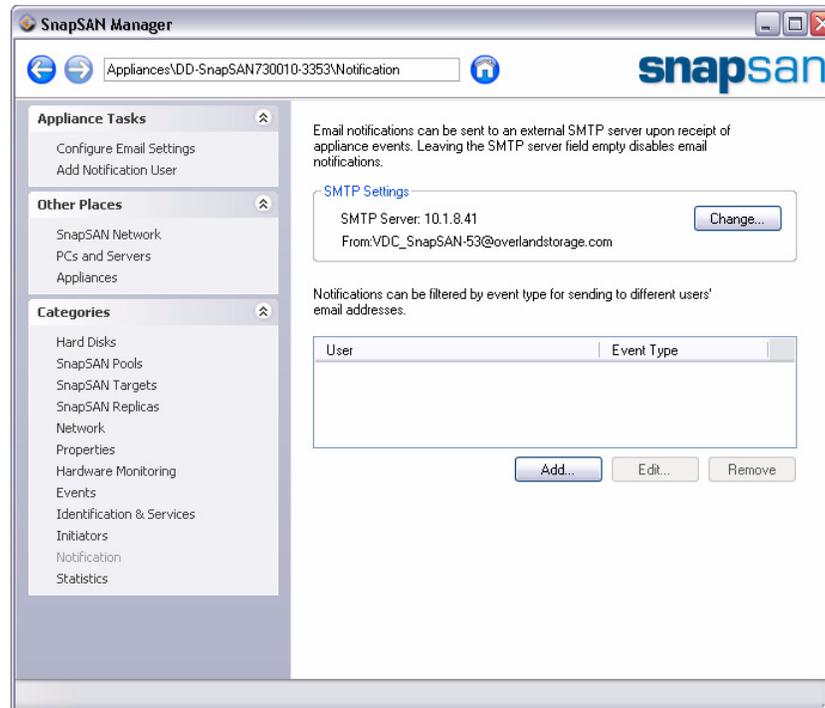
The appliance remembers all of the initiators (up to a limit of 1024) which are either referenced in an ACL or have attempted to connect to the appliance, for example to discover the targets on it. The In Use field is set to Yes if the initiator is present in any Target ACL on the appliance, otherwise it is set to No.

Any unused initiator can be removed from the list by selecting it and then clicking the Remove button (or selecting the Remove Initiator IQN option from the Appliance Tasks list). The initiator is immediately removed from the list.

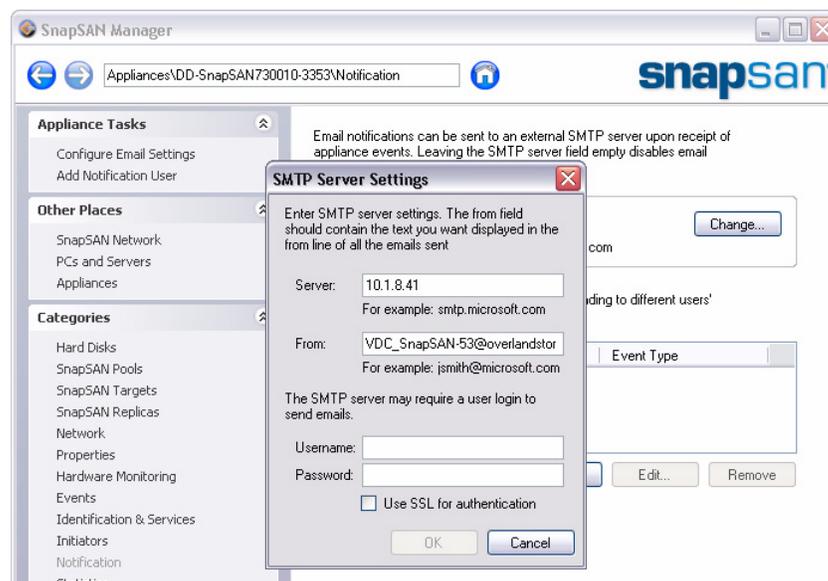
Initiators can also be added to the list manually, using the Add button (or selecting Add Initiator IQN from the Appliance Tasks list). This is for convenience, to avoid having to enter them when setting up a Target ACL. In the Add Initiator dialog box, enter the IQN and click OK.

Notification Category

When events (see [“Events Category” on page 7-37](#)) occur on the appliance, support engineers can be notified of the events via email¹. The Notification view has controls for configuring these notifications.



If the SMTP server settings are not yet configured, click the Configure button (or select Configure Email Settings from the Appliance Tasks list). Enter in the SMTP Server Settings dialog box the server fully-qualified hostname or IP address, a From email address, and (if required) the SMTP server username and password. If you want SSL for authentication, check the box. Click OK when done.

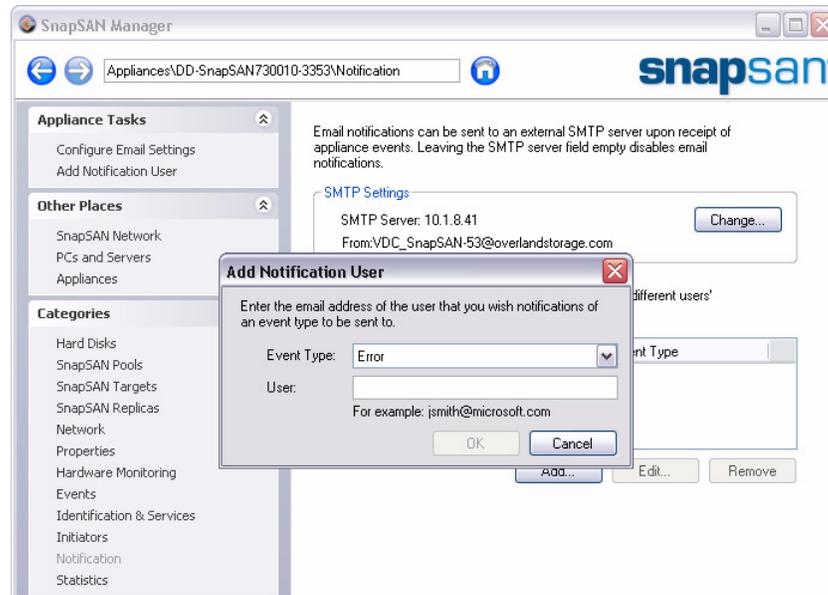


1. To send notifications as SMS text messages, simply use email to a SMS gateway.

Once configured, to change the settings, click the Change button (or select Configure Email Settings from the Appliance Tasks list).

If desired, emails can be sent to multiple recipients and each recipient can be configured to receive only emails for events at or above a certain severity level. For example, you could set up one email account as a 'log' to receive details of all events from the appliance and another to forward all Error events to a support engineer or organization.

To configure which users will receive emails, click the Add button (or select Add Notification User from the Appliance Tasks list).



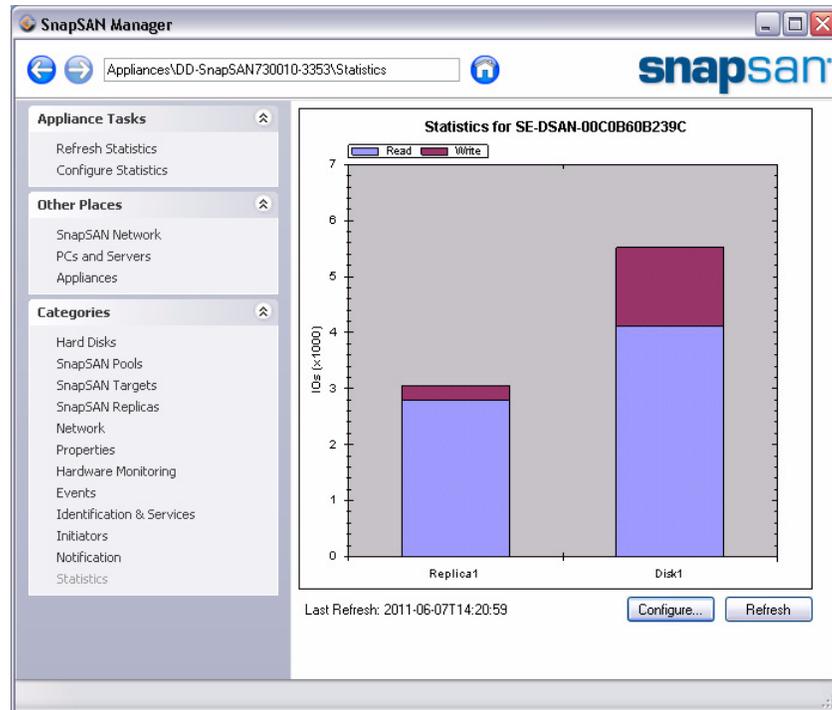
The Add Notification User dialog box pops up for you to enter the name of a recipient and select the type of event about which this user will be notified. When you confirm your entries, the user is added to the list in the bottom panel of the Notification view.

To change the event type associated with a user, select the user from the notification list and then click the Edit button (or select Edit Notification User from the Appliance Tasks list).

To remove a user from the notification list, select the user and then click the Remove button (or select Remove Notification User from the Appliance Tasks list).

Statistics Category

The Statistics view enables you to compare volumes on the appliance and see how heavily they are being used.



To configure the display, click the Configure button (or select Configure Statistics from the Appliance Tasks list). The Configure Statistics dialog box pops up. Select a target, the type of data and a time interval.

Click the Refresh button (or select Refresh Statistics from the Appliance Tasks list) to update the display.

Web Management Interface

The Web Management Interface enables you to manage SnapSAN S2000 appliances individually using a standard web browser. This chapter describes the Web Management Interface in detail. It is organized as follows:

- [Accessing the Web Management Interface](#)
- [Overview and Usage](#)
- [Home Tab](#)
- [System Tab](#)
- [Network Tab](#)
- [Targets Tab](#)
- [Pools Tab](#)
- [Devices Tab](#)
- [Events Tab](#)
- [Replicant Tab](#)

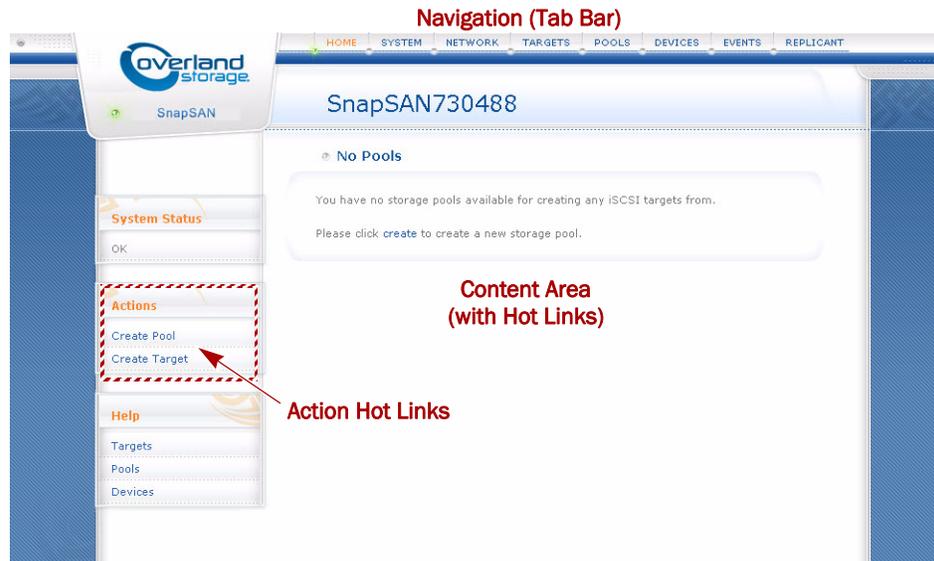
Accessing the Web Management Interface

To manage an appliance using the Web Management Interface, start up a browser and enter the network name or IP address of the appliance to be managed.

SnapSAN S2000 supports most common web browsers, including Internet Explorer 7 or higher, Firefox 3.6 or higher, Safari 5 or higher, or Chrome 11 or higher. JavaScript must be enabled in the browser.

To manage the appliance you must enter a user name and a password. The user name is “admin” and the password is whatever you set during the initial configuration of the appliance (see [“Configuring the Appliance” on page 3-13](#)).

When the password has been verified, the appliance's Home Page is displayed.



Overview and Usage

The Web Management Interface is made up of a number of cross-linked pages, enabling you to perform management operations easily on your iSCSI storage. All the pages have a similar layout. Use your browser's Back button to return to a previous page.

The top of the page features the **main navigation panel**, with Tabs (links) to all the main areas of management. Just under the Tab bar is the name of the current web page (except for the Home page which shows the SAN appliance name).

The left side of each default page has three sections:

- **System Status** is determined by events occurring on the system. There are three types of events:
 - Informational events are normal. Examples include such things as appliance startup and password changes.
 - Warning events are used to indicate that something unexpected has occurred, but that it is unlikely to be an ongoing problem. Examples included failed iSCSI logins and lost network connections.
 - Error events indicate a more serious problem, such as the failure of a hardware component, perhaps leading to a RAID array going into degraded mode.

If the status is Warning or Error, clicking the status will take you to a page listing the event that caused the change of status and from which the status can be cleared.

- The **Actions** section provides links to pages for performing various management operations. Clicking an action item usually opens a new page.
- The **Help** section provides information about some the contents of the page. Most of the web pages include help definitions.

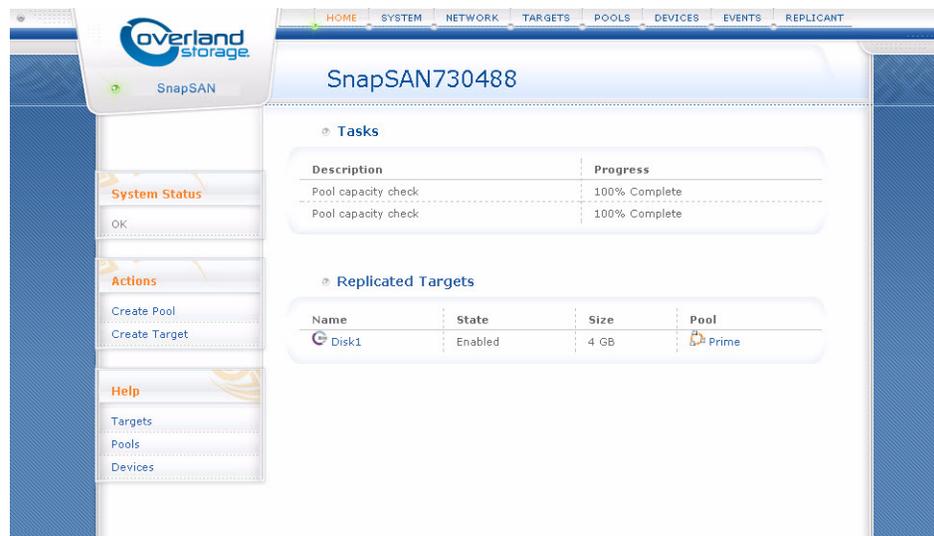
The primary **Contents Area** of each page contains details specific to the selected management area. Many of the items shown in this area are links (light blue text) to pages which show more details about the item. For example, clicking a target's name in the Content Area takes you to the [Target Information](#) page under the Targets tab.

Home Tab

Clicking the Home tab displays the home page. This page is also the default screen shown when logging in.

Appliance Home Page

The home page displays the appliance name as the title of the page. Usually the Content Area is blank unless important management information regarding pools and targets need to be addressed.



Content Area Links

This area is normally blank unless an important message about pools or targets is displayed. Some of the messages contain links to other pages.

Actions Available

The following action items are available on the home page for the most popular items:

- **Create Pool** – takes you to the [Create Storage Pool](#) page under the Pools tab.
- **Create Target** – takes you to the [Create Target](#) page under the Targets tab.

System Tab

The System tab provides action items for you to manage the hardware and software of your SnapSAN appliance. The default page is the [System Information](#) page.

System Information

The default System Information page shows system details, including the firmware version and information about the main hardware components of the appliance.

Please reference the **Server Number** for any licensing or support inquiries

Details

Serial Number	SMSCSS02999998
Server Number	730488
Product ID Number	00C0B60B2578
License Key	TFAJ-LHLO-ROED

Firmware

Name	Date	Version	Active	Boot
iSCSI Appliance	2010-02-24 20:54:34 UTC	4.3.1023	<input type="checkbox"/>	<input type="checkbox"/>
iSCSI Appliance	2011-04-14 11:52:30 UTC	4.4.1163	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Hardware

Hardware Type	Details
Processor	Intel(R) Xeon(R) CPU E5504 @ 2.00GHz
Processor	Intel(R) Xeon(R) CPU E5504 @ 2.00GHz
Processor	Intel(R) Xeon(R) CPU E5504 @ 2.00GHz
Processor	Intel(R) Xeon(R) CPU E5504 @ 2.00GHz
Memory DIMM	2048 MB
PIC	Intel Corporation X58 I/O Hub I/OxAPIC Interrupt Controller (rev 13)
etc	Intel Corporation X58 I/O Hub System Management Registers

Content Area Links

There are no Content Area hot links on the System Information page.

Actions Available

The following action items are available on the System Information page:

- **Backup Config** – launches the [System Configuration](#) page to save the current configuration data.
- **Upgrade Firmware** – launches the [System Firmware Upgrade](#) page to upload an upgrade file (type IMG) to the appliance.
- **Hardware Monitoring** – launches the [Hardware Sensors Information](#) page that displays the data from the sensors mounted throughout the appliance.
- **Power Off** – launches the [System Power Settings](#) page to let you shutdown or reboot the appliance.
- **Set Admin Password** – launches the [Set Admin Password](#) page that lets you change the appliance's Web Management Interface password.
- **Get a Diagnostic Dump** – launches the [System Diagnostics](#) page to retrieve a file containing diagnostic information.
- **Set the Date & Time** – launches the [Set System Date & Time](#) page to change the system date and time or access the NTP server settings.

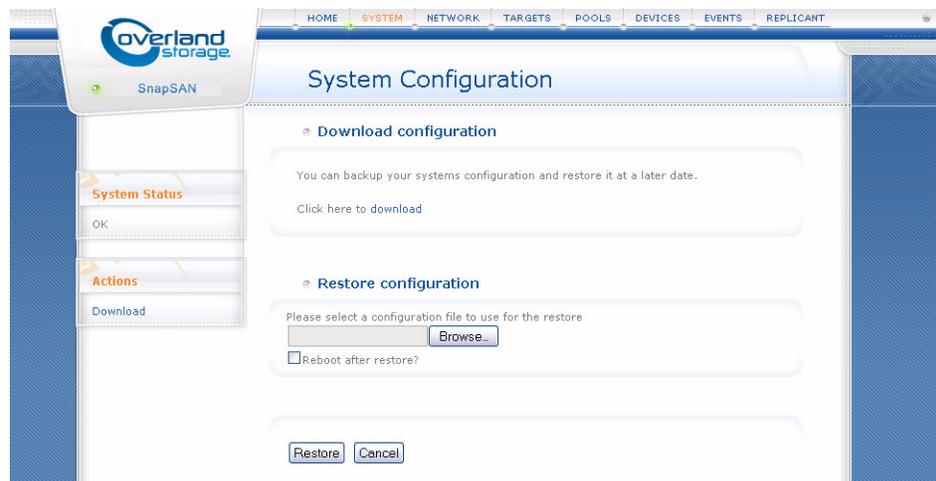
- **License Key** – launches the [System License](#) page to display the system serial number and any installed license keys.
- **Authentication Certificate** – launches the [Secure Authentication Certificate](#) page to download and install the CA certificate, so that the appliance's web interface becomes “trusted” by your web browser.

System Tab Subpages

The following pages are also available under the System tab either directly through action items or indirectly from text links in the Content Area.

System Configuration

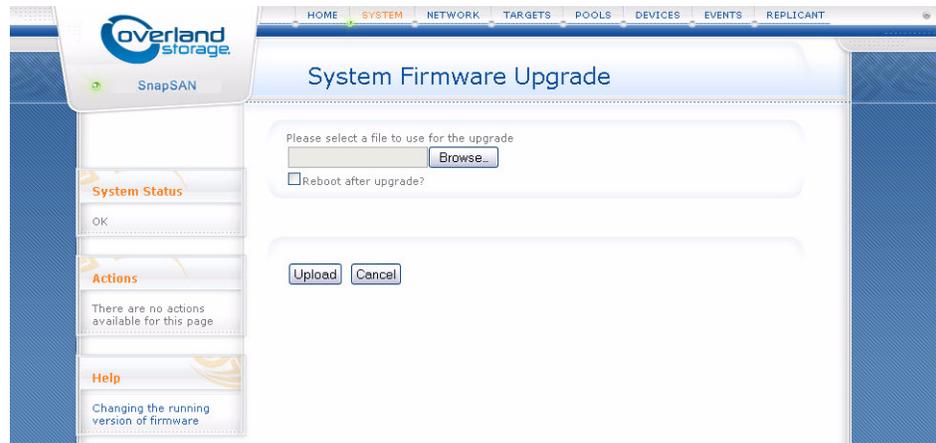
Use this page to download or restore your SnapSAN S2000 configuration. It is accessed by clicking the Backup Config action item on the [System Information](#) page.



The current settings can be downloaded by clicking either the “download” text link in the Content Area or the Download action item on the side. To restore a configuration, click the Browse button, browse to the file, and click Restore. To reboot after restoring the configuration, be sure to check the box below the file name.

System Firmware Upgrade

Use this page to update to the latest firmware. This page is accessed by clicking the Upgrade Firmware action item on the [System Information](#) page. Use the Browse button to select the firmware upgrade file.



IMPORTANT: Once the firmware is uploaded, the appliance needs to be restarted to activate the new firmware. Check the box to do this automatically.

Hardware Sensors Information

This page displays the temperatures and fan speeds from the sensors embedded in the appliance hardware. It is accessed by clicking the Hardware Monitoring action item on the [System Information](#) page.

Sensor	Type	Value	Monitored
System Temperature	Temperature Sensor	37.0 deg C	✓
CPU 2	Temperature Sensor	40.5 deg C	✓
CPU 1	Temperature Sensor	0.0 deg C	✓
System Fan 1	Fan Sensor	4115.0 RPM	✓
System Fan 2	Fan Sensor	4115.0 RPM	✓
System Fan 3	Fan Sensor	4115.0 RPM	✓

Sensor	Type	Value	Monitored
PSU1 Temperature	Temperature Sensor	32.0 deg C	✓
PSU1 Fan 1	Fan Sensor	7245.0 RPM	✓
PSU1 Fan 2	Fan Sensor	5405.0 RPM	✓

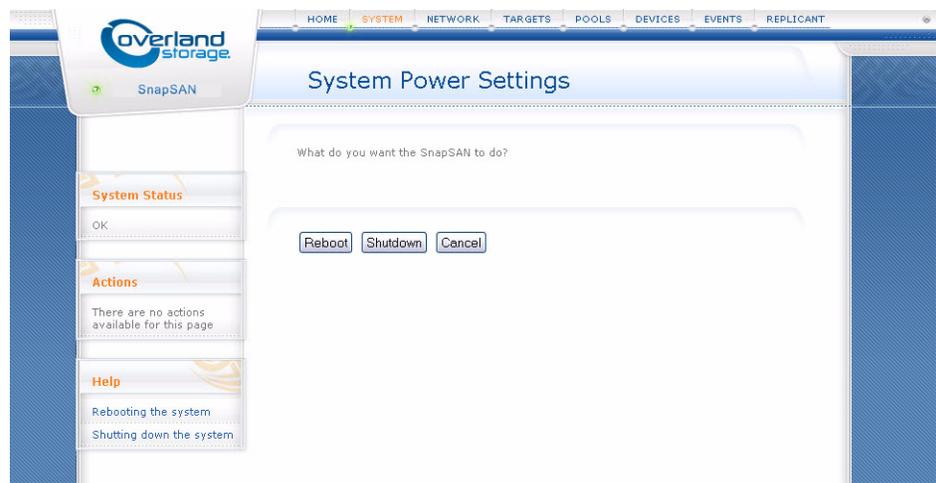
Sensor	Type	Value	Monitored
PSU2 Temperature	Temperature Sensor	34.0 deg C	✓
PSU2 Fan 1	Fan Sensor	7705.0 RPM	✓

By clicking the **Configure Monitoring** action item on the [Hardware Sensors Information](#) page, the fan speed monitoring becomes configurable and the checkboxes can be changed to activate/deactivate the monitoring of a particular fan. By selecting/deselecting the Hardware Monitoring Enabled checkbox at the top, fan monitoring can be turned on/off for the entire appliance.

NOTE: The temperature sensors are always on and cannot be changed.

System Power Settings

This page lets you reboot or shutdown your system remotely. Selecting reboot will cause the system to be safely shutdown and restarted in a controlled manner. Selecting shutdown will cause the system to be safely shutdown, and powered off in a controlled manner. It is accessed by clicking the Power Off action item on the [System Information](#) page.

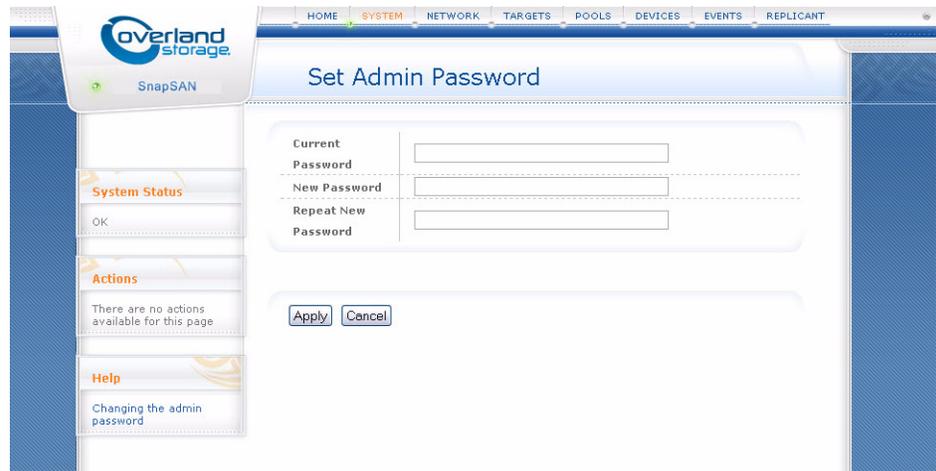


CAUTION: To prevent data loss, always verify that host systems are no longer using the storage on the appliance before rebooting or shutting down the system.

Set Admin Password

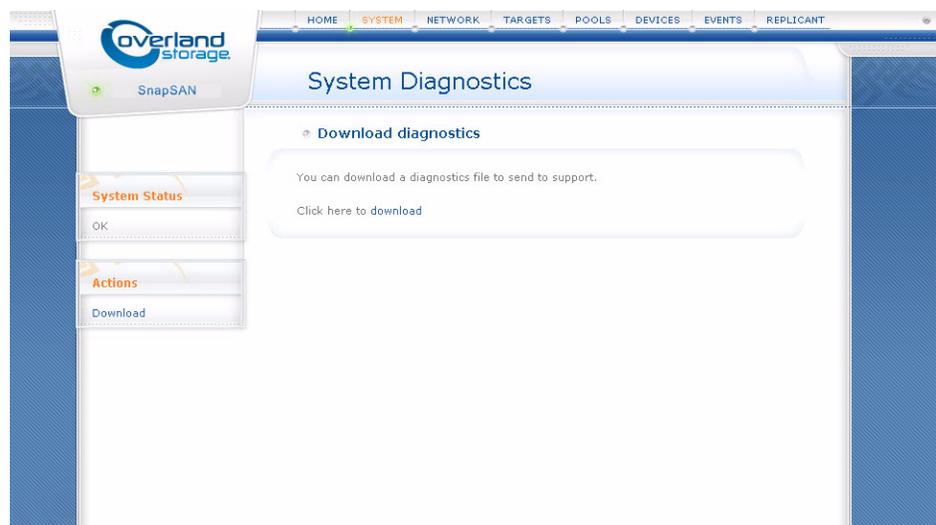
Use this page to change your password. It is accessed by clicking the Set Admin Password action item on the [System Information](#) page.

NOTE: In order to change the admin password on the system you first need to enter the current system password followed by the new password. You are required to enter the new password twice in order to ensure that it is spelled correctly.



System Diagnostics

This page provides access to diagnostic information that might be required by the Overland technical support team to troubleshoot a problem. It is accessed by clicking the Get a Diagnostic Dump action item on the [System Information](#) page.



IMPORTANT: This page is intended to help diagnose obscure system problems; it is only useful to the Overland technical support team.

The current diagnostics data can be downloaded by clicking either the blue “download” text link in the Content Area or the Download action item on the side.

Set System Date & Time

This page enables you to change the date and time of the appliance. This is important for the timestamps and logs, especially if this is a remote unit. The page is accessed by clicking the Set the Date & Time action item on the [System Information](#) page.

overland storage
SnapSAN

HOME SYSTEM NETWORK TARGETS POOLS DEVICES EVENTS REPLICANT

Set System Date & Time

Please set the time according to the timezone on your local computer.
The time on your local computer is currently: 2011-04-26 14:53:27

Date & Time

Date: 2011 Apr 26

Time: 14 : 50

April 2011

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Click the User Local Time button to align the SnapSAN S2000 with the time zone on your local computer. Otherwise, manually set the date and time then click Apply. Click the Show/Hide Calendar button to alternately display and hide the calendar.

The single Action on this subpage provides access to edit the NTP server settings (see [Specific Network Item Change Pages](#) for Edit NTP Server).

System License

Use this page to change your system license key to activate more features. The page is accessed by clicking the License Key action item on the [System Information](#) page.

The screenshot displays the 'System License' page in the SnapSAN interface. The page is divided into several sections:

- System Status:** Shows 'OK'.
- Actions:** States 'There are no actions available for this page'.
- Activated:** Displays the current license details:

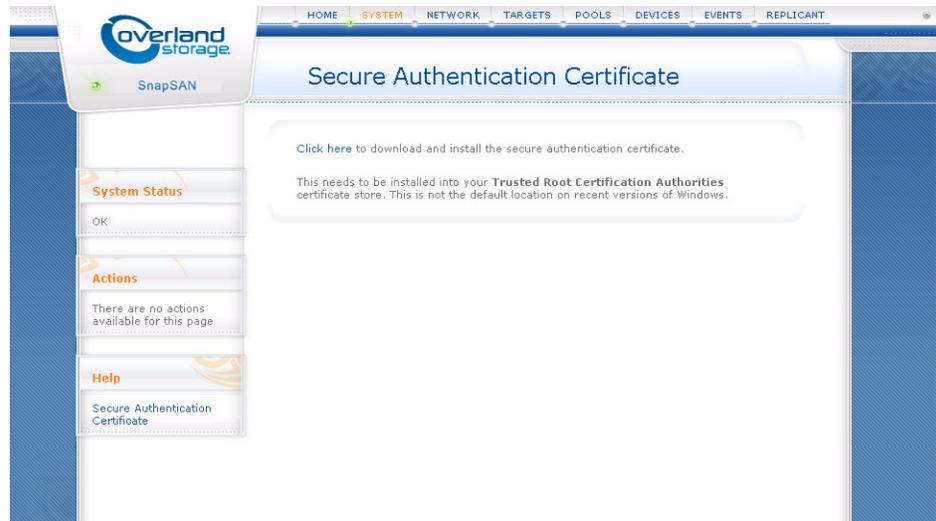
Serial	00C0B60B2578
License Key	TFAJ-LHLO-ROED
Status	OK
- Features:** A table showing the status of various features:

Feature	Licensed	Evaluation time Remaining (Hours)
Replication	True	N/A
iSCSI Target	True	N/A
Target	Licensed for Unlimited	N/A
Capacity	Capacity	N/A
Mirroring	True	N/A
- Online Feature Activation:** Includes a text box for the license key (pre-filled with 'TFAJ-LHLO-ROED') and a 'Connect' button. A checkbox option is available: ' I connect to the internet through a proxy server'.
- Offline Feature Activation:** Provides instructions on how to obtain an activation file from the vendor, mentioning the product ID number '00C0B60B2578'.

If your SnapSAN S2000 has Internet access, you can use the Online Feature Activation option. Otherwise, you need to contact the vendor from which you purchased this SnapSAN S2000 and obtain a special activation code.

Secure Authentication Certificate

Use this page to download a secure Authentication Certificate for your browser. It is accessed by clicking the Authentication Certificate action item on the [System Information](#) page.



Click the blue “Click here” text in the Content Area to download the certificate.

Network Tab

The Network tab provides access to manage the network devices, interfaces, and routes. The default page is the [Network Information](#) page.

Network Information

This is the default page for the Network tab and displays a range of network information.

The screenshot displays the SnapSAN Network Information page. The navigation menu on the left includes System Status (OK), Actions (Configure Discovery, Create Interface, Create Route, Change Hostname, Change Domain, Change SAN Name, Change NTP Server, Change ISNS Server, Change DNS Server, Ping, Traceroute), and Help (DNS Nameserver, NTP Server, ISNS Server, System Hostname, Domain Name, SAN Name, Network Devices, Network Interfaces, Network Routes). The main content area is titled 'Network Information' and contains the following sections:

- Appliance identification**
 - Hostname: SnapSAN730488
 - Domain: overland.myoverland.net
 - SAN Name:
- Servers**
 - NTP Server: 10.20.13.100
 - ISNS Server:
 - Nameserver:
- Network devices**

MAC	Driver	Name	MTU	TXQLEN
00:C0:B6:0B:25:78	igb	eth0	1500	1000
00:C0:B6:0B:25:79	igb	eth1	1500	1000
00:15:17:CE:D0:04	e1000e	eth2	1500	1000
00:15:17:CE:D0:05	e1000e	eth3	1500	1000
- Interfaces**

Name	IP Address	Netmask	DHCP	Device
Default	10.21.33.58	255.255.0.0	<input type="checkbox"/>	00:C0:B6:0B:25:78
Default	10.20.13.32	255.255.0.0	<input checked="" type="checkbox"/>	00:C0:B6:0B:25:79
Default	Acquiring from DHCP	Acquiring from DHCP	<input checked="" type="checkbox"/>	00:15:17:CE:D0:04
Default	Acquiring from DHCP	Acquiring from DHCP	<input checked="" type="checkbox"/>	00:15:17:CE:D0:05

Content Sections and Links

Appliance Identification

- **Hostname** – the name given to the appliance. It is used by DNS to look up the IP address so that you can communicate with the appliance by name.
- **Domain** – used by DNS when looking up an IP address.
- **SAN Name** – a name on which filtering can be performed to prevent automatic discovery of appliances from occurring. SnapSAN S2000 appliances can be grouped together under SAN Names.

Servers

- **NTP Server** – shows the NTP (Network Time Protocol) server used to keep the system's clock synchronized with an accurate external clock.
- **iSNS Server** – shows the iSNS (Internet Storage Name Service) server used to enable the automated discovery of iSCSI devices. Initiators can query the iSNS server to discover what storage has been assigned to them.
- **Nameserver** – shows the DNS (Domain Name System) server used to resolve domain names to IP addresses and vice versa.

Network Devices

Details of each physical network device are listed, including interface name, MAC address, and various other interface parameters.

Click a MAC address to view the [Network Device Information](#) page.

Interfaces

Details of each logical network interface are listed, including Network Device, IP address, and other network parameters.

Click an interface name to view the [Network Interface Information](#) page.

Click a MAC address to view the [Network Device Information](#) page.

Routes

Configured routes and gateways are listed.

Click a route name to view the [Network Route Information](#) page.

Click an interface name to view the [Network Interface Information](#) page.

Actions Available

The following action items are available on the [Network Information](#) page:

- **Configure Discovery** – launches the [Discovery](#) page that shows all the SnapSAN S2000 appliances and managed servers on the network.
- **Create Interface** – launches the [Create Network Interface](#) page to create a new logical interface.
- **Create Route** – launches the [Create Network Route](#) page to define a new route.
- **Change Hostname** – launches the Edit Hostname page where you can change the name of the host.
- **Change Domain** – launches the Edit Domain page to change the domain name.
- **Change SAN Name** – launches the Edit SAN Name page to change the SAN Name.
- **Change NTP Server** – launches the Edit NTP Server page to change the NTP Server.
- **Change iSNS Server** – launches the Edit iSNS Server page to change the iSNS Server.
- **Change DNS Server** – launches the Edit DNS Server page to change the DNS Server.
- **Ping** – launches the [Network Ping](#) page to check the ability to access a host.
- **Traceroute** – launches the [Network Traceroute](#) page to check and display the route (path) and measure transit delays of packets across the network.

Network Tab Subpages

The following pages are also available under the Network tab.

Discovery

This page lists all the SnapSAN S2000 appliances along with any managed servers on the network. It is accessed by clicking the Configure Discovery action item on the [Network Information](#) page.

The screenshot shows the SnapSAN Discovery page. The page has a navigation bar at the top with tabs: HOME, SYSTEM, NETWORK (selected), TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The main content area is titled "Discovery" and contains two sections: "SnapSAN" and "Managed Servers".

SnapSAN Section:

Name	Static	SAN Name	Product ID Number	IP
SnapSAN730488			00C0B60B2578	127.0.0.1
SE-SnapSAN730058-51		SE-VDC	00C0B60B23CA	10.20.33.51
SnapSAN730020-161-0b23a4			00C0B60B23A4	10.20.18.161
SnapSAN730014-204			00C0B60B239E	10.20.13.55
SnapSAN14552-19-de0d34			003048DE0D34	10.20.18.19
DD-SnapSAN730012-3354		APPS	00C0B60B239C	10.20.33.54
TSLABSnapS2000			00C0B60B2406	10.20.64.76
M-SnapSAN730022		SESAN	00C0B60B23A6	10.20.33.41
SnapSAN-Shawn2		herpderp	00C0B60B23A0	10.20.18.235
SnapSAN-Shawn1		herpderp	003048DA1466	10.20.18.178
SnapSAN730030-196-0B23AE			00C0B60B23AE	10.20.16.196
Prime-SnapSAN730304		SESAN	00C0B60B2468	10.20.33.40
DD-SnapSAN730010-3353			00C0B60B239A	10.20.33.53
SE-SnapSAN730008-50		SE-VDC	00C0B60B2398	10.20.33.50

Managed Servers Section:

Name	Static	SAN Name	Product ID Number	IP
demo-dell850-4			0015c5e1bb98	10.20.34.4
QA-W832-183		herpderp	001143cdc08e	10.20.18.183
W2K8R2x64-34107			001b2100319e	10.20.34.107
qa-w2k8r1-182		herpderp	001b21043329	10.20.18.182
se-w2k3-32160			0015c5f47775	10.20.32.160
sw-win2k3as-85		herpderp	00e08127f282	10.20.16.85
se-hpw2k3-3348			0007e91fbcf9	10.20.33.48
SE-W2K3-32190			0015c5f477ff	10.20.32.190

On the left side of the page, there is a sidebar with the following elements:

- System Status:** OK
- Actions:**
 - Add Static Entry
 - Refresh Discovery List

The two action items on this page enable you to add a static entry to the list by launching the [Add Static Discovery Entry](#) page and to refresh the list by clicking Refresh Discovery List. The latter action only refreshes the current page; it does not open a new page.

Clicking an appliance name launches the [Discovery Entry Information](#) page to provide you with more detailed information.

Add Static Discovery Entry. Use this page to add a static IP address for discovery so the associated appliance can be added to the SAN Discovery table. It is accessed by clicking the Add Static Entry action item on the [Discovery](#) page.

The screenshot shows the 'Add Static Discovery Entry' page. The navigation bar includes 'HOME', 'SYSTEM', 'NETWORK', 'TARGETS', 'POOLS', 'DEVICES', 'EVENTS', and 'REPLICANT'. The main content area is titled 'Add Static Discovery Entry' and contains a form with a 'Static IP Address' input field and 'Apply' and 'Cancel' buttons. A left sidebar shows 'System Status' (OK) and 'Actions' (no actions available).

Discovery Entry Information. This page shows the basic information about an appliance discovered on the SAN. It is accessed by clicking the SAN Name or managed server name in the table on the [Discovery](#) page.

The screenshot shows the 'Discovery Entry Information' page. The navigation bar includes 'HOME', 'SYSTEM', 'NETWORK', 'TARGETS', 'POOLS', 'DEVICES', 'EVENTS', and 'REPLICANT'. The main content area is titled 'Discovery Entry Information' and displays a table with the following information:

SnapSAN	SnapSAN730488
Product ID	00C0B60B2578
Number	
IP Address	127.0.0.1
Static Address	
SAN Name	

A left sidebar shows 'System Status' (OK) and 'Actions'.

Network Device Information

This page shows device information and traffic statistics. It provides link to edit the MTU and TXQLEN parameters. The page is accessed by clicking a networked device MAC address on the [Network Information](#), [Network Interface Information](#), [Edit Network Interface](#), or [Create Network Interface](#) page.

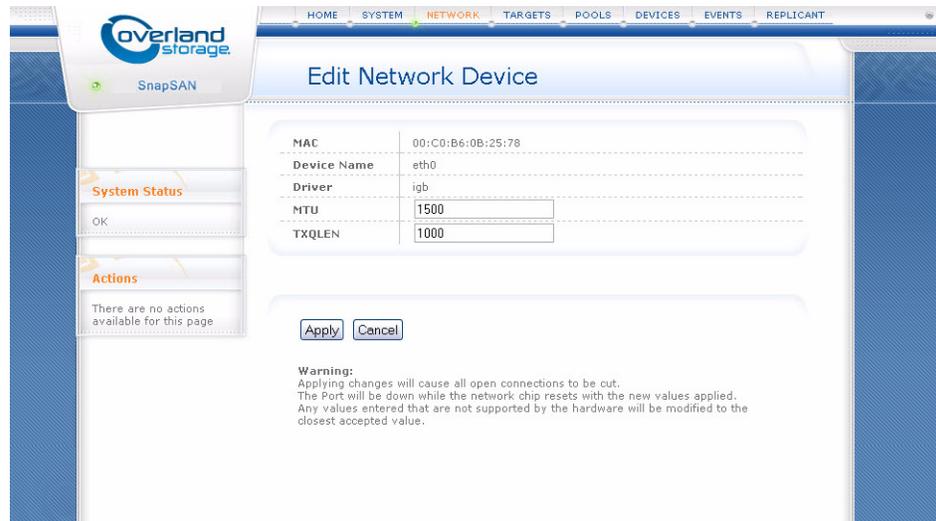
The screenshot shows the SnapSAN web interface. The top navigation bar includes links for HOME, SYSTEM, NETWORK (selected), TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The left sidebar contains 'System Status' (OK) and 'Actions' (Edit). The main content area is titled 'Network Device Information' and displays the MAC address 00:C0:B6:0B:25:7B. Below this, there are two sections: 'Device Information' and 'Statistics'. The 'Device Information' section shows fields for Device Name (eth0), Driver (igb), Configured MTU (1500), and Configured TXQLEN (1000). The 'Statistics' section shows a list of network statistics including Carrier (True), MTU (1500), TXQLEN (1000), rx_multicast (0), rx_packets (393233), rx_compressed (0), rx_bytes (254468758), tx_errors (0), tx_carrier_errors (0), rx_fifo_errors (0), tx_fifo_errors (0), collisions (0), rx_errors (0), tx_bytes (262460508), rx_frame_errors (0), tx_dropped (0), rx_dropped (0), tx_packets (408200), and tx_compressed (0). At the bottom, there is a section for 'Interfaces on this device' with columns for Name, IP Address, Netmask, and DHCP.

Click the interface name to view the [Network Interface Information](#) page.

The single Action on this subpage (Edit) launches the [Edit Network Device](#) page.

Edit Network Device

Using this page enables you to edit the frame size (MTU) and transmit queue length (TXQLEN). It is accessed by clicking the Edit action item on the [Network Device Information](#) page.



overland storage
SnapSAN

HOME SYSTEM NETWORK TARGETS POOLS DEVICES EVENTS REPLICANT

Edit Network Device

MAC 00:C0:B6:0B:25:78

Device Name eth0

Driver igb

MTU 1500

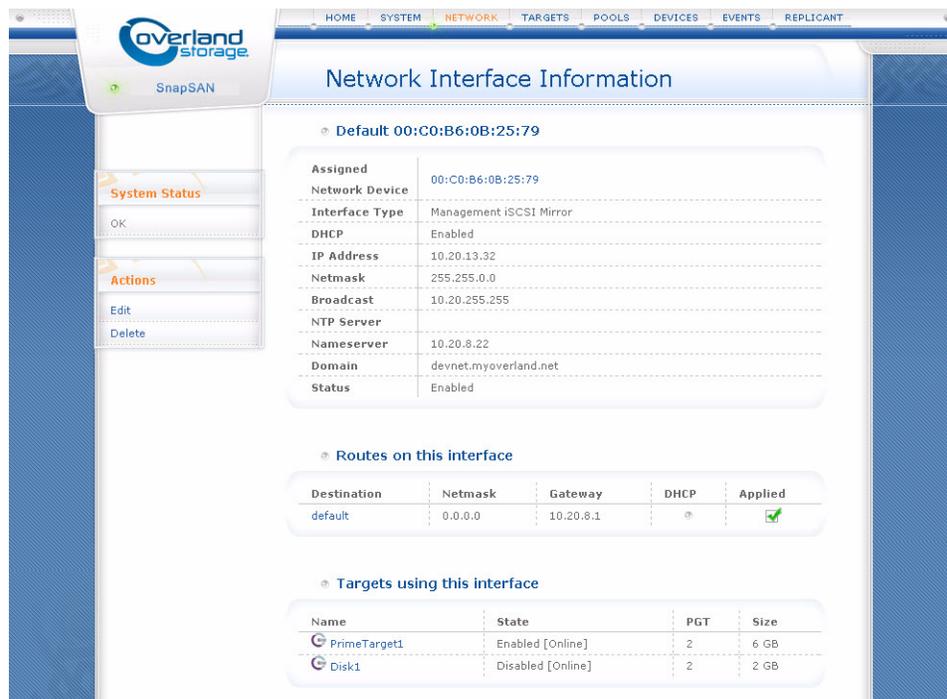
TXQLEN 1000

Apply Cancel

Warning:
Applying changes will cause all open connections to be cut.
The Port will be down while the network chip resets with the new values applied.
Any values entered that are not supported by the hardware will be modified to the closest accepted value.

Network Interface Information

This page shows details of the logical interface and also the physical interface to which it is assigned. It is accessed by clicking an interface name on the [Network Information](#), [Network Device Information](#), [Network Route Information](#), or [Create Network Route](#) page.



overland storage
SnapSAN

HOME SYSTEM NETWORK TARGETS POOLS DEVICES EVENTS REPLICANT

Network Interface Information

Default 00:C0:B6:0B:25:79

Assigned Network Device 00:C0:B6:0B:25:79

Interface Type Management iSCSI Mirror

DHCP Enabled

IP Address 10.20.13.32

Netmask 255.255.0.0

Broadcast 10.20.255.255

NTP Server 10.20.8.22

Nameserver 10.20.8.22

Domain devnet.myoverland.net

Status Enabled

Routes on this interface

Destination	Netmask	Gateway	DHCP	Applied
default	0.0.0.0	10.20.8.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Targets using this interface

Name	State	PGT	Size
PrimeTarget1	Enabled [Online]	2	6 GB
Disk1	Disabled [Online]	2	2 GB

If DHCP is enabled, most of the network parameters are obtained automatically.

The bottom section of the page lists the targets which are using this interface. Each logical interface can be defined as being either for iSCSI or for management traffic or both (enabling you to put your iSCSI storage on a separate network from your main network).

IMPORTANT: Advanced Feature: Individual targets are assigned to Target Portal Groups, which define groups of logical interfaces over which iSCSI connections can be established. Each group is assigned a number called a Target Portal Group Tag. If you want to associate a portal group with a target, this can be done from the [Target Information](#) page.

Content area embedded links include clicking a network device name to view the [Network Device Information](#) page, a route name to view the [Network Route Information](#) page, and a target name to view the [Target Information](#) page.

The two action items on this page allow you to edit or delete a logical interface. You can edit the interface by launching the [Edit Network Interface](#) page and delete it by launching the [Delete Network Interface](#) page.

Create Network Interface

Use this page to assign a physical interface to a network device, along with defining interface parameters including the interface name, whether to use DHCP, the IP address/netmask, and the interface type (iSCSI, management, or both). The page is accessed by clicking the Create Interface action item on the [Network Information](#) page.

The screenshot shows the 'Create Network Interface' page in the SnapSAN web interface. The page has a navigation bar with tabs for HOME, SYSTEM, NETWORK (selected), TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The main content area contains a form with the following fields:

- Network Device: 00:C0:B6:0B:25:78
- Name: (empty text box)
- Enabled:
- DHCP:
- IP Address: 0 . 0 . 0 . 0
- Network Mask: 255 . 255 . 255 . 0
- Interface Type:
 - iSCSI:
 - Mirror:
 - Add to targets:
- Management:

Below the form are 'Apply' and 'Cancel' buttons. At the bottom, there is a section titled 'Network devices' with a table:

MAC	Driver	Name	MTU	TXQLEN
00:C0:B6:0B:25:78	igb	eth0	1500	1000
00:C0:B6:0B:25:79	igb	eth1	1500	1000
00:15:17:CE:D0:04	e1000e	eth2	1500	1000
00:15:17:CE:D0:05	e1000e	eth3	1500	1000

Clicking a network device name launches the [Network Device Information](#).

Edit Network Interface

This page lets you edit your network interface parameters. The page is accessed by clicking the Edit action item on the [Network Interface Information](#) page.

The screenshot shows the 'Edit Network Interface' page in the SnapSAN web interface. The page is titled 'Edit Network Interface' and has a navigation bar with links for HOME, SYSTEM, NETWORK, TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The main content area is divided into several sections:

- Network Device:** A drop-down menu showing '00:C0:B6:0B:25:78'.
- Name:** A text input field containing 'Default 00:C0:B6:0B:25:78'.
- Enabled:** A checked checkbox.
- DHCP:** An unchecked checkbox.
- IP Address:** Four input fields for the IP address: 10, 21, 33, and 58.
- Network Mask:** Four input fields for the network mask: 255, 255, 0, and 0.
- Interface Type:** Three checked checkboxes: Management, iSCSI, and Mirror.

Below the configuration fields are 'Apply' and 'Cancel' buttons. The page also features a sidebar with 'System Status', 'Actions', and 'Help' sections. The 'Help' section contains links for Network Device, Interface Name, Interface Enabled, DHCP, IP Address, Network Mask, Interface Types, and Add to targets. At the bottom, there are two tables:

Network devices

MAC	Driver	Name	MTU	TXQLEN
00:C0:B6:0B:25:78	igb	eth0	1500	1000
00:C0:B6:0B:25:79	igb	eth1	1500	1000
00:15:17:CE:D0:04	e1000e	eth2	1500	1000
00:15:17:CE:D0:05	e1000e	eth3	1500	1000

Routes assigned to this interface

Destination	Netmask	Gateway	DHCP	Applied
-------------	---------	---------	------	---------

With the Network Device selected in the drop-down list, you can change the user-defined name, enable/disable the interface (without deleting it), change from DHCP to static IP address (and keep the DHCP routes), enter the static IP address and network mask, and change the interface type.

The Interface Type allows the interface to be configured for management traffic, iSCSI traffic, or both. If an interface is enabled for iSCSI traffic, there is an option to add it as a target portal to existing iSCSI targets.

Content area embedded links include clicking a network device name to view the [Network Device Information](#) page and clicking a route name to view the [Network Route Information](#) page.

Delete Network Interface

Use this page to delete a specific network interface. The page is accessed by clicking the Delete action on the [Network Interface Information](#) page.

overland storage
SnapSAN

HOME SYSTEM NETWORK TARGETS POOLS DEVICES EVENTS REPLICANT

Delete Network Interface

Do you really want to delete Interface Default 00:C0:B6:0B:25:78?

Removing this interface may break open iSCSI connections.

Removing this interface may break open management connections.

Routes that will be deleted with this interface

Destination	Netmask	Gateway	DHCP	Applied

Targets using this interface

Name	State	PGT	Size
PrimeTarget1	Enabled [Online]	1	6 GB
Disk1	Disabled [Online]	1	2 GB

Are you sure?

Delete Cancel

Content area embedded links include clicking a route name to view the [Network Route Information](#) page and a target name to view the [Target Information](#) page.

Network Route Information

This page provides detailed information about a specific route. The page is accessed by clicking a route name on the [Network Information](#), [Network Interface Information](#), [Edit Network Interface](#), or [Delete Network Interface](#) page.

overland storage
SnapSAN

HOME SYSTEM NETWORK TARGETS POOLS DEVICES EVENTS REPLICANT

Network Route Information

Route 0

Interface	Default 00:C0:B6:0B:25:79
Destination	default
Netmask	0.0.0.0
Gateway	10.20.8.1
Assigned via DHCP	Yes
Applied	Yes

Help

- Interface
- Destination
- Network Mask
- Gateway
- Assigned via DHCP
- Applied

Clicking a network interface name in the Content Area launches the [Network Interface Information](#) page.

Create Network Route

Use this page to create a new network route associated with an interface. The page is accessed by clicking the Create Route action on the [Network Information](#) page.

The screenshot shows the 'Create Network Route' page in the SnapSAN web interface. The page has a navigation menu on the left with sections for System Status, Actions, and Help. The main content area is titled 'Create Network Route' and contains a form for defining a network route. The form includes fields for 'Interface' (a dropdown menu), 'Destination', 'Network Mask', and 'Gateway', each with a four-digit input field. Below the form are 'Apply' and 'Cancel' buttons. At the bottom, there is an 'Interface Information' table listing various network interfaces with their IP addresses, netmasks, DHCP status, and MAC addresses.

Name	IP Address	Netmask	DHCP	MAC
Default 00:C0:B6:0B:25:78	10.21.33.58	255.255.0.0		00:C0:B6:0B:25:78
Default 00:C0:B6:0B:25:79	10.20.13.32	255.255.0.0	True	00:C0:B6:0B:25:79
Default 00:15:17:CE:D0:04	Acquiring from DHCP	Acquiring from DHCP	True	00:15:17:CE:D0:04
Default 00:15:17:CE:D0:05	Acquiring from DHCP	Acquiring from DHCP	True	00:15:17:CE:D0:05

Network routing tables are used to direct network traffic from a source to their ultimate destination network. The common mechanism is to direct traffic via a dedicated hardware router, which in turn knows where to forward the traffic.

Clicking a network interface name in the Content Area launches the [Network Interface Information](#) page. Clicking a MAC address launches the [Network Device Information](#) page.

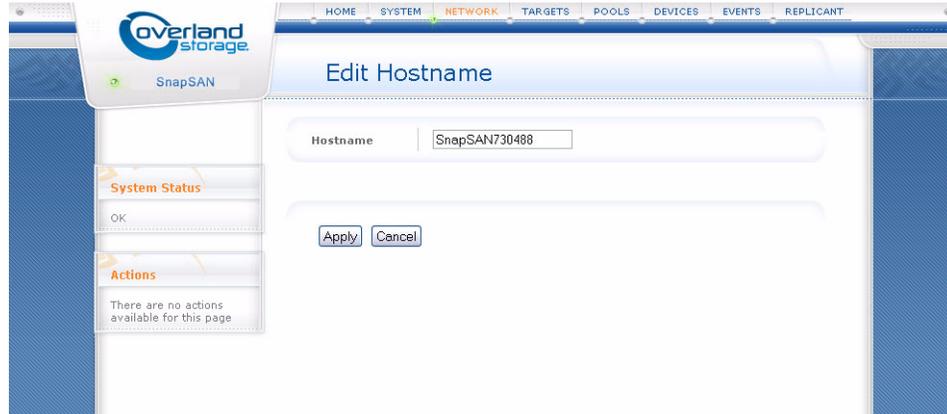
Specific Network Item Change Pages

Use these pages to change these network names or server addresses. A subpage is accessed by clicking the appropriate action item on the [Network Information](#) page:

- **Change Hostname** – launches the Edit Hostname page to enter or change the name of the host.
- **Change Domain** – launches the Edit Domain page to enter or change the domain name.
- **Change SAN Name** – launches the Edit SAN Name page to enter or change the SAN Name used in searches.
- **Change NTP Server** – launches the Edit NTP Server page to enter or change the NTP server address.
- **Change iSNS Server** – launches the Edit iSNS Server page to enter or change the iSNS server address
- **Change DNS Server** – launches the Edit DNS Server page to enter or change up to three DNS server addresses.

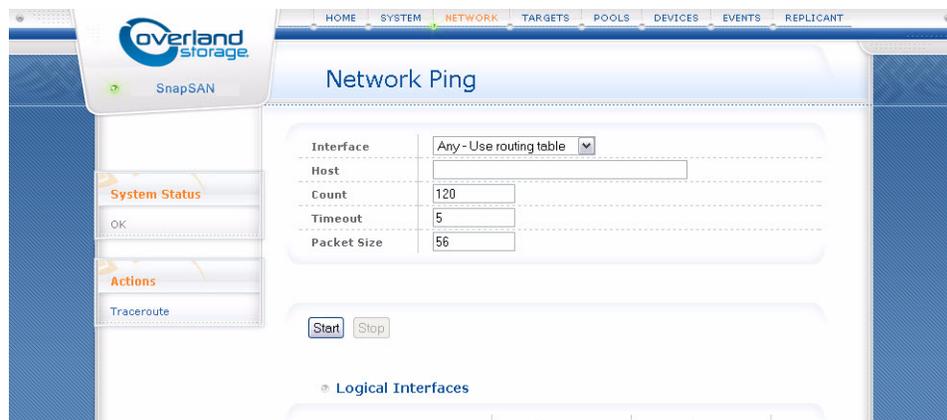
You can specify up to three DNS servers; however, this is not required if DHCP is being used to provide addresses.

For example, click Edit Hostname to display the Edit Hostname page where you can change the name of the host.



Network Ping

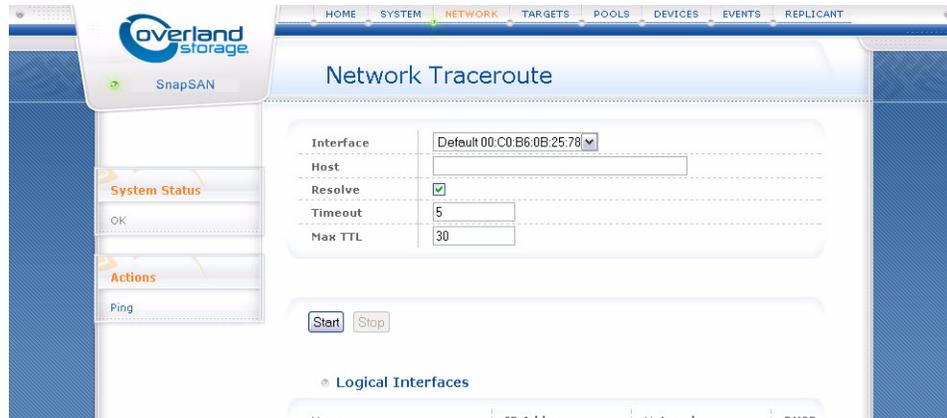
Use this page to run the network utility to test whether a host can be reached by an appliance. The page is accessed by clicking the Ping action item on the [Network Information](#) page.



The single action item on this subpage (Traceroute) launches the [Network Traceroute](#) page.

Network Traceroute

Use this page to run the network tool to verify the route and measure the delays across the network to the host. The page is accessed by clicking the Traceroute action item on the [Network Information](#) page.



The screenshot shows the 'Network Traceroute' page in the SnapSAN web interface. The page has a navigation bar at the top with tabs for HOME, SYSTEM, NETWORK (selected), TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. On the left, there is a sidebar with 'System Status' (OK) and 'Actions' (Ping). The main content area is titled 'Network Traceroute' and contains a form with the following fields: 'Interface' (Default 00:C0:B6:0B:25:78), 'Host' (empty), 'Resolve' (checked), 'Timeout' (5), and 'Max TTL' (30). Below the form are 'Start' and 'Stop' buttons. At the bottom, there is a section for 'Logical Interfaces' with a table that is partially visible.

The single action item on this subpage (Ping) launches the [Network Ping](#) page.

Targets Tab

The Target tab provides access to manage the targets on the network. The default page is the Targets page.

Targets

This overview page is the default page for the Targets tab and displays a list of targets along with initiators and active sessions related to those targets.

The screenshot shows the SnapSAN web interface. The top navigation bar includes HOME, SYSTEM, NETWORK, TARGETS (selected), POOLS, DEVICES, EVENTS, and REPLICANT. The main content area is titled 'Targets' and contains three sections: Targets, Initiators, and Sessions.

Targets Section:

Name	EUI64	Type	State	Pool	Size
Disk1	S4243354517985313	Normal	Enabled [Online]	Secondary	2 GB
Disk2	S4243354517985314	Normal	Enabled [Online]	Secondary	4 GB
PrimeTarget1	S4243354517985316	Normal	Enabled [Online]	Prime	6 GB
Snapshots1	S4243354517985315	Snapshot	Enabled [Online]	Secondary	4 GB

Initiators Section:

Initiator Name

- iqn.1991-05.com.microsoft:sddb2r4bp1durba.overland.myoverland.net
- iqn.1991-05.com.microsoft:demo-ibm336-6.appsdemo.overlandstorage.com

Sessions Section:

Target Name	Initiator Name
Disk1	iqn.1991-05.com.microsoft:demo-ibm336-6.appsdemo.overlandstorage.com
Disk1	iqn.1991-05.com.microsoft:demo-ibm336-6.appsdemo.overlandstorage.com

Content Sections and Links

The **Targets** section in the Content Area provides the basic target information:

- **Name** – target’s user-friendly (alias) name.
Click a name to view its [Target Information](#) page.
- **EUI64** – target’s Extended Unique Identifier address.
- **Type** – type of target such as a basic Volume or a Snapshot.
- **State** – this can be Enabled (online), Disabled (taken offline by an administrator) or Error (if the target’s pool is inaccessible).
- **Pool** – pool from which target was created.
Click a pool name to view its [Pool Information](#) page.
- **Size** – size of the target volume.

The **Initiators** section lists the IQNs of all the initiators known to the appliance. Initiators must be specified in a target’s Access Control List (ACL) if the initiator is allowed to access the target. Click an initiator name to view the [Target Initiator View](#) page.

The **Sessions** section lists all the iSCSI sessions currently active on the appliance. A session is a connection between a host initiator and a target volume. For each active session, the target's alias name and the initiator's IQN are listed.

Actions Available

The following action items are available on the [Targets](#) page:

- **Create Target** – launches the [Create Target](#) page to create a new target.
- **Add Initiator** – launches the [Add Initiator to Target](#) page to add a new initiator.

Target Tab Subpages

The following pages are also available under the Target tab.

Target Information

This page shows the specific details about a target. The page is accessed by clicking a target name on the [Targets](#), [Target Edit](#), [Create Snapshot Target](#), [Storage Journal Configuration](#), [Network Interface Information](#), and [Delete Network Interface](#) pages. It is also accessed via the View Target action item on the [Target Initiator View](#) page.

The screenshot displays the SnapSAN web interface. The top navigation bar includes links for HOME, SYSTEM, NETWORK, TARGETS (highlighted), POOLS, DEVICES, EVENTS, and REPLICANT. The main content area is titled 'Target Information' and shows details for 'Disk1'.

Target Information

Disk1

IQN	iqn.1997-10.com.snapsan:b2578.8155820.disk1			
EUI64	54243354517985313			
Authentication	No Authentication			
State	Enabled [Online]			
Size	2 GB			
Pool	Secondary			

Replicants of this target

Replicant Host	Status	Date	Size	Progress
DD-SnapSAN730010-3353	Initialisation denied			

ACL for this target

Initiator IQN	Access Type
iqn.1991-05.com.microsoft:dell850-src-180	Read Write

Active Sessions for this target

Initiator IQN	IP Addresses
iqn.1991-05.com.microsoft:demo-ibm336-6.appsdemo. overlandstorage.com	10.20.13.32

Portal Groups for this target

IP Address	Local Portal	Portal Group
10.21.33.58	<input checked="" type="checkbox"/>	1
10.20.13.32	<input checked="" type="checkbox"/>	2
Acquiring from DHCP	<input checked="" type="checkbox"/>	Disabled

The left sidebar contains navigation options: System Status (OK), Actions (Edit Target, Extend Target, Delete Target, Disable Target, Add ACL Entry, Create Snapshot, Add Replicant, Create Recovery Point), and Help (Target ACL, Active Sessions, Replicant).

The main items displayed in the Content Area:

- **<Target_name>** – Name, IQN, type of authentication, state, size, and pool from which the target was created.
Click the pool name to open the [Pool Information](#) page.
- **Replicants of this target** (optional license) – If licensed and a replicant host created, the location of the target's replica or replicas together with the date of the last update, its size and the progress of the update process is shown.
Select a replicant host to open the [Target Replicant Host Information](#) page.
- **ACL for this target** – List of initiators allowed to access the target. For each initiator, the IQN and access type are shown.
Click the IQN name to open the [Target ACL Entry](#) page.
- **Active Sessions for this target** – List of initiators logged in to the target.
- **Portal Groups for this target** – List of network interfaces through which the target can be connected.
Click the group name/address to open the [Network Interface Information](#) page.

Action items available:

- **Edit Target** – This takes you to the [Target Edit](#) page to make changes.
- **Extend Target** – Allows the target to be extended, as long as there is spare capacity in its pool. Opens the [Extend Target](#) page.
- **Delete Target** – Deletes the target, destroying the volume using the [Target Delete](#) page.
- **Disable Target / Enable Target** – Disables an existing target without removing or deleting it. The action item name then changes to Enable Target. Clicking the new link name lets you re-enable a disabled target. The links open the [Target Disable/Enable](#) page which varies by the status.
- **Add ACL Entry** – Add an initiator to the target's ACL table using the [Add ACL Entry to Target](#) page.
- **Create Snapshot** – Create a snapshot of the target using the [Create Snapshot Target](#) page.
- **Add Replicant** – If licensed, add a replicant (a location for storing a replica of the target) using the [Add Replicant Host to Target](#) page.

NOTE: If a Storage Journal drive has not been configured, this link takes you to the [Storage Journal Configuration](#) to set it up first.

- **Create Recovery Point / Add/Break Mirror Plex** – this action item changes based on the status of certain replica and mirroring items.
 - **Create Recovery Point** – A recovery point is created from which the data on the target can be replicated, using the [Create Target Recovery Point](#) page. This action is only available if a replicant has been added to provide storage for the replica.
 - **Add/Break Mirror Plex** – If two SnapSAN S2000 appliances are licensed for mirroring and on the same network, this link can be used to set up a mirrored pair. Clicking the link opens the [Add Mirror Plex to Target](#) page.

The screenshot shows the 'Target Information' page in the SnapSAN web interface. The left sidebar contains a 'System Status' section (OK) and an 'Actions' section with the following items: Edit Target, Extend Target, Delete Target, Disable Target, Add ACL Entry, Create Snapshot, Add Replicant, and Add Mirror Plex (highlighted with a red arrow). The main content area shows the following information:

- Mirror2**
 - IQN:** iqn.1997-10.com.snapsan:b2578.815582a.mirror2
 - EUI64:** 54243354517985323
 - Authentication:** No Authentication
 - State:** Enabled [Online]
 - Size:** 6 GB
 - Pool:** Secondary
- ACL for this target**

Initiator IQN	Access Type
iqn.1991-05.com.microsoft:demo-ibm336-6.appsdemo. overlandstorage.com	Read Write
- Active Sessions for this target**

Target Edit

This page enables you to edit a target. You can alter the authentication type, which can be CHAP or none. The page is accessed by clicking the Edit Target action item on the [Target Information](#) page.

The screenshot shows the 'Target Edit' page in the SnapSAN web interface. The left sidebar contains a 'System Status' section (OK) and an 'Actions' section with the text 'There are no actions available for this page'. The main content area shows the following information:

- Disk2**
 - Target Name:** Disk2
 - IQN:** iqn.1997-10.com.snapsan:b2578.8155821.disk2
 - Authentication:** CHAP Authentication
 - State:** Enabled [Online]
 - Pool:** Secondary
 - Size:** 4 GB
- Portal Groups for this target**

IP	Local Portal	Portal Group	Enabled
10.21.33.58	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>
10.20.13.32	<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>
Acquiring from DHCP	<input checked="" type="checkbox"/>	3	<input checked="" type="checkbox"/>
Acquiring from DHCP	<input checked="" type="checkbox"/>	4	<input checked="" type="checkbox"/>

Buttons: Apply, Cancel

Notes: Disabling an interface here only applies to this target.

There are three Content Area links (light blue text):

- **Target Name** – opens the [Target Information](#) page.
- **Pool Name** – opens the [Pool Information](#) page.
- **Portal Group IP address** – opens the [Network Interface Information](#) page.

Manually Setting CHAP Secrets. By default, when CHAP is enabled, random secrets are generated for each initiator in the ACL, preventing access to the target by the initiator until it knows the secret. To enable access by each initiator in the ACL, you should manually set the target secret and then supply the secret to the initiator.

To set the CHAP secret:

1. Select the **target name** in the Content Area of the [Targets](#) page to open the [Target Information](#) page.
2. Click the **Add ACL Entry** action item to bring up the [Add ACL Entry to Target](#) page and enter the name of a new Initiator (or select an existing initiator). Click **Apply** to return to the [Target Information](#) page.
3. At the [Target Information](#) page, select the **initiator IQN** from the ACL list to display the [Target ACL Entry](#) page.
4. Click the **Edit ACL Entry** action item to open the [Edit Target ACL Entry](#) page. Here, CHAP secrets can be entered either as hexadecimal strings or as character strings. The initiator secret is only required if the initiator has been set up to require a mutual CHAP, otherwise it can be left blank.

You can also alter which interfaces can be used to access the target and, for each interface, specify a Portal Group Tag. Portal Group Tags are used to group ports across sessions that can be spanned.

Extend Target

This page enables you to extend the target size. It is accessed by clicking the Extend Target action item on the [Target Information](#) page.

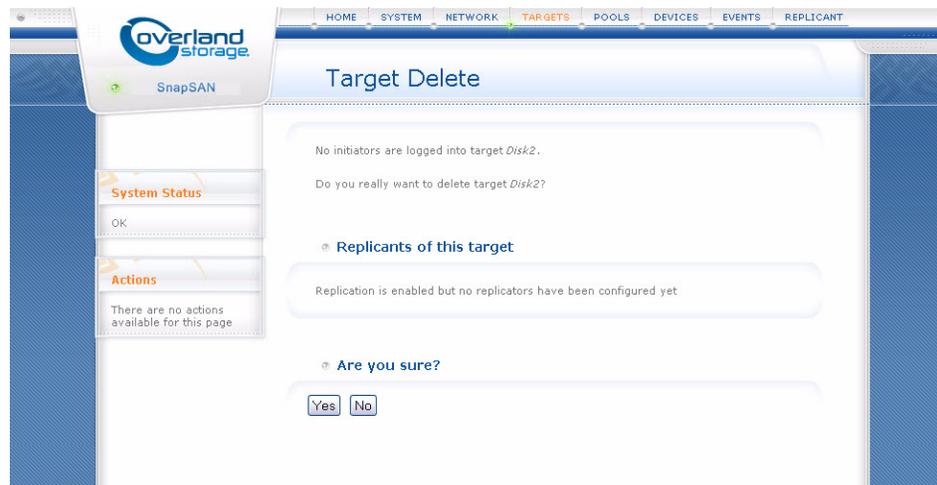
What size should Target Disk2 grow to?	
Pool	Secondary
Free space	459.242 GB
Current Size	4 GB
New size	<input type="text" value="6"/> GB

Apply Cancel

Enter the New Size of the target in the field provided and click Apply.

Target Delete

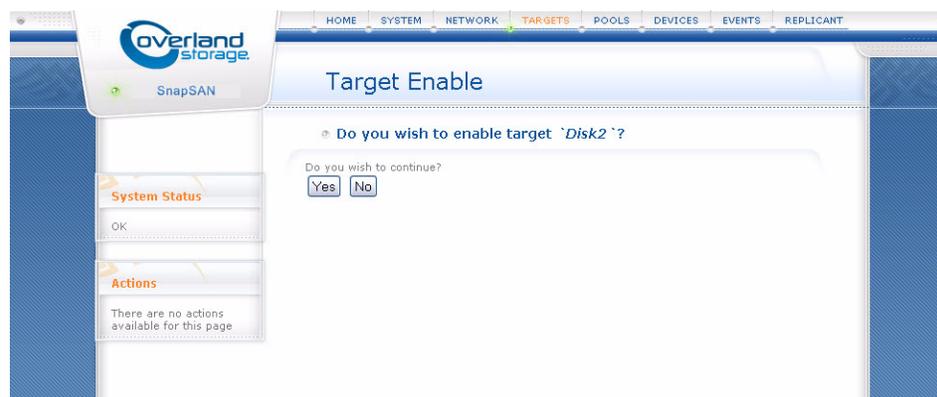
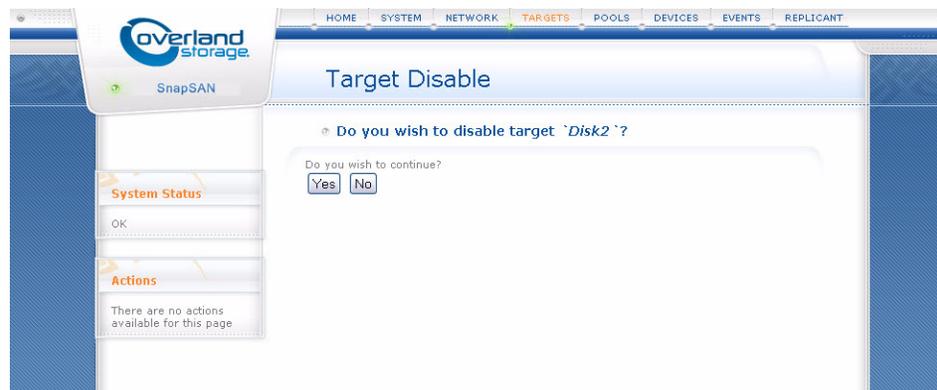
This page enables you to delete a target. It is accessed by clicking the Delete Target action item on the [Target Information](#) page.



NOTE: All replicants must be removed and plexes broken before a target can be deleted.

Target Disable/Enable

This page allows you to disable a target (without having to first delete it) and then re-enable it. It is accessed (depending on the status) by clicking the Disable Target (or Enable Target) action item on the [Target Information](#) page.



Add ACL Entry to Target

This page enables you to add a new entry to the ACL table. It is accessed by clicking the Add ACL Entry action item on the [Target Information](#) page.

Either enter a New initiator name in the Initiator IQN field or select an Existing initiator, select the type of Access, and click Apply to create a new ACL entry. If more than one initiator exists, use the Existing drop-down list to select the one you want to use.

From the “ACL for this target” list, click the Initiator IQN to open the [Target ACL Entry](#) page.

Target ACL Entry

Use this page to view the information about a specific ACL for a target. It is accessed by clicking a ACL name on the [Target Information](#), [Target Initiator View](#), or [Add ACL Entry to Target](#) page.

Clicking the initiator name opens the [Target Initiator View](#) page.

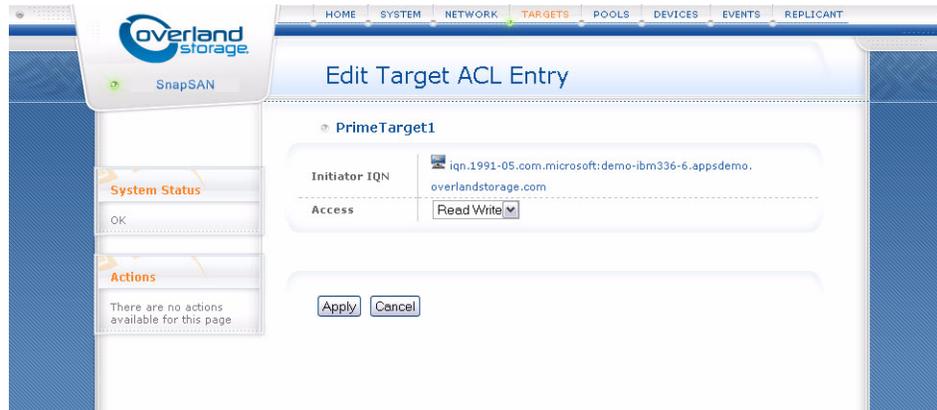
There are three action items:

- **View Target** – Opens the [Target Information](#) page.
- **Edit ACL Entry** – Opens the [Edit Target ACL Entry](#) page for editing.

- **Remove ACL Entry** – Removes this ACL entry using the [Remove Target ACL Entry](#) page.

Edit Target ACL Entry

This page is used to edit the CHAP secret for the target and initiator of a ACL entry. The page is accessed by clicking the Edit ACL Entry action item on the [Target ACL Entry](#) page.



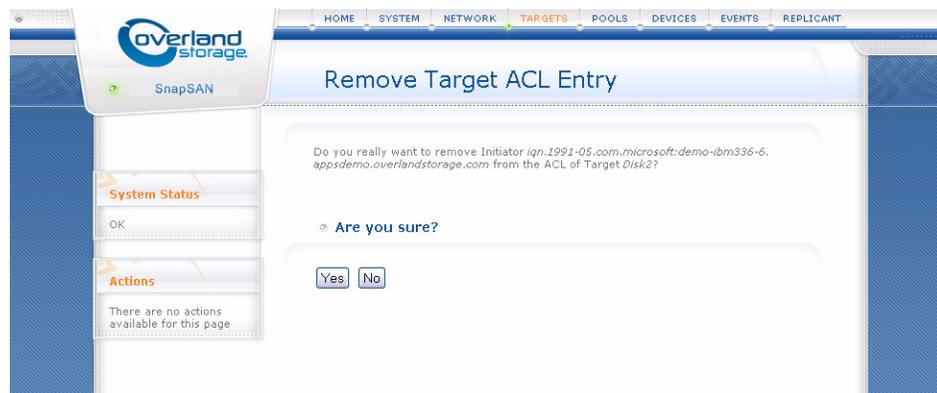
Using the Access drop-down list, choose your type of access:

- Read Only
- Read Write
- No Access

Clicking the Initiator IQN name opens the [Target Initiator View](#) page.

Remove Target ACL Entry

Use this page to delete a ACL entry. It is accessed by clicking the Remove ACL Entry action item on the Target ACL Entry page, or the iSCSI Target name on the [Remove Initiator](#) page.



Create Target

This page is for creating new iSCSI targets. It is accessed by clicking the Create Target action item on the [Targets](#) default page.

Interface	IP	Enabled
Default 00:C0:B6:0B:25:78	10.21.33.58	<input checked="" type="checkbox"/>
Default 00:C0:B6:0B:25:79	10.20.13.32	<input checked="" type="checkbox"/>
Default 00:15:17:CE:D0:04	Acquiring from DHCP	<input checked="" type="checkbox"/>
Default 00:15:17:CE:D0:05	Acquiring from DHCP	<input checked="" type="checkbox"/>

Name	RAID level	Subsystem	Stripe size	Free
Prime	RAID1	LSI Hardware RAID #0	N/A	457.242 GB

To create a target, enter the following information:

- **Target Name** – Choose a convenient name for the target, up to 32 alphanumeric characters in length. It cannot be blank.
- **Initiator IQN** – Assign the target to a host by specifying the host's initiator name (IQN). You can either select an initiator from the drop-down list or enter the name of a new initiator. On a Windows system, you can find IQN information by bringing up the Windows iSCSI Control Panel applet. On Linux, you can usually find the information by using the iSCSI management application or by looking in the iSCSI initiator configuration file.

Tip: If no Initiator IQN is specified, the host will not be able to connect to the volume but, when it tries, the appliance will save the initiator's IQN. You can then bring up the [Targets](#) page and it will display a list of IQNs that the appliance knows about, including any which tried to connect but failed. You can then choose the IQN of the host from the list.
- **Authentication** – You can set the target to allow initiators, specified in the target's ACL, to connect without authentication; alternatively, you can specify CHAP authentication.
- **Enable Replication** – Check this box if the target volume is to be replicated.

NOTE: Replication is an optional feature requiring a separate license. Also, a replication journal drive must be configured to enable replication (see [“Pools Tab” on page 8-46](#)) and storage for the replica configured using the Add Replicant action on the [Target Information](#) page.

- **Create as Mirror Plex** – Check this box if the target volume is to be part of a mirror plex.
- **2 TB Limit for ESX** – Check this box if you are using VMware ESX and need to limit the size of the datastore creation to 2 TB.
- **Pool** – Specify which pool to use for the target. All the pools on the system are listed, along with their available capacity.
- **Size** – Shows the size of the new target volume. This cannot exceed the unallocated capacity of the chosen pool.

Click Apply to confirm creation of the target and the target is created and the [Target Information](#) page is shown.

If you want to configure authentication or network interfaces, click the Edit Target action item to open the [Target Edit](#) page. To add replication details, use the Add Replicant action item to open the [Add Replicant Host to Target](#) page.

Once the target has been created, you have to log in to it from the host. To do this, you must configure the host initiator. The procedure for doing this depends on the initiator being used. Typically, you will have to enter the IQN of the target and the IP address of the appliance into a configuration utility. However, if you have an iSNS server configured, the target should be discovered and listed automatically.

Add Initiator to Target

This page lets you define an initiator IQN. Once defined, the initiator can be added to a target's ACL table. The page is accessed by clicking the Add Initiator action item on the [Targets](#) page.

Initiators are also added to this list automatically if they try to access the appliance. Although they may not have permission to access to any storage, the appliance notes their IQN and stores it, so that in future they appear in the list of known initiators.

Target Initiator View

This page shows the details for an initiator. The page is accessed by clicking the initiator name in the Content Area of the [Targets](#) default page, [Target ACL Entry](#) page, or [Target Information](#) page (if shown there).



Clicking the target name in the Content Area opens the [Target ACL Entry](#) page.

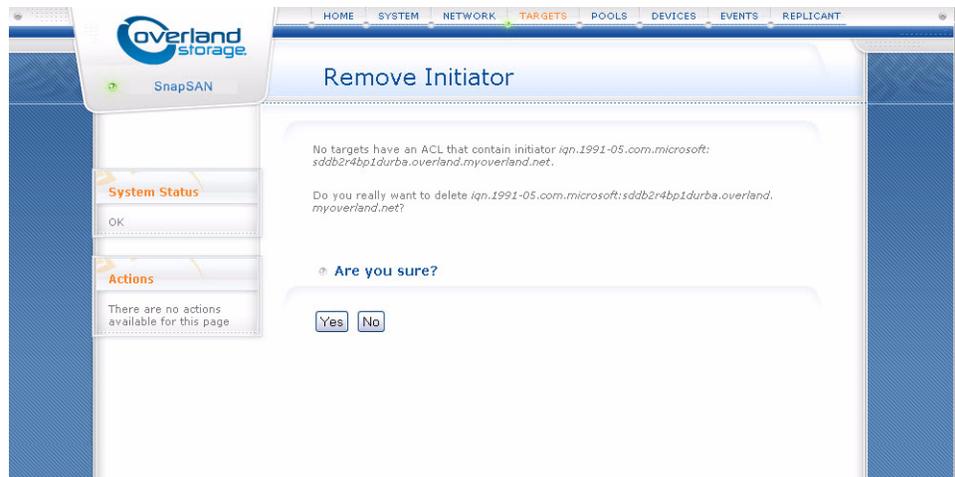
The Remove action item allows you to remove the initiator using the [Remove Initiator](#) page.

Remove Initiator

This page shows a list of targets using an initiator. The page is accessed by clicking the Remove action item on the [Target Initiator View](#) page.



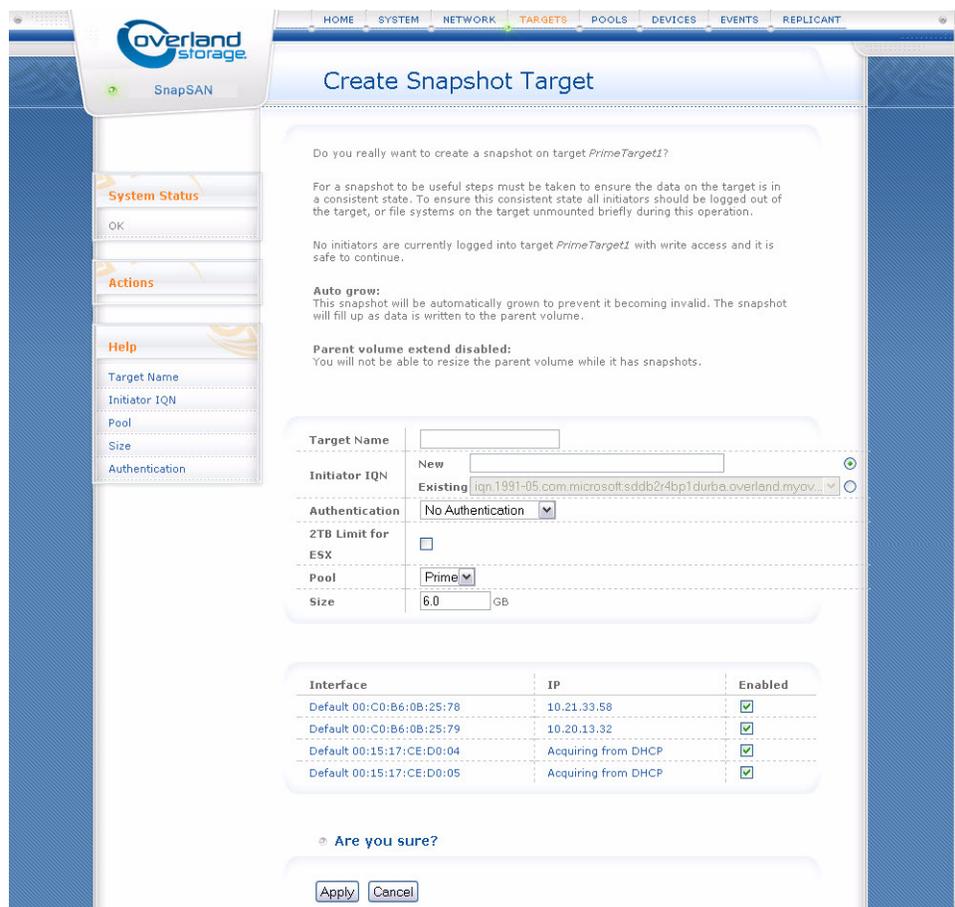
All target ACL entries have to be deleted before the initiator can be removed. Click the target name to open the [Remove Target ACL Entry](#) page. Click Yes to remove the entry. The [Target Information](#) page is displayed after removal.



After all ACL entries are removed from the initiator, click Yes on the [Remove Initiator](#) page to remove the initiator. The [Targets](#) default page is then displayed.

Create Snapshot Target

This page enables you to take a snapshot of the target. It is accessed by clicking the Create Snapshot action item on the [Target Information](#) page.



 **IMPORTANT:** The data on the target must be in a consistent state when the snapshot is taken. For this reason, all the initiators must be logged out or the file systems on the target dismounted.

Enter the following information:

- **Target Name** – Choose a convenient name for the snapshot target, up to 32 alphanumeric characters in length. It cannot be blank.
- **Initiator IQN** – Assign the target to a host by specifying the host's initiator name (IQN). You can either select an initiator from the drop-down list or enter the name of a new initiator. On a Windows system, you can find IQN information by bringing up the Windows iSCSI Control Panel applet. On Linux, you can usually find the information by using the iSCSI management application or by looking in the iSCSI initiator configuration file.

Tip: If no Initiator IQN is specified, the host will not be able to connect to the volume but, when it tries, the appliance will save the initiator's IQN. You can then bring up the [Targets](#) page and it will display a list of IQNs that the appliance knows about, including any which tried to connect but failed. You can then choose the IQN of the host from the list.
- **Authentication** – You can set the target to allow initiators, specified in the target's ACL, to connect without authentication; alternatively, you can specify CHAP authentication.
- **2 TB Limit for ESX** – Check this box if you are using VMware ESX and need to limit the size of the datastore creation to 2 TB.
- **Pool** – Specify which pool to use for the target. All the pools on the system are listed, along with their available capacity.
- **Size** – Lists the size of the new target volume. This cannot exceed the unallocated capacity of the chosen pool.

Details of the parent target and pool are shown at the bottom of the page. Click Apply to create the snapshot target.

Add Replicant Host to Target

This page enables you to configure a destination for the replica. It is accessed by clicking the Add Replicant action item on the [Target Information](#) page.

NOTE: A Storage Journal drive must be configured before a destination can be set up.

The screenshot shows the SnapSAN web interface. The main content area is titled "Add Replicant Host to Target". It contains the following form fields:

- Target:** PrimeTarget1
- Replicant Host:** (empty text input field)
- Paused:**
- Transfer compression:**

Below the form are "Apply" and "Cancel" buttons. A "Target Information" section is also visible, containing the following table:

Target Information	
IQN	iqn.1997-10.com.snapsan:b2578.8155823.primetarget1
Authentication	No Authentication
State	Enabled [Online]
Size	6 GB
Pool	Prime

Enter the following details:

- **Replicant Host** – Enter the name of the remote host on which the replica will be stored. This is the Hostname found on the [Network Information](#) screen.
- **Paused** – Check this box to pause the replicant creation.
- **Transfer Compression** – Check this box to have the data that is sent to the replica compressed to save bandwidth.

Click Apply to confirm the details.

A volume for the replica must be configured on the replicant host. To do this, use the Add Replicant Volume action item on the [Replicant Tab](#) default screen.

To replicate the target, use the [Create Target Recovery Point](#) page.

Target Replicant Host Information

This page provides the basic facts concerning a replica. It is accessed by clicking the replicant hostname in the Content Area on the [Target Information](#) page.

The screenshot displays the SnapSAN web interface. The top navigation bar includes links for HOME, SYSTEM, NETWORK, TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The main content area is titled "Target Replicant Host Information" and is divided into two sections:

- Replicant of Disk2:** This section contains a table with the following data:

Target	Disk2
Replicant Host	SE-W2K3-3406
Serial	
Connected	<input type="checkbox"/>
Status	Cannot connect to replicant
Paused	<input type="checkbox"/>
Transfer	
Compression	<input type="checkbox"/>
- Target Information:** This section contains a table with the following data:

IQN	iqn.1997-10.com.snapsan:b2578.8155821.disk2
Authentication	CHAP Authentication
State	Enabled [Online]
Size	4 GB
Pool	Secondary

On the left side of the interface, there is a sidebar with a "System Status" section showing "OK" and an "Actions" section with "Edit" and "Remove" buttons.

There are two links in the Content Area (light blue text):

- **Target** – Click the name to open the [Target Information](#) page.
- **Pool** – Click the name to open the [Pool Information](#) page.

There are two action items:

- **Edit** – Opens the [Edit Replicant Host Details](#) page where you can change the hostname, specify compression, and pause a replicant process.
- **Remove** – Allows you to remove a replica using the [Remove Replicant Host from Target](#) page.

Edit Replicant Host Details

This page enables you to edit the replicant host including using compression. It is accessed by clicking the Edit action item on the [Target Replicant Host Information](#) page.

The screenshot shows the 'Edit Replicant Host Details' page in the SnapSAN web interface. The page has a blue header with the Overland Storage logo and 'SnapSAN' text. The navigation menu includes HOME, SYSTEM, NETWORK, TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The sidebar on the left contains 'System Status' (OK), 'Actions' (no actions available), and 'Help' (Replicant Host, Transfer compression). The main content area has the following form fields:

- Target:** Disk2
- Replicant Host:** SE-W2K3-3406
- Paused:**
- Transfer compression:**

Below the form fields are 'Apply' and 'Cancel' buttons. The 'Target Information' section contains the following table:

Target Information	
IQN	iqn.1997-10.com.snapsan:b2578.8155821.disk2
Authentication	CHAP Authentication
State	Enabled [Online]
Size	4 GB
Pool	Secondary

There are three configurable items:

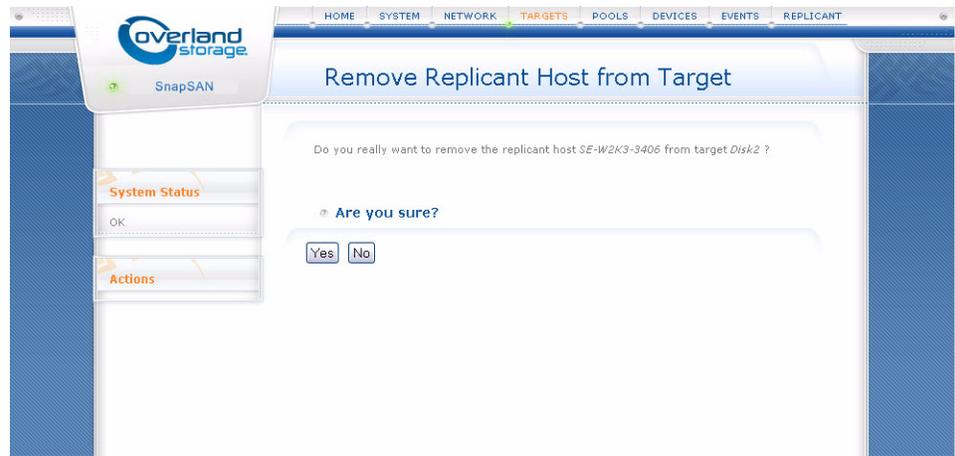
- **Replicant Host** – You can change the name of the replicant host.
- **Paused** – This allows you to pause a replication process.
- **Transfer Compression** – This turns on/off compression to save bandwidth. It will utilize the CPU more heavily.

There are two links in the Content Area (light blue text):

- **Target** – Click the name to open the [Target Information](#) page.
- **Pool** – Click the name to open the [Pool Information](#) page.

Remove Replicant Host from Target

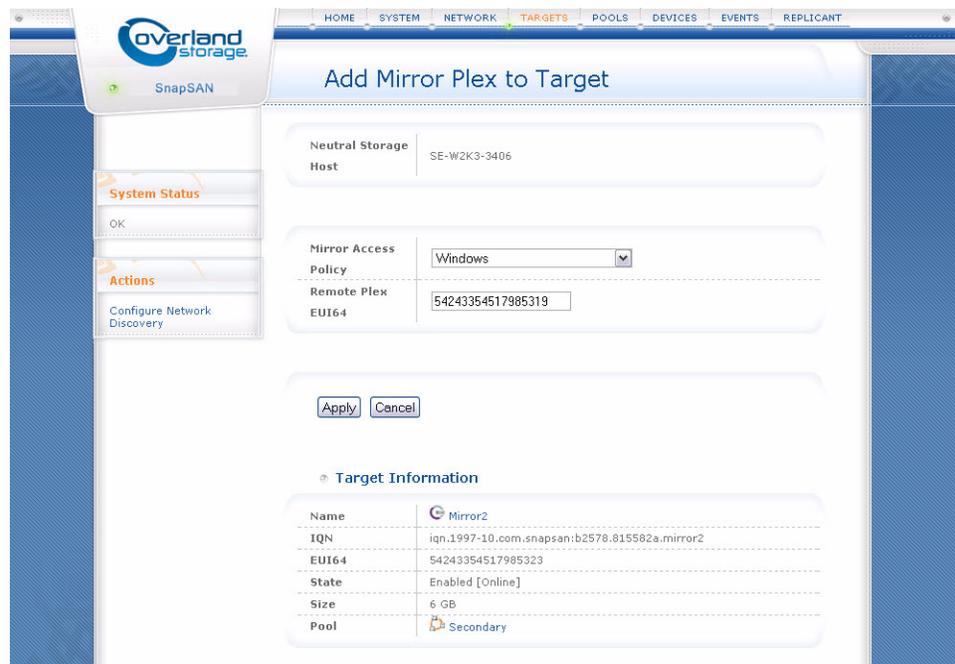
This page facilitates the removal of a replica by removing the replicant host link from the target. It is accessed by clicking the Remove action item on the [Target Replicant Host Information](#) page.



Add Mirror Plex to Target

NOTE: MPIO and the optional mirroring license are required for mirroring.

This page enables you to create a mirror plex between two SnapSAN S2000 appliances licensed for mirroring. The page is accessed by clicking the Add Mirror Plex action item on the [Target Information](#) page.



There are two configurable items:

- **Mirror Access Policy** – Select the type of mirror access to be used:
 - ESX (VMware) – VMware ESX 3.5 policy
 - Windows – Standard Windows mirror access policy
 - Asymmetric Logical Unit Access – VMware ESX 4.0+ policy
- **Remote Plex EUI64** – Enter the identifier for the remote host.

There are two links in the Content Area (light blue text):

- **(Target) Name** – Click the target name to open the [Target Information](#) page.
- **Pool** – Click the name to open the [Pool Information](#) page.

There is one action item:

- **Edit** – Opens the [Edit Replicant Host Details](#) page where you can change the hostname, specify compression, and pause a replicant process.
- **Remove** – Allows you to remove a replica using the [Remove Replicant Host from Target](#) page.

For an example of creating a new mirror, see [Appendix F, “Mirror Example.”](#)

Plex Information

This page shows the basic information about a mirror plex. It is accessed by clicking the Plex Host name (light blue text) on the [Target Information](#) page.

The action items for this page is determined by the target (source or destination):

- **Source plex host** – the only action item is to Break Local Plex.
- **Destination plex host** – the two action items are Promote to Management Plex and Remove Plex.

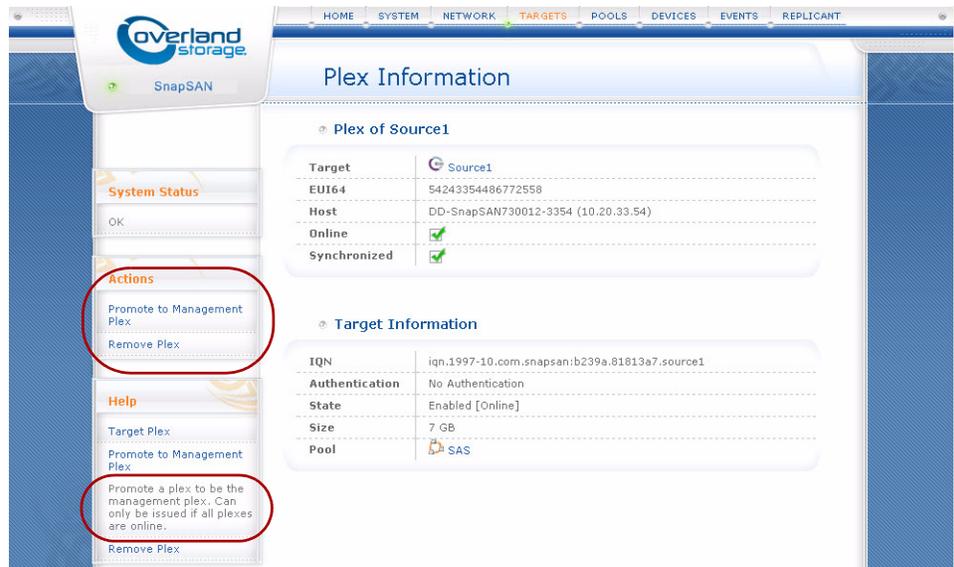
The screenshot shows the SnapSAN web interface. The main content area is titled "Plex Information" and displays details for a Plex of Source1. The details are organized into two sections: "Plex of Source1" and "Target Information".

Plex of Source1	
Target	Source1
EUI64	54243354486641576
Host	DD-SnapSAN730010-3353 (127.0.0.1)
Online	<input checked="" type="checkbox"/>
Synchronized	<input checked="" type="checkbox"/>

Target Information	
IQN	iqn.1997-10.com.snapsan:b239a.81813a7.source1
Authentication	No Authentication
State	Enabled [Online]
Size	7 GB
Pool	SAS

On the left sidebar, the "Actions" menu is circled in red, showing the "Break Local Plex" option.

Break Mirror Plex (Source only) – Changes the storage EUI64 and target IQN to represent a new iSCSI target. All mirror configuration on this target is then lost.



Promote to Management Plex (Destination only) – Promote a plex to be the management plex (Mirror Leader Plex). Can only be issued if all plexes are online. The [Change \(Promote to\) Management Plex](#) page is displayed.

Remove Plex (Destination only) – Removes a mirror plex on a remote appliance. Can only be issued from the appliance that owns the mirror management plex. The [Remove Mirror Plex](#) page is displayed.

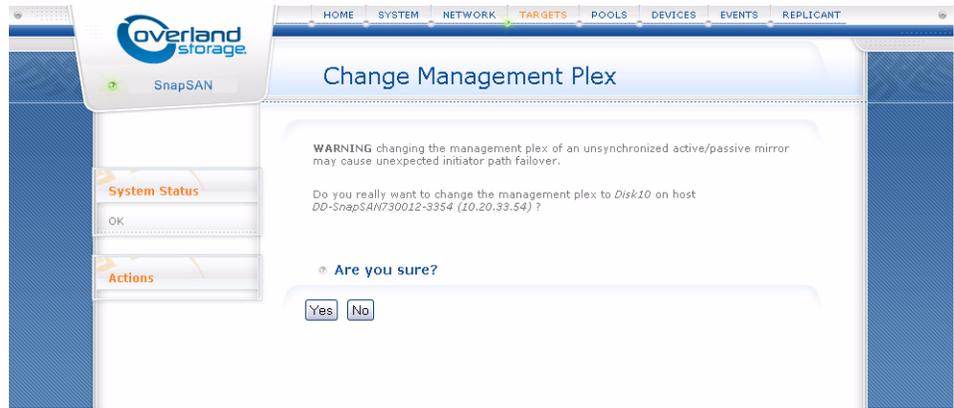
Remove Mirror Plex

This page enables you to remove the plex from the remote appliance. This can only be done from the appliance that owns the mirror management plex. It is accessed by clicking the Remove Plex action item on the [Plex Information](#) page for the remote plex host.



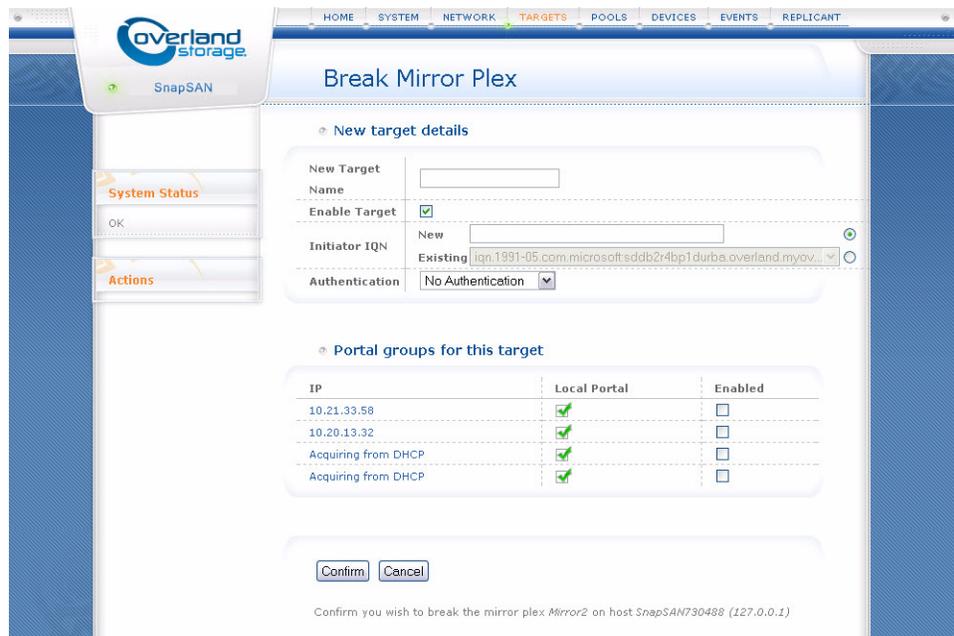
Change (Promote to) Management Plex

This page enables you to change the management plex from the local appliance (which owns the management plex by default) to the remote appliance. It is accessed by clicking the Promote to Management Plex action item on the [Plex Information](#) page for the remote plex host.



Break Mirror Plex

This page enables you to remove the management plex from the appliance by creating a dummy target. The page is accessed by clicking the Break Local Plex action item on the [Plex Information](#) page for the management plex host.



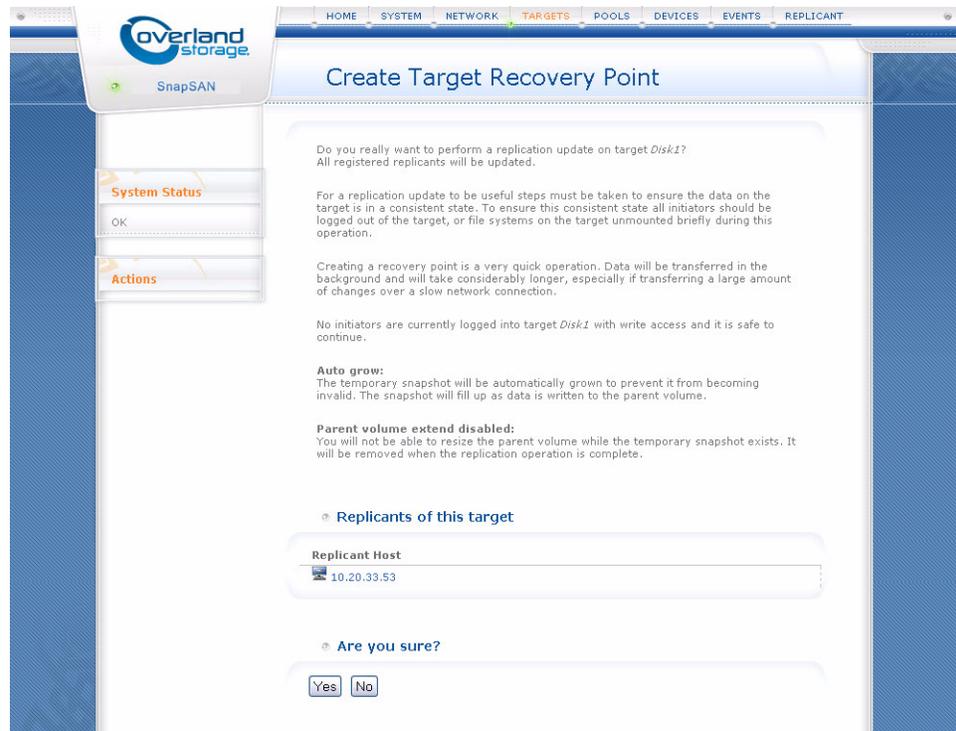
To break a previously configured mirror, be sure all targets are disabled or removed, enter a dummy target name, select an Initiator IQN, and confirm the deletion. Then delete the dummy target your just created.



CAUTION: All mirror configuration on this target is then lost when you remove the synchronized plex from the mirror.

Create Target Recovery Point

This page enables you to create a recovery point from which the data on the replicated target can be restored. The page is accessed by clicking Create Recovery Point action item (only shown when a replicant exists) on the [Target Information](#) page.



IMPORTANT: The data on the target must be in a consistent state while the recovery point is made. For this reason, all the initiators must be logged out or the file systems on the target dismounted while a snapshot is taken. Once the snapshot has been taken, the target may be brought back online.

Using the snapshot, the recovery point information is written to the replicant volume as a background task. This may take some time depending on the amount of data and the speed of the network. The snapshot is deleted when the transfer is complete.

To restore the replica, use the [Replicant Volume Information](#) page.

Create Target on <Pool_name>

This page is used to create a target on a pre-specified pool. It is accessed from the [Pool Information](#) page ([Storage Pools](#) page > click a pool name) by clicking the Create Target on <Pool_name> action item.

Interface	IP	Enabled
Default 00:C0:B6:0B:25:78	10.21.33.58	<input checked="" type="checkbox"/>
Default 00:C0:B6:0B:25:79	10.20.13.32	<input checked="" type="checkbox"/>
Default 00:15:17:CE:D0:04	Acquiring from DHCP	<input checked="" type="checkbox"/>
Default 00:15:17:CE:D0:05	Acquiring from DHCP	<input checked="" type="checkbox"/>

Pool Information				
Name	RAID level	Subsystem	Stripe size	Free
Prime	RAID1	LSI Hardware RAID #0	N/A	457.242 GB

This page is the same as the [Create Target](#) page except it is limited to a specific, pre-selected pool and is accessible only from the [Pool Information](#) page.

Export to USB Devices

If a recovery point is created on a replicant volume which has manual import enabled, this action is made available so that the replication data can be transferred to the replicant volume by means of a USB device rather than over the network. The network must still be present for the target and replicant to communicate and negotiate the transfer. The **Export Replicant Recovery Point** page, displayed when this action is selected, enables you to specify a device and select the replica to be transferred. The [Target Information](#) page shows when the data has been exported after which the USB device can be taken to the replicant host site so that the data can be imported.



CAUTION: When copying the data on or off the USB device, wait until the transfer reads Complete before removing the USB (you may have to refresh the page before the Complete text is shown). Removing the USB even at 100% interrupts some final housekeeping and destroys the data.

This option is useful for replicating an existing target over a slow network. Rather than transferring a potentially large target over the network, the data can be transferred via the USB device. For very large targets, the data can be spread over multiple USB drives. Subsequently, incremental updates can be sent over the network.



CAUTION: Any data already on the USB drive will be destroyed. Up to eight (8) recovery points can be stored on a USB drive depending on the amount of storage available.

Pools Tab

The Pools tab provides information and access to manage the storage pools on the network. The default page is the [Storage Pools](#) page.

Storage Pools

The Storage Pools page handles the management of pools. Pools are storage capacity, created by aggregating physical disks using a RAID controller. Targets are created from the pool storage.

The screenshot shows the SnapSAN Storage Pools management interface. The navigation menu on the left includes System Status (OK), Actions (Create Pool, Add Global Hot Spare, Remove Global Hot Spare, Set Storage Journal, Set Neutral Storage Host, Rescan Subsystems), and Help (Subsystems, RAID Level, Stripe Size, State, Storage Journal). The main content area displays 'Storage Pools' for a subsystem named 'LSI Hardware RAID #0'. It contains two tables: one for 'Pools' and one for 'Global Hot Spares'. A red arrow points to a link labeled 'Click for Alarm Settings'.

Name	RAID Level	Stripe Size	State	Size	Free
Prime	RAID1	N/A	Normal [Online]	465,242 GB	457,242 GB
Secondary	RAID1	N/A	Normal [Online]	465,242 GB	459,242 GB

Name	Size	Model	Revision
LSI:0:12	465,762 GB	ATA ST3500630NS	K

Content Sections and Links

With the SnapSAN S2000, only one RAID subsystem is present. the [Storage Pools](#) page groups pools by their RAID subsystem so it groups all the pools together:

- **Subsystem:** <Subsys_name> – Clicking the subsystem name at the top of the page displays the [Subsystem Information](#) page where you can:
 - Enable/silence alarms.
 - Initiate a battery test (if a backup battery card is installed).
 - Refresh the storage space.

- **Pools** – The table shows the pool name, RAID level, stripe size, current state, disk size, and free space.
Click a name to view its [Pool Information](#) page.
- **Global Hot Spares** – This table shows the name of the drive the hot spare is on, its size, drive model, and revision.
Global Hot Spares are disks which act as stand-by disks in event of another disk failure. If a disk in a RAID 1, 5, 6, 10, 50, or 60 pool fails, it is replaced automatically by a hot spare (if one is available) and the RAID set is rebuilt to exclude the failed disk.
Click a drive name to view its [Device Information](#) page.

Actions Available

The following action items are available on the [Storage Pools](#) page:

- **Create Pool** – launches the [Create Storage Pool](#) page to create a new pool.
- **Add Global Hot Spare** – launches the [Add Global Hot Spare](#) page to specify that an unused disk device is a Global Hot Spare. This action is only available if there are unused disks.
- **Remove Global Hot Spare** – launches the [Remove Global Hot Spare](#) page to specify that a disk is no longer to be used as a Global Hot Spare. This action is only available if there is a Global Hot Spare.
- **Set Storage Journal** – If the optional replication license is activated, this displays the [Storage Journal Configuration](#) page used to configure a replication storage journal that must be configured to enable replication.
- **Set Neutral Storage Host** – launches the [Set Neutral Storage Host](#) page to select an available host.
- **Rescan Subsystems** – launches the [Subsystem Rescan](#) page to scan for new devices.

Other Network Tab Subpages

The following pages are also available under the Network tab:

Subsystem Information

This page enables you to enable, disable, and silence alarms, check battery status, and refresh the storage space. It is accessed by clicking the subsystem name at the top of the [Storage Pools](#) page.

The screenshot displays the 'Subsystem Information' page in the SnapSAN interface. The page is divided into three main sections: LSI Hardware RAID #0, Battery Information, and Refresh. The LSI Hardware RAID #0 section shows details for the MegaRAID SAS 8888ELP, including Model, Firmware (11.0.1-0017), Revision, Serial Number (P499753009), Alarm Status (Enabled), and Host Number (6). The Battery Information section shows Battery Status (GOOD) and Charge Level (100%). The Refresh section contains a 'Refresh storage' button. Red circles highlight the 'Disable Alarm' and 'Silence Alarm' buttons in the LSI Hardware RAID #0 section, the 'Initiate Battery Test' button in the Battery Information section, and the 'Refresh storage' button in the Refresh section.

LSI Hardware RAID #0	
Model	MegaRAID SAS 8888ELP
Firmware	11.0.1-0017
Revision	11.0.1-0017
Serial Number	P499753009
Alarm Status	Enabled
Host Number	6

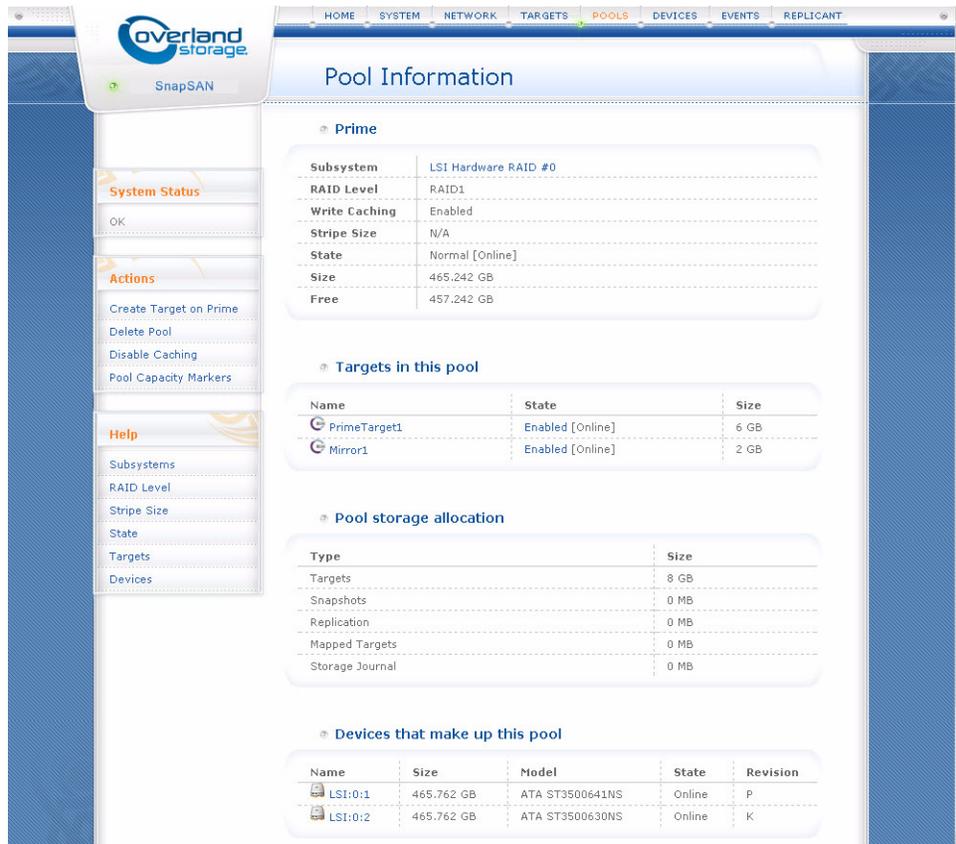
Battery Information	
Battery Status	GOOD
Charge Level	100%

Refresh	
Refresh storage	

Use the buttons provided to manage the subsystem features.

Pool Information

This page displays information about a single pool. The page is accessed by clicking a pool name on the [Storage Pools](#), [Device Information](#), [Target Information](#), [Target Edit](#), [Create Snapshot Target](#), [Storage Journal Configuration](#), [Targets](#), [Create Target](#), [Devices](#), [Replicant Information](#), [Replicant Volume Information](#), or [Replicant ACL Entry](#) page.



The screenshot shows the SnapSAN web interface with the 'Pool Information' page selected. The page is divided into several sections:

- Prime:** A summary box containing:

Subsystem	LSI Hardware RAID #0
RAID Level	RAID1
Write Caching	Enabled
Stripe Size	N/A
State	Normal [Online]
Size	465.242 GB
Free	457.242 GB
- Targets in this pool:** A table listing targets:

Name	State	Size
PrimeTarget1	Enabled [Online]	6 GB
Mirror1	Enabled [Online]	2 GB
- Pool storage allocation:** A table showing usage:

Type	Size
Targets	8 GB
Snapshots	0 MB
Replication	0 MB
Mapped Targets	0 MB
Storage Journal	0 MB
- Devices that make up this pool:** A table listing the physical disks:

Name	Size	Model	State	Revision
LSI:0:1	465.762 GB	ATA ST3500641NS	Online	P
LSI:0:2	465.762 GB	ATA ST3500630NS	Online	K

This page shows important pool information including:

- **(Pool) State** – States include Normal (online), Failed (offline), Degraded (a disk has failed), and Rebuilding (a failed disk has been replaced and the RAID set is being rebuilt).
- **Free (Space)**– Unused capacity available in the pool. Unused capacity can be used to expand existing targets or create new ones.
- **Pool Storage Allocation** – Shows how the pool is allocated for various uses: such as targets, snapshots, replicas, mapped targets, and the replication journal.
- **Disk Devices** – A list of devices that make up the pool.

There are four Content Area links (light blue text):

- **Subsystem** – Opens the [Subsystem Information](#) page.
- **Target Name** – Opens the [Target Information](#) page.
- **Target State**– Opens the [Target Disable/Enable](#) page. The actual page depends on the current status.
- **Device Name** – Opens the [Device Information](#) page.

Action items available on this page:

- **Create Target On <Pool_name>** – Launches the [Create Target on <Pool_name>](#) page to create a target. Works the same way as the [Create Target](#) page but limited to a single, pre-selected pool.
- **Delete Pool** – Launches the [Delete Storage Pool](#) page to delete a pool. Pools cannot be deleted if they have any targets assigned to them. To delete a pool, delete its targets and then delete the pool.
- **Enable/Disable Caching** – Launches the [Set Pool Cache](#) page to enable or disable caching.
- **Pool Capacity Markers** – Launches the [Pool Markers](#) page to set the marker type (Informational, Warning, or Error) and percentage of drive capacity used to provide alerts when certain capacity levels are reached.

Create Storage Pool

Use this page to create a new pool from unallocated disks. The page is accessed by clicking the Create Pool action item on the [Appliance Home Page](#), [Storage Pools](#), or [Devices](#) page.

To create a pool, enter the following information:

- **Pool Name** – A unique name for the pool. This can be anything you like, up to 32 alphanumeric characters in length. It cannot be blank.
- **Subsystem** – Choose which RAID subsystem to use for the pool. Normally there is only one. Your choice activates the RAID Level option.
- **RAID Level** – Select the RAID level for the pool. You have to choose the Subsystem to activate this option. The choice of levels available depends on how many unallocated disks there are and the RAID card features. Your choice activates the Stripe Size and Devices options.

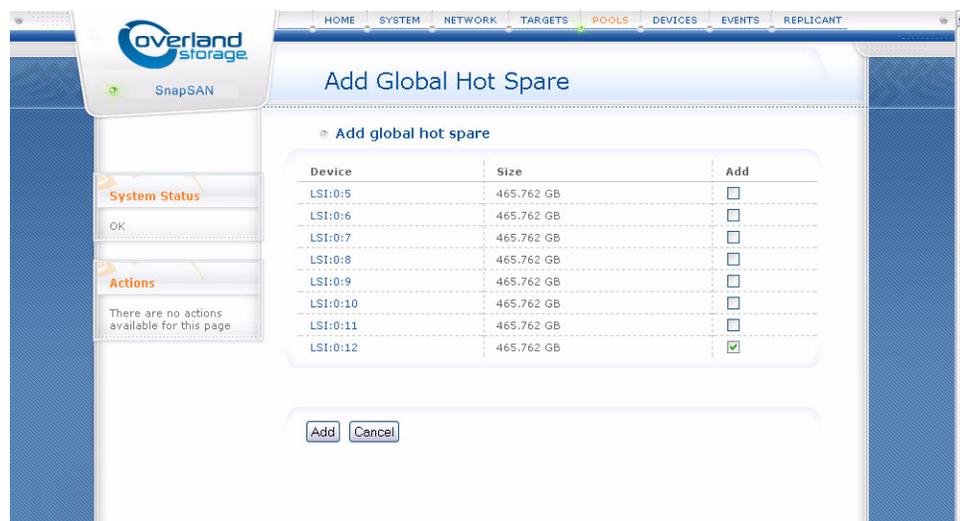
RAID Level	Number of Disks
RAID 0	Minimum of 2
RAID 1	Exactly 2
RAID 5	Minimum of 3
RAID 6	Minimum of 4
RAID 10	Minimum of 4
RAID 50	Minimum of 6
RAID 60	Minimum of 8
JBOD	Minimum of 1

- **Stripe Size** – Stripe size (for RAID 0, 5, 6, 10, 50, and 60). You have to choose the RAID Level to activate this option. For certain types of application, changing the stripe size may improve performance but in most cases the default setting is the best.
- **Devices** – Which disk devices to use for the pool. You have to choose the RAID Level to activate this option. Check each device to be used. The number of disks required for each RAID level is as follows:

After entering all the information requested, click **Apply**.

Add Global Hot Spare

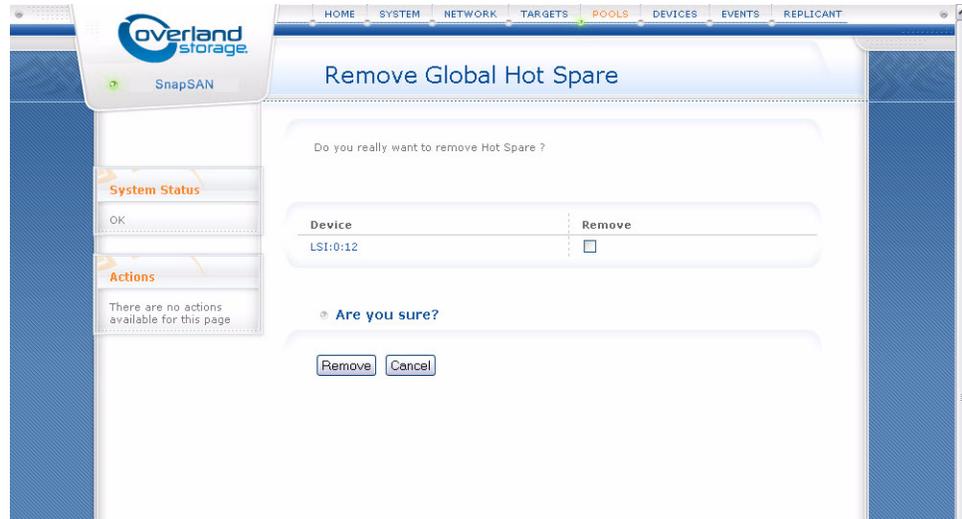
This page is used to set up one or more global hot spares. A global hot spare automatically replaces an equivalent failed disk in a pool that shares the same subsystem as the hot spare. It is accessed by clicking the Add Global Hot Spare action item on the [Storage Pools](#) page.



Clicking a device name opens the [Device Information](#) page.

Remove Global Hot Spare

Use this page to undo the designation of a disk drive as a global hot spare. It is accessed by clicking the Remove Global Hot Spare action item on the [Storage Pools](#) page that is displayed when at least one global hot spare is created.



NOTE: The disk reverts to being unallocated and may be added to a new pool.

Clicking a device name (light blue text) opens the [Device Information](#) page.

Storage Journal Configuration

IMPORTANT: To enable replication (if licensed), a Storage Journal must first be configured using the Web Management Interface. New units come from the factory with the storage journal dedicated drive already configured.

This page enables you to allocate a dedicated area of storage for a replication journal. The journal is used to temporarily log changes to all the replicated volumes. For optimum performance, put the journal on a dedicated device such as the dedicated drive that comes with the SnapSAN S2000.

The page is accessed by clicking the Set Storage Journal action item on the [Storage Pools](#) page.

NOTE: This page is also displayed when you attempt to add a replicant with the storage journal not yet configured.

The storage journal needs to be configured on dedicated storage to enable replication and mirroring. This dedicated storage is used to track the changes that occur on all replicated and mirrored volumes.

Better performance will be achieved if the storage journal is configured on a dedicated device.

Dedicated device

Device	Size	Add
LSI:0:5 (ATA ST3500630NS : K)	465.762 GB	<input type="radio"/>
LSI:0:6 (ATA ST3500641NS : P)	465.762 GB	<input type="radio"/>
LSI:0:7 (ATA ST3500630NS : K)	465.762 GB	<input type="radio"/>
LSI:0:8 (ATA ST3500641NS : P)	465.762 GB	<input type="radio"/>
LSI:0:9 (ATA ST3500641NS : P)	465.762 GB	<input type="radio"/>
LSI:0:10 (ATA ST3500630NS : K)	465.762 GB	<input type="radio"/>
LSI:0:11 (ATA ST3500630NS : K)	465.762 GB	<input type="radio"/>
SCSI:5:0:0:0 (ATA WDC WD800BEVT-75 : 11.0)	74.53 GB	<input checked="" type="radio"/>

Part of existing pool

Pools	Size	Add
Prime	465.242 GB	<input type="radio"/>
Secondary	465.242 GB	<input type="radio"/>

Add Cancel

Dedicated Disk Drive (Journal Drive)

To configure a replication journal, select the drive from the list of available devices and choose which pool can use it. Click Add to save the settings.

Clicking a device name opens the [Device Information](#) page and clicking a pool name opens the [Pool Information](#) page.

Once a drive is configured as the storage journal, selecting the Set Storage Journal action item opens this page displaying a message that the drive is already configured. You can click Remove to clear that setting and then choose a different device.

The storage journal needs to be configured on dedicated storage to enable replication and mirroring. This dedicated storage is used to track the changes that occur on all replicated and mirrored volumes.

Better performance will be achieved if the storage journal is configured on a dedicated device.

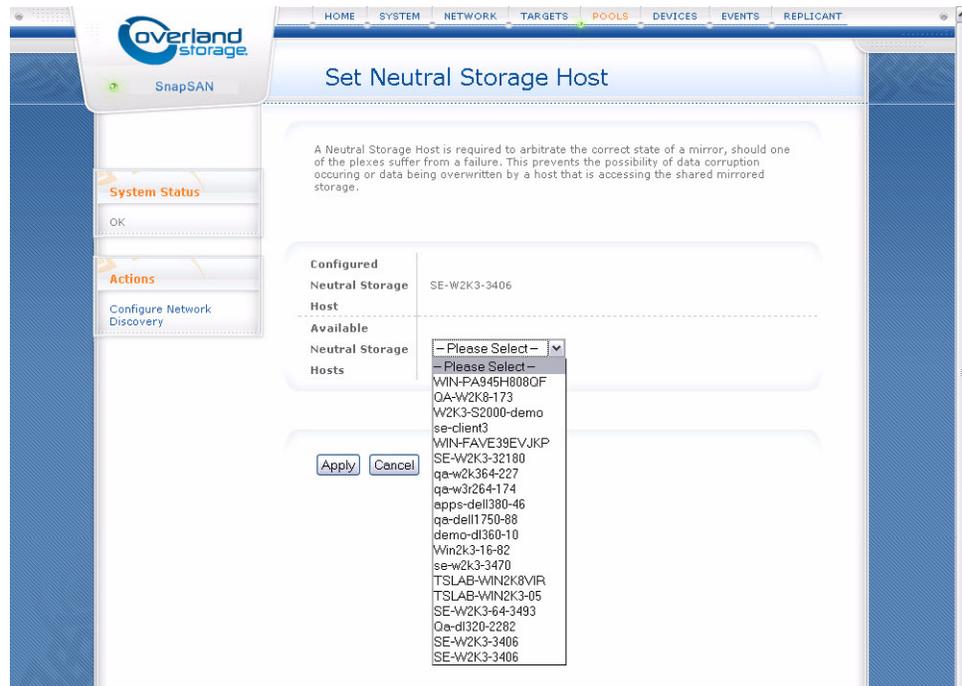
The storage journal is configured on device SCSI:5:0:0:0

Remove Cancel

Set Neutral Storage Host

Use this page to select the host that is to be used as a neutral storage site for mirroring (optional feature) which is required to arbitrate the correct state of a mirror, should one of the plexes suffer from a failure. This prevents the possibility of data corruption occurring or data being overwritten by a host that is accessing the shared mirrored storage. The same host must be used when setting up a mirror plex.

This page is accessed by clicking the Set Neutral Storage Host action item on the [Storage Pools](#) page.



The drop-down list shows all the hosts on the network on which the SnapSAN Manager Suite has been installed. You can return to this page anytime to change the host used.

Subsystem Rescan

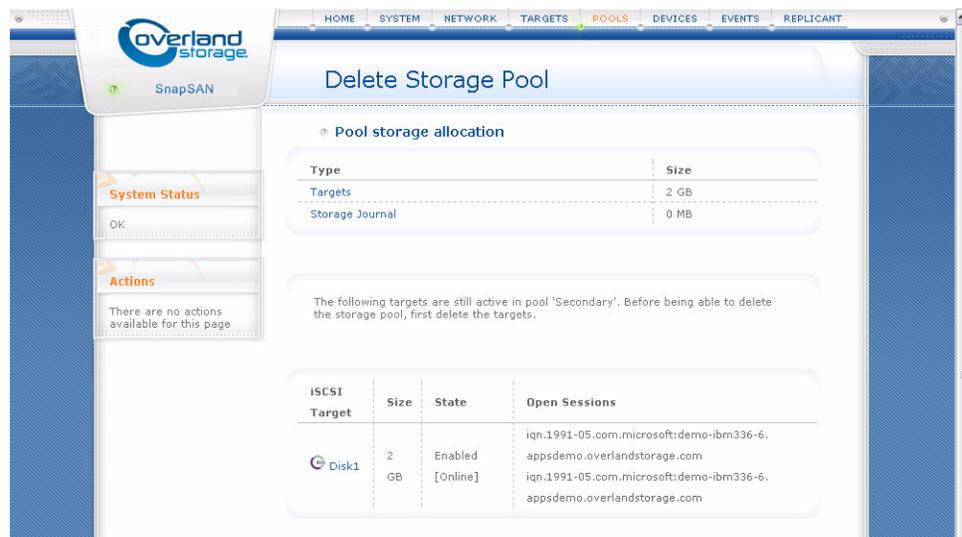
This page enables you to rescan the subsystem to discover new devices. This page is accessed by clicking the Rescan Subsystems action item on the [Storage Pools](#) page.



Delete Storage Pool

This page enables you to clear a storage pool drive allocations. It is accessed by clicking the Delete Pool action item on the [Pool Information](#) page.

NOTE: A pool cannot be deleted until all targets active in the pool are deleted. See [Target Delete](#) page.

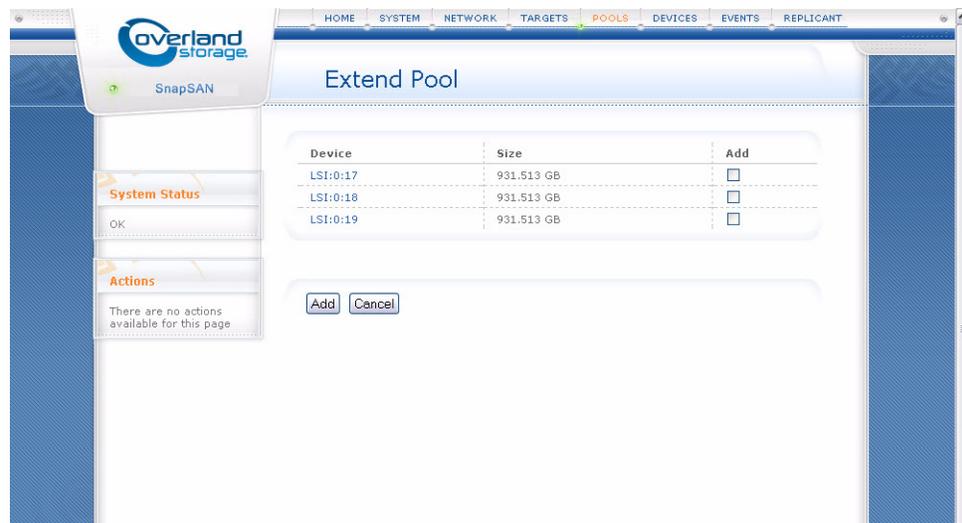


Depending on the settings, there can be several Content Area links:

- **Targets** – Opens the [Targets](#) page.
- **Storage Journal** – Opens the [Storage Journal Configuration](#) page.
- **iSCSI Target Name** – Opens the [Target Information](#) page.

Extend Pool

This page provides a way to extend a pool by linking other devices. It is accessed by clicking the Extend Pool action item on the [Storage Pools](#) page.

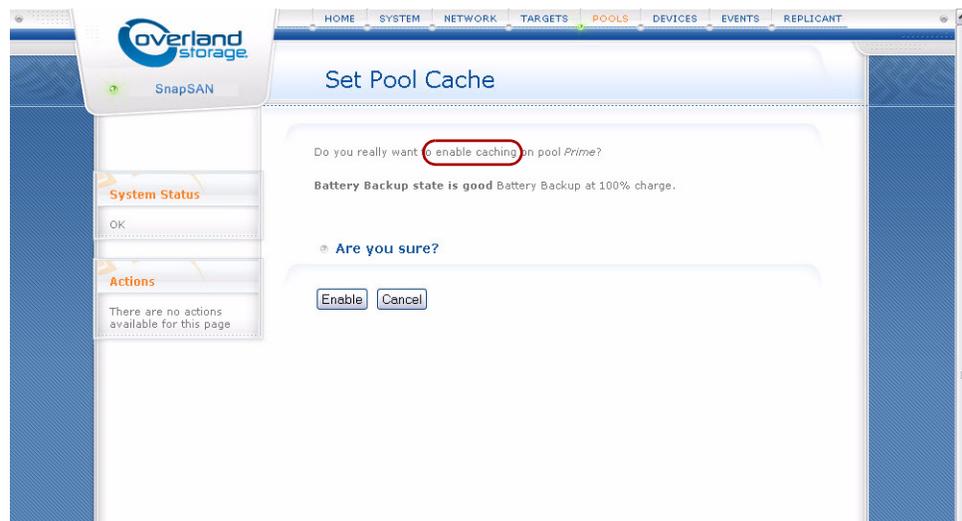


Clicking a device name opens the [Device Information](#) page.

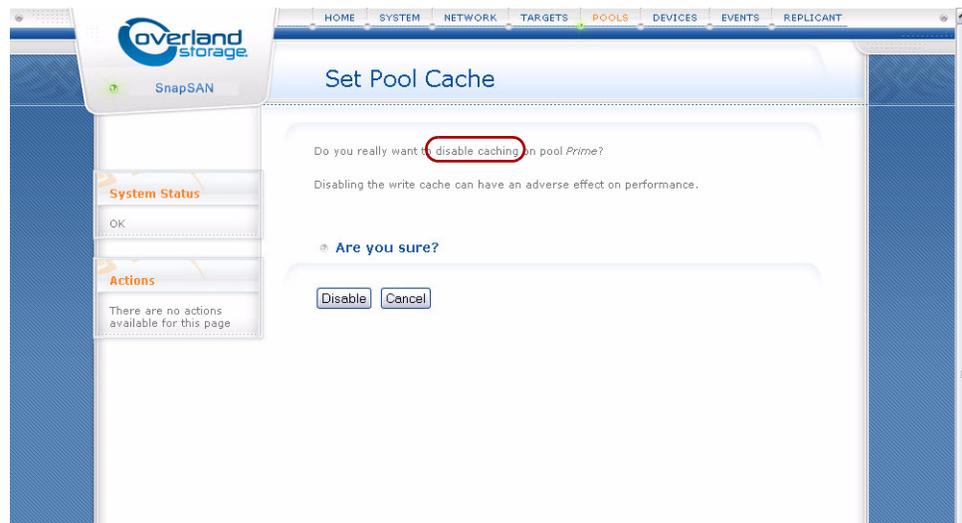
Set Pool Cache

This page enables/disables the pool cache. It is accessed by clicking the Enable/Disable Caching action item (depending on the current setting) on the [Pool Information](#) page.

The initial page view lets you enable the cache.

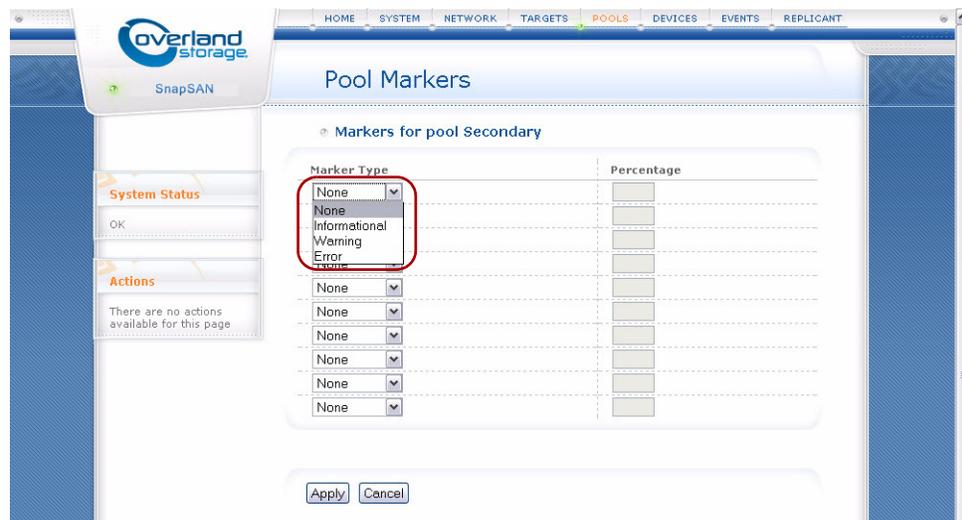


Once enabled, the same page view is used to disable the cache.



Pool Markers

This page allows you to configure pool capacity markers by type (Informational, Warning, or Error) and percentage of drive capacity used to activate the alert. Each pool can have up to 10 markers.



Example: To track how fast the pool is being used, markers can be set with Informational alerts at 25%, 50%, and 75%, a Warning alert for 85%, and an Error alert for 95%.

Devices Tab

The Devices tab provides access to a page where all the available devices are shown.

Devices

The Devices page lists the disk devices present in the appliance.

overland storage
SnapSAN

HOME SYSTEM NETWORK TARGETS POOLS DEVICES EVENTS REPLICANT

Devices

Subsystem: LSI Hardware RAID #0

Name	Size	Model	Revision	Pool
LSI:0:1	465.762 GB	ATA ST3500641NS	P	Prime
LSI:0:2	465.762 GB	ATA ST3500630NS	K	Prime
LSI:0:3	465.762 GB	ATA ST3500630NS	K	Secondary
LSI:0:4	465.762 GB	ATA ST3500630NS	K	Secondary
LSI:0:5	465.762 GB	ATA ST3500630NS	K	
LSI:0:6	465.762 GB	ATA ST3500641NS	P	
LSI:0:7	465.762 GB	ATA ST3500630NS	K	
LSI:0:8	465.762 GB	ATA ST3500641NS	P	
LSI:0:9	465.762 GB	ATA ST3500641NS	P	
LSI:0:10	465.762 GB	ATA ST3500630NS	K	
LSI:0:11	465.762 GB	ATA ST3500630NS	K	
LSI:0:12 (Spare)	465.762 GB	ATA ST3500630NS	K	

System Status
OK

Actions
Create Pool
Rescan Subsystems

Content Sections and Links

The following links (light blue text) are available on the Devices Content Area:

- **Subsystem Name** – Opens the [Subsystem Information](#) page.
- **Device Name** – Opens the [Device Information](#) page.
- **Pool Name** – Opens the [Pool Information](#) page.

Actions Available

The following action items are available on the **Devices** page:

- **Create Pool** – Launches the [Create Storage Pool](#) page to create a new pool using available devices.
- **Rescan Subsystems** – Launches the [Subsystem Rescan](#) page to rescan for new devices.

Other Device Tab Subpages

The following page is also available under the Devices tab.

Device Information

This page displays the basic information about a specific disk drive. It is accessed by clicking a device name on the [Storage Pools](#) or [Devices](#) page.

The screenshot shows the SnapSAN web interface. The top navigation bar includes links for HOME, SYSTEM, NETWORK, TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The main content area is titled "Device Information" and displays details for the device "LSI:0:1". On the left side, there is a sidebar with "System Status" (OK) and "Actions" (There are no actions available for this page).

LSI:0:1	
Subsystem	LSI Hardware RAID #0
Host adapter	megaraid_sas
Model	ATA ST3500641NS
Revision	P
State	Online
Pool	Prime
Size	465.762 GB

Clicking the pool name (light blue text) opens the [Pool Information](#) page.

Events Tab

The Events tab provides access to a log of all the significant events occurring on the appliance.

Events

The Events page displays the log of events showing 15 events on each page of the log. You can navigate between the pages using the Start, Back, Next, and End buttons at the bottom of each page.

Time	Type	Text
2011-04-25 13:51:38	Informational	RAID subsystem 'LSI Hardware RAID #0' write cache has been enabled on pool 'Prime'
2011-04-25 12:30:25	Informational	RAID subsystem 'LSI Hardware RAID #0' write cache has been disabled on pool 'Prime'
2011-04-25 12:12:07	Informational	Destroyed target 'iqn.1997-10.com.snapsan:b2578.8155821.disk2'
2011-04-25 12:11:59	Informational	Volume logging disabled for 'iqn.1997-10.com.snapsan:b2578.8155821.disk2' for replication
2011-04-25 12:11:59	Informational	Replicant for 'iqn.1997-10.com.snapsan:b2578.8155821.disk2' on host 'SE-W2K3-3406' removed
2011-04-25 11:13:56	Informational	The appliance event log was cleared

Significant events that occur on the appliance are recorded in the appliance's event log. This is a fixed size log: when it fills, the oldest events are discarded. The event log can also be cleared using the Clear Events action.

There are three types of events:

Informational

These events are logged when something significant occurs on the appliance, for example, when the appliance is started or shut down or when a storage target pool is created or destroyed.

Warning

These events indicate that something unexpected has occurred, for example, an initiator has tried to log into a target but it failed to supply the correct authentication credentials.

Error

These events indicate that some sort of fault has occurred, for example, a disk or hardware component has failed.

If a Warning or Error event occurs, the system status will be changed from OK to Warning or Error to alert administrators. When the event has been dealt with, the administrator can clear the system status using the Clear System Status action.

Event notification can be set up using the [Event Notification](#) so that email messages are sent out when events at or above specified levels occur.

Actions Available

The following action items are available on the [Events](#) page:

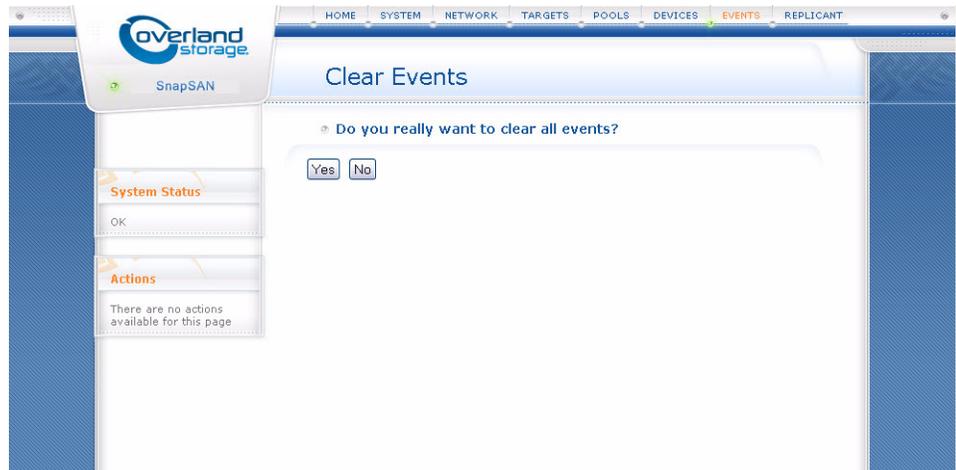
- **Clear Events** – This launches the [Clear Events](#) page to clear the event log by deleting all the old events. A new Informational event is generated to indicate that the event log has been cleared.
- **Notification** – This launches the [Event Notification](#) page to set up alerts.
- **Clear System Status** – This launches the [Clear System Status](#) page to reset the System Status to OK without clearing any events from the log.

Other Device Tab Subpages

The following page is also available under the Events tab.

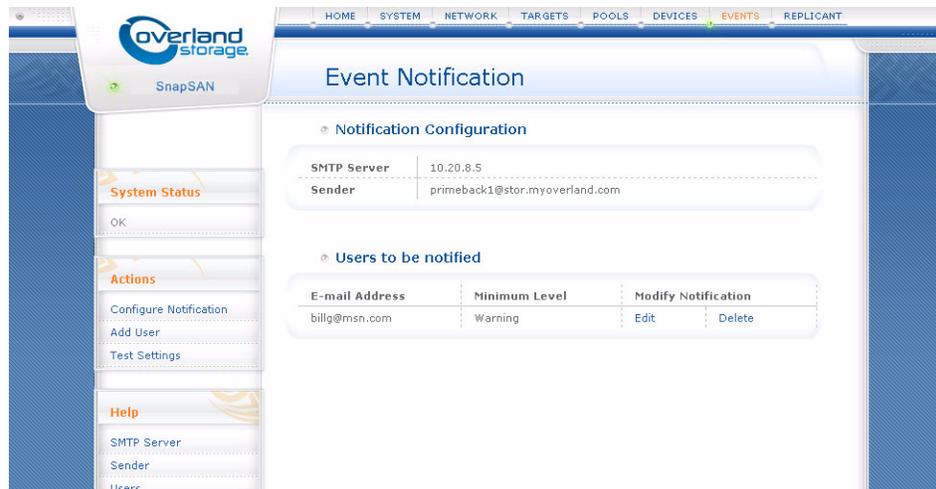
Clear Events

This page is used to clear all events from the log. The page is accessed by clicking the Clear Events action item on the [Events](#) page.



Event Notification

This page is used to configure the users who are notified when events occur. The page is accessed by clicking the Notification action item on the [Events](#) page.



Once a user is added, there are two Content Area links available:

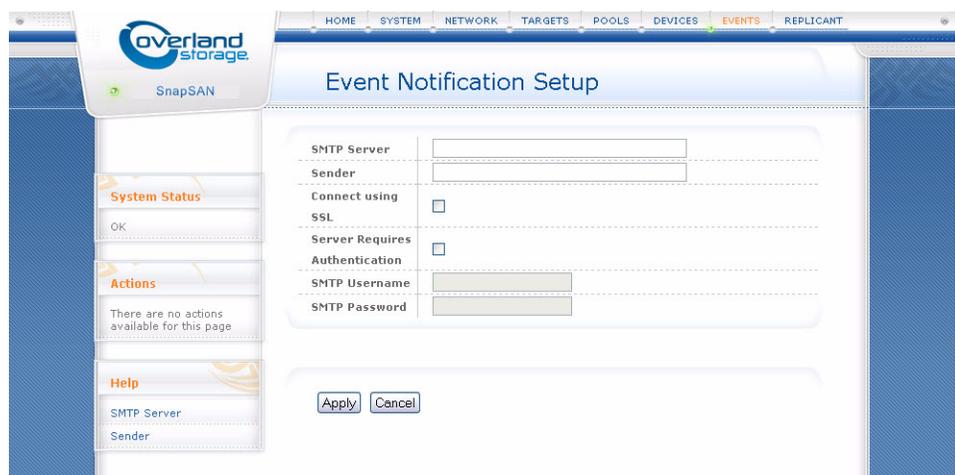
- **Edit** – This returns you to the [Event Notification Setup](#) page to edit your settings.
- **Delete** – Opens the [Remove Event Notification](#) page to delete the selected user.

There are three action items available:

- **Configure Notification** – This takes you to the [Event Notification Setup](#) page.
- **Add User** – Launches the [Add Event Notification](#) page to add a user to be notified when certain types of event occur.
- **Test Settings** – Used to test email settings to confirm the person receives the event notifications.

Event Notification Setup

This page is used to set up the SMTP alerts for event notification. It is accessed by clicking the Configure Notification action item on the [Event Notification](#) page.



To set up event notification, enter the following information:

- **SMTP Server** – The name of an outgoing mail (SMTP) server to use for sending out mail.

- **Sender** – A full email address to be used as the From address of the notification email.
- **Connect Using SSL** – Check if the SMTP server requires the use of SSL.
- **Server Requires Authentication** – Check if the SMTP server requires authentication. If so, the **SMTP Username** and **SMTP Password** of an account on the SMTP server must be provided in the two fields below.

When all the required information is entered, click **Apply**.

Once event notification has been set up, one or more users can be set up to receive notification of events when they occur using the [Add Event Notification](#) page.

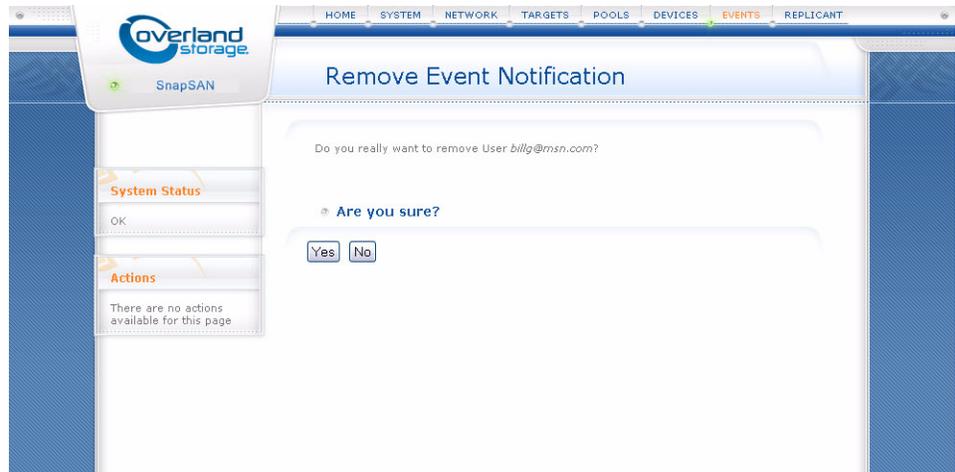
Add Event Notification

Use this page to add a user email address for alerts and set the level of alerts to be sent. The page is accessed by clicking the Add User action item on the [Event Notification](#) page or clicking Edit under Modify Notification area in the Content Area of the [Event Notification](#) page.

The user will be notified of all events at or above the minimum level set here. For example, if the level is set to Warning, the user will be notified of all Warning and Error events.

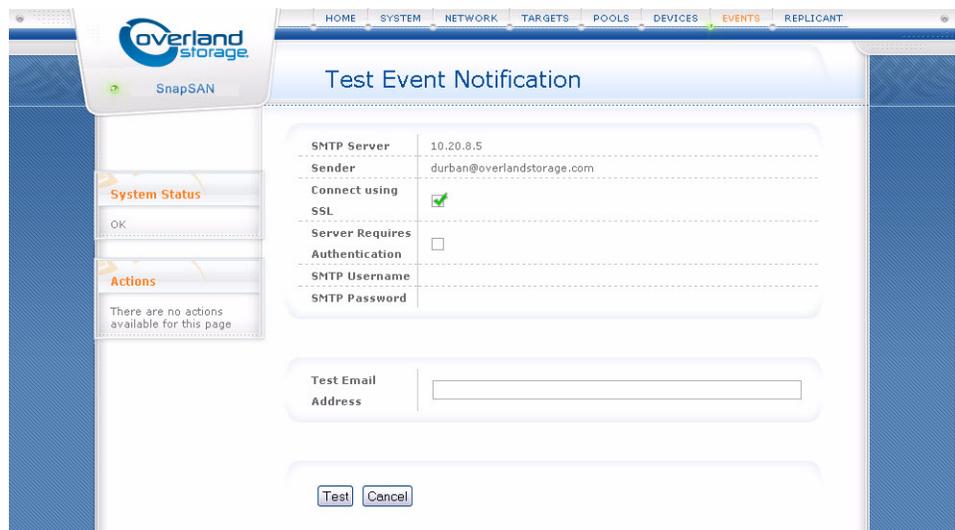
Remove Event Notification

Use this page to remove a user's email address from the notification list. The page is accessed by clicking Delete under Modify Notification in the Content Area of the [Event Notification](#) page.



Test Event Notification

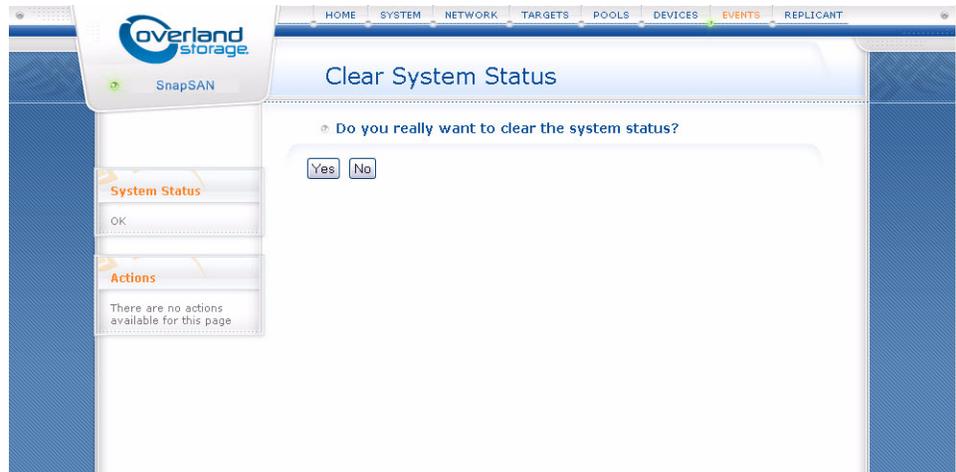
This page is used to test the configuration for event notifications. It is accessed by clicking the Test Settings action item on the [Event Notification](#) page.



It displays the current settings for event notification. To test these settings, enter a test email address in the appropriate field and click Test. An alert notification should appear in that email address's In Box.

Clear System Status

This page is used to clear the current system status and return it to OK without purging the Events log. The page is accessed by clicking the Clear System Status action item on the [Events](#) page.

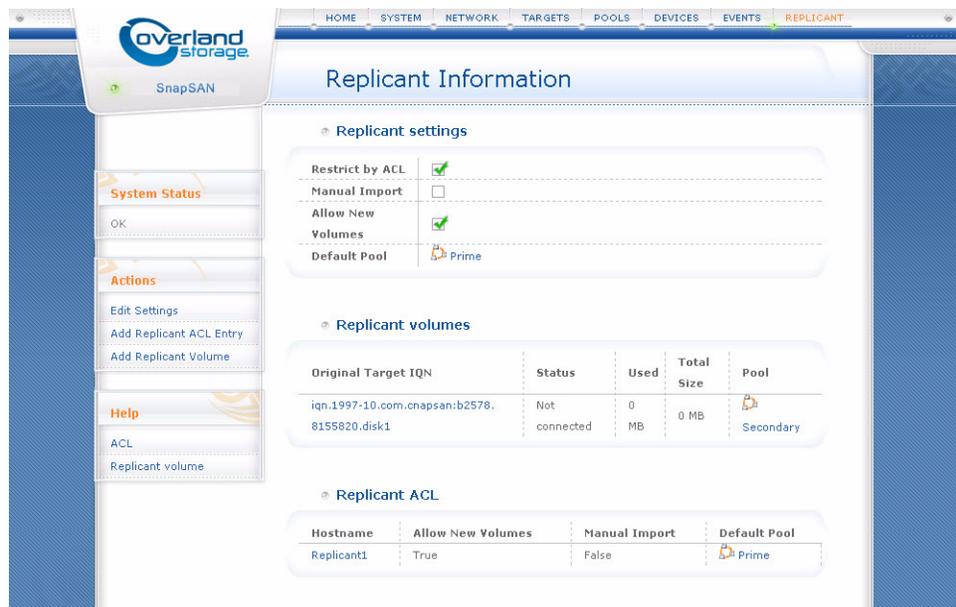


Replicant Tab

The Replicant tab provides a central area for managing replicants and recovery points on your network.

Replicant Information

When the optional license is installed, the Replicant Information page enables you to configure storage for replicating targets and displays details of replicated volumes and mapped targets.



The **Replicant Settings** section of the page shows the following information:

- **Restrict by ACL** – When selected, the ACL is used to determine which initiators may access the storage.
- **Manual Import** – Causes data transfer to take place from an external drive, such as a USB drive, rather than over the network (see also [“Target Information” on page 8-25](#)).
- **Allow New Volumes** – This allows new volumes to be created on the storage automatically rather than being explicitly requested.
- **Default Pool** – Sets a default pool to use where none is specified.

The **Replicant Volumes** section lists the volumes on the replicant that are being used to store replicas. For each volume, it shows the IQN of the original target (the target that is being replicated), current status, amount of storage used, total size of the pool, and the name of the pool that contains the storage for the replica.

The **Replicant ACL** section lists the ACLs that are linked to the replicant. The table shows the Hostname, if new volumes are allowed, if a manual import is allowed, and the name of the default pool.

The **Mapped Targets** section (only visible when recovery points exist) shows the targets that have been created using recovery points. A mapped target represents the data on a replicated target at a given recovery point.

Content Sections and Links

The following links (light blue text) are available in the Content Area of the [Replicant Information](#) page:

- **Default Pool** – Under Replicant Volumes, opens the [Pool Information](#) page for that particular pool.
- **Original Target IQN** – Opens the [Replicant Volume Information](#) page.
- **Pool** – Under Replicant Volumes, opens the [Pool Information](#) page.
- **Hostname** – Opens the [Replicant ACL Entry](#) page.
- **Pool** – Under Replicant ACLs, opens the [Pool Information](#) page.

Actions Available

The following action items are available on the [Replicant Information](#) page:

- **Edit Settings** – Launches the [Replicant Settings](#) page to edit the replicant settings.
- **Add Replicant ACL Entry** – Launches the [Add ACL Entry to Replicant](#) page to add a host to the replicant’s ACL list so that host can create replicas on the replicant.
- **Add Replicant Volume** – Launches the [Create Replicant Volume](#) page to add a new volume on the replicant host’s storage.

Other Device Tab Subpages

The following pages are also available under the Replicant tab.

Replicant Settings

This page is used to set up or edit the replicant options. It is accessed by clicking the [Edit Settings](#) action item on the [Replicant Information](#) page.

The screenshot shows the 'Replicant Settings' page in the SnapSAN web interface. The page title is 'Replicant Settings'. On the left, there is a sidebar with 'System Status' (OK) and 'Actions' (There are no actions available for this page). The main content area contains the following settings:

- Restrict by ACL:
- Manual import:
- Allow New Volumes:
- Default Pool: Prime (dropdown menu)

At the bottom of the settings area, there are 'Apply' and 'Cancel' buttons.

Add ACL Entry to Replicant

This page is used to add an entry to the ACL. It is accessed by clicking the [Add Replicant ACL Entry](#) action item on the [Replicant Information](#) page.

The screenshot shows the 'Add ACL Entry to Replicant' page in the SnapSAN web interface. The page title is 'Add ACL Entry to Replicant'. On the left, there is a sidebar with 'System Status' (OK) and 'Actions' (There are no actions available for this page). The main content area contains the following settings:

- Replica hostname: Replicant1 (text input field)
- Manual import:
- Allow New Volumes:
- Default Pool: Prime (dropdown menu)

At the bottom of the settings area, there are 'Apply' and 'Cancel' buttons.

Use the page to specify the new hostname, whether to allow manual import, whether the host can create a new volume, and which pool to use as a default if none is specified.

Create Replicant Volume

This page is used to set up a new replicant volume. The page is accessed by clicking the Add Replicant Volume action item on the [Replicant Information](#) page.

Enter the following:

- **Replicator Host** – The IP address or domain name of the replicant host. This is a remote destination where replicas are stored for future recovery.
- **Product ID Number** – The serial number of the appliance acting as the replicant host.
- **IQN (of Target)** – The IQN of the target associated with the volume.
- **Manual Import** – Causes data transfer to take place from an external drive, such as a USB drive, rather than over the network (see also [“Target Information” on page 8-25](#)).
- **Pool** – The pool from which storage for the volume will be allocated.

Replicant Volume Information

Use this page to configure the replicant volume, check its status, and create mapped targets from recovery points. The page is accessed by clicking a replicant volume name (IQN) in the Content Area on the [Replicant Information](#) page.

The screenshot shows the SnapSAN web interface. The top navigation bar includes links for HOME, SYSTEM, NETWORK, TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The main content area is titled 'Replicant Volume Information'. On the left, there is a sidebar with 'System Status' (OK), 'Actions' (Edit Replicant, Delete Replicant), and 'Help' (Delete Replicant). The main content area contains a table with the following data:

Associated Target IQN	iqn.1997-10.com.cnapsan:b2578.8155820.disk1
Replicator Host	10.20.13.32
Connected	<input type="checkbox"/>
Status	Not connected
Product ID Number	54243354517985313
Name	
Target Size	0 MB
Volume Size (Used/Total)	0 MB / 0 MB
Pool	Secondary
Manual Import	<input type="checkbox"/>

Below the table, there is a section titled 'Mapped Targets' with a sub-section 'No targets are mapped'.

The following information about the replicant volume is displayed:

- **Associated Target IQN** – The IQN of the target associated with the volume.
- **Replicator Host** – The name of the replicant host.
- **Connected** – Whether or not the initiator is connected to the volume.
- **Status** – The status of the replication process.
- **Product ID Number** – The serial number of the appliance acting as the replicant host.
- **Name** – The name of the target that is being replicated.
- **Target Size** – The size of the target that is being replicated.
- **Volume Size (Used/Total)** – The
- **Pool** – The pool allocated for the replicated volume.
- **Manual Import** – Causes data transfer to take place from an external drive, such as a USB drive, rather than over the network.
- **Recovery Point Dates** – The first and last dates on which recovery points have been made. This is only visible when a recovery point exists.
- **Recovery Point Count** – The number of recovery points created. This is only visible when a recovery point exists.

The details of the previous transfer of replication data are shown as follows:

- **Recovery Point Date** – The date the last recovery point was made.
- **Completion Time** – The time at which the transfer completed.
- **Transfer Size** – The amount of data transferred.

The Mapped Targets section shows the name, time stamp, and size of any mapped targets created from a recovery point. Click the Replica field (light blue text) of a mapped target to open the [Recovery Point Information](#) page from which you can map a target (click Map Target) to a replica at a specified recovery point using the [Recovery Point Target Mapping](#).

Clicking the pool name opens the [Pool Information](#) page.

There are several actions that you can carry out from this page:

- **Edit Replicant** – Displays the [Edit Replicant Volume](#) page for you to enable or disable manual import.
- **Delete Replicant** – This removes the replicant volume and all the storage associated with it. Any mapped targets must be removed before the replicant volume is removed. The [Delete Replica Volume](#) page is displayed for you to carry out the remove operation. Before doing this, it is recommended that you break the association between the replicated volume and the target that is being replicated. To do this, select the replicant host from the [Target Information](#) page. The [Target Replicant Host Information](#) page is displayed. Select the Remove action.
- **Map Recovery Point** – This action enables you to create a mapping from a recovery point. The [Recovery Point Target Mapping](#) page is displayed for you to set up the details. This is only visible when a recovery point exists.
- **Import Replicant Data** – If manual import is selected, the Import **Recovery Point from USB** page is shown where replication data can be imported from a USB device rather than transferred over the network. This option is only visible when a recovery point exists. See the [Target Information](#) page for details of exporting replication data.

To manually import data, select the replication data item from **Replicant Import** page and click Apply to start the transfer. The [Replicant Volume Information](#) page shows the progress of the import.

Recovery Point Information

This page displays the details of the replicant recovery point.

The screenshot shows the SnapSAN web interface with the 'Recovery Point Information' page. The page is divided into several sections:

- Host Information:**

Host	DD-SnapSAN730012-3354
Product ID	00C0B60B239C
Number	00C0B60B239C
Original Target IQN	iqn.1997-10.com.snapsan:b239c.8181351.disk2
Name	Disk2
Target Size	7 GB
Pool	SAS
Manual Import	False
- Recovery Point:**

Date	2011-05-16 15:59:50
Size on Disk	38 MB
- Targets mapped to this replica:**

Name	Original Target IQN
RecvyPt	iqn.1997-10.com.snapsan:b239c.8181351.disk2
May16RecPt	iqn.1997-10.com.snapsan:b239c.8181351.disk2

The following information about the replicant volume is displayed:

- **Host** – The name of the replicant host.
- **Serial** – The serial number of the appliance acting as the replicant host.
- **Original Target IQN** – The IQN of the target being replicated.
- **Name** – The name of the target being replicated.
- **Target Size** – The size of the target being replicated.
- **Pool** – The pool from which storage for the replica has been allocated.
- **Manual Import** – Causes data transfer to take place from an external drive, such as a USB drive, rather than over the network.

The Replica section gives the date and size of the replica.

The last section of the page names the targets that are mapped to this replica together with the IQN of the initiator of the replicated disk.

There is one action item available on this page:

- **Map Target** – This takes you to the [Recovery Point Target Mapping](#) page.

Edit Replicant Volume

This page is used to edit the replicant volume settings. It is accessed by clicking the Edit Replicant action item on the [Replicant Volume Information](#) page.

The screenshot displays the 'Edit Replicant Volume' page in the SnapSAN interface. The page title is 'Edit Replicant Volume'. The navigation menu on the left includes 'System Status' (OK), 'Actions' (no actions available), and 'Help' (Manual import). The main form contains the following fields:

Replicator Host	10.20.13.32
Product ID Number	54243354517985313
IQN	iqn.1997-10.com.cnapsan:b2578.8155820.disk1
Manual Import	<input checked="" type="checkbox"/>
Pool	Secondary

At the bottom of the form, there are 'Apply' and 'Cancel' buttons.

Delete Replica Volume

This page is used to remove a replicant volume. It is accessed by clicking the Remove Replicant action item on the [Replicant Volume Information](#) page.



Recovery Point Target Mapping

This page shows a calendar view of all the recovery points that have been made for a replicated target. Days on which recovery points have been made are highlighted. Select a day to see the times at which recovery points were made in the box alongside the calendar. The page is accessed by clicking the Map Target action item on the [Recovery Point Information](#) page.

Name	RAID level	Subsystem	Stripe size	Free
Pool0	RAID1	3Ware Hardware RAID #0	N/A	684.613 GB

Enter the following details and then click the Apply button to create a mapping at a selected recovery point. The mapped target created represents the replicated volume at the time of the recovery point.

- **Selected Recovery Point** – Select a recovery point from the box alongside the calendar.

- **Target Name** – Enter an alphanumeric name for the new mapped target.
- **Initiator IQN** – Enter the IQN of the initiator that will connect to the mapped target or select one from the drop-down list.
- **Authentication** – You can configure the mapped target to allow initiators, specified in the target's ACL, to connect without authentication or you can specify that CHAP authentication must be used.

The Pool Information section lets you check that sufficient storage is available for the mapped target.

When the mapped target has been created, the [Target Information](#) page is displayed, showing the details of the new mapped target.

Edit Replicant ACL Entry

This page is used to edit a replicant ACL entry. It is accessed by clicking the Edit Replicant ACL Entry action item on [Replicant ACL Entry](#) page.

The screenshot shows the 'Edit Replicant ACL Entry' page. The navigation bar includes HOME, SYSTEM, NETWORK, TARGETS, POOLS, DEVICES, EVENTS, and REPLICANT. The left sidebar shows 'System Status' (OK) and 'Actions' (no actions available). The main content area has the following fields:

- Replica hostname:
- Manual import:
- Allow New Volumes:
- Default Pool:

Buttons:

Remove Replicant ACL Entry

This page is used to remove a replicant ACL entry. It is accessed by clicking the Remove Replicant ACL Entry action item on [Replicant ACL Entry](#) page.

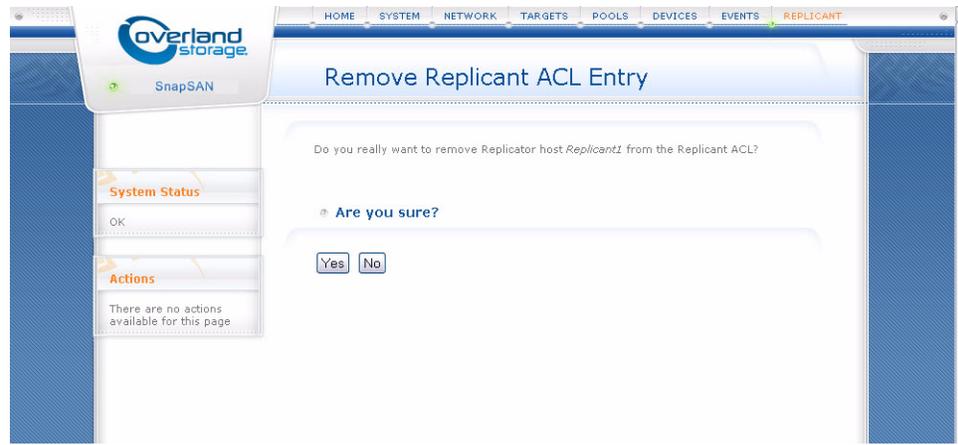
The screenshot shows the 'Remove Replicant ACL Entry' page. The navigation bar is the same as the previous screenshot. The left sidebar is also the same. The main content area displays a confirmation dialog:

Do you really want to remove Replicator host *Replicant1* from the Replicant ACL?

Are you sure?

Replicant ACL Entry

This page displays the basic information about a replicant ACL entry. It is accessed by clicking the Hostname in the Replicant ACL table on the [Replicant Information](#) page.



There are two action items on this page:

- Edit Replicant ACL Entry – displays the [Edit Replicant ACL Entry](#) page.
- Remove Replicant ACL Entry – displays the [Remove Replicant ACL Entry](#) page.

SnapServer Manager (SSM) is a administrative application that is Java-based, platform-independent, and runs on all major platforms. SSM provides a single interface from which administrators can discover SnapSAN S2000 appliances on the network and launch their Web Management Interface software. A link to the latest software can be found at:

<http://docs.overlandstorage.com/snapsan>

Installing the SSM Software

Download and install SSM using the SSM Software link found on start.html screen located on your Documentation and Software CD. SSM can be installed to all client platforms, including Windows, Mac OS, Linux, and UNIX.

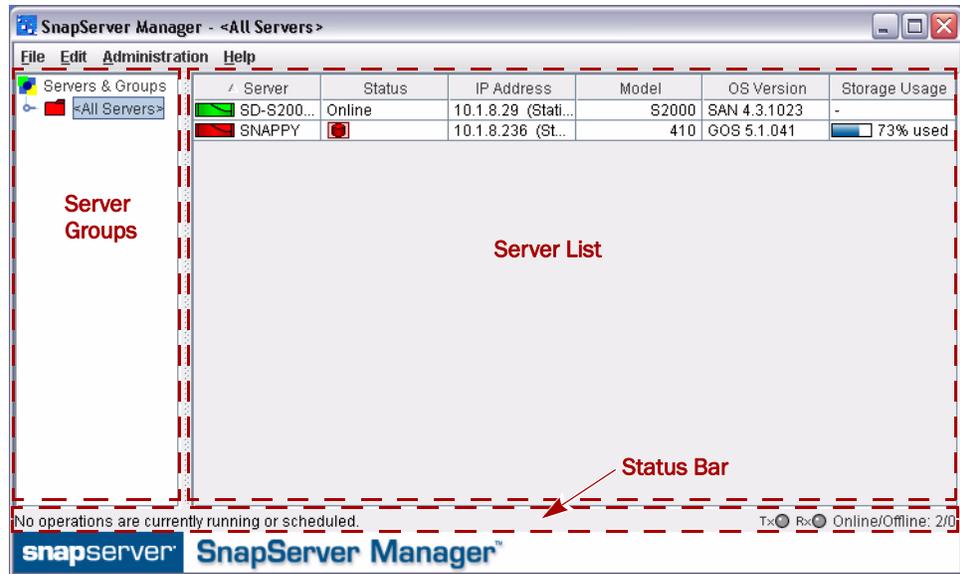
If you plan to run SSM on a Mac client, you must be running Mac OS 10.2 or higher (required for JRE 1.4.0 or higher support).

Launching SSM

Launch SSM using one of the methods described in the following table:

Operating System	Procedure
Microsoft Windows XP/2003/Vista	Click Start > All Programs > SnapServerManager > SnapServer Manager.
Mac OS X: v10.5 or higher	Open the SnapServerManager folder and double-click the SnapServer Manager icon.
UNIX/Linux	For default options: <ul style="list-style-type: none"> • cd to home directory, then run the SnapServer Manager command: <code>./Snap_Server_Manager</code> If you selected not to create links: <ul style="list-style-type: none"> • cd to home directory, then cd to the SnapServer Manager directory, and run the SnapServer Manager command: <code>./Snap_Server_Manager</code>

The SSM Console (default window) is displayed and consists of three main areas:



- **Server Groups** – Located on the left, this area shows the different groups of servers on the network.
- **Server List** – Located on the right, this area shows each server in the highlighted group.
- **Status Bar** – Located on the bottom, this bar displays the current status of a server selected from the Server List. It also shows any network activity.

 **IMPORTANT:** For the latest information about using SSM, refer to the online help files within the program.

SnapSAN S2000 Discovery

To enable a SnapSAN S2000 appliance to be discovered, you must always enter it manually into the SSM database by choosing **Edit > Remote Servers > Add** to add the IP address to the list.

Accessing Management Software

The SSM Console can be used to launch the SnapSAN S2000 management tools:

- Right-click the appliance name and select **Launch Web Administration** to launch the Web Management Interface. This can also be accomplished by selecting **Administration > Launch Web Administration**.
- If the Windows SnapSAN Manager is installed on the same host as SSM, you can launch it by selecting **Administration > SnapSAN S2000 Administration**.

Right-Click vs. Control-Click

This document uses the Windows convention of right-click in describing keyboard access to context-sensitive menus. Macintosh users should substitute control-click to achieve the same result.

Expanding Capacity

This appendix explains how to expand the capacity of a SnapSAN S2000 appliance by adding one or more expansion arrays to expand the capacity.



IMPORTANT: To ensure data integrity, back up the data on the appliance before you perform any of these procedures.

Attaching Expansion Arrays

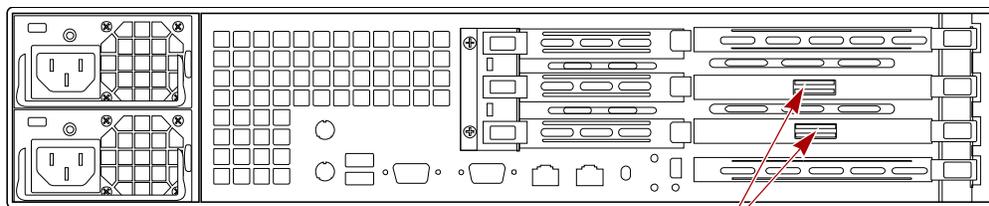


CAUTION: If you intend to attach more than one expansion array, we recommend you attach **only one at a time** to the SnapSAN S2000 and let the SnapSAN S2000 recognize it before connecting the additional expansion arrays.

1. Power off the SnapSAN S2000 head unit followed by any expansion arrays attached.
2. Using the installation instructions provided with the new expansion array, install the unit in the rack, attach the SAS cables, and power it ON.



CAUTION: It is critical to the process that you set up the hardware and power ON the expansion arrays before you power ON the SnapSAN S2000 head unit.



SAS Connections

3. Power ON the head unit.
Wait while the system reboots.
4. If additional expansion arrays are being added, repeat [Steps 1–3](#).

The SnapSAN S2000 appliance includes a number of open source third-party software packages. This appendix includes copyright notices and details of the licenses under which the packages are released. The source code of all the open source packages included in the appliance is available on written request.

GNU General Public License

The majority of open source packages incorporated in the appliance are licensed under the GPL Version 2, or the Lesser GPL, both of which are reproduced below.

GPL Version 2

GNU GENERAL PUBLIC LICENSE

Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc. 51 Franklin St., Fifth Floor, Boston, MA 02110-1301 USA Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too. When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things. To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they

know their rights. We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software. Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

GNU GENERAL PUBLIC LICENSE

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you". Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program. You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.

You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.

If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License.

(Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.) These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it. Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for non commercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it. 6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING,

REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.> Copyright (C)
<year> <name of author>
```

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 51 Franklin St., Fifth Floor, Boston, MA 02110-1301 USA

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

Gnomovision version 69, Copyright (C) year name of author

Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type 'show w'. This is free software, and you are welcome to redistribute it under certain conditions; type 'show c' for details.

The hypothetical commands 'show w' and 'show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than 'show w' and 'show c'; they could even be mouse-clicks or menu items – whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the program, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program 'Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989 Ty Coon, President of Vice

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.

Lesser GPL

GNU LESSER GENERAL PUBLIC LICENSE

Version 2.1, February 1999

Copyright (C) 1991, 1999 Free Software Foundation, Inc.

59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software – to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages – typically libraries – of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it. For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library. To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license. Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a defacto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library. The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

GNU LESSER GENERAL PUBLIC LICENSE

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables. The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

The modified work must itself be a software library.

You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library. In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a “work that uses the Library”. Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a “work that uses the Library” with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a “work that uses the library”. The executable is therefore covered by this License.

Section 6 states terms for distribution of such executables.

When a “work that uses the Library” uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law. If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a “work that uses the Library” with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer’s own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable “work that uses the Library”, as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user’s computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the “work that uses the Library” must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties with this License.

If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

The Free Software Foundation may publish revised and/or new versions of the Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and “any later version”, you have the option of following the terms and conditions

either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR

INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the “copyright” line and a pointer to where the full notice is found.

```
<one line to give the library's name and a brief idea of what it does.> Copyright (C)
<year> <name of author>
```

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details.

You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the library, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the library 'Frob' (a library
for tweaking knobs) written by James Random Hacker. <signature of Ty Coon>, 1
April 1990
```

```
Ty Coon, President of Vice
```

```
That's all there is to it!
```

Copyright Notices and Licenses

The appliances includes other third party software packages which are subject to the following copyright notices and licences:

The program, “bzip2”, the associated library “libbzip2”, and all documentation, are copyright (C) 1996-2005 Julian R Seward. All rights reserved.

```
*****
```

The expat module: Copyright (c) 1998, 1999, 2000 Thai Open Source Software Center Ltd and Clark Cooper Copyright

(c) 2001, 2002, 2003, 2004, 2005, 2006 Expat maintainers. Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the “Software”), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions: The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software. THE SOFTWARE IS PROVIDED “AS IS”, WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

File utilities: Copyright (c) Ian F. Darwin 1986, 1987, 1989, 1990, 1991, 1992, 1994, 1995. Software written by Ian F. Darwin and others; maintained 1994-2004 Christos Zoulas. This software is not subject to any export provision of the United States Department of Commerce, and may be exported to any country or planet. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met: 1. Redistributions of source code must retain the above copyright notice immediately at the beginning of the file, without modification, this list of conditions, and the following disclaimer. 2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution. THIS SOFTWARE IS PROVIDED BY THE AUTHOR AND CONTRIBUTORS “AS IS” AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The FreeType Project LICENSE 2006-Jan-27

Copyright 1996-2002, 2006 by David Turner, Robert Wilhelm, and Werner Lemberg
Introduction

The FreeType Project is distributed in several archive packages; some of them may contain, in addition to the FreeType font engine, various tools and contributions which rely on, or relate to, the FreeType Project. This license applies to all files found in such packages, and which do not fall under their own explicit license. The license affects thus the FreeType font engine, the test programs, documentation and makefiles, at

the very least. This license was inspired by the BSD, Artistic, and IJG (Independent JPEG Group) licenses, which all encourage inclusion and use of free software in commercial and freeware products alike. As a consequence, its main points are that:

We don't promise that this software works. However, we will be interested in any kind of bug reports. ('as is' distribution)

You can use this software for whatever you want, in parts or full form, without having to pay us. ('royalty-free' usage)

You may not pretend that you wrote this software. If you use it, or only parts of it, in a program, you must acknowledge somewhere in your documentation that you have used the FreeType code. ('credits'). We specifically permit and encourage the inclusion of this software, with or without modifications, in commercial products. We disclaim all warranties covering The FreeType Project and assume no liability related to The FreeType Project. Finally, many people asked us for a preferred form for a credit/disclaimer to use in compliance with this license. We thus encourage you to use the following text:

Portions of this software are copyright lc 2007 The FreeType Project (www.freetype.org). All rights reserved.

Little cms Copyright (C) 1998-2004 Marti Maria Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Lighttpd: Copyright (c) 2004, Jan Kneschke, incremental All rights reserved. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- Neither the name of the "incremental" nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS “AS IS” AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The MNG Library is Copyright (c) 2000 Gerard Juyn (gerard@libmng.com)

Libpng versions 1.2.6, August 15, 2004, through 1.2.12, June 27, 2006, are Copyright (c) 2004, 2006 Glenn Randers-Pehrson, and are distributed according to the same disclaimer and license as libpng-1.2.5 with the following individual added to the list of Contributing Authors: Cosmin Truta. libpng versions 1.0.7, July 1, 2000, through 1.2.5 - October 3, 2002, are Copyright (c) 2000-2002 Glenn Randers-Pehrson, and are distributed according to the same disclaimer and license as libpng-1.0.6 with the following individuals added to the list of Contributing Authors: Simon-Pierre Cadieux, Eric S. Raymond, Gilles Vollant and with the following additions to the disclaimer: There is no warranty against interference with your enjoyment of the library or against infringement. There is no warranty that our efforts or the library will fulfill any of your particular purposes or needs. This library is provided with all faults, and the entire risk of satisfactory quality, performance, accuracy, and effort is with the user. libpng versions 0.97, January 1998, through 1.0.6, March 20, 2000, are Copyright (c) 1998, 1999 Glenn Randers-Pehrson, and are distributed according to the same disclaimer and license as libpng-0.96, with the following individuals added to the list of Contributing Authors: Tom Lane, Glenn Randers-Pehrson, Willem van Schaik libpng versions 0.89, June 1996, through 0.96, May 1997, are Copyright (c) 1996, 1997 Andreas Dilger Distributed according to the same disclaimer and license as libpng-0.88, with the following individuals added to the list of Contributing Authors: John Bowler, Kevin Bracey, Sam Bushell, Magnus Holmgren, Greg Roelofs, Tom Tanner libpng versions 0.5, May 1995, through 0.88, January 1996, are Copyright (c) 1995, 1996 Guy Eric Schalnat, Group 42, Inc. For the purposes of this copyright and license, “Contributing Authors” is defined as the following set of individuals: Andreas Dilger, Dave Martindale, Guy Eric Schalnat, Paul Schmidt, Tim Wegner. The PNG Reference Library is supplied “AS IS”. The Contributing Authors and Group 42, Inc. disclaim all warranties, expressed or implied, including, without limitation, the warranties of merchantability and of fitness for any purpose. The Contributing Authors and Group 42, Inc. assume no liability for direct, indirect, incidental, special, exemplary, or consequential damages, which may result from the use of the PNG Reference Library, even if advised of the possibility of such damage.

The lsof package is Copyright 2002 Purdue Research Foundation, West Lafayette, Indiana 47907. All rights reserved. Written by Victor A. Abell.

The following copyright notice applies to all files collectively called the Network Time Protocol Version 4 Distribution. Unless specifically declared otherwise in an individual file, this notice applies as if the text was explicitly included in the file. Copyright (c) David L. Mills 1992-2006 Permission to use, copy, modify, and distribute this software and its documentation for any purpose with or without fee is hereby granted, provided that the above copyright notice appears in all copies and that both the copyright notice and this permission notice appear in supporting documentation, and that the name University of Delaware not be used in advertising or publicity pertaining to distribution of the software without specific, written prior permission. The University of Delaware makes no representations about the suitability this software for any purpose. It is provided “as is” without express or implied warranty.

OpenSSL License. Copyright (c) 1998-2006 The OpenSSL Project. All rights reserved. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

All advertising materials mentioning features or use of this software must display the following acknowledgment: “This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>)”

The names “OpenSSL Toolkit” and “OpenSSL Project” must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact openssl-core@openssl.org.

Products derived from this software may not be called “OpenSSL” nor may “OpenSSL” appear in their names without prior written permission of the OpenSSL Project.

Redistributions of any form whatsoever must retain the following acknowledgment: “This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>)”. THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT “AS IS” AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,* SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

PCRE LICENCE. PCRE is a library of functions to support regular expressions whose syntax and semantics are as close as possible to those of the Perl 5 language. Release 5 of PCRE is distributed under the terms of the “BSD” licence, as specified below. The documentation for PCRE, supplied in the “doc” directory, is distributed under the

same terms as the software itself. Written by: Philip Hazel <ph10@cam.ac.uk> University of Cambridge Computing Service, Cambridge, England. Phone: +44 1223 334714. Copyright (c) 1997-2004 University of Cambridge All rights reserved. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met: Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution. Neither the name of the University of Cambridge nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission. THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

strace is Copyright (c) 1991, 1992 Paul Kranenburg <pk@cs.few.eur.nl> Copyright (c) 1993 Branko Lankester <branko@hacktic.nl> Copyright (c) 1993 Ulrich Pegelow <pegelow@moorea.uni-muenster.de> Copyright (c) 1995, 1996 Michael Elizabeth Chastain <mec@duracef.shout.net> Copyright (c) 1993, 1994, 1995, 1996 Rick Sladkey <jrs@world.std.com> Copyright (C) 1998-2001 Wichert Akkerman <wakkerma@deephackmode.org> All rights reserved. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

The name of the author may not be used to endorse or promote products derived from this software without specific prior written permission. THIS SOFTWARE IS PROVIDED BY THE AUTHOR "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

SWIG is distributed under the following terms:

I. Copyright (c) 1995-1998 The University of Utah and the Regents of the University of California All Rights Reserved Permission is hereby granted, without written agreement and without license or royalty fees, to use, copy, modify, and distribute this software and its documentation for any purpose, provided that (1) The above copyright notice and the following two paragraphs appear in all copies of the source code and (2) redistributions including binaries reproduces these notices in the supporting documentation. Substantial modifications to this software may be copyrighted by their authors and need not follow the licensing terms described here, provided that the new terms are clearly indicated in all files where they apply.

IN NO EVENT SHALL THE AUTHOR, THE UNIVERSITY OF CALIFORNIA, THE UNIVERSITY OF UTAH OR DISTRIBUTORS OF THIS SOFTWARE BE LIABLE TO ANY PARTY FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF THIS SOFTWARE AND ITS DOCUMENTATION, EVEN IF THE AUTHORS OR ANY OF

THE ABOVE PARTIES HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. THE AUTHOR, THE UNIVERSITY OF CALIFORNIA, AND THE UNIVERSITY OF UTAH SPECIFICALLY DISCLAIM ANY WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE SOFTWARE PROVIDED HEREUNDER IS ON AN "AS IS" BASIS, AND THE AUTHORS AND DISTRIBUTORS HAVE NO OBLIGATION TO PROVIDE MAINTENANCE, SUPPORT, UPDATES, ENHANCEMENTS, OR MODIFICATIONS.

II. This software includes contributions that are Copyright (c) 1998-2005 University of Chicago. All rights reserved. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met: Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution. Neither the name of the University of Chicago nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission. THIS SOFTWARE IS PROVIDED BY THE UNIVERSITY OF CHICAGO AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE UNIVERSITY OF CHICAGO OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

III. This software includes contributions that are Copyright (c) 2005-2006 Arizona Board of Regents (University of Arizona). All Rights Reserved Permission is hereby granted, without written agreement and without license or royalty fees, to use, copy, modify, and distribute this software and its documentation for any purpose, provided

that (1) The above copyright notice and the following two paragraphs appear in all copies of the source code and (2) redistributions including binaries reproduces these notices in the supporting documentation. Substantial modifications to this software may be copyrighted by their authors and need not follow the licensing terms described here, provided that the new terms are clearly indicated in all files where they apply. THIS SOFTWARE IS PROVIDED BY THE UNIVERSITY OF ARIZONA AND CONTRIBUTORS “AS IS” AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE UNIVERSITY OF ARIZONA OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The product includes modules written in the Python language, which link to standard Python libraries, but does not include any dead parrots. Python is subject to the following copyright and license: PYTHON SOFTWARE FOUNDATION LICENSE VERSION 2

This LICENSE AGREEMENT is between the Python Software Foundation (“PSF”), and the Individual or Organization (“Licensee”) accessing and otherwise using this software (“Python”) in source or binary form and its associated documentation.

Subject to the terms and conditions of this License Agreement, PSF hereby grants Licensee a nonexclusive, royalty-free, world-wide license to reproduce, analyze, test, perform and/or display publicly, prepare derivative works, distribute, and otherwise use Python alone or in any derivative version, provided, however, that PSF’s License Agreement and PSF’s notice of copyright, i.e., “Copyright (c) 2001, 2002, 2003, 2004, 2005, 2006 Python Software Foundation; All Rights Reserved” are retained in Python alone or in any derivative version prepared by Licensee.

In the event Licensee prepares a derivative work that is based on or incorporates Python or any part thereof, and wants to make the derivative work available to others as provided herein, then Licensee hereby agrees to include in any such work a brief summary of the changes made to Python.

PSF is making Python available to Licensee on an “AS IS” basis. PSF MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED. BY WAY OF EXAMPLE, BUT NOT LIMITATION, PSF MAKES NO AND DISCLAIMS ANY REPRESENTATION OR WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR THAT THE USE OF PYTHON WILL NOT INFRINGE ANY THIRD PARTY RIGHTS.

PSF SHALL NOT BE LIABLE TO LICENSEE OR ANY OTHER USERS OF PYTHON FOR ANY INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES OR LOSS AS A RESULT OF MODIFYING, DISTRIBUTING, OR OTHERWISE USING PYTHON, OR ANY DERIVATIVE THEREOF, EVEN IF ADVISED OF THE POSSIBILITY THEREOF.

This License Agreement will automatically terminate upon a material breach of its terms and conditions.

Nothing in this License Agreement shall be deemed to create any relationship of agency, partnership, or joint venture between PSF and Licensee. This License Agreement does not grant permission to use PSF trademarks or trade name in a trademark sense to endorse or promote products or services of Licensee, or any third party.

By copying, installing or otherwise using Python, Licensee agrees to be bound by the terms and conditions of this License

**BEOPEN.COM LICENSE AGREEMENT FOR PYTHON 2.0. BEOPEN PYTHON
OPEN SOURCE LICENSE AGREEMENT VERSION 1**

This LICENSE AGREEMENT is between BeOpen.com (“BeOpen”), having an office at 160 Saratoga Avenue, Santa Clara, CA 95051, and the Individual or Organization (“Licensee”) accessing and otherwise using this software in source or binary form and its associated documentation (“the Software”).

Subject to the terms and conditions of this BeOpen Python License Agreement, BeOpen hereby grants Licensee a non-exclusive, royalty-free, world-wide license to reproduce, analyze, test, perform and/or display publicly, prepare derivative works, distribute, and otherwise use the Software alone or in any derivative version, provided, however, that the BeOpen Python License is retained in the Software, alone or in any derivative version prepared by Licensee.

BeOpen is making the Software available to Licensee on an “AS IS” basis. BEOPEN MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED. BY WAY OF EXAMPLE, BUT NOT LIMITATION, BEOPEN MAKES NO AND DISCLAIMS ANY REPRESENTATION OR WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR THAT THE USE OF THE SOFTWARE WILL NOT INFRINGE ANY THIRD PARTY RIGHTS.

BEOPEN SHALL NOT BE LIABLE TO LICENSEE OR ANY OTHER USERS OF THE SOFTWARE FOR ANY INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES OR LOSS AS A RESULT OF USING, MODIFYING OR DISTRIBUTING THE SOFTWARE, OR ANY DERIVATIVE THEREOF, EVEN IF ADVISED OF THE POSSIBILITY THEREOF.

This License Agreement will automatically terminate upon a material breach of its terms and conditions.

This License Agreement shall be governed by and interpreted in all respects by the law of the State of California, excluding conflict of law provisions. Nothing in this License Agreement shall be deemed to create any relationship of agency, partnership, or joint venture between BeOpen and Licensee. This License Agreement does not grant permission to use BeOpen trademarks or trade names in a trademark sense to endorse or promote products or services of Licensee, or any third party. As an exception, the “BeOpen Python” logos available at <http://www.pythonlabs.com/logos.html> may be used according to the permissions granted on that web page.

By copying, installing or otherwise using the software, Licensee agrees to be bound by the terms and conditions of this License Agreement. CNRI LICENSE AGREEMENT FOR PYTHON 1.6.1

This LICENSE AGREEMENT is between the Corporation for National Research Initiatives, having an office at 1895 Preston White Drive, Reston, VA 20191 (“CNRI”), and the Individual or Organization (“Licensee”) accessing and otherwise using Python 1.6.1 software in source or binary form and its associated documentation.

Subject to the terms and conditions of this License Agreement, CNRI hereby grants Licensee a nonexclusive, royalty-free, world-wide license to reproduce, analyze, test, perform and/or display publicly, prepare derivative works, distribute, and otherwise use Python 1.6.1 alone or in any derivative version, provided, however, that CNRI’s License Agreement and CNRI’s notice of copyright, i.e., “Copyright (c) 1995-2001 Corporation for National Research Initiatives; All Rights Reserved” are retained in Python 1.6.1 alone or in any derivative version prepared by Licensee. Alternately, in lieu of CNRI’s License Agreement, Licensee may substitute the following text (omitting the quotes): “Python 1.6.1 is made available subject to the terms and conditions in CNRI’s License Agreement. This Agreement together with Python 1.6.1 may be located on the Internet using the following unique, persistent identifier (known as a handle): 1895.22/1013. This Agreement may also be obtained from a proxy server on the Internet using the following URL: <http://hdl.handle.net/1895.22/1013>”.

In the event Licensee prepares a derivative work that is based on or incorporates Python 1.6.1 or any part thereof, and wants to make the derivative work available to others as provided herein, then Licensee hereby agrees to include in any such work a brief summary of the changes made to Python 1.6.1.

CNRI is making Python 1.6.1 available to Licensee on an “AS IS” basis. CNRI MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED. BY WAY OF EXAMPLE, BUT NOT LIMITATION, CNRI MAKES NO AND DISCLAIMS ANY REPRESENTATION OR WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR THAT THE USE OF PYTHON 1.6.1 WILL NOT INFRINGE ANY THIRD PARTY RIGHTS.

CNRI SHALL NOT BE LIABLE TO LICENSEE OR ANY OTHER USERS OF PYTHON 1.6.1 FOR ANY INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES OR LOSS AS A RESULT OF MODIFYING, DISTRIBUTING, OR OTHERWISE USING PYTHON 1.6.1, OR ANY DERIVATIVE THEREOF, EVEN IF ADVISED OF THE POSSIBILITY THEREOF.

This License Agreement will automatically terminate upon a material breach of its terms and conditions.

This License Agreement shall be governed by the federal intellectual property law of the United States, including without limitation the federal copyright law, and, to the extent such U.S. federal law does not apply, by the law of the Commonwealth of Virginia, excluding Virginia’s conflict of law provisions. Notwithstanding the foregoing, with regard to derivative works based on Python 1.6.1 that incorporate non-separable material that was previously distributed under the GNU General Public License (GPL), the law of the Commonwealth of Virginia shall govern this License Agreement only as to issues arising under or with respect to Paragraphs 4, 5, and 7 of this License Agreement. Nothing in this License Agreement shall be deemed to create any relationship of agency, partnership, or joint venture between CNRI and Licensee. This License Agreement does not grant permission to use CNRI trademarks or trade name in a trademark sense to endorse or promote products or services of Licensee, or any third party.

By clicking the “ACCEPT” button where indicated, or by copying, installing or otherwise using Python 1.6.1, Licensee agrees to be bound by the terms and conditions of this License Agreement. Copyright (c) 1991 - 1995, Stichting Mathematisch Centrum Amsterdam, The Netherlands. All rights reserved. Permission to use, copy,

modify, and distribute this software and its documentation for any purpose and without fee is hereby granted, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation, and that the name of Stichting Mathematisch Centrum or CWI not be used in advertising or publicity pertaining to distribution of the software without specific, written prior permission. STICHTING MATHEMATISCH CENTRUM DISCLAIMS ALL WARRANTIES WITH REGARD TO THIS SOFTWARE, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS, IN NO EVENT SHALL STICHTING MATHEMATISCH CENTRUM BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

This is version 2005-Feb-10 of the Info-ZIP copyright and license. The definitive version of this document should be available at <ftp://ftp.info-zip.org/pub/infozip/license.html> indefinitely. Copyright (c) 1990-2005 Info-ZIP. All rights reserved. For the purposes of this copyright and license, “Info-ZIP” is defined as the following set of individuals: Mark Adler, John Bush, Karl Davis, Harald Denker, Jean-Michel Dubois, Jean-loup Gailly, Hunter Goatley, Ed Gordon, Ian Gorman, Chris Herborth, Dirk Haase, Greg Hartwig, Robert Heath, Jonathan Hudson, Paul Kienitz, David Kirschbaum, Johnny Lee, Onno van der Linden, Igor Mandrichenko, Steve P. Miller, Sergio Monesi, Keith Owens, George Petrov, Greg Roelofs, Kai Uwe Rommel, Steve Salisbury, Dave Smith, Steven M. Schweda, Christian Spieler, Cosmin Truta, Antoine Verheijen, Paul von Behren, Rich Wales, Mike White This software is provided “as is,” without warranty of any kind, express or implied. In no event shall Info-ZIP or its contributors be held liable for any direct, indirect, incidental, special or consequential damages arising out of the use of or inability to use this software. Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions:

Redistributions of source code must retain the above copyright notice, definition, disclaimer, and this list of conditions.

Redistributions in binary form (compiled executables) must reproduce the above copyright notice, definition, disclaimer, and this list of conditions in documentation and/or other materials provided with the distribution. The sole exception to this condition is redistribution of a standard UnZipSFX binary (including SFXWiz) as part of a self-extracting archive; that is permitted without inclusion of this license, as long as the normal SFX banner has not been removed from the binary or disabled.

Altered versions—including, but not limited to, ports to new operating systems, existing ports with new graphical interfaces, and dynamic, shared, or static library versions—must be plainly marked as such and must not be misrepresented as being the original source. Such altered versions also must not be misrepresented as being Info-ZIP releases—including, but not limited to, labeling of the altered versions with the names “Info-ZIP” (or any variation thereof, including, but not limited to, different capitalizations), “Pocket UnZip,” “WiZ” or “MacZip” without the explicit permission of Info-ZIP. Such altered versions are further prohibited from misrepresentative use of the Zip-Bugs or Info-ZIP email addresses or of the Info-ZIP URL(s).

Info-ZIP retains the right to use the names “Info-ZIP,” “Zip,” “UnZip,” “UnZipSFX,” “WiZ,” “Pocket UnZip,” “Pocket Zip,” and “MacZip” for its own source and binary releases.

This appendix explains how to install the VMware plug-in on a vSphere client. The basic SnapSAN Manager Suite installation is the same (see [“Installing SnapSAN Manager Suite Software” on page 3-1](#)) except for the choosing of components to install. Links to the software can be found at:

<http://docs.overlandstorage.com/snapsan>

Install SnapSAN Manager Suite

Follow the on-window instructions to install the software:

1. Launch the installation **software**.
2. Under the **Software** heading, click either the 32-bit or 64-bit link.
3. At the start window, click **Next**.
4. Review the license agreement, click the **box** to accept, and click **Next** to continue the installation.
5. At the Setup Type window, verify that all components are selected and click **Next**.
The installer recognizes it is on a VMware system and automatically activates the VMware plug-in option.
6. At the confirmation window, click **Install**.
The progress window is displayed with a Status bar showing the amount completed. It may take several minutes to complete the installation. When done, the Next button becomes active.
7. When the installation is complete, click **Next**.
8. At the completion window, click **Finish** to exit.

Install VMware Plug-in

1. Launch **vSphere Client**.
2. Go to **Plug-ins > Manage Plug-ins**.
3. Under the Available Plug-ins, locate the **SnapSAN Manager Suite**.

4. Locate and click the blue link **Download and Install** on the SnapSAN Manager Suite line.
5. When installed, locate the plug-in and click the **Disabled** link.
6. Change the status to **Enabled** and close.

Create Datastore

1. In the vSphere Client screen, click the new **SnapSAN** tab.
2. Click the **Create New iSCSI Datastore** option.
3. At the Appliance Type screen, click **Next**.
4. At the Select Cluster screen, select a **cluster** and click Next.
5. At the Select Hosts screen, select **all the hosts** that need to see the data.
6. At the Select Appliances screen:
 - a. Select one **appliance** for the data.
 - b. If using **mirroring**, select a second appliance.
Only two can be selected before the rest are grayed-out.
 - c. Click **Next**.
7. At the Properties screen:
 - a. Choose to automatically **name** the Datastore or enter your own name.
 - b. Select the **size** of the VMFS.
 - c. Click **Next**.
8. At the Ready to Complete screen, review your settings and click Finish.
Wait while the files are built. A small number of paths appear once the first side of the plex is done. After the second side is synchronized, more paths appear.

Overview

Volume Shadow Copy Service (VSS) is a feature that allows backups to be made while maintaining 24/7 access to a storage subsystem (the storage need not be taken off-line while backups are made). Each vendor of a storage solution can write their own “provider” that enables VSS to be used with their storage device.

The Overland Hardware Provider for VSS (called the VSS provider), enables the Microsoft VSS to be used with Overland storage arrays.

Theory of Operation

When setting up a system that makes use of the snapshot feature, you must create two separate arrays. One of these arrays holds the logical drive that contains the user’s data and is available as a standard volume within Windows. The second array is used to hold the snapshot data. Snapshot data is the data copied from the user volume at a specific point in the past.

When enabling the snapshot feature on the logical drive holding the users data, you must choose the area of the second array. The second array holds the snapshot data and will be made into an internally available logical drive.

When a snapshot is initiated using a Windows requester such as the Backup Utility, the following happens:

- I/O is temporarily frozen and cached data is written to the originating volume.
- VSS asks any registered providers if they support all of the parts of the selected volume. If a VSS provider responds in a positive way, then VSS commands the provider to start a snapshot.
- A command is then sent to the enclosure to tell it to perform the snapshot. All subsequent writes to the originating volume cause the data that is about to be overwritten to be copied to the snapshot area.
- After the snapshot has completed successfully, VSS waits for the Plug and Play device manager to recognize that a new device has arrived. This new device is the snapshot, itself. The snapshot is hidden, but you can expose and use it as a standard read-only volume at some future time. This allows you to see the volume as it was at the time of the snapshot and map it as a physical volume within the operating system.

Installation

System Requirements

Use of the Overland Hardware Provider for VSS requires the following:

Hardware Requirements

- Overland storage array
- Host Bus Adapter (HBA)
- A direct connection from the HBA to the storage array

Operating System Requirements

- 32-bit Intel-compatible
- 64-bit EM64T or AMD64 architecture running Windows Server 2003 R2 only.
- 64-bit IA-64 (Itanium) architecture running Windows Server 2003 Service Pack 2 only or Windows Server 2008 R2.

Software Requirements

The software must be installed on Windows Server 2003 (32- or 64-bit) with Service Pack 2 or later applied, or Windows Server 2008 R2 (64-bit).

Installation

1. Double-click the installer executable, which has a name resembling this form:
VSS_Hardware_Provider-Overland-0.0.x.xx.exe
2. Read the license agreement and click **I Agree** to accept to the terms and conditions.
3. Choose a destination folder for the application (or accept the default) and click **Install**.
A message indicates when the installation is complete.
4. When the installation finishes, click **Close** to dismiss the installation window.

Verifying the Installation

To verify that the installation was completely successful:

1. Click **Start > Control Panel > Administrative Tools > Services**.
2. In the Services screen, look for a service called Overland Storage VSS Provider. The Startup Type should be set to **Automatic**.
3. Start a Command Prompt window and type the following:
`vssadmin list providers`
4. Search through the output from the command. The service VSS Hardware Provider - Overland should be present in the output.
5. If the tests in [Step 2](#) and [Step 4](#) pass, the provider was installed correctly.

Uninstallation

An uninstall executable is provided in the following folder:

Program Files\VSS Hardware Provider – Overland

System Setup



IMPORTANT: Before using the Overland Hardware Provider for VSS to create shadow copies, it is essential that you perform the following steps.

NOTE: These steps can also be performed using an alternative method, such as the controller's TUI.

1. Create two arrays of any RAID level that are the same type.
2. Create at least one logical drive on the first array.
3. Create a SAN LUN mapping for each logical drive.



CAUTION: The Overland VSS provider cannot operate without SAN-mapped logical drives.

4. When the arrays have finished initializing, select each of the logical drives and Enable Snapshot. Select space on the second array for the snapshot data (ODA Size). It is suggested that the space on the second array be at least the same size as the logical drive you are protecting.
5. Open Disk Management from within the Computer Management application that comes with Windows 2003. If the logical drives cannot be seen, click **Action > Rescan Disks** to detect them.
6. Initialize each of the new disks.
7. Add partitions to the initialized disks.
8. Create logical drives on the partitions. Make sure drive letters are assigned and the drives are formatted with the NTFS file system.

You can now create snapshots on the Windows drives located on the Overland storage array using the VSS provider.

Using the Overland Hardware Provider for VSS

There are four applications that can communicate with VSS.

The following two applications do **not** use the hardware provider – they are configured to use an internal software provider:

- The vssadmin utility
- The Shadow Copy tabs in Windows Explorer's Properties window

The following two applications are recommended for use with the hardware provider:

- The vshadow command (part of the Microsoft VSS Software Development Kit).
- The Microsoft Backup application (found under **Accessories > System Tools**).

Creating a Snapshot

To issue a simple snapshot, type the following command:

```
vshadow -p <Drive Letter>
```

Where:

-p – Creates a persistent snapshot which can be viewed.

<Drive Letter> – The Windows label for a drive located on the storage array.

NOTE: If the **-p** is omitted, **vshadow** causes the snapshot to be deleted at completion of the command.

For example, to create a persistent snapshot on drive F:, the command is:

```
vshadow -p F
```

Listing Snapshots

To list all snapshots known to the system, type:

```
vshadow -q
```

Exposing a Snapshot

To expose a snapshot as a drive, making its contents available as if it were any other drive, type:

```
vshadow -el=<Snapshot ID>,<Drive Letter>
```

Where:

<Snapshot ID> – The identifier for the snapshot, including the braces: {}. This can be determined using the “vshadow -q” command.

<Drive Letter> – The Windows label for accessing the snapshot data.

The data is only available to read; data cannot be written to this drive.

For example, to expose the snapshot with ID {6a1c4c9d-3fd7-48dc-adfa-a35d1064f9f9} as drive letter G:

```
Vshadow -el={6a1c4c9d-3fd7-48dc-adfa-a35d1064f9f9},G:
```

Example Using VSS

1. Create a logical drive on the enclosure that can be snapshot. Assign it a drive letter, such as D:.
2. Store some files on this drive.
3. Create a persistent snapshot by typing:

```
vshadow -p D:
```

- Query all snapshots in the system and make sure that the command has completed successfully by typing:

```
vshadow -q
```

The output should look similar to the following:

```
Querying all shadow copies in the system...
* SNAPSHOT ID = {8fe7374f-c226-4516-b264-807b8fb5c042}...
  - Shadow copy Set: {fd10e62b-ad4f-41ab-b5dc-f7156acd4336}
  - Original count of shadow copies = 1
  - Original Volume name: \\?\Volume{06542530-17f6-11dc-ac00-0016763eb177}\ [D:\]
  - Creation Time: 11/06/2007 13:50:05
  - Shadow copy device name: \\?\Volume{0654253c-17f6-11dc-ac00-0016763eb177}
  - Originating machine: BlueBook
  - Service machine: BlueBook
  - Not Exposed
  - Provider id: {6a1c4c9d-3fd7-48dc-adfa-a35d1064f9f9}
  - Attributes: No_Auto_Release Persistent Hardware
```

- Delete some of the files from D:.
- Expose the snapshot. For example, to expose the snapshot as drive E:, type:

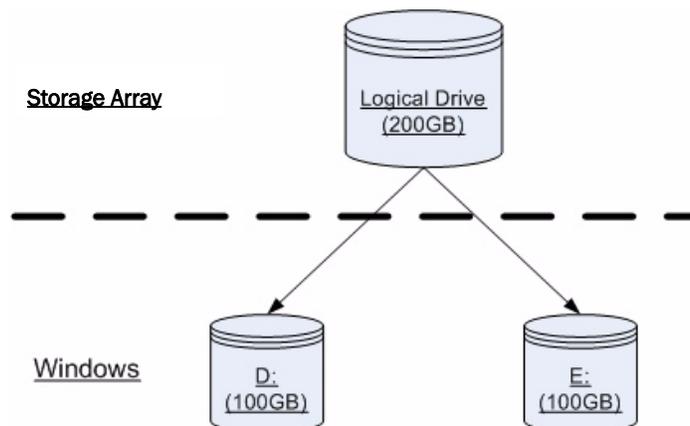
```
vshadow -el={8fe7374f-c226-4516-b264-807b8fb5c042},E:
```

- Retrieve the deleted files.

The E: drive has the same contents that the D: drive did at the point of the snapshot.

Storage Array Logical Drives versus Windows Volumes

There is, conceptually, a big difference between a logical drive created on the storage array and a volume created within Windows. Windows volumes are created using some or all of the space taken up by a logical drive. This can be a problem if using VSS and an Overland storage array together:



- A logical drive of 200GB is created and mapped on the enclosure.
- The user now creates two volumes with Windows Disk Manager, each of 100GB. These are assigned the drive letters D: and E:.

- The logical drive has snapshot enabled, which means both D: and E: are covered by a single snapshot or shadow copy command.
- The user uses D: and E: independently, creating shadow copies whenever necessary.
- At some point, the user has a problem with D: and decides to recover the D: drive using the snapback component because he does not want to individually recover files using VSS.
- Potentially, the snapback can cause data loss because the snapback initiated by the storage array recovers the whole of the logical drive to a specific point in time. This means both D: and E: are returned to that point in time, and updates to E: could be lost.

Because of the potential for data loss, you must be very careful when using the snapback component with Windows.

Use of VSS Tools

The vssadmin utility and the Shadow Copy tabs in Windows Explorer's Properties screen cannot be used with the Overland Hardware Provider for VSS. This is a limitation of Microsoft's implementation of VSS, rather than an issue with the hardware provider.

Breaking a Snapshot Set

It is possible to break a previously created snapshot from VSS using commands such as:

```
vshadow -b {snapshot set ID}
```

or:

```
vshadow -bw {snapshot set ID}
```

These commands separate the snapshot from VSS, and the operating system subsequently treats it as a volume. While this works using the Overland Hardware Provider for VSS, it is not recommended.



CAUTION: Using a previously created snapshot as a standalone writable volume is strongly discouraged.

Event Codes

The Overland Hardware Provider for VSS stores messages in the standard Windows event log to record any information or errors that may be of interest.

To view events:

1. In the Windows Control Panel, click **Administrative Tools > Event Viewer**.
2. Click the **Application** log to view system-level events.

Successful Messages

This table lists messages that indicate successful completion of a command:

Event Log Message	Explanation
Shadow copy created successfully	The shadow copy has been created successfully on the enclosure. No action is required.

Informational Messages

This table lists messages that are purely for information and require no intervention on the user's part:

Event Log Message	Explanation
Starting provider and loading into memory	The provider has been started successfully.
Stopping provider and unloading from memory	The provider has been stopped successfully.

Error Messages

This table lists messages that warn of situations that may require intervention:

Event Log Message	Explanation
Unable to read Controller information to determine if the LUN can be shadow copied	Communication problem. Check the connections and retry the command.
The controllers do not support shadow copy (snapshot). Please check firmware has a valid licence	Check that appropriate snapshot licensing is available for the RAID controller firmware installed.
Unable to determine which Logical Drive matches this LUN	Communication problem. Check the connections and retry the command.
Unable to read Overwrite Data Area (ODA) information from the controller to determine if the logical drive can be shadow copied	Communication problem. Check the connections and retry the command.
Unable to read Overwrite Data Area (ODA) stats information from the controller to determine if the logical drive can be shadow copied	Communication problem. Check the connections and retry the command.
Unable to read configuration information from the controller to determine if the logical drive is mapped	Communication problem. Check the connections and retry the command.
SAN Mapping does not appear to have been setup for this logical drive. Please add mappings before continuing	SAN mapping must be applied to the Logical Drive in order for it to be shadow copied. Please add an appropriate mapping before continuing.

Event Log Message	Explanation
Unable to perform a shadow copy as the maximum number supported by the controller has been reached	The user has reached the maximum number of snapshots for which the Snapshot component is licensed. Contact Overland Storage for a license key.
Unable to perform shadow copy as the Overwrite Data Area (ODA) is invalid or full	Space available for snapshots is now full and potentially invalid. Delete all snapshots to continue.
Device does not match any previously discovered devices	Communication problem. Check the connections and retry the command.
Unable to allocate memory for current configuration structure within LocateLuns()	Internal provider memory error. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
Unable to create mapping for shadow copy (start new config)	Communication problem. Check the connections and retry the command.
Unable to create mapping for shadow copy (Delete mapping failed)	Communication problem. Check the connections and retry the command.
Unable to create mapping for shadow copy (Add mapping failed)	Communication problem. Check the connections and retry the command.
Unable to create mapping for shadow copy (Save config failed)	Communication problem. Check the connections and retry the command.
Unable to delete snapshot	Communication problem. Check the connections and retry the command.
Unexpected snapshot set ID during EndPrepareSnapshots	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
EndPrepareSnapshots called out of sequence	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
Unexpected snapshot set ID during PreCommitSnapshots	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
PreCommitSnapshots called out of sequence	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
Unexpected snapshot set ID during CommitSnapshots	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
CommitSnapshots called out of sequence	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
Failed to create a shadow copy of the chosen logical drive	Communication problem. Check the connections and retry the command.
Unexpected snapshot set ID during PostCommitSnapshots	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.

Event Log Message	Explanation
PostCommitSnapshots called out of sequence	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
Unable to allocate memory for current configuration structure in FindLunUsingLunReference()	Internal Microsoft Windows VSS Problem. Using Windows Services, stop the Overland Hardware Provider for VSS and restart it. Retry the command.
Unsupported Operating System detected during GetTargetLuns	The provider only supports Windows 2003.

Overview



IMPORTANT: The optional licenses for replication and mirroring must be activated on **two different** SnapSAN S2000 appliances before a mirror can be created.

This section provides an example of how to set up a mirror plex between two S2000 appliances. The primary S2000 is where the original data is stored. The secondary S2000 is the plex where the same data is mirrored.

Procedure

1. In a browser, open a Web Management Interface window for **each appliance**.
2. For each appliance, set the **Neutral Storage Host** to the same host:
 - a. Click the **Pools tab** to go to the Storage Pools default page.
 - b. Click the **Set Neutral Storage Host** action item.
 - c. Choose the **same** Neutral Storage Host for each appliance.

NOTE: A Neutral Storage Host is any Windows computer which has the SnapSAN Manager Suite installed on it. A Neutral Storage Host is required to arbitrate the correct state of a mirror, should one of the plexes suffer from a failure.

3. At the **Source** appliance, create a **target** on the appliance's existing storage pool:
 - a. Select the **Targets tab**.
 - b. Click the **Create Target** action item.
 - c. Enter a **Target Name** for the pool.
 - d. Select a New or Existing **Initiator IQN**.
 - e. Optionally, enable **CHAP Authentication**.
 - f. Select the **Pool** from the drop-down list.
Refer to the Pool Information at the bottom to determine which storage pool you want to use.
 - g. Enter a **Size (GB)** for the mirror plex.

Overland Glossary & Acronym List

NOTE: This is a general Overland Storage glossary and acronym list. Not all items may be found in this document or be used by this product.

1000BASE-T

1000BASE-T (also known as IEEE 802.3ab) is a standard for gigabit Ethernet over copper wiring. It requires, at a minimum, Category 5 cable (the same as 100BASE-TX), but Category 5e (Category 5 enhanced) and Category 6 cable may also be used and are often recommended. 1000BASE-T requires all four pairs to be present and is far less tolerant of poorly installed wiring than 100BASE-TX.

ACL

Access Control List. Shows the iSCSI initiators that are allowed to access the target.

Address

An address is a data structure or logical convention used to identify a unique entity, such as a particular process or network device.

ATA

Short for *Advanced Technology Attachment*. A standard interface for connecting storage devices to a PC.

Auto Balance

A feature that automatically balances preferred paths evenly among all available host ports and controller ports. Auto balancing spreads I/O load by utilizing as many host ports and controller ports as possible.

Back-end

Front-end and back-end are terms used to characterize program interfaces and services relative to the initial user, human or program, of these interfaces and services. A “front-end” application is one that application users interact with directly. A “back-end” application or program serves indirectly in support of the front-end services, usually by being closer to the required resource or having the capability to communicate with the required resource. The back-end application may interact directly with the front-end or, perhaps more typically, is a program called from an intermediate program that mediates front-end and back-end activities.

Bar Code

The machine-readable representation of a product code. Bar codes are read by a scanner that passes over the code and registers the product code. The width of black lines and white spaces between varies. Combinations of lines and spaces represent characters. Overland uses 3-of-9 code (Code 39) where each character is represented by 9 bars, 3 of which are wide.

Bridging

Devices that connect and pass packets between two network segments that use different communications protocol.

Bus or Channel

A common physical path composed of wires or other media, across which signals are sent from one part of a computer to another. A channel is a means of transferring data between modules and adapters, or between an adapter and SCSI devices. A channel topology network consists of a single cable trunk that connects one workstation to the next in a daisy-chain configuration. All nodes share the same medium, and only one node can broadcast messages at a time.

CA

Short for *Certificate Authority*. A trusted third-party in a network that issues and manages security credentials.

Cat 5 Cable

Short for *Category 5*, it is network cabling that consists of four twisted pairs of copper wire terminated by 8P8C modular connectors. CAT 5 cabling supports frequencies up to 100 MHz and speeds up to 100 Mbps. It can be used for ATM, token ring, 100BASE-T, and 10BASE-T networking.

Cat 5 is based on the EIA/TIA 568 Commercial Building Telecommunications Wiring Standard developed by the Electronics Industries Association as requested by the Computer Communications Industry Association in 1985.

Cat 6 Cable

Short for *Category 6*, it is network cabling that consists of four twisted pairs of copper wire terminated by 8P8C modular connectors made to higher standards that help reduce noise caused by crosstalk and system noise. The ANSI/TIA-568-B.2-1 specification states the cable may be made with 22 to 24 AWG gauge wire, so long as the cable meets the specified testing standards.

It is designed for Gigabit Ethernet that is backward compatible with the Category 5/5e and Category 3 cable standards. Cat 6 features more stringent specifications for crosstalk and system noise. The cable standard provides performance of up to 250 MHz and is suitable for 10BASE-T / 100BASE-TX and 1000BASE-T (Gigabit Ethernet).

DHCP

Short for *Dynamic Host Configuration Protocol*. A mechanism for assigning unique IP addresses to network nodes.

DNS

Short for *Domain Name Service*. A network service that translates domain names into IP addresses.

DSM

Short for *Device Specific Module*, it is a software module that allows RAID storage array hardware to use Microsoft's MPIO.

Expansion Slot

Area in a computer that accepts additional input/output boards to increase the capability of the computer.

F_port

A *Fabric* port within a Fibre Channel switch that provides a point-to-point link attachment to a single N_Port. F_Ports are intermediate ports in virtual point-to-point links between end ports, for example N_Port to F_Port to F_Port to N_Port using a single Fibre Channel fabric switch.

Failback

Failback occurs when a path with a higher priority than the currently active path is restored. In this case, I/O will “fail back” to the higher priority path once it is available again.

Failover

The ability to automatically substitute a working system or path for one which has failed.

Failover/Failback

A combination of Failover and Failback. When a preferred path becomes unavailable, another path is used to route I/O until the preferred path is restored. In this case I/O will “fail back” to the preferred path once it is available again.

FC-AL

Short for *Fibre Channel Arbitrated Loop*. An FC-AL is a Fibre Channel network in which up to 126 systems and devices are connected in a loop topology, with each transmitter connecting to the receiver of the device on its logical right. The Fibre Channel Arbitrated Loop protocol used for transmission is different from Fibre Channel switched and point-to-point protocols. Multiple FC-AL loops can be connected via a fabric switch to extend the network.

Fibre Channel

Fibre Channel (FC) is a gigabit-speed network technology which transports SCSI commands over Fibre Channel networks. Fibre Channel was primarily concerned with simplifying the connections and increasing distances, but later designers added the goals of connecting SCSI disk storage, providing higher speeds and far greater numbers of connected devices.

Firmware

Software stored in read-only memory (ROM) or programmable ROM (PROM). Firmware is often responsible for the behavior of a system when it is first switched on.

FL_port

A *Fabric Loop* port within a Fibre Channel switch that is capable of Fibre Channel Arbitrated Loop operations and is connected to one or more NL_Ports via a Fibre Channel Arbitrated Loop. An FL_Port becomes a shared entry point for public

NL_Port devices to a Fibre Channel fabric. FL_Ports are intermediate ports in virtual point-to-point links between end ports that do not reside on the same loop, for example NL_Port to FL_Port to F_Port to N_Port through a single Fibre Channel fabric switch.

Front-end

See [Back-end](#).

Gigabit Ethernet

Also known as GigE or GbE, this Ethernet standard uses a one Gigahertz (1000 Hz) clock rate to move data.

HBA

Short for *Host Bus Adapter*. An HBA is an I/O adapter that sits between the host computer's bus and the Fibre Channel loop and manages the transfer of information between the two channels. In order to minimize the impact on host processor performance, the HBA performs many low-level interface functions automatically or with minimal processor involvement.

Hot Swap

The action of components being removed and replaced while the unit is running, with power to either the component or a device still connected to the unit. Not all components are hot swappable. Please read installation and maintenance instructions carefully.

IDE

Short for *Integrated Drive Electronics*. A standard interface for connecting storage devices to a PC

Internet

A global network of networks used to exchange information using the TCP/IP protocol. It allows for electronic mail and the accessing and retrieval of information from remote sources.

Initiator Device

A system component that originates an I/O command over an I/O bus or network. An initiator issues the commands; a *target* receives them.

An initiator normally runs on a host computer. It may be either a software driver or a hardware plug-in card, often called a Host Bus Adapter (HBA). A software initiator uses one of the computer's Ethernet ports for its physical connection, whereas the HBA will have its own dedicated port.

Software initiators are readily available for most host operating systems. Hardware initiators are not widely used, although they may be useful in very high performance applications or if 10 Gigabit Ethernet support is required.

IP

Short for *Internet Protocol*. IP specifies the format of packets and the addressing scheme.

IQN

Short for *iSCSI Qualified Name*. A name format used in the iSCSI protocol.

Initiators and targets have IP addresses, just like any other network entity. They are also identified using an iSCSI name, called the iSCSI Qualified Name (IQN). The IQN should be unique world-wide. It is made up of a number of components, specifying the date, identifying the vendor in reverse format, and then uniquely identifying the initiator or target. An example of an IQN is:

```
iqn.2001-04.com.example:storage:diskarray-sn-123456789
```

Since these IQNs are rather unwieldy, initiators and targets also use short, user friendly names (sometimes called alias names or just aliases).

iSCSI

Short for *Internet SCSI*. iSCSI is an IP-based storage networking standard for linking data storage facilities, developed by the Internet Engineering Task Force (IETF). By carrying SCSI commands over IP networks, iSCSI is used to facilitate data transfers over intranets and to manage storage over long distances. The iSCSI protocol is among the key technologies expected to help bring about rapid development of the storage area network (SAN) market, by increasing the capabilities and performance of storage data transmission. Because of the ubiquity of IP networks, iSCSI can be used to transmit data over local area networks (LANs), wide area networks (WANs), or the Internet and can enable location-independent data storage and retrieval.

iSNS Server

Short for *Internet Storage Name Service Server*. A protocol enabling the automatic discovery, configuration, and management of iSCSI devices on a TCP/IP network.

LAN

Short for *Local Area Network*. A network connecting computers in a relatively small area such as a building.

LED

Short for *Light-Emitting Diode*. An LED is a type of diode that emits light when current passes through it. Visible LEDs are used as indicator lights on electronic devices.

LUN

Short for *Logical Unit Number*. A SCSI or Fibre Channel device identifier. LUN is a subdivision of a SCSI target.

MAC Address

Short for *Media Access Control address*, a hardware address that uniquely identifies each node of a network.

Mapping table

A table indexed by sequential LUN values, indicating the selected BUS:TARGET:LUN devices. Mapping tables are used by routers and bridges like the GEOi to perform Ethernet-to-SCSI pathing.

MD5 Algorithm

MD5 is a way to verify data integrity, and is much more reliable than checksum and many other commonly used methods.

MPIO

Short for *Multipath Input/Output*. A multipath solution built into Microsoft server-grade operating systems. It requires the DSM to work with RAID storage array hardware.

MTU

Short for *Maximum Transfer Unit*. It is the largest size packet or frame, specified in octets (eight-bit bytes), that can be sent in a packet- or frame-based network.

N_port

A *Node* port connects via a point-to-point link to either a single N_Port or a single F_Port. N_Ports handle creation, detection, and flow of message units to and from the connected systems. N_Ports are end ports in virtual point-to-point links through a fabric, for example N_Port to F_Port to F_Port to N_Port using a single Fibre Channel fabric switch.

NAS

Short for *Network Attached Storage*. Data storage connected to a network that provides network clients access to data using file-level protocols.

NAT

Short for *Network Address Translation*. A technique for passing network traffic through a router whereby one set of IP addresses is used on one side of the router and another set of addresses is used on the other side. This is done to avoid address conflicts and to increase the address space of the internal network.

Network Interface Card (NIC)

A board that provides network communication capabilities to and from a computer.

NDMP

Short for *Network Data Management Protocol*. A protocol standard used by some Network Attached Storage systems to provide an industry standard means to do backup and restores of the NAS system without the need for 3rd party agents to be installed on the NAS device. Also see NDMP.org for further details.

NL_port

A *Node Loop* port is capable of arbitrated loop functions and protocols. An NL_Port connects via an arbitrated loop to other NL_Port and at most a single FL_Port. NL_Ports handle creation, detection, and flow of message units to and from the connected systems. NL_Ports are end ports in virtual point-to-point links through a fabric, for example NL_Port to F_Port to F_Port to N_Port using a single Fibre Channel fabric switch. In the absence of a fabric switch FL_Port, NL_Ports can communicate with other NL_Ports in virtual point-to-point links through a FC-AL open loop circuit often through FC-AL (Arbitrated Loop) hub or loop switch devices.

Node Name

This is an eight-byte, 16-character hexadecimal number, uniquely identifying a single fibre device. It incorporates the World Wide Name and two additional bytes that are used to specify the format. In a host system with multiple FC ports, all adapters typically use the same Node Name, but unique Port Names.

NTFS

Short for *New Technology File System*. The standard file system used by Windows NT and later versions of the Windows operating system.

NTP

Short for *Network Time Protocol*. A protocol for synchronizing the system clocks of computers over a packet-switched network.

NVRAM

Abbreviation of *Non-Volatile Random Access Memory*, a type of memory that retains its contents when power is turned off.

Port Name

This is an eight-byte hexadecimal number, uniquely identifying a single host [HBA](#) port. It incorporates the World Wide Name and two additional bytes that are used to specify the format and indicate the port number.

Portal

A target's IP address together with its TCP port number.

Preferred Path

The preferred path is the default path. When the path selection policy is set to Failover/Failback, the preferred path is always used if it is available. If the preferred path fails, I/O switches to another path. If it is later restored, I/O switches back to the preferred path.

PTP

Short for *Point-to-Point*. PTP is the common mode of attachment to a single host. PTP is sometimes used to attach to a Fibre Channel switch for [SAN](#) connectivity.

RETMA

Short for *Radio-Electronics-Television Manufacturers' Association*. It is the common name given for a 19-inch distribution frame rack for mounting components.

Round Robin

The Round Robin path selection policy causes all healthy paths to be used for I/O. Paths are used in a round-robin order.

Router

A router is a device that enables connectivity between Ethernet network segments.

SAN

Short for *Storage Area Network*. Data storage connected to a network that provides network clients access to data using block level protocols. To the clients, the data storage devices appear local rather than remote. An iSCSI SAN is sometimes referred to as an IP-SAN.

SAS

Short for *Serial Attached SCSI*. It is a point-to-point serial protocol that replaces parallel SCSI bus technology (multidrop) and uses the standard SCSI command set. It has no termination issues, supports up to 16,384 devices (using expanders), and eliminates clock skew. It consists of an Initiator that originates device service requests, a Target containing logical units that receives device service requests, and a Service Delivery Subsystem that transmits information between the Initiator and the Target.

SCSI

Short for *Small Computer System Interface*. SCSI is an industry standard for connecting peripheral devices and their controllers to an initiator. Storage devices are daisy-chained together and connected to a host adapter. The host adapter provides a shared bus that attached peripherals use to pass data to and from the host system. Examples of devices attached to the adapter include disk drives, CD-ROM discs, optical disks, and tape drives. In theory, any SCSI device can be plugged into any SCSI controller.

SCSI addressing

Each device supported by a SCSI adapter has its own unique SCSI address, which dictates the device's priority when arbitrating for access to the SCSI bus. A SCSI address of 7 has the highest priority. For a fast/wide SCSI adapter that supports up to 16 devices, the next highest priority address is 6, then 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, and 8. The narrow SCSI adapter supports up to eight devices, including itself. The SCSI address 7 has the highest priority, followed by 6, 5, 4, 3, 2, 1, and 0.

SCSI bus

A SCSI bus provides a means of transferring data between SCSI devices. A SCSI bus is either an 8- or 16-bit bus that supports up to 8 or 16 devices, including itself. The bus can consist of any mix of initiators and targets, with the requirement that at least one initiator and one target must be present.

SCSI device

A SCSI device is a single unit on a SCSI bus that originates or services SCSI commands. A SCSI device is identified by a unique SCSI address. SCSI devices can act as initiators or targets.

SCSI port

A SCSI port is an opening at the back of a router that provides connection between the SCSI adapter and SCSI bus.

Session

When an initiator wants to establish a connection with a target, it establishes what is known as an iSCSI session. A session consists of one or more TCP/IP connections between an initiator and a target. Sessions are normally established (or re-established) automatically when the host computer starts up, although they also can be established (and broken) manually.

SMS

Short for *Short Message Service*. Is a means of sending short text messages to a mobile phone.

SMTP

Short for *Simple Mail Transfer Protocol*. A TCP/IP protocol used for sending and receiving email.

SSL

Short for *Secure Sockets Layer*. A protocol for managing the security of a message sent on the Internet.

Storage Area Network

See [SAN](#).

Target

A target is a device (peripheral) that responds to an operation requested by an initiator (host system). Although peripherals are generally targets, a peripheral may be required to act temporarily as an initiator for some commands (for example, SCSI COPY command).

Targets are embedded in iSCSI storage controllers. They are the software that makes the RAID storage available to host computers, making it appear just like any other sort of disk drive.

TCP/IP

Short for *Transmission Control Protocol/Internet Protocol*. The basic protocol used for data transmission over the Internet.

Telco

Short for *Telephone Company*. When used in reference to a rack, it refers to the two-posted, light-weight rack for center-mounted appliances.

Telnet

A terminal emulation program for TCP/IP networks such as the Internet. The Telnet program runs on a computer and connects it to a server on the network. You enter commands through the Telnet program and they will be executed as if you were entering them directly on the server console. This enables you to control the server and communicate with other servers on the network. To start a Telnet session, you must log in to a server by entering a valid user name and password. Telnet is a common way to remotely control Web servers.

Terminator

A terminator refers to the electrical connection at each end of a SCSI bus. The terminator is composed of a set of resistors, or possibly other components. The function of a terminator is to provide a pull-up for open collector drivers on the bus, and also impedance matching to prevent signal reflections at the ends of the cable. SCSI buses require that a terminator be placed on the SCSI connector on the last SCSI peripheral. Data errors may occur in a SCSI bus that is not terminated.

TOE (TCP Offload Engine)

Short for *TCP Offload Engine*. TOE is a technology used in network interface cards to offload processing of the entire TCP/IP stack to the network controller. It is primarily used with high-speed network interfaces, such as gigabit Ethernet and 10 gigabit Ethernet, where processing overhead of the network stack becomes significant.

Topology

Logical layout of the parts of a computer system or network and their interconnections. There are two types of topology: physical and logical. The physical topology of a network refers to the configuration of cables, computers, and other peripherals. Logical topology is the method used to pass the information between workstations.

UDP

Short for *User Datagram Protocol*. A communications protocol for sending messages between computers in a network that uses the Internet Protocol (IP). UDP is an alternative to the Transmission Control Protocol but, unlike TCP, does not guarantee reliability or ordering of data packets.

USB (Universal Serial Bus) Port

A hardware interface for low-speed peripherals such as the keyboard, mouse, joystick, scanner, printer, and telephony devices.

VLAN

Short for *Virtual LAN*. It consists of a network of computers that behave as if they are connected to the same wire - even though they may actually be physically connected to different segments of a LAN.

Symbols

> (flow indicator) **PR-iv**

A

ACL **8-26**
 activate features **8-10**
 activate warranty **2-1**
 Active Sessions **8-26**
 Add ACL Entry Replicant page **8-67**
 Add ACL Entry to Target page **8-30**
 Add Event Notification page **8-63**
 Add Global Hot Spare page **8-51**
 add host to ACL **7-12**
 Add Initiator to Target page **8-33**
 Add Mirror Plex to Target page **8-40**
 Add Replicant Host to Target page **8-36**
 Add Static Discovery Entry page **8-15**
 administering the network **7-28**
 Advanced, Network Connections screen **7-30**
 alarms, enabling/silencing **7-6, 8-46**
 appliance
 activation status **3-14**
 configuration **3-5, 3-13**
 events **7-37**
 hard disks **7-3**
 hardware **7-36**
 initiators **7-40**
 management **7-1, 7-2**
 networks **7-28**
 notification **7-41**
 pools **7-4**
 properties **7-34**
 replicas **7-23**
 services **7-38**
 statistics **7-43**
 targets **7-10**
 Appliances view **7-1**
 authentication change **8-27**
 automatic disk extension **5-12**

B

backup types
 mirrors **4-7**
 replicas **4-5**
 snapshots **4-5**
 battery test **8-46**
 break local plex **8-43**
 Break Mirror Plex page **8-43**

C

CA certificate **3-13**
 capacity markers **8-57**
 Categories
 Events **7-37**
 Hard Disks **7-3**
 Hardware Monitoring **7-36**
 Identification & Services **7-38**
 Initiators **7-40**
 Network **7-28**
 Notification **7-41**
 Properties **7-34**
 SAN Pools **7-4**
 SAN Targets **7-10**
 Statistics **7-43**
 Storage Replicas **7-23**
 change journal drive **8-53**
 Change Management Plex page **8-43**
 CHAP
 edit secret **8-31**
 manual setup **8-27**
 CHAP authentication **5-5**
 Clear Events page **8-61**
 Clear System Status page **8-65**
 components **1-1**
 configure a replicant volume **8-69**
 conventions, typographical **PR-iv**
 create a mirror **8-40**
 create a SnapSAN disk **4-2, 5-4**
 create a SnapSAN pool **7-8**

Create Network Interface page 8-18
 Create Network Route page 8-21
 Create Replicant Volume page 8-68
 Create Snapshot Target page 8-35
 Create Storage Pool page 8-50
 Create Target on Pool_name page 8-45
 Create Target page 8-32
 customer support PR-iii

D

dataflow 5-9
 Delete Network Interface page 8-20
 Delete Storage Pool page 8-55
 destroy plex 8-43
 Device Information page 8-59
 Devices page 8-58
 Devices tab 8-57
 DHCP IP address 3-12
 disable pool cache 8-56
 discovery entry 6-4
 Discovery Entry Information page 8-15
 Discovery page 8-14
 disk drive information 8-59
 disk pool creation 7-8
 disk replication 4-5, 5-12, 5-14
 DNS server change 8-21
 DNS view 7-32
 domain name change 8-21

E

Edit Network Device page 8-17
 Edit Network Interface page 8-19
 Edit Replicant ACL Entry page 8-73
 Edit Replicant Host Details page 8-39
 Edit Target ACL Entry page 8-31
 electrostatic discharge 2-3
 Enable Automatic Rediscovery box 6-3
 Enable Broadcast Discovery box 6-3
 enable pool cache 8-56
 errors 7-37
 EULA 3-13
 event notification
 add user 8-63
 delete user 8-64
 setup 8-62
 Event Notification page 8-61
 event types 8-60
 events 7-37
 Events page 8-60

Events tab 8-59
 expand capacity B-1
 expansion arrays B-1
 Extend Target page 8-28

F

fan speeds 8-6
 feature activation 8-10
 flow indicator PR-iv
 front panel 2-3

G

Global Hot Spare
 add 8-51
 definition 8-47
 remove 8-52
 group appliances 6-2

H

hard disks 7-3
 hardware monitoring 7-36
 Hardware Sensors Information page 8-6
 home page 8-3
 Home tab 8-3
 Hostname 8-12
 hostname change 8-21

I

icons
 padlock 7-2
 warning (!) 7-2
 Identification & Services view 7-38
 import data by USB 8-70
 Import Recovery Point from USB page 8-70
 initiator IQN, define 8-33
 initiator removal 8-34
 initiators 7-40
 iSCSI initiator 3-1
 iSCSI session 8-25
 iSCSI target 7-10
 iSCSI volumes 7-4, 7-10
 iSNS server 7-38, 8-12
 iSNS server change 8-21

J

journal drive 4-5, 8-26, 8-36, 8-52
 jumbo frames 7-30

L

LEDs 2-3
 license agreement 3-13
 License Key 8-10
 licenses C-1
 Linux replication scheduling 5-22
 lock icon 7-2
 login dialog box 3-13

M

manage a replicated disk 5-16
 Manage Appliance option 7-2
 manage network targets 7-28
 manage options
 events 7-37
 hard disks 7-3
 hardware 7-36
 initiators 7-40
 notification 7-41
 pools 7-4
 properties 7-34
 replicas 7-23
 services 7-38
 statistics 7-43
 targets 7-10
 manage SAN disk 5-10
 management plex 8-43
 manual import 8-45
 mapped target 8-66
 mappings
 definition 5-21
 destroy 5-21
 disk renaming 5-22
 manage 5-21
 Mappings screen 5-22
 mirror creation 8-40
 mirroring
 definitions 4-7
 procedure 4-8, 8-40
 Mirroring tab options 5-7
 MPIO tab options 5-8
 MTU 8-17
 multipath dataflow 5-9
 multiple paths 5-18

N

Nameserver 8-12
 network administration 7-28
 Network Device Information page 8-16
 Network Edit page

change DNS server 8-21
 change domain name 8-21
 change hostname 8-21
 change iSNS server 8-21
 change NTP server 8-21
 change SAN name 8-21

Network Information page 8-12
 network name 3-12
 Network Ping page 8-22
 Network Properties window 6-1
 Network Route Create page 8-21
 Network Route Information page 8-20
 Network tab 8-11
 Network Traceroute page 8-23
 Neutral Storage Hosts 8-54, F-1
 notification 7-41
 NTP server
 definition 8-12
 settings 7-38, 8-9, 8-21

O

Overland Technical Support PR-iii

P

padlock icon 7-2
 Partitioning tab options 5-7
 password 8-7
 changing 7-38
 default 3-13
 paths 5-18
 PCs and Servers 5-1
 plex management host 8-43
 plex removal 8-42
 pool creation 7-8
 pool delete 8-55
 Pool Information page 8-49
 Pool Markers page 8-57
 Pools tab 8-46
 pools, storage 8-46
 Portal Groups 8-26
 power switch 2-3
 product description 1-1
 product documentation PR-iii
 properties 7-34
 Properties & Scheduler screen 5-22
 Properties, Network Connections screen 7-29

R

RAID types supported 3-8, 3-18, 7-4

- recovery point creation 5-16
 - Recovery Point Creation page 8-44
 - recovery points 8-72
 - refresh storage space 8-46
 - Remove Event Notification page 8-64
 - Remove Global Hot Spare page 8-52
 - Remove Initiator page 8-34
 - remove journal drive 8-53
 - Remove Mirror Plex page 8-42
 - Remove Replicant ACL Entry page 8-73
 - Remove Target ACL Entry page 8-31
 - rename a disk 5-11
 - replica
 - destination 7-17, 8-36
 - destroying 5-19
 - information 8-38
 - managing 5-19
 - mapping 8-72
 - new disk replica 4-5, 5-12, 5-14
 - recovery point 5-20
 - removing 8-70
 - using 4-5
 - Replicant ACL Entry page 8-74
 - replicant host 8-39
 - Replicant Information page 8-65
 - Replicant Replica View page 8-70
 - Replicant Settings page 8-67
 - Replicant tab 8-65
 - replicant volume
 - configuration 8-69
 - Replicant Volume Edit page 8-71
 - Replicant Volume Remove page 8-72
 - Replicant Volume View page 8-69
 - replicas
 - viewing 5-19
 - replicated disk management 5-16
 - replicating volumes 7-23
 - replication procedure 4-5, 5-12, 5-14
 - replication storage journal 4-5
 - Replication tab options 5-6
 - Routing view 7-33
- S**
- SAN disk
 - extending 5-12
 - managing 5-10
 - renaming 5-11
 - SAN Manager Suite
 - installation 3-1
 - SAN name change 8-21
 - SAN Name 8-12
 - scheduling replication 5-22
 - Secure Authentication Certificate page 8-11
 - sensors 8-6
 - session, iSCSI 8-25
 - Set Admin Password page 8-7
 - Set Neutral Storage Host page 8-54
 - Set Pool Cache page 8-56
 - Set System Date & Time page 8-9
 - SnapSAN disk
 - creation 5-4
 - SnapSAN disk, creating 4-2
 - SnapSAN Manager Suite
 - installation 3-5
 - overview 1-1
 - SnapSAN pool creation 7-8
 - SnapServer Manager (SSM) A-1
 - snapshot 4-4
 - snapshot creation 8-35
 - snapshots 4-5
 - software update PR-iii
 - star rating 5-4
 - static IP address 3-11, 8-15
 - statistics 7-43
 - Statistics, Network Connections screen 7-31
 - storage groups 6-2
 - Storage Journal Configuration page 8-52
 - storage pool, create 8-50
 - storage pools 7-4
 - Storage Pools tab 8-46
 - Subsystem Information page 8-48
 - Subsystem Rescan page 8-55
 - superscript S 6-3
 - System Configuration page 8-5
 - System Diagnostics page 8-8
 - System Firmware Upgrade page 8-6
 - System Information page 8-4
 - System License page 8-10
 - System Power page 8-7
 - System tab 8-3
- T**
- Target ACL Entry page 8-30
 - Target Disable/Enable page 8-29
 - Target Edit page 8-27
 - Target Information page 8-25
 - Target Initiator View page 8-34
 - target name 8-24
 - Target Portal Groups 8-18
 - Target Replica Host Information page 8-38
 - Target Replica Remove page 8-40

targets **7-10**
 Targets tab **8-24**
 technical support **PR-iii**
 temperature sensors **8-7**
 third-party software **C-1**
 troubleshooting **8-8**
 TXQLEN **8-17**
 type of authentication **8-24**
 types of events **8-2**
 typographical conventions **PR-iv**

U

USB data import **8-70**
 USB data transfer **8-45**
 user interface preferences **6-5**
 user name **3-13**

V

VMware ESX **8-33, 8-36**

W

warning icon (!) **7-2**
 warranty support **2-1**
 Web Management Interface

- Devices tab **8-57**
- Events tab **8-59**
- Home tab (default) **8-3**
- Network tab **8-11**
- overview **1-2, 8-2**
- Replicant tab **8-65**
- starting **8-1**
- supported browsers **3-10**
- System tab **8-3**
- Targets tab **8-24**
- using for configuration **3-13**

 Windows SnapSAN Manager

- configuration steps **3-5**
- overview **1-2, 4-1**