

iSCSI AIX® Host Utilities 5.0

Installation and Setup Guide

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Preface

About this guide

This guide describes how to configure the iSCSI initiator included in the AIX operating system. It also describes how to configure a NetApp storage system to work with an AIX host and how to access the storage system LUNs as disks on the host.

See the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do> for information on the specific AIX versions supported, including required technology levels and PTFs.

Audience

This guide is for administrators of AIX hosts and NetApp storage systems.

Terminology

This guide uses the following terms:

- ◆ NetApp storage products (filers, FAS appliances, and NearStore systems) are all storage systems and are also sometimes called filers or storage appliances.
- ◆ *FC* refers to Fibre Channel.
- ◆ *LUN* (Logical Unit Number) refers to a logical unit of storage identified by a number.
- ◆ *LUN ID* refers to the numerical identifier for a LUN.
- ◆ *Initiator* refers to the system component that originates an I/O command over an I/O bus or network.
- ◆ *Target* refers to the storage system that receives an I/O request and serves the data requested by the initiator.

Command conventions

You can enter storage system commands on the system console or from any client that can obtain access to the storage system using a Telnet session.

Formatting conventions

The following table lists different character formats used in this guide to set off special information.

Formatting convention	Type of information
<i>Italic type</i>	◆ Words or characters that require special attention. ◆ Placeholders for information you must supply. For example, if the guide requires you to enter the <code>fcstest adaptername</code> command, you enter the characters “fcstest” followed by the actual name of the adapter. ◆ Book titles in cross-references.
Monospaced font	◆ Command and daemon names. ◆ Information displayed on the system console or other computer monitors. ◆ The contents of files.
Bold monospaced font	Words or characters you type. What you type is always shown in lowercase letters, unless your program is case-sensitive and uppercase letters are necessary for it to work properly.

Keyboard conventions

This guide uses capitalization and some abbreviations to refer to the keys on the keyboard. The keys on your keyboard might not be labeled exactly as they are in this guide.

What is in this guide...	What it means...
hyphen (-)	Used to separate individual keys. For example, Ctrl-D means holding down the Ctrl key while pressing the D key.
<i>Enter, enter</i>	Used to refer to the key that generates a carriage return; the key is named Return on some keyboards. Also used to mean pressing one or more keys and then pressing the Enter key.
<i>type</i>	Used to mean pressing one or more keys on the keyboard.

Special messages

This guide contains special messages that are described as follows:

Note

A note contains important information that helps you install or operate the system efficiently.

Attention

An attention contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

How to send your comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have comments or suggestions for improving this publication, you can send comments electronically to docomments@netapp.com. To help direct the comments to the correct division, please put iSCSI AIX 5.0 in the subject line.

About this chapter

This chapter provides a brief overview of the installation process and the tasks you need to complete before you install the Host Utilities.

Topics in this chapter

This chapter includes the following topics:

- ◆ [“iSCSI AIX Host Utilities overview”](#) on page 2
- ◆ [“Supported AIX, Data ONTAP features, configurations”](#) on page 4
- ◆ [“iSCSI AIX Host Utilities installation and setup overview”](#) on page 8
- ◆ [“Where to go for additional information”](#) on page 10

iSCSI AIX Host Utilities overview

Important information about Host Utilities

The Host Utilities provide components that enable users to connect AIX hosts to NetApp storage systems. They support several different AIX environments:

- ◆ **(Fibre Channel Protocol only)** Veritas. This environment uses Veritas Storage Foundation to provide volume management and multipathing. For multipathing, it uses Veritas Dynamic Multipathing (DMP).
- ◆ **(iSCSI and Fibre Channel Protocols)** Native OS. This environment uses features of the AIX operating system to provide volume management and multipathing. For multipathing, it uses Multiple Path I/O (MPIO) with IBM's default Path Control Module (PCM).
- ◆ **(iSCSI and Fibre Channel Protocols)** PowerVM. This environment uses the AIX Virtual Input/Output Server/Client. You must be running the Native OS stack to use PowerVM; you cannot use PowerVM and Veritas together.

Note

The term “VIO” was used to refer to PowerVM in earlier documentation.

To determine which environments the Host Utilities support, check the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do>.

Note

Previous versions of the Host Utilities were called FC AIX Attach Kits.

The tools contained in the Host Utilities apply to numerous components. Sometimes the same tools are used by Host Utilities for other operating systems. As a result, the Host Utilities version number and the tools version number do not match, even though the tools are part of that Host Utilities release. This is not issue.

Software tools provided by the Host Utilities

The AIX Host Utilities bundle the software tools into a SAN Toolkit. The toolkit contains the following components:

- ◆ `aix_info` script. This script collects configuration information about your host.

Note

You use this script on AIX hosts that are running Native OS environments. It does not use this script for VIO environments. Not all FCP AIX Host Utilities stacks support VIO environments.

- ◆ `filer_info` script. This script collects information about the storage system.
- ◆ (VIO environment only) `ontap_collect`. This is a `snap` extension that collects configuration information about your host just as the `aix_info` script does. VIO servers require you to run as the prime administrator (`padmin`) instead of `root`. You can execute `ontap_collect` only when running as `padmin`.
- ◆ `san_version` command. This command displays the version of the SAN Toolkit that you are running.
- ◆ `sanlun` utility. You can use this utility to display information about LUNs on the storage system that are available to this host. In a VIO environment, you can only run the `sanlun` utility on the server; you cannot run it on a VIO client.
- ◆ The man pages for `sanlun` and the diagnostic scripts.

Many of the tools installed by Host Utilities are common across other kits. There are some differences in kits, though, so some of the files installed do not apply to the iSCSI AIX Host Utilities. You can ignore these files. They do not affect your system or its performance.

To allow you to confirm that all the files installed are part of the Host Utilities software, here is a list of the files that the iSCSI AIX Host Utilities do not commonly use:

- ◆ `dotpaths` utility
- ◆ `brocade_info`
- ◆ `cisco_info`
- ◆ `mcdata_info`
- ◆ `qllogic_info`

Remove previous versions before installing Host Utilities

This version of the Host Utilities uses a different stack from previous versions. If you have an earlier version installed, you must remove it before you install this version. For more information, see “[Uninstalling the software packages](#)” on page 34.

Supported AIX, Data ONTAP features, configurations

Features supported by the Host Utilities

The Host Utilities support a number of features and configurations available with AIX hosts and storage systems running Data ONTAP. Your specific environment affects what the Host Utilities support. Some of the supported features include:

- ◆ iSCSI and FC within the same AIX host and to the same target as long as they use different volume groups.
- ◆ Support for VIO server environments in certain configurations.
- ◆ Multiple paths to the storage system when a multipathing solution is installed
- ◆ Dynamic Logical Partitioning
- ◆ (Native stack only) Asymmetrical Logical Unit Access
- ◆ PowerVM Live Partition Mobility on IBM System p
- ◆ IBM General Parallel File System (GPFS)
- ◆ Multipathing to enable use of iSCSI with AIX's native MPIO PCM (Path Control Module)
- ◆ Switch trunking to enable the use of iSCSI in environments that do not use AIX's native MPIO for multipathing.
- ◆ SAN booting

For information on which features are supported with which configurations, see the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do>.

Understanding how iSCSI is implemented

The iSCSI protocol is a licensed service on the storage system that enables you to transfer block data to hosts using the SCSI protocol over TCP/IP. The iSCSI protocol standard is defined by RFC 3720 (www.ietf.org).

In an iSCSI network, storage systems are targets that have storage target devices, called LUNs (logical units). An AIX or Virtual Input/Output (VIO) server uses the iSCSI protocol to access LUNs on a storage system.

The AIX Host Utilities support both iSCSI software initiators and hardware adapters. When you use the software initiator, you do not need a hardware iSCSI host bus adapter (HBA).

Note

At the time this document was produced, the iSCSI software initiator was supported only on AIX hosts, not on VIO servers. For information on the supported configurations, see “[Where to go for additional information](#)” on page 10.

On the host, the iSCSI protocol is implemented over either the host’s standard Gigabit Ethernet interfaces or an HBA. On the storage system, the iSCSI protocol can be implemented over the storage system’s standard Gigabit Ethernet interfaces using one of the following:

- ◆ A software driver that is integrated into Data ONTAP.
- ◆ (Data ONTAP 7.1 and later) An iSCSI target HBA or an iSCSI TCP/IP offload engine (TOE) adapter.

The connection between the initiator and target uses a standard TCP/IP network. No special network configuration is needed to support iSCSI traffic. The network can be either a dedicated TCP/IP network or your regular public network. The storage system listens for iSCSI connections on TCP port 3260.

For more information on using iSCSI with your storage system, see the *Data ONTAP Block Access Management Guide* for your version of Data ONTAP.

Using a VIO environment with the Host Utilities

If you are using AIX with a VIO server, make sure you have your VIO environment set up before you install the Host Utilities. VIO environments enable you to share physical I/O resources between logical partitions. You can use both physical and virtual LUNs as well as create virtual disks on both the server and the client.

VIO servers require that you run as `padmin`, not `root`. As a result, some of the commands you use in setting up your Host Utilities environment are different than if you were running the Host Utilities on an AIX system without VIO. For example, to discover LUNs on VIO servers, you use the `cfgdev` command; on AIX hosts without VIO, you use the `cfgmgr` command.

Some other differences include:

- ◆ Installing the Host Utilities in VIO environments:
 - ❖ You must login as `padmin` and then use the `oem_setup_env` command to change to `root`. The Host Utilities require you to be `root` during the installation.

Note

When you enter the `oem_setup_env` command, the system goes into the `oem_setup_env` command mode. You can do things like install the Host Utilities or run the `sanlun` utility when you are in this mode. To return to the normal operating mode for VIO environments, halt the `oem_setup_env` command mode. For example, enter `exit` at the command prompt.

- ❖ You must install the SAN Toolkit software package on the VIO server. In addition, you should also install it on each VIO client. While you cannot run the `sanlun` utility on the client, you can run the diagnostic scripts that are installed as part of the SAN Toolkit.

Note

The `sanlun` utility does not return any information if you run it in a VIO client environment.

- ◆ Troubleshooting on VIO servers
 - ❖ To collect information about the host, you must run the `ontap_collect` script, not the `aix_info` script. The `ontap_collect` script is a `snap` plug-in. See the `snap` man page for instructions on running `snap` and its plug-ins.
 - ❖ If you have virtual LUNs set up, the `sanlun` utility does not recognize them. This is because the LUNs are identified as VID “IBM” and PID “VDASD.”

Note

For details on using VIO servers, please see the IBM documentation. If you want to see which commands you can use with VIO servers, enter the `help` command. Then use the `man` command to see details on each command.

About using multiple protocols on a single host

The Host Utilities support using both Fibre Channel (FC) and iSCSI on the same host and pointing to the same target. Because you need to have a separate volume group for each protocol, you must use a separate LUN for each protocol. You cannot mix FC and iSCSI on the same volume group.

Note

This document discusses using Host Utilities in supported iSCSI environments. For information on setting up the Host Utilities in an FC environment, see the *FC AIX Host Utilities 5.0 for Native OS and Veritas Setup and Installation Guide*.

Multipathing

The iSCSI AIX Host Utilities use Multiple Path I/O (MPIO) with IBM's default Path Control Module (PCM) as the multipathing solution. This multipathing support lets you configure multiple network paths between the AIX host and storage system. If one path fails, traffic continues on the remaining paths. You must have multipathing enabled if the host has multiple paths to a LUN.

Using IPv6

Data ONTAP 7.3.1 added support for Internet Protocol version 6 (IPv6). You can use IPv6 with the Host Utilities if you are using a version of Data ONTAP that both supports IPv6 and is supported by the Host Utilities. For information on which versions of Data ONTAP the Host Utilities support, see the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do>. To determine whether your version of Data ONTAP supports IPv6, check the *Data ONTAP Release Notes*.

If your configuration supports IPv6, you can enable it by entering the following command on your storage system:

```
# options ip.v6.enable
```

To determine whether you are using IPv4 or IPv6, use the iSCSI status commands `iscsi portal show`. You can also use `ifconfig -a`.

Setting up a SAN boot LUN

You have the option of setting up a SAN boot LUN. The Host Utilities support using a SAN-attached disk, such as a LUN, as a boot device for a host. See “[Configuring SAN booting](#)” on page 67.

iSCSI AIX Host Utilities installation and setup overview

Overview of installing the Host Utilities and setting up your system

Installing the iSCSI AIX Host Utilities and setting up your system involves a number of steps that are performed on both the storage system and the host. The following sections provide information about the tasks you need to perform.

Note

Occasionally there are known problems that can affect your system setup. Please check the AIX Host Utilities Release Notes to make sure there are no issues affecting your system setup.

Prerequisites

Before you install the Host Utilities, you must perform the following tasks:

1. Set up your system:

- ❖ Host OS and appropriate updates
- ❖ Storage system and Data ONTAP
- ❖ Either the software initiator or an HBA

See the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do> for current information about the system requirements.

2. Verify that your storage system is:

- ❖ Licensed correctly
- ❖ Running the iSCSI service
- ❖ Set up with working volumes and qtrees (if desired)

Note

It is recommended that you create volumes and LUNs with space reservations enabled.

3. If you have the iSCSI AIX Support Kit or Host Utilities currently installed, remove that software.

Setup procedure

The procedure for setting up the iSCSI protocol on a host and storage system follows the same basic sequence for all host types. You perform some of the steps on the host and some on the storage system. The following list summarizes the steps.

1. **(Host)** Perform these steps:
 - ❖ Record or set the host's iSCSI node name.
 - ❖ Install the Host Utilities software.
 - ❖ List each storage system in the host's targets file.
2. **(Storage system)** Configure the storage system:
 - ❖ **(Optional)** Configure CHAP (Challenge-Handshake Authentication Protocol).
 - ❖ Create LUNs, create an igroup that contains the host's iSCSI node name, and map the LUNs to that igroup.
3. **(Host)** Configure the initiator on the host:
 - ❖ Set the initiator parameters.
 - ❖ **(Optional)** Configure CHAP.
4. **(Host)** Access the LUNs from the host:
 - ❖ Discover LUNs.
 - ❖ Create file systems on the LUNs and mount them, or configure the LUNs as raw devices.

Where to go for additional information

Where to go for more information

The following table describes where to find additional information about using iSCSI on your storage system.

If you want...	Go to...
Known issues, system requirements, and last minute updates	The <i>Release Notes</i>, which are available at http://now.netapp.com/NOW/knowledge/docs/san/ Note— The <i>Release Notes</i> are updated more frequently than the rest of the documentation. You should always check the release notes before installing the Host Utilities to see if there have been any changes to the installation or setup process since this document was prepared. You should check them periodically to see if there is new information on using the Host Utilities. A summary of what has been updated and when is on the <i>Release Notes</i> index page.
A summary of some of the commands you might use with the Host Utilities	The <i>Quick Reference</i> for the AIX Host Utilities, which is available from the NOW site
The latest supported Host Utilities configurations and environments	<i>NetApp Interoperability Matrix Tool</i> at http://now.netapp.com/matrix/mtx/login.dol
Best practices or configuration issues	NetApp Knowledge Base at https://now.netapp.com/eservice/kbbrowse

If you want...	Go to...
Configuring the storage system	◆ <i>Best Practices for Reliability: New System Installation</i> at http://now.netapp.com/NOW/knowledge/docs/other/best_practices/index.shtml ◆ The Data ONTAP documentation, which is at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml In particular, check the following documents: ❖ <i>Data ONTAP Software Setup Guide</i> ❖ <i>Data ONTAP Block Access Management Guide</i> ❖ <i>Data ONTAP Release Notes</i> ❖ <i>Data ONTAP Upgrade Guide</i>
Information about how to configure and manage the iSCSI service on the storage system	The following documentation for your release of Data ONTAP: ◆ <i>Data ONTAP Block Access Management Guide</i> ◆ <i>Data ONTAP Release Notes</i>
Upgrading Data ONTAP	<i>Data ONTAP Upgrade Guide</i> at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml
Verifying compatibility of storage system with environmental requirements	<i>Site Requirements</i> at http://now.netapp.com/NOW/knowledge/docs/docs.shtml
Your host operating system	Refer to your operating system documentation.
Information about managing the iSCSI initiator	See the “iSCSI software initiator” section of the <i>AIX System Management Guide: Communications and Networks</i> . This guide is in the AIX documentation library and is also available from http://publib16.boulder.ibm.com/doc_link/en_US/a_doc_lib/aixbman/commadmn/tcp_initiator.htm .
HBA	Refer to your vendor documentation.
VIO environments	Refer to your VIO server documentation. Additional documentation on using VIO environments is available on the IBM web site.

About this chapter

This chapter explains the tasks you need to perform before you install the Host Utilities software as well as instructions for installing the software.

Topics in this chapter

This chapter includes the following topics:

- ◆ [“Tasks involved in installing the Host Utilities”](#) on page 14
- ◆ [“Verify that you have a supported configuration”](#) on page 15
- ◆ [“Download and uncompress the Host Utilities software”](#) on page 17
- ◆ [“Installing the Host Utilities software”](#) on page 19
- ◆ [“Uninstalling the software packages”](#) on page 34

Tasks involved in installing the Host Utilities

Installation task overview

Installing the Host Utilities is simple; however, the complete process involves several tasks. You perform some of these tasks before you do the actual installation. Once you have the Host Utilities software installed, you must configure it. For information on configuring the Host Utilities, see the information in [“Configuring the Host Utilities”](#) on page 41 and the information in [“Accessing LUNs from the AIX host”](#) on page 53.

Note

The iSCSI software initiator is included as part of the AIX Base Operating System. You obtain the media and documentation from your IBM reseller.

Tasks to perform before you install the Host Utilities

Before you install the Host Utilities software, there are several tasks you should preform that will enable the installation to go smoothly. They include:

- ◆ Making sure you have the correct AIX technology level.
- ◆ Confirming you have the recommended AIX PTFs applied.
- ◆ Making sure you have the correct adapter device driver for the HBA.
- ◆ Removing any previous iSCSI AIX Host Utilities or Support Kits that you have installed.
- ◆ Downloading the Host Utilities software and uncompressing the files.

Verify that you have a supported configuration

Verify configuration and AIX technology level

Be sure that the version of AIX on the host and the version of Data ONTAP on the storage system are supported with this version of the iSCSI AIX Host Utilities. You should verify that your AIX host is running a supported technology level.

For information on supported configurations, see the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do>.

Apply required PTFs

For best performance, be sure to apply any AIX PTFs listed in the *NetApp Interoperability Matrix*. PTFs are available from the IBM Support site at <http://www-912.ibm.com/eserver/support/fixes/>.

Verify that the operating system can see the HBA

Please verify that your operating system can see your HBA.

For example, if you are using the IBM iSCSI hardware iSCSI TOE card, you must install the 1 Gigabit iSCSI TOE PCI-X Adapter device driver on the host before you install the adapter and the Host Utilities software. You can use the `lslpp -l` command to verify that the device driver is installed.

Example: To verify that the driver filesets for the copper connector are installed, issue the `lslpp -l devices.pci.1410d002*` command.

Note

The device and the vendor ID that you use with this command varies. For example, the IBM pSeries adapters use a vendor ID of 1014 (which is 1410 endian-reversed), while a Blade daughter card uses the QLogic vendor ID of 1077.

```
# lslpp -l devices.pci.1410d002*
Fileset                Level  State      Description
-----
Path: /usr/lib/objrepos
devices.pci.1410d002.com 5.3.0.50 COMMITTED  Common PCI iSCSI TOE Adapter
Device Software
devices.pci.1410d002.diag 5.3.0.50 COMMITTED  1000 Base-TX PCI-X iSCSI TOE
Adapter Device Diagnostics
devices.pci.1410d002.rte 5.3.0.50 COMMITTED  1000 Base-TX PCI-X iSCSI TOE
Adapter Device Software
```

To verify that the driver filesets for the optical connector are installed, issue the `lslpp -l devices.pci.1410cf02*` command.

```
# lslpp -l devices.pci.1410cf02*
Fileset                Level  State      Description
-----
Path: /usr/lib/objrepos
devices.pci.1410cf02.diag 5.3.0.50 COMMITTED  1000 Base-SX PCI-X iSCSI TOE
Adapter Device Diagnostics
devices.pci.1410cf02.rte 5.3.0.50 COMMITTED  1000 Base-SX PCI-X iSCSI TOE
Adapter Device Software
```

You should also check the IBM site to confirm that the IBM iSCSI HBA is supported on a specific IBM machine type and model. The IBM iSCSI HBA is not supported on all IBM machine types and models.

Remove any currently installed Host Utilities

If you currently have a version of the iSCSI AIX Host Utilities or Support Kit installed, you should remove it. For instructions on doing this, see [“Uninstalling the software packages”](#) on page 34.

Note

Previous versions of the Host Utilities were called Support Kits.

Download and uncompress the Host Utilities software

Software packages required for the Host Utilities

The Host Utilities are packaged into a single compressed file. When you uncompress this file, it places software packages in three directories:

- ◆ MPIO. This software package applies to Native OS and VIO environments that use MPIO for multipathing.
- ◆ SAN. This software package applies to Veritas environments that use Veritas DMP.
- ◆ SAN_Tool_Kit. This software package contains the SAN Toolkit and applies to all AIX Host Utilities 5.0 environments.

The host settings software package contains the NetApp device definition for your environment. This is an Object Data Manager (ODM) stanza LPP package. For iSCSI environments, you only need to install the package for MPIO.

You must also install the SAN Toolkit software package. You install the same file regardless of your configuration. This software package contains the `sanlun` utility and diagnostic scripts. The `sanlun` utility displays configuration information about LUNs and HBAs. The diagnostic scripts collect information about your system if a problem occurs. Customer Support might ask you to run the `sanlun` utility or a diagnostic script if a problem occurs.

Note

The examples use file names that may differ from the actual file names. The examples provide information about the type of output you should see and are often created before the file names are finalized., The names used on the NOW site and CD are the correct names.

Downloading the Host Utilities software

To get a copy of the Host Utilities, download the compressed file from the NOW site at <http://now.netapp.com/NOW/cgi-bin/software> to a working directory on your host.

Note

If you do not download the software to your AIX host, you must move it to a directory on that host before you install it.

Uncompressing the software file you downloaded

To uncompress the software file you downloaded from the NOW site, complete the following steps.

Step	Action
1	Change to the directory where you saved the downloaded software and uncompress the host settings file for your system and the SAN Toolkit file. You can use the <code>zcat</code> and <code>tar</code> commands to uncompress these files and extract the software. Note _____ These are sample file names. The names of the files that you download from the NOW site may be slightly different. Use the files that are posted on the NOW site. _____ <pre># zcat ntap_aix_host_utilities_5.0.tar.Z tar -xvf -</pre> Result: The extracted software is placed in three directories: ◆ MPIO. This directory contains the host settings software package you must install when you're using a Native OS or VIO environment running MPIO. ◆ SAN. This directory contains the host settings software package you must install when you're using a Veritas environment running DMP. ◆ SAN_Tool_Kit. This directory contains the SAN Toolkit file. You always install this file regardless of your host environment. Example: Executing the <code>zcat</code> and <code>tar</code> commands produces output similar to the following: <pre>#-> zcat ntap_aix_host_utilities_5.0.tar.Z tar xvf - x ntap_aix_host_utilities_5.0 x ntap_aix_host_utilities_5.0/SAN_Tool_Kit x ntap_aix_host_utilities_5.0/SAN_Tool_Kit/NetApp.SAN_toolkit, 1343488 bytes, 2624 tape blocks x ntap_aix_host_utilities_5.0/SAN x ntap_aix_host_utilities_5.0/SAN/NetApp.fcp_attach_kit, 24576 bytes, 48 tape blocks x ntap_aix_host_utilities_5.0/SAN/NetApp.iscsi_support_kit, 20480 bytes, 40 tape blocks x ntap_aix_host_utilities_5.0/MPIO x ntap_aix_host_utilities_5.0/MPIO/NetApp.mpio_attach_kit, 184320 bytes, 360 tape blocks</pre>
2	Go to “Installing the Host Utilities software” on page 19.

Installing the Host Utilities software

Methods for installing the Host Utilities software

You can install the host settings software and the SAN Toolkit software using either the AIX System Management Interface Tool (SMIT) or the `installp` command. For information on these methods, see:

- ◆ [“Using SMIT to install the software”](#) on page 20
- ◆ [“Using a command line to install the software”](#) on page 28

Upgrading from an earlier attach kit

If you have an iSCSI AIX Host Support Kit or a previous version of the Host Utilities installed, you should remove it before you install a new version of the Host Utilities. See [“Uninstalling the software packages”](#) on page 34.

The correct software for your environment

You must install the correct software packages for your host environment. For an iSCSI environment, use the software package that is extracted to the MPIO directory.

You must also install the SAN Toolkit. This software package is extracted to the SAN_Tool_Kit directory. You install the same software package regardless of whether you are using a Native OS, VIO, or Veritas environment.

**Using SMIT to
install the software**

You must install both the host setting software and the SAN Toolkit software. To do this, complete the following steps.

Note _____
This installation example installs the host settings software. You then repeat the steps to install the SAN Toolkit.

Step	Action
1	Make sure you are logged in as root. VIO environments only: If you are running VIO on your host and you have logged in as padmin, you need to become root. Enter the <code>oem_setup_env</code> command to become root (sudo root). Once you execute this command you are in <code>oem_setup_env</code> command mode until you stop the mode by entering a command such as <code>exit</code>. VIO example: The following is a example of becoming root on a VIO server. <pre>vioserver\$ oem_setup_env</pre>
2	Start SMIT by entering the following command: <pre># smit install</pre>

Step	Action
3	At the screen that appears, select the option titled “Install and Update Software.” Example: When you start SMIT, it displays the following screen. On this screen, the “Install and Update Software” option is the first menu option. <pre># smitty install +-----+ Software Installation and Maintenance Move cursor to desired item and press Enter. Install and Update Software List Software and Related Information Software Maintenance and Utilities Software Service Management Network Installation Management EZ NIM (Easy NIM Tool) System Backup Manager Alternate Disk Installation EFIX Management F1=Help F2=Refresh F3=Cancel Esc+8=Image Esc+9=Shell Esc+0=Exit Enter=Do +-----+</pre>

Step	Action
4	At the next screen, select the Install Software menu option. Example: The following is an example of the Install and Update Software screen. <pre> +-----+ Install and Update Software Move cursor to desired item and press Enter. Install Software Update Installed Software to Latest Level (Update All) Install Software Bundle Update Software by Fix (APAR) Install and Update from ALL Available Software F1=Help F2=Refresh F3=Cancel Esc+8=Image Esc+9=Shell Esc+0=Exit Enter=Do +-----+</pre>

Step	Action
5	At the Install Software screen, specify the location of the software in one of the following ways: ◆ Manually enter the location by providing the following information. ❖ If you're installing from the CD-ROM, enter the CD-ROM drive. ❖ If you're installing from the host machine, enter the path to the software package (for example, /var/tmp/ntap_aix_mpio_5.0/NetApp.mpio_attach_kit). ◆ Press F4 to display a list of options. If you want to use the F4 method, complete the following steps: 1. Press F4. 2. At the prompt for software to install, enter NetApp.mpio_attach_kit. 3. At the prompt asking whether you want to continue or cancel, press Enter to complete the installation. Example 1: The following is an example of entering the path to the software package when you're at the Install Software screen. <pre> +-----+ Install Software Type or select a value for the entry field. Press Enter AFTER making all desired changes. [Entry Fields] * INPUT device / directory for software [/var/tmp/ntap_aix_mpio_5.0/NetApp.mpio_attach_kit]+ F1=Help F2=Refresh F3=Cancel F4=List Esc+5=Reset Esc+6=Command Esc+7=Edit Esc+8=Image Esc+9=Shell Esc+0=Exit Enter=Do +-----+</pre>

Step	Action
	Example 2: After you enter path to the software package, SMIT displays the following screen. This is the screen where you enter the name of the software package, Netapp.mpio_attach_kit, and press Enter. <pre> +-----+ Install Software Type or select values in entry fields. Press Enter AFTER making all desired changes. [Entry Fields] * INPUT device / directory for software [/var/tmp/ntap_aix_mpio5.0/NetApp.mpio_attach_kit]+ * SOFTWARE to install [NetApp.mpio_attach_kit]+ PREVIEW only? (install operation will NOT occur) no + COMMIT software updates? yes + SAVE replaced files? no + AUTOMATICALLY install requisite software? yes + EXTEND file systems if space needed? yes + OVERWRITE same or newer versions? no + VERIFY install and check file sizes? no + Include corresponding LANGUAGE filesets? yes + DETAILED output? no + Process multiple volumes? yes + ACCEPT new license agreements? no + Preview new LICENSE agreements? no + F1=Help F2=Refresh F3=Cancel F4=List Esc+5=Reset Esc+6=Command Esc+7=Edit Esc+8=Image Esc+9=Shell Esc+0=Exit Enter=Do +-----+ </pre>

Step	Action
6	SMIT displays a warning, asking you to confirm that you want to install the software. Press Enter to continue. Example 1: The following is an example of entering the path to the software package when you're at the Install Software screen. <pre>x*****x x ARE YOU SURE? x x x x Continuing may delete information you may want x x to keep. This is your last chance to stop x x before continuing. x x Press Enter to continue. x x Press Cancel to return to the application. x x x x Flx F1=Help F2=Refresh F3=Cancel x x Esx Esc+8=Image Esc+0=Exit Enter=Do x x*****x</pre>

Step	Action
7	SMIT displays information about the installation. Note_____ By default, the host settings software installs the filesets for both iSCSI and FCP. This is not a problem. If you are using only iSCSI, ignore the FCP fileset. _____ Example of a successful installation: The following is an example of output you might see when an installation completes successfully. <pre> COMMAND STATUS Command: running stdout: yes stderr: no Before command completion, additional instructions may appear below. NetApp.mpio_attach_kit.pcmadm 5.0.0.0 NetApp.mpio_attach_kit.iscsi 5.0.0.0 NetApp.mpio_attach_kit.fcp 5.0.0.0 NetApp.mpio_attach_kit.config 5.0.0.0 << Copyright notice for NetApp.mpio_attach_kit >> (C) Copyright Network Appliance, Inc. 2003-2008. All rights reserved. << End of copyright notice for NetApp.mpio_attach_kit >>. . . . Finished processing all filesets. (Total time: 5 secs). 0503-409 installp: bosboot verification starting... installp: bosboot verification completed. 0503-408 installp: bosboot process starting... bosboot: Boot image is 23825 512 byte blocks. 0503-292 This update will not fully take effect until after a system reboot. * * * A T T E N T I O N * * * System boot image has been updated. You should reboot the system as soon as possible to properly integrate the changes and to avoid disruption of current functionality.</pre>

Step	Action
	<pre> installp: bosboot process completed. +-----+ Summaries: +-----+ Installation Summary ----- Name Level Part Event Result ----- NetApp.mpio_attach_kit.pcm 5.0.0.0 USR APPLY SUCCESS NetApp.mpio_attach_kit.isc 5.0.0.0 USR APPLY SUCCESS NetApp.mpio_attach_kit.fcp 5.0.0.0 USR APPLY SUCCESS NetApp.mpio_attach_kit.conf 5.0.0.0 USR APPLY SUCCESS COMMAND STATUS Command: OK stdout: yes stderr: no Before command completion, additional instructions may appear below. NetApp.mpio_attach_kit.config 5.0.0.0 << Copyright notice for NetApp.mpio_attach_kit >> (C) Copyright Network Appliance, Inc. 2003-2008. All rights reserved. << End of copyright notice for NetApp.mpio_attach_kit >>. . . . Finished processing all filesets. (Total time: 5 secs). 0503-409 installp: bosboot verification starting... installp: bosboot verification completed. 0503-408 installp: bosboot process starting... bosboot: Boot image is 23825 512 byte blocks. 0503-292 This update will not fully take effect until after a system reboot. installp: bosboot process completed. +-----+ Summaries: +-----+ Installation Summary ----- </pre>

- ◆ In the MPIO directory that is created when you uncompress the Host Utilities file. From the directory containing the uncompressed files, go to /ntap_aix_host_utilities_5.0/MPIO directory.

Note

If you are running in a VIO environment, use the `oem_setup_env` command to become root.

To install the host settings software, enter the command line:

```
# installp -aXd NetApp.mpio_attach_kit NetApp.mpio_attach_kit
```

To install the SAN Toolkit software, enter the command line:

```
# installp -aXd NetApp.SAN_toolkit NetApp.SAN_toolkit
```

Example: The following is an example of installing the SAN Toolkit using the command line.

```
# installp -aXd NetApp.SAN_toolkit NetApp.SAN_toolkit
+-----+
+               Pre-installation Verification...
+-----+
Verifying selections...done
Verifying requisites...done
Results...

SUCCESES
-----
Filesets listed in this section passed pre-installation verification
and will be installed.

Selected Filesets
-----
NetApp.SAN_toolkit.sanlun 5.0.0.0           # Network Appliance SAN Toolki...
NetApp.SAN_toolkit.scripts 5.0.0.0        # Network Appliance SAN Toolki...

<< End of Success Section >>

FILESET STATISTICS
-----
    2 Selected to be installed, of which:
      2 Passed pre-installation verification
----
    2 Total to be installed

+-----+
+               Installing Software...
+-----+

installp: APPLYING software for:
          NetApp.SAN_toolkit.scripts 5.0.0.0
          NetApp.SAN_toolkit.sanlun 5.0.0.0
. . . . . << Copyright notice for NetApp.SAN_toolkit >> . . . . .
(C) Copyright Network Appliance, Inc. 2003-2008.
All rights reserved.
. . . . . << End of copyright notice for NetApp.SAN_toolkit >>. . . .
Finished processing all filesets. (Total time: 2 secs).
```

-----+ Summaries: -----+ Installation Summary -----				
Name	Level	Part	Event	Result

NetApp.SAN_toolkit.scripts	5.0.0.0	USR	APPLY	SUCCESS
NetApp.SAN_toolkit.sanlun	5.0.0.0	USR	APPLY	SUCCESS
#				

Sample installation using installp on a VIO server

The following is an example of using the `installp` command to install the Host Utilities on a VIO server.

```
vioserver$ oem_setup_env
# PS1="$(hostname)# "
vioserver# zcat ntap_aix_mpio_5.0.tar.Z | tar xvf -
x ./ntap_aix_mpio_5.0/NetApp.mpio_attach_kit, 195584 bytes, 382 media blocks.
vioserver# cd ntap_aix_mpio_5.0
vioserver# installp -aXd NetApp.mpio_attach_kit NetApp.mpio_attach_kit
+-----+
Pre-installation Verification...
+-----+
Verifying selections...done
Verifying requisites...done
Results...

SUCSESSES
-----
Filesets listed in this section passed pre-installation verification
and will be installed.
```

```

Selected Filesets
-----
NetApp.mpio_attach_kit.config 5.0.0.0      # Network Appliance MPIO PCM K...
NetApp.mpio_attach_kit.fcp 5.0.0.0         # Network Appliance MPIO PCM K...
NetApp.attach_kit.iscsi 5.0.0.0           # Network Appliance MPIO PCM K...
NetApp.attach_kit.pcmmodm 5.0.0.0         # Network Appliance MPIO PCM K...

<< End of Success Section >>

FILESET STATISTICS
-----
    4  Selected to be installed, of which:
        4  Passed pre-installation verification
    ----
    4  Total to be installed

0503-409 installp:  bosboot verification starting...
installp:  bosboot verification completed.
+-----+
+-----+ Installing Software... +-----+
+-----+

installp:  APPLYING software for:
    NetApp.mpio_attach_kit.pcmmodm 5.0.0.0
    NetApp.mpio_attach_kit.iscsi 5.0.0.0
    NetApp.mpio_attach_kit.fcp 5.0.0.0
    NetApp.mpio_attach_kit.config 5.0.0.0

. . . . . << Copyright notice ffor NetApp.mpio_attach_kit >> . . . . .
(C) Copyright Network Appliance, Inc. 2003-2008.
All rights reserved.

. . . . . << End of copyright notice for NetApp.mpio_attach_kit >>. . . .

Finished processing all filesets.  (Total time:  6 secs).

0503-409 installp:  bosboot verification starting...
installp:  bosboot verification completed.
0503-408 installp:  bosboot process starting...

bosboot: Boot image is 30522 512 byte blocks.
0503-292 This update will not fully take effect until after a
        system reboot.

```

* * * A T T E N T I O N * * *

System boot image has been updated. You should reboot the system as soon as possible to properly integrate the changes and to avoid disruption of current functionality.

installp: bosboot process completed.

Summaries:

Installation Summary

Name	Level	Part	Event	Result
NetApp.mpio_attach_kit.pcmo	5.0.0.0	USR	APPLY	SUCCESS
NetApp.mpio_attach_kit.iscs	5.0.0.0	USR	APPLY	SUCCESS
NetApp.mpio_attach_kit.fcp	5.0.0.0	USR	APPLY	SUCCESS
NetApp.mpio_attach_kit.conf	5.0.0.0	USR	APPLY	SUCCESS

vioserver#

Uninstalling the software packages

Remove previous versions before installing the Host Utilities

The iSCSI AIX Host Utilities for Native OS uses a different set of tools from the previous version of the Host Utilities and from the iSCSI AIX Support Kit.

If you have an earlier version of the Host Utilities or a version of the Support Kit installed on the host, you must remove it before you install this version of the Host Utilities.

Before you uninstall previous versions of software

Before you uninstall a previous version of the software, make sure you do the following;

- ◆ Unmount the file systems that contain the volume groups mapped to storage system LUNs.
- ◆ Quiesce and export the volume groups.
- ◆ Remove the existing NetApp LUN handles.

These procedures disconnect NetApp LUNs from the host before you uninstall the software.

Methods for uninstalling the software

You can uninstall the Host Utilities software using either SMIT or the `installp -u` command.

Uninstalling the Host Utilities software using SMIT

You can use SMIT to uninstall the Host Utilities software.

To uninstall the software using SMIT, complete the following steps.

Step	Action
1	Ensure that you are logged in as root.
2	Start SMIT by entering the following command: # smit

Step	Action
3	Select the “Software Installation and Maintenance” menu option. Example: When you start SMIT, it displays the following screen. <pre> +-----+ root> # smit System Management Move cursor to desired item and press Enter. Software Installation and Maintenance Software License Management Devices System Storage Management (Physical & Logical Storage) Security & Users Communications Applications and Services Print Spooling Problem Determination Performance & Resource Scheduling System Environments Processes & Subsystems Applications Cluster System Management Using SMIT (information only) F1=Help F2=Refresh F3=Cancel Esc+8=Image Esc+9=Shell Esc+0=Exit Enter=Do +-----+ </pre>

Step	Action
4	At the screen that appears, select the Software Maintenance and Utilities menu option. Example: The following is an example of the Software Installation and Maintenance screen. <pre> +-----+ Software Installation and Maintenance Move cursor to desired item and press Enter. Install and Update Software List Software and Related Information Software Maintenance and Utilities Network Installation Management System Backup Manager F1=Help F2=Refresh F3=Cancel Esc+8=Image Esc+9=Shell Esc+0=Exit Enter=Do +-----+</pre>

Step	Action
5	At the next screen, select the Remove Installed Software menu option. Example: The following is an example of the Software Maintenance and Utilities screen. <pre>+-----+ Software Maintenance and Utilities Move cursor to desired item and press Enter. Commit Applied Software Updates (Remove Saved Files) Reject Applied Software Updates (Use Previous Version) Remove Installed Software Copy Software to Hard Disk for Future Installation Check Software File Sizes After Installation Verify Software Installation and Requisites Clean Up After Failed or Interrupted Installation F1=Help F2=Refresh F3=Cancel Esc+8=Image Esc+9=Shell Esc+0=Exit Enter=Do +-----+</pre>

Step	Action
6	Remove the software in one of the following ways: ◆ Enter the package name (NetApp.mpio_attach_kit). (Make sure that the “Preview only” option is set to no.) ◆ Press F4 to display a list of names. If you use F4, complete the following steps: 1. Press F4. 2. Scroll down the list of names until you reach NetApp.mpio_attach_kit. 3. Select NetApp.mpio_attach_kit and press Enter. 4. At the prompt asking whether you want to continue or cancel, press Enter to complete the uninstall. Example 1: The following is an example of the Remove Installed Software screen. Note_____ By default PREVIEW only? is set to yes. You must change it to no if you want to uninstall. <pre> +-----+ Remove Installed Software Type or select values in entry fields. Press Enter AFTER making all desired changes. [Entry Fields] * SOFTWARE name [NetApp.mpio_attach_kit.config NetApp.mpio_attach_kit.iscsi NetApp.mpio_attach_NetApp.mpio attach_kit_> + PREVIEW only? (remove operation will NOT occur) no + REMOVE dependent software? no + EXTEND file systems if space needed? no + DETAILED output? no + F1=Help F2=Refresh F3=Cancel F4=List Esc+5=Reset Esc+6=Command Esc+7=Edit Esc+8=Image Esc+9=Shell Esc+0=Exit Enter=Do +-----+ </pre>

Step	Action
	Example of successful uninstall: The following output appears when you successfully uninstall the software. This example uninstalls the iSCSI AIX Host Utilities 5.0. <pre>Command: running stdout: yes stderr: no Before command completion, additional instructions may appear below. 0503-409 installp: bosboot verification starting... installp: bosboot verification completed. +-----+ +-----Deinstalling Software-----+ +-----+ installp: DEINSTALLING software for: NetApp.mpio_attach_kit.config 5.0.0.0 NetApp.mpio_attach_kit.fcp 5.0.0.0 NetApp.mpio_attach_kit.iscsi 5.0.0.0 NetApp.mpio_attach_kit.pcmadm 5.0.0.0 Finished processing all filesets. (Total time: 4 secs). 0503-409 installp: bosboot verification starting... installp: bosboot verification completed. 0503-408 installp: bosboot process starting... bosboot: Boot image is 23818 512 byte blocks. 0503-292 This update will not fully take effect until after a system reboot. * * * A T T E N T I O N * * * System boot image has been updated. You should reboot the system as soon as possible to properly integrate the changes and to avoid disruption of current functionality. installp: bosboot process completed. +-----+ +-----Summaries-----+ +-----+ Installation Summary ----- Name Level Part Event Result ----- NetApp.mpio_attach_kit.confi 5.0.0.0 USR DEINSTALL SUCCESS NetApp.mpio_attach_kit.fcp 5.0.0.0 USR DEINSTALL SUCCESS NetApp.mpio_attach_kit.iscsi 5.0.0.0 USR DEINSTALL SUCCESS NetApp.mpio_attach_kit.pcmad 5.0.0.0 USR DEINSTALL SUCCESS</pre>

Using a command line to uninstall the software

You can use a command line to uninstall this software. You must be logged on as root to do this.

To uninstall the host settings software, enter the command line:

```
# installp -u NetApp*
```

To uninstall the SAN Toolkit software, enter the command line:

```
# installp -u NetApp.SAN_toolkit*
```

Uninstall a previous Support Kit

If you have an earlier version of the iSCSI AIX Support Kit installed on your AIX host, uninstall it before installing the new version.

To uninstall an earlier support kit, complete the following steps.

Step	Action
1	On the AIX host console, run the ./uninstall script in the /opt/NetApp/iscsitools/bin directory.
2	From the System Management menu, choose Software Installation and Maintenance > Software Maintenance and Utilities > Remove Installed Software.
3	Press Esc-4 to list installed software packages.
4	Select the following packages to uninstall: ◆ Netapp.iscsi_toolkit.sanlun ◆ Netapp.iscsi_toolkit.scripts

Overview

This chapter provides information on how to complete the Host Utilities installation by configuring the initiator and the storage system.

Topics in this chapter

The chapter includes the following topics:

- ◆ [“Completing the Host Utilities installation”](#) on page 42
- ◆ [“Configuring the software initiator”](#) on page 43
- ◆ [“Configuring the storage system for iSCSI”](#) on page 50
- ◆ [“Configuring CHAP authentication”](#) on page 51

Completing the Host Utilities installation

Configuration needed for initiator and storage system

To complete the installation of the Host Utilities, you must do the following:

- ◆ Configure the initiator. The steps you perform vary depending on whether you have a software initiator or an HBA.

For a software initiator, you must:

- ❖ Change the software initiator's iSCSI node name

For an HBA, you must:

- ❖ Prepare the HBA by either removing the protocol device if it is configured or changing the database
- ❖ Configure the HBA
- ❖ Add information to the targets file

- ◆ Configure the storage system.
- ◆ (Optionally) configure CHAP.

The next sections provide information on performing these tasks.

Configuring the software initiator

Change the software initiator's iSCSI node name

You must change the software initiator's iSCSI node name. The default node name generated by AIX does not work with the storage system. To change the node name, complete the following steps:

Step	Action
1	Confirm that your system is correctly set up for iSCSI. From the AIX host console, enter: lsdev -c grep -i iscsi Example: The following is an example of the type of information you should see when you execute this command. AIXHOST >lsdev -C grep -i iscsi iscsi0 Available iSCSI Protocol Device
2	Get the current node name by entering: lsattr -El iscsi0 By getting the current node name, you can later verify that the change occurred. Example: The following is an example of the type of information you should see when you execute this command. AIXHOST >lsattr -El iscsi0 disc_filename /etc/iscsi/targets Configuration file False disc_policy file Discovery Policy True initiator_name iqn.aixp52.hostid.0a3da60c iSCSI Initiator Name True max_targets 16 Maximum Targets Allowed True num_cmd_elems 200 Maximum number of commands to queue to driver True

Step	Action
3	Change the node name by entering: <pre>chdev -l iscsi0 -a initiator_name=nodename</pre> <i>nodename</i> is the new iSCSI node name for the host. Node names must follow these rules: ◆ The format must be <code>iqn.1996-04.com.ibm:unique-value</code>. ◆ Maximum 223 characters. ◆ Allowed characters are lowercase letters (a to z), numbers (0 to 9), period (“.”), hyphen (“-”), and colon (“:”). ◆ The underscore character (“_”) is <i>not</i> allowed.
4	Verify the new node name by entering: <pre>lsattr -El iscsi0</pre>

Configuring the iSCSI HBA

Performing tasks in a VIO environment

If you are performing these tasks in a VIO environment, enter the `oem_setup_env` command. This puts the system into the `oem_setup_env` command mode, which enables you execute operations as root instead of `padmin`.

Once you complete all the tasks, return to the normal operating mode for VIO environments by entering `exit` at the command prompt.

Remove the protocol device or change databases

Before you can configure the HBA, you must either:

- ◆ Remove the protocol device if it is configured. Normally, this device will be configured.
Or
- ◆ Make the changes to the database. Once you make changes, you must reboot your system.

To find the protocol device for the HBA, use the `lsdev -p <adapter>` command. To remove the protocol device, use the `rmdev -dl <protocol_device>` command.

Once you've found and removed the protocol device, you can configure the adapter without any issues.

Example: This example locates the protocol device.

```
# lsdev -p ics0
icsi0 Available 01-11-01 iSCSI Protocol Device
```

Now it removes the device:

```
# rmdev -dl icsi0
icsi0 Deleted
```

Configure the HBA

After you insert the HBA and install the Host Utilities software, you must configure the adapter.

You use the `smit iscsi` command to do this. The example below shows how you select the option to configure the characteristics of the adapter and select the number of the adapter you are configuring.

In this example, the options you need to select are shown in bold to make the example easier to read. Also, the information that you must enter once you select "Change / Show Characteristics of an iSCSI Adapter" are shown in bold.

Note.

This is an example of configuring the adapter after you have removed the protocol device. If you did not remove the protocol device, then you would set “Apply change to DATABASE only” to **yes**.

```
# smit iscsi

+-----+
                                     iSCSI
Move cursor to desired item and press Enter.


iSCSI Adapter
    iSCSI Protocol Device
    iSCSI Target Device Parameters in ODM
+-----+

Select "iSCSI Adapter"

+-----+
                                     iSCSI Adapter
Move cursor to desired item and press Enter.


List All iSCSI Adapters
Change / Show Characteristics of an iSCSI Adapter
Generate Error Report
Trace iSCSI Adapter
+-----+
```

```

+-----+
|                                     iSCSI Adapter                                     |
|                                                                                     |
| Move cursor to desired item and press Enter.                                     |
|                                                                                     |
| ics0 Available 01-11 iSCSI Adapter                                             |
| ics1 Available 01-13 iSCSI Adapter                                             |
|                                                                                     |
| F1=Help           F2=Refresh           F3=Cancel                             |
| F8=Image          F10=Exit             Enter=Do                             |
| /=Find            n=Find Next          |
+-----+

Change / Show Characteristics of an iSCSI Adapter

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

iSCSI Adapter      [Entry Fields]
Description         ics0
Status             iSCSI Adapter
Location           Available
iSCSI Initiator Name 09-09
Maximum number of Commands to Queue to Adapter [iqn.1996-04.com.ibm:sn.0310b806g1]
Maximum Transfer Size [200] +
Discovery Filename   [0x100000] +
Discovery Policy     [/etc/iscsi/targetshw]
Automatic Discovery Secrets Filename [file] +
Adapter IP Address  []
Adapter Subnet Mask [10.60.244.136]
Adapter Gateway Address [255.255.255.0]
Apply change to DATABASE only [no] +

```

Add information to the targets file

You must edit the targets file indicated by the Discovery Filename parameter. For each storage system in the cluster pair, you need to supply the:

- ◆ IP address
- ◆ TCP port
- ◆ iSCSI target node name

Note

The NetApp iSCSI target only supports *file* as the value of the Discovery Policy.

To get information for the targets file, use the following Data ONTAP commands:

◆ The `iscsi portal show` command

```
# iscsi portal show
      Network portals:
      IP address      TCP Port  TPGroup  Interface
      10.60.244.34    3260     1000     e0
```

◆ The `iscsi nodename` command

```
# lsdev | grep 'iSCSI Protocol Device'
iscsi0      Available 11-09-01      iSCSI Protocol Device
iscsi1      Available 1D-09-01      iSCSI Protocol Device
iscsi2      Available              iSCSI Protocol Device <software
initiator>
```

```
# lsattr -El iscsi2 -a disc_filename
disc_filename /etc/iscsi/targets Configuration file False
```

You can then check the final `disc_filename` file.

Software initiator: Here is an example of checking the information when you are using a software initiator:

```
# lsdev -Cc adapter | grep 'iSCSI Adapter'
ics0      Available 11-09      iSCSI Adapter
ics1      Available 1D-09      iSCSI Adapter

# lsattr -El iscsi2 -a disc_filename
disc_filename /etc/iscsi/targets Configuration file False
```

HBA: Here is an example of checking the information if you have a HBA:

```
# lsdev -Cc adapter | grep 'iSCSI Adapter'
ics0      Available 11-09      iSCSI Adapter
ics1      Available 1D-09      iSCSI Adapter

# lsattr -El ics0 -a disc_filename
disc_filename /etc/iscsi/ targetshw_VLAN_100  Discovery Filename
True

# lsattr -El ics1 -a disc_filename
disc_filename /etc/iscsi/ targetshw_VLAN_200  Discovery Filename
True
```

```
# cat /etc/iscsi/targetshw_VLAN_100

192.168.100.222 3260 iqn.1986-03.com.ibm:sn.84209003
192.168.100.221 3260 iqn.1986-03.com.ibm:sn.84213404

# cat /etc/iscsi/targetshw_VLAN_200

192.168.200.222 3260 iqn.1986-03.com.ibm:sn.84209003
192.168.200.221 3260 iqn.1986-03.com.ibm:sn.84213404
```

If your environment uses multiple HBAs you may need to set up multiple target files. This is only necessary if you have multiple unique network segments. In that case you would need a unique targets file for each network segment. On a flat network, you would want one targets file and all the adapters to log into the same iSCSI target.

To log back into the target, you must rescan the bus using the `cfgmgr` command.

For information on adding targets, see [“Adding targets”](#) on page 54.

Configuring the storage system for iSCSI

Before you begin

You need the host's iSCSI node name that you created before you can configure the storage system.

You must verify that you are running a supported version of Data ONTAP software on your storage system. For the latest information on which Data ONTAP versions are supported, refer to the *NetApp iSCSI Support Matrix* at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/iscsi_support_matrix.shtml

Tasks for configuring the storage system

To configure the storage system and prepare it for initiator access, you must complete the following tasks:

- ◆ Ensure that the iSCSI service is licensed and started.
- ◆ If you want to use CHAP authentication, use the `iscsi security` command to configure a CHAP user name and password.
- ◆ Create LUNs and map them to igroups. You can manage LUNs using the web-based FilerView interface or using the Data ONTAP command line. Be sure to specify the LUN type and igroup type as `aix`.

For detailed steps

For detailed steps, see the *Data ONTAP Block Access Management Guide* for your version of Data ONTAP.

Data ONTAP upgrade note

In some cases, if you upgrade the Data ONTAP software running on the storage system, the CHAP configuration on the storage system is not saved. Be sure to run the `iscsi security add` command for each iSCSI initiator, even if you had previously configured the CHAP settings.

Configuring CHAP authentication

(Optional) Configure CHAP authentication

If you choose, you can also configure CHAP authentication. When you use CHAP, you must configure it on both the host and the storage system.

The AIX initiator supports both unidirectional and bidirectional CHAP. By default, the initiator uses its iSCSI node name as its CHAP username.

Setting CHAP on the storage system in initiator/HBA environments

The storage system recognizes two types of CHAP user names and passwords. These types indicate the direction of authentication, relative to the storage system:

- ◆ Inbound—The storage system authenticates the initiator or HBA. Inbound settings are required if you are using CHAP authentication.
- ◆ Outbound—The AIX software initiator or HBA does not support authentication of the storage system using CHAP. Do not specify outbound settings for AIX hosts.

CHAP settings are defined in the `/etc/iscsi/targets` file on the host. This file is specified in the Discovery Filename parameter. The storage system's inbound password must match the initiator's CHAPSecret in the `/etc/iscsi/targets` file on the host. The storage system's inbound user name must match the initiator node name of the host. The AIX initiator or HBA always uses its iSCSI node name as its CHAP user name.

Overview of accessing LUNs

NetApp LUNs appear to the AIX host as disks. You can use LUNs like you would use any local disk on the system.

Topics in this chapter

This chapter includes the following topics:

- ◆ [“Configuring iSCSI targets”](#) on page 54
- ◆ [“Discovering and using LUNs”](#) on page 55

Configuring iSCSI targets

Adding targets

To access LUNs on a storage system, you must add an entry for the storage system to the Discovery Filename on the AIX host. You need one entry for each storage system, regardless of the number of interfaces that are enabled for iSCSI traffic. A clustered storage system needs two entries, one for each node in the cluster.

Note For information on working with targets for the HBA, see “[Add information to the targets file](#)” on page 47 or the “targets File” section of the *IBM AIX Files Reference*.

To add a target, complete the following steps.

Step	Action
1	With a text editor, open the file specified by the disk_filename parameter.
2	Add one line for one interface on each storage system. Be sure to use an interface that is enabled for iSCSI traffic. HostNameOrAddress PortNumber iSCSIName [CHAPSecret] <i>HostNameOrAddress</i> is the host name or IP address of a gigabit Ethernet interface on the storage system. Specify an interface that is enabled for iSCSI communication. <i>PortNumber</i> is always 3260. <i>iSCSIName</i> is the iSCSI target node name of the storage system. <i>CHAPSecret</i> is the optional CHAP password for the host. Enclose the text string in double quotes. This value must match the value configured on the storage system for this initiator. Examples: <pre>192.168.10.100 3260 iqn.1992-08.com.netapp:sn.12345678</pre> <pre>192.168.10.19 3260 iqn.1992-08.com.netapp:sn.12345678 "q2r2E8g12B1e7R3g"</pre>

Discovering and using LUNs

Performing tasks in a VIO environment

If you are performing these tasks in a VIO environment, enter the `oem_setup_env` command. This puts the system into the `oem_setup_env` command mode, which enables you execute operations as root instead of `padmin`.

After you complete all the tasks, return to the normal operating mode for VIO environments by entering `exit` at the command prompt.

Discovering LUNs

After editing the file defined by the `disk_filename` parameter, rescan the AIX host to discover the LUNs you mapped to the host.

To rescan and discover LUNs, enter the following command on the AIX host console:

```
cfgmgr
```

Run the `cfgmgr` command each time you add a new LUN and map it to the AIX host.

Note

If you have a VIO server, you must use the `cfgdev` command instead of the `cfgmgr` command.

Viewing LUN information with `sanlun`

The `sanlun` tool included in the Host Utilities displays information about storage systems and LUNs. The `sanlun` tool is installed in the `/opt/NetApp/santools/bin` directory. To view LUN information, enter the following command on the AIX host console:

```
sanlun lun show all
```

Viewing disk properties, including LUN queue depth

The AIX disk properties include the queue depth used for a LUN. The queue depth affects performance and is automatically set for LUNs on NetApp storage systems. To view the queue depth, enter the following command on the AIX host console:

```
lsattr -El hdiskx
```

where *x* is the AIX disk number for the LUN, for example `hdisk4`.

Using LUNs

The NetApp LUNs appear on the AIX host or VIO server as disks. You can then use these disks the same way you use local disks on the host.

To display all AIX disks, including NetApp LUNs, enter the following command:

```
lsdev -Cc disk
```

The host settings ODM file that is installed as part of the Host Utilities causes the LUNs to be displayed as MPIO NetApp iSCSI Disks in a multipathing environment; otherwise, they appear as NetApp iSCSI LUN.

Note

If you are using a VIO server environment and you have virtual SCSI LUNs set up, the `sanlun` utility does not recognize them. This is because the LUNs are identified as VID “IBM” and PID “VDASD.”

About this chapter This chapter provides some troubleshooting tips and information about the Host Utilities diagnostic utilities.

Topics in this chapter The chapter includes the following topics:

- ◆ [“General troubleshooting information”](#) on page 58
- ◆ [“Make sure the iSCSI HBA is working correctly”](#) on page 60
- ◆ [“Using Diagnostic Utilities”](#) on page 63

General troubleshooting information

Check the Release Notes for the most up-to-date information

Check the *Release Notes* for a list of known problems and limitations. The *Release Notes* also contain information on how to look up information about known bugs.

You can access the *Release Notes* from the NOW site. A link to the *Release Notes* is online in the SAN/ISAN library at <http://now.netapp.com/NOW/knowledge/docs/san/>. A link is also available on the NOW Description Page for the iSCSI AIX Host Utilities.

Make sure your configuration is supported

Certain combinations of host operating system software, host hardware, Data ONTAP software, and storage system hardware may not work well together. Be sure you are using a supported configuration by checking the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do>.

Note

SAN booting is not supported on all iSCSI AIX Host Utilities configurations. Check the Interoperability Matrix Tool to confirm that your configuration is before you create a boot LUN.

Collect information

Record any error messages displayed on the host or storage system console. Collect the host and storage system log files. Record the symptoms of the problem and any changes made to the host or storage system just before the problem appeared.

Run the `filer_info` and `aix_info` scripts that are included with this support kit. The scripts are installed in the `/opt/NetApp/santools/bin` directory on the AIX host. They collection information about your system. For information on using them, see “[Using Diagnostic Utilities](#)” on page 63.

Note

If you are using a VIO environment, run the `ontap_collect` script instead of the `aix_info` script. The script collects information about your system setup and places it in a file. If you have a problem, you can send the file to Customer Support. The `ontap_collect` script is a `snap` extension. While `aix_info` requires that you be root to run it, `ontap_collect` works if you are the prime administrator (`padmin`). If you installed the SAN Toolkit on the VIO clients, you can run this script on them as well as the server.

Contact technical support

If you are unable to resolve the problem, contact NetApp Support for assistance.

Make sure the iSCSI HBA is working correctly

Verify information about the HBA

You can use the `lscfg -vl ics*` command verify the feature code, part number, and firmware level of the IBM iSCSI HBA.

```
# lscfg -vl ics*
ics0      U787B.001.DNW872B-P1-C1-T2  iSCSI Adapter
IBM iSCSI Server TX Adapter              :
Part Number.....30R5219
EC Level.....J85591
Manufacture ID.....52P8480
FRU Number.....30R5209
Customer Card ID Number....1986 (feature code)
Brand.....H0
Serial Number.....YJ1H7N62F08W
Network Address.....000D60B96D55
ROM Level.(alterable).....000002000057
Product Specific.(Z1).....iqn.1996-04.com.ibm:sn.0310b806g1
Device Specific.(YL).....U787B.001.DNW872B-P1-C1-T2
```

If the HBA is installed in an unsupported server, you may receive the following message when running the `cfgmgr` command:

```
# cfgmgr -l ics0
Method error (/usr/lib/methods/cfgqlisc -l ics0 ): 0514-086
Cannot perform the requested function because the specified
device is not supported on this platform.
```

The HBA stays logged into the iSCSI target only if the iSCSI device handles are currently in an active volume group. Otherwise, the iSCSI device handles are closed, and the HBA logs out of the target after device discovery.

Verify that the HBA is logged on to the storage system

To verify if the HBA is logged onto the storage system, go to the storage system and issue either the `igroup show` command or the `iscsi initiator show` command.

```
> igroup show
ibmp550-fak01 (iSCSI) (ostype: aix):
iqn.1996-04.com.ibm:sn.0310b806g1 (logged in on: e0)
iqn.1996-04.com.ibm:sn.0310b806g2 (logged in on: e0)
> iscsi initiator show
Initiators connected:
```

```

        TSIH  TPGroup  Initiator
        35    1000    iqn.1996-04.com.ibm:sn.0310b806g1 /
40:00:0f:21:00:00
        36    1000    iqn.1996-04.com.ibm:sn.0310b806g2 /
40:00:0f:21:00:00

```

You can also use the ping command to determine if the storage system can communicate with the HBA.

Note

If you are using an HBA, do not use the ping command on the host. The HBA does not have an Ethernet interface.

Verify the adapter's configuration

You can use the `lsattr -El icsX` command (where *X* is the adapter instance) to verify that the software initiator or HBA characteristics were configured correctly.

# lsattr -El ics0			
bus_intr_lvl	278	Bus interrupt level	False
bus_io_addr	0xcfc00	Bus I/O address	False
bus_mem_addr	0xc0100000	Bus memory address	False
disc_filename	/etc/iscsi/targetshw	Discovery Filename	True
disc_policy	file	Discovery Policy	True
gateway_addr		Adapter Gateway Address	True
host_addr	10.60.224.136	Adapter IP Address	True
initiator_name	iqn.1996-04.com.ibm:sn.0310b806g1	iSCSI Initiator Name	True
intr_priority	3	Interrupt Priority	False
lg_term_dma	0x800000	Amount of memory used for long term DMA mapping	True
max_xfer_size	0x100000	Maximum transfer size	True
num_cmd_elems	200	Maximum number of commands to queue to the adapter	True
subnet_mask	255.255.255.0	Adapter Subnet Mask	True

Check the LUN characteristics

You can display the characteristics of a LUN by executing the `lsattr -El <hdiskname>` command.

```
# lsattr -El hdisk4
PCM                PCM/friend/NetAppDefaultPCM      Path Control Module      False
algorithm          round_robin                          Algorithm                 True
clr_q              no                                    Device CLEARS its Queue on error True
dist_err_pcnt      0                                    Distributed Error Sample Time True
dist_tw_width      50                                    Distributed Error Sample Time True
hcheck_cmd         inquiry                             Health Check Command      True
hcheck_interval    30                                    Health Check Interval     True
hcheck_mode        nonactive                            Health Check Mode         True
host_addr          10.60.244.35                        Hostname or IP Address    False
location           Location Label                       Location Label            True
lun_id             0x0                                  Logical Unit Number ID    False
max_transfer       0x40000                             Maximum TRANSFER Size     True
port_num           0xcbc                               PORT Number               False
pvid               000a105418b0c7ed00000000000000000 Physical volume identifier
False
q_err              yes                                    Use QERR bit              True
q_type             simple                               Queuing TYPE              True
queue_depth        12                                    Queue DEPTH               True
reassign_to        120                                  REASSIGN time out value   True
reserve_policy     no_reserve                           Reserve Policy             True
rw_timeout         120                                  READ/WRITE time out value True
start_timeout      60                                    START unit time out value True
target_name        iqn.1992-08.com.netapp:sn.33610045 Target NAME                False
```

Check the MPIO disk path information

If you want to see information about the MPIO disk paths, execute the `lspath` command.

```
# lspath -l hdisk20 -F connection:status:parent:path_id
iqn.1986-03.com.ibm:sn.84213404,192.168.2.221,0xcbc,0x1000000000000:Enabled:iscsi0:0
iqn.1986-03.com.ibm:sn.84213404,192.168.2.221,0xcbc,0x1000000000000:Enabled:iscsi1:1
```

Using Diagnostic Utilities

Diagnostic utilities

The Host Utilities provide command-line utilities that provide diagnostic information you can use for troubleshooting.

When you run these utilities, they gather configuration information about your host and storage system. They automatically collect information and place it in a directory. Then they create a compressed tar file of that directory. You can send this file to NetApp Customer Support.

Normally, you only use these utilities when requested to do so by Customer Support. The utilities that apply to the iSCSI AIX Host Utilities are:

- ◆ `filer_info`. See “[Collecting storage system information](#)” on page 63 for more information.
- ◆ `aix_info`. See “[Collecting AIX information](#)” on page 64 for more information.

General steps for executing the programs

Although some of the scripts have arguments that you may want to use, the general steps for executing these scripts are the same.

Step	Action
1	Change to the <code>/opt/NTAP/SANToolkit/bin</code> directory: <code>cd /opt/NTAP/SANToolkit/bin</code>
2	Enter the utility name. If the utility you are using includes arguments, you can enter them as well. Result: The configuration information that the utility gathers is placed in a compressed file.

Collecting storage system information

If you are having a problem, Customer Support might ask you to run `filer_info` to collect storage system configuration information. You should only run this utility when requested to do so by Customer Support. To execute `filer_info`, complete the following steps.

Running filer_info

Complete the steps below to collect storage system information.

Step	Action
1	On the AIX host, change to the /opt/NTAP/SANToolkit/bin directory: <pre>cd /opt/NTAP/SANToolkit/bin</pre>
2	At the host command prompt, enter the <code>filer_info</code> command: <pre>filer_info [-d <i>path_and_file_name</i>] [-l <i>passwd</i>] -n <storage_system_name> -f</pre> -d enables you to specify a different path in which to place the resulting output. -l <i>passwd</i> allows you to specify a password to access the storage system. -n <storage_system_name> specifies the target of the command, where <i>storage_system_name</i> is the name or IP address of the storage system accessed. -f automatically overwrites an existing <storage_system_name> file in the default output directory. You might have an existing file in this directory if you previously ran the script. If you do not use the -f option, and you have an existing file, the <code>filer_info</code> script tells you to delete or rename the file. Result: The output of various status commands are placed in the output directory, where <i>storage_system_name</i> is replaced by the storage system name or IP address. The contents of this directory are placed in a tarred and compressed file named <code>storage_system_<storage_system_name>.tar.Z</code>.
3	Send the resulting compressed file to Customer Support for analysis.

Collecting AIX information

If you are having a problem, Customer Support might ask you to run `aix_info` to collect configuration information about your host. You should only run this utility when requested to do so by Customer Support.

Running aix_info

To execute `aix_info`, complete the following steps:

Step	Action
1	On the AIX host, change to the <code>/opt/NTAP/SANToolkit/bin</code> directory: <pre>cd /opt/NTAP/SANToolkit/bin</pre>
2	At the command prompt, enter the <code>aix_info</code> command: <pre>aix_info [-d <directory>] [-n <file_name>] -f</pre> <code>-d <directory></code> specifies the location for the file that <code>aix_info</code> creates. <code>-n <file_name></code> specifies the name for the output file and directory names. <code>-f</code> automatically overwrites an existing <code>.tar.Z</code> file in the default output directory. You might have an existing file in this directory if you previously ran the script. If you do not use the <code>-f</code> option, and you have an existing file, the script tells you to delete or rename the file. Result: When you run <code>aix_info</code>, the utility gathers information about your AIX configuration and places it in a <code>.tar.Z</code> file. It also creates a directory and populates it with files containing output from numerous commands run on the AIX system and contents of the <code>/var/adm/message</code> file.
3	Send the resulting file to Customer Support for analysis.

About this chapter

This chapter describes what you need to do to configure SAN booting on an AIX host using the iSCSI protocol.

Note

While SAN booting is currently not supported with Veritas configurations, NetApp qualifies solutions and components on an ongoing basis. To determine whether SAN booting is supported in your configuration, see the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do>.

Topics in this chapter

This chapter discusses the following topics:

- ◆ “[Overview of setting up a SAN boot LUN](#)” on page 68
- ◆ “[Before you begin](#)” on page 70
- ◆ “[Detailed steps for installing and configuring the SAN boot LUN](#)” on page 71

Overview of setting up a SAN boot LUN

What is SAN booting

SAN booting is using a SAN-attached disk, such as a LUN, as a boot device for a host. Configuring SAN booting allows you to:

- ◆ Remove the hard drives from your servers and use the SAN for your boot needs. This eliminates the costs associated with maintaining and servicing hard drives.
- ◆ Use the SAN for both storage and boot needs, thereby consolidating and centralizing storage.

Note

Jumbo frames are not currently supported for SAN booting.

Overview of configuring a SAN boot LUN

Configuring a boot LUN involves steps both on the host and on the storage system. You will need to install the operating system on the host and set up the boot LUN and map it to igroup once you have all the necessary information.

One way to do this is to open a separate window on the host and use a command such as telnet to connect to the storage system.

Here is a high-level overview of the steps you need to perform to set up a boot LUN:

1. Before you begin:
 - a. Determine the size required for the boot LUN.
 - b. Get information about the iSCSI software or HBA.
2. On the host, configure the network disks:
 - a. Boot the AIX server using a NIM server or a CD-ROM. The Base Operating System Installation and Maintenance menu appears.
 - b. From the menu, configure the iSCSI software initiator or HBA by selecting option 4.
3. On the storage system, get the NetApp controller information:
 - a. Open another window on the AIX host and connect to the storage system in order to get information about the NetApp controller.
 - b. Create an igroup for the boot LUN.

4. On the storage system, create the boot LUN and map it to the igroup.
5. On the host, add the NetApp controller information to the iSCSI Configuration -- SW Initiator panel in the Base Operating System Installation and Maintenance menu.
 - a. After the iSCSI initiator is configured, it logs into the storage system and discovers the boot LUN.
6. On the host, return to the Base Operating System Installation and Maintenance menu on the host and select Option 2: Change/Show Installation Settings and Install.
 - a. Choose Option 1: Disk(s) where you want to install Use Maps.
 - b. Choose option 77 (twice) to use the iSCSI initiator to choose the device handle.
 - c. Choose Option 0 to install to the iSCSI boot device handle.
 - d. The iSCSI boot banner should appear, followed by the AIX Kernel banner.
 - e. Enter the appropriate commands to enable AIX to discover the iSCSI boot device.
7. Install the Host Utilities software on the boot LUN.
 - a. Follow the instructions in Chapter 2 to install the Host Utilities software.
8. Change the boot LUN's reservation policy for MPIO to single_path.
9. Power cycle the server and boot from the LUN.
 - a. Verify that the boot device is a Netapp MPIO iSCSI device.

Before you begin

Important notes about creating a SAN boot LUN

Before you set up a SAN boot LUN, make sure the following is true:

- ◆ You are running the correct version and technology level of the operating system and your host and storage system are configured properly.
- ◆ You have confirmed that your configuration supports SAN booting by checking the *NetApp Interoperability Matrix Tool* at <http://now.netapp.com/matrix/mtx/login.do>
- ◆ You are logged in as root.
- ◆ You have checked the Release Notes to make sure none of the steps have changed since this guide was produced.

Documentation required for creating a boot LUN

You should have the following documentation available to you when begin this procedure.

- ◆ This document. This guide provides a summary of the key steps.
- ◆ The *Data ONTAP™ Block Access Management Guide*, which is available at http://now.netapp.com/NOW/knowledge/docs/ontap/ontap_index.shtml.
- ◆ The AIX product documentation.

Determine the size of the boot LUN

You should determine the size of the boot LUN before you begin the installation.

The LUN must be large enough to provide space for the AIX operating system version you are using. See the AIX product documentation to determine how much disk space is required.

Get the iSCSI node name of the host's initiator or HBA

Before you start, you should get the iSCSI node name of the host's initiator of HBA. You need this information to create an igroup.

Detailed steps for installing and configuring the SAN boot LUN

Creating a SAN boot LUN

Creating a LUN you can boot from involves several tasks that you must perform on the host and on the storage system. To create a SAN boot LUN, complete the following steps.

Note_____

This is an example of one way to create a SAN boot LUN. There are other ways to do this. Check your AIX product documentation for more information. To make the examples shown in these steps easier to read, the options you need to select are shown in bold.

Step	Action
1	Make sure that you are logged in as root and that you have: ◆ Calculated the size needed for the boot LUN. ◆ Have information on the iSCSI software initiator or HBA.
2	(AIX Host) Boot the AIX server using either a NIM server or a CD-ROM. The Base Operating System Installation and Maintenance menu appears.

Step	Action
3	(AIX Host) Configure the iSCSI software initiator or iSCSI HBA. Choose option 4 in the Base Operating System Installation and Maintenance menu. Example: When you start the AIX operating system, it displays the Base Operating System Installation and Maintenance menu. At the “Installation and Maintenance” menu, choose the option: “4 Configure Network Disks (iSCSI).” <pre> Welcome to Base Operating System Installation and Maintenance Type the number of your choice and press Enter. Choice is indicated by >>>. >>> 1 Start Install Now with Default Settings 2 Change/Show Installation Settings and Install 3 Start Maintenance Mode for System Recovery 4 Configure Network Disks (iSCSI) 88 Help ? 99 Previous Menu >>> Choice [1]: 4 Move cursor to desired item and press Enter. Configure iSCSI <<<----- Network Utilities Esc+1=Help Esc+2=Refresh Esc+3=Cancel F8=Image F9=Shell F10=Exit Enter=Do x Available Network Devices x x x x Move cursor to desired item and press Enter. x x x x en0 N/A x x ics0 02-09 N/A x x x </pre>

Step	Action
4	(Storage System) Get information from the storage system on the NetApp controller. You can do this by opening a window on the host and using a command such as telnet to connect to the storage system. You need to this information on the NetApp controller in order to configure the iSCSI adapter for booting. From a command line on the storage system, you must: 1. Get the iSCSI node name. Use the command <code>iscsi nodename</code>. 2. Display information about the iSCSI portal. Use the command <code>iscsi portal show</code>. 3. (Recommended) Disable all the interfaces except the one you are using. Use the command <code>iscsi interface disable interface_name</code>. 4. Display information on the interface to confirm that the unused interfaces have been disabled. Use the command <code>iscsi interface show</code>. 5. Create the igroup. Use the command <code>igroup create -i -t aix initiator_group [node ...]</code>. 6. Display information on the new igroup. Use the command <code>iscsi show igroup_name</code> Note_____ For more information on performing storage system operations, see the <i>Data ONTAP Block Access Management Guide for iSCSI and FCP</i>. _____ Example: The following is an extended example showing the series of commands that you might execute to get information about the NetApp controller. These commands take you through the process of getting the iSCSI node information to setting up an igroup called iSCSI_Boot_POWER6. All these commands are run on the storage system, even though you might be executing them from a window on your host. <pre> ControllerA> iscsi nodename iSCSI target nodename: ign.1986-03.com.ibm:sn.101173314 ControllerA> iscsi portal show Network portals: IP address TCP Port TPGroup Interface 10.60.240.124 3260 1000 e0a </pre>

Step	Action
	<pre> ControllerA> iscsi interface disable e0b e0c e0d ControllerA> iscsi interface show Interface e0a enabled Interface e0b disabled Interface e0c disabled Interface e0d disabled ControllerA> igroup create -i -t aix iSCSI_Boot_POWER6 iqn.1986-03.com.ibm:sn.101173314 ControllerA> igroup show iSCSI_Boot_POWER6 iSCSI_Boot_POWER6 (iSCSI) (ostype: aix): iqn.1986-03.com.ibm:sn.106024177 (not logged in) </pre>
5	(Storage System) On the storage system, create the boot LUN and map it to the igroup. From a command line on the storage system, you must: 1. Create the boot LUN. You can use the interactive <code>lun setup</code> command or the command line <code>lun create -s size -t aix lun_path</code>. 2. Map the LUN to the igroup you created. Use the command <code>lun map lun_path igroup_name [lun_id]</code>. 3. Display information on the boot LUN to confirm that it has been created and mapped to the igroup. Use the command <code>lun show igroup_name</code>. Note_____ For more information on performing storage system operations, see the <i>Data ONTAP Block Access Management Guide for iSCSI and FCP</i>. _____

Step	Action
	Example: The following is an extended example showing the series of commands that you might execute to create a LUN, map it to an igroup, and verify it. All these commands are executed on the storage system, even though you might be executing them from a window on your host using a command such as <code>telnet</code>. <pre> ControllerA> lun create -s 45g -t aix /vol/SANboot/p570-aix01p1.bootlun ControllerA> lun map /vol/SANboot/p570-aix01p1.bootlun iSCSI_Boot_POWER6 ControllerA> lun show -v -g iSCSI_Boot_POWER6 /vol/SANboot/p570-aix01p1.bootlun 45g (48318382080) (r/w, online, mapped) Serial#: C4daG4FGMKC/ Share: none Space Reservation: enabled Multiprotocol Type: aix Maps: iSCSI_Boot_POWER6=0 </pre>
6	(AIX Host) On the host, add the NetApp iSCSI controller information to the iSCSI Configuration -- SW Initiator menu panel. Example: The following example shows the AIX menu screen filled in with the information on the NetApp controller that you got during Step 4. <pre> iSCSI Configuration -- SW Initiator Type or select values in entry fields. Press Enter AFTER making all desired changes. [Entry Fields] * Ethernet Interface en0 * IP Address of Ethernet Interface 10.60.241.77 * Network Mask of Ethernet Interface 255.255.252.0 * Gateway to iSCSI Target 10.60.240.1 * iSCSI Target Name [iqn.1986-03.com.ibm:s> * IP Address of iSCSI Target [10.60.240.124] * Port Number of iSCSI Target [3260] * iSCSI Initiator Name <.com.ibm:sn.106024177] Esc+1=Help Esc+2=Refresh Esc+3=Cancel Esc+4=List Esc+5=Reset F6=Command F7=Edit F8=Image F9=Shell F10=Exit Enter=Do </pre>

Step	Action
7	(AIX Host, Storage System) After you configure the iSCSI initiator, it should log into the storage system. Example: The following information appears on the storage system when the iSCSI initiator logs into the target. Note_____ If the initiator does not login, then there is a problem. Confirm that you got the information on the initiator and entered it correctly. _____
	<pre>ControllerA> Tue Jan 8 09:56:44 EST [3020-aix07: iscsi.notice:notice]: ISCSI: New session from initiator iqn.1986-03.com.ibm:sn.106024177 at IP addr 10.60.241.77 COMMAND STATUS Command: OK stdout: yes stderr: no Before command completion, additional instructions may appear below. en0 changed inet0 changed iscsi1 changed hdisk0 Available N/A Esc+1=Help Esc+2=Refresh Esc+3=Cancel F6=Command F8=Image F9=Shell F10=Exit /=Find n=Find Next</pre>

Step	Action
8	(AIX Host) Return to the Base Operating System Installation and Maintenance menu and choose option 2 to change the installation settings and install the operating system. Example: The following sample screen is the same one you saw when you first started AIX on the host. Select the option: “2 Change/Show Installation Settings and Install.” <pre data-bbox="239 357 1209 881"> Welcome to Base Operating System Installation and Maintenance Type the number of your choice and press Enter. Choice is indicated by >>>. >>> 1 Start Install Now with Default Settings 2 Change/Show Installation Settings and Install 3 Start Maintenance Mode for System Recovery 4 Configure Network Disks (iSCSI) 88 Help ? 99 Previous Menu >>> Choice [1]: 2 </pre>

Step	Action
9	(AIX Host) Select the iSCSI boot device by choosing option 1 at the System Backup Installation and Settings screen. Example: The following is an example of the screen you see. Select the option: “1 Disk(s) where you want to install Use Maps.” <pre> System Backup Installation and Settings Either type 0 and press Enter to install with the current settings, or type the number of the setting you want to change and press Enter. Setting: Current Choice(s): 1 Disk(s) where you want to install Use Maps..... No 2 Shrink File Systems..... No 3 Import User Volume Groups..... No 4 Recover Devices..... No >>> 0 Install with the settings listed above. 88 Help ? +-----+ 99 Previous Menu Selected disks don't match disks with maps. >>> Choice [0]: 1</pre>

Step	Action
10	(AIX Host) Use the iSCSI initiator to choose the device handle. Note_____ You can use option 77 to verify that this device handle is via the iSCSI initiator. You must select this option twice. _____ Example: After you select the option: “1 Disk(s) where you want to install Use Maps,” the following screen appears. Select option 77 twice to verify that the device handle is from the iSCSI software driver. <pre> Change Disk(s) Where You Want to Install Type one or more numbers for the disk(s) to be used for installation and press Enter. To cancel a choice, type the corresponding number and Press Enter. At least one bootable disk must be selected. The current choice is indicated by >>>. Name Location Code Size(MB) VG Status Bootable Maps >>> 1 hdisk0 none 46080 rootvg Yes Yes >>> 0 Continue with choices indicated above 55 More Disk Options 66 Disks not known to Base Operating System Installation 77 Display Alternative Disk Attributes 88 Help ? 99 Previous Menu >>> Choice [0]: 77 <<<<----- choose option 77 twice to verify this Device Handle is from the iSCSI Software Driver Change Disk(s) Where You Want to Install Type one or more numbers for the disk(s) to be used for installation and press Enter. To cancel a choice, type the corresponding number and Press Enter. At least one bootable disk must be selected. The current choice is indicated by >>>. Name Device Adapter Connection Location or Physical Location Code >>> 1 hdisk0 iscsi <<<<----- iSCSI Software Driver </pre>

Step	Action
11	(AIX Host) Choose option 0 to continue installing to this iSCSI boot device handle. Example: After you select the option 77, the following screen appears. To continue installing the iSCSI boot device handle, select the option “0 Continue with choices indicated above.” <pre> >>> 0 Continue with choices indicated above 55 More Disk Options 66 Disks not known to Base Operating System Installation 77 Display Alternative Disk Attributes 88 Help ? 99 Previous Menu >>> Choice [0]: 0 System Backup Installation and Settings Either type 0 and press Enter to install with the current settings, or type the number of the setting you want to change and press Enter. Setting: Current Choice(s): 1 Disk(s) where you want to install hdisk0 Use Maps..... No 2 Shrink File Systems..... No 3 Import User Volume Groups..... No 4 Recover Devices..... No >>> 0 Install with the settings listed above. 88 Help ? +-----+ 99 Previous Menu WARNING: Base Operating System Installation will destroy or impair recovery of ALL data on the destination disk hdisk0. >>> Choice [0]: 0 </pre>

Step	Action
12	After installing directly to a NetApp iSCSI device, the iSCSI boot banner appears followed by the AIX kernel banner. These banners indicate that you have successfully installed the operating system on the boot LUN. Example: The banners that appear should appear similar to the following ones. <pre>iSCSI BOOT ----- Server IP.....10.60.240.124 Client IP.....10.60.241.77 Subnet Mask.....255.255.252.0 iSCSI Initiator.....iqn.1986-03.com.ibm:sn.106024177 iSCSI Target.....iqn.1986-03.com.ibm:sn.101173314 Target Port.....3260 Target LUN.....0 ----- Welcome to AIX. boot image timestamp: 15:06 01/08 The current time and date: 15:09:32 01/08/2008 number of processors: 1 size of memory: 2048MB boot device: /lhea@23c00200/ethernet@23e00000:iscsi,ciaddr=10.60.241.77,subnet- mask=255.255.252.0,itname=iqn.1986- 03.com.ibm:sn.106024177,ipport=3260,ilun=0,iname=iqn.1986- 03.com.ibm:sn.101173314,siaddr=10.60.240.124,2 kernel size: 15001975; 64 bit kernel -----</pre>

Step	Action
13	(AIX Host) Get AIX to discover the iSCSI boot device. Depending on NetApp controller version being used, AIX discovers the iSCSI boot device as either “MPIIO other device” or, if the controller is prior to FAS3000 series, “iSCSI other device.” You use the commands <code>bootlist</code>, <code>lsdev</code>, and <code>lslpp</code> to discover the boot device. Example: The following is an example of discovering the iSCSI boot device. <pre>[5300-07-01-0748] root@p01p1 / -> bootlist -m normal -o hdisk0 [5300-07-01-0748] root@p01p1 / -> lsdev egrep 'ics iscsi' ics0 Available 02-09 iSCSI Adapter iscsi0 Available 02-09-01 iSCSI Protocol Device iscsi1 Available iSCSI Protocol Device [5300-07-01-0748] root@p01p1 / -> lsdev -c driver -t iscsi iscsi1 Available iSCSI Protocol Device [5300-07-01-0748] root@p01p1 / -> lsdev -Cc disk grep -w hdisk0 hdisk0 Available MPIIO Other iSCSI Disk Drive [5300-07-01-0748] root@p01p1 / -> lslpp -i NetApp* lslpp: 0504-132 Fileset NetApp* not installed. [5300-07-01-0748] root@p01p1 / -> lsattr -El hdisk0 PCM PCM/friend/iscsiother Path Control Module False algorithm fail_over Algorithm True clr_q no Device CLEARS its Queue on error True dist_err_pcmt 0 Distributed Error Percentage True dist_tw_width 50 Distributed Error Sample Time True hcheck_cmd test_unit_rdy Health Check Command True hcheck_interval 60 Health Check Interval True hcheck_mode nonactive Health Check Mode True host_addr 10.60.240.124 Hostname or IP Address False location Location Label Location Label True lun_id 0x0 Logical Unit Number ID False max_transfer 0x40000 Maximum TRANSFER Size True port_num 0xcbc PORT Number False pvid 00c5a250ce555d310000000000000000 Physical volume identifier False q_err yes Use QERR bit True q_type simple Queuing TYPE True queue_depth 8 Queue DEPTH True reassign_to 120 REASSIGN time out value True reserve_policy single_path Reserve Policy True</pre>

Step	Action																												
	<table><tr><td>q_type</td><td>simple</td><td>Queuing TYPE</td><td>True</td></tr><tr><td>queue_depth</td><td>8</td><td>Queue DEPTH</td><td>True</td></tr><tr><td>reassign_to</td><td>120</td><td>REASSIGN time out value</td><td>True</td></tr><tr><td>reserve_policy</td><td>single_path</td><td>Reserve Policy</td><td>True</td></tr><tr><td>rw_timeout</td><td>30</td><td>READ/WRITE time out value</td><td>True</td></tr><tr><td>start_timeout</td><td>60</td><td>START unit time out value</td><td>True</td></tr><tr><td>target_name</td><td>iqn.1986-03.com.ibm:sn.101173314</td><td>Target NAME</td><td>False</td></tr></table>	q_type	simple	Queuing TYPE	True	queue_depth	8	Queue DEPTH	True	reassign_to	120	REASSIGN time out value	True	reserve_policy	single_path	Reserve Policy	True	rw_timeout	30	READ/WRITE time out value	True	start_timeout	60	START unit time out value	True	target_name	iqn.1986-03.com.ibm:sn.101173314	Target NAME	False
q_type	simple	Queuing TYPE	True																										
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start_timeout	60	START unit time out value	True																										
target_name	iqn.1986-03.com.ibm:sn.101173314	Target NAME	False																										
14	(AIX Host) Install the Host Utilities. For information on doing this, see “ Installing the Host Utilities software ” on page 19.																												
15	(AIX Host) Change the boot LUN's reserve policy for MPIO by entering the following command: <pre>AIX_Host> chdev -Pl hdisk0 -a algorithm=fail_over -a reserve_policy=single_path</pre> This command prevents SCSI-2 Reserve conflicts by setting the reserve policy to single_path. Note_____ This change applies only to the boot LUN. You do not have to change the settings for data LUNs. Data LUNs can use the Host Utilities default settings. _____																												
16	(AIX Host) Reboot the server.																												

Step	Action
17	(AIX Host) Verify the boot device is a NetApp MPIO iSCSI device. Example: The following is an example of verifying that the boot device is a NetApp MPIO iSCSI device. <pre>[5300-07-01-0748] root@p570-aix01p1 / -> lslpp -i NetApp* Vendor Fileset Code Product Id Feature Id Package Name ----- - Path: /usr/lib/objrepos NetApp.SAN_toolkit.sanlun 5.0.0.0 NetApp.SAN_toolkit NetApp.SAN_toolkit.scripts 5.0.0.0 NetApp.SAN_toolkit NetApp.mpio_attach_kit.config 5.0.0.0 NetApp.mpio_attach_kit NetApp.mpio_attach_kit.fcp 5.0.0.0 NetApp.mpio_attach_kit NetApp.mpio_attach_kit.iscsi 5.0.0.0 NetApp.mpio_attach_kit NetApp.mpio_attach_kit.pcmadm 5.0.0.0 NetApp.mpio_attach_kit [5300-07-01-0748] root@p570-aix01p1 / -> lsdev -Cc disk grep -w \$(bootinfo -b) hdisk1 Available MPIO NetApp iSCSI Disk [5300-07-01-0748] root@p570-aix01p1 / -> lsdev -Cc disk hdisk0 Defined MPIO Other iSCSI Disk Drive hdisk1 Available MPIO NetApp. iSCSI Disk [5300-07-01-0748] root@p570-aix01p1 / -> rmdev -dl hdisk0 hdisk0 deleted [5300-07-01-0748] root@p570-aix01p1 / -> bootlist -m normal -o hdisk1 [5300-07-01-0748] root@p570-aix01p1 / -> lsattr -El hdisk1 PCM PCM/friend/NetAppDefaultPCM Path Control Module False algorithm round_robin Algorithm True clr_q no Device CLEARS its Queue on error True dist_err_pcmt 0 Distributed Error Sample Time True dist_tw_width 50 Distributed Error Sample Time True hcheck_cmd inquiry Health Check Command True hcheck_interval 30 Health Check Interval True hcheck_mode nonactive Health Check Mode True [host_addr 10.60.240.124 Hostname or IP Address False location Location Label True hcheck_mode nonactive Health Check Mode True</pre>

Step	Action																																																												
	<table><tr><td>[host_addr</td><td>10.60.240.124</td><td>Hostname or IP Address</td><td>False</td></tr><tr><td>location</td><td></td><td>Location Label</td><td>True</td></tr><tr><td>lun_id</td><td>0x0</td><td>Logical Unit Number ID</td><td>False</td></tr><tr><td>lun_reset_spt</td><td>yes</td><td>LUN Level Reset</td><td>True</td></tr><tr><td>max_transfer</td><td>0x40000</td><td>Maximum TRANSFER Size</td><td>True</td></tr><tr><td>port_num</td><td>0xcbc</td><td>PORT Number</td><td>False</td></tr><tr><td>pvid</td><td>00c5a250ce555d310000000000000000</td><td>Physical volume identifier</td><td>False</td></tr><tr><td>q_err</td><td>yes</td><td>Use QERR bit</td><td>True</td></tr><tr><td>q_type</td><td>simple</td><td>Queuing TYPE</td><td>True</td></tr><tr><td>queue_depth</td><td>12</td><td>Queue DEPTH</td><td>True</td></tr><tr><td>reassign_to</td><td>120</td><td>REASSIGN time out value</td><td>True</td></tr><tr><td>reserve_policy</td><td>no_reserve</td><td>Reserve Policy</td><td>True</td></tr><tr><td>rw_timeout</td><td>120</td><td>READ/WRITE time out value</td><td>True</td></tr><tr><td>start_timeout</td><td>60</td><td>START unit time out value</td><td>True</td></tr><tr><td>target_name</td><td>iqn.1986-03.com.ibm:sn.101173314</td><td>Target NAME</td><td>False</td></tr></table>	[host_addr	10.60.240.124	Hostname or IP Address	False	location		Location Label	True	lun_id	0x0	Logical Unit Number ID	False	lun_reset_spt	yes	LUN Level Reset	True	max_transfer	0x40000	Maximum TRANSFER Size	True	port_num	0xcbc	PORT Number	False	pvid	00c5a250ce555d310000000000000000	Physical volume identifier	False	q_err	yes	Use QERR bit	True	q_type	simple	Queuing TYPE	True	queue_depth	12	Queue DEPTH	True	reassign_to	120	REASSIGN time out value	True	reserve_policy	no_reserve	Reserve Policy	True	rw_timeout	120	READ/WRITE time out value	True	start_timeout	60	START unit time out value	True	target_name	iqn.1986-03.com.ibm:sn.101173314	Target NAME	False
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lun_id	0x0	Logical Unit Number ID	False																																																										
lun_reset_spt	yes	LUN Level Reset	True																																																										
max_transfer	0x40000	Maximum TRANSFER Size	True																																																										
port_num	0xcbc	PORT Number	False																																																										
pvid	00c5a250ce555d310000000000000000	Physical volume identifier	False																																																										
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target_name	iqn.1986-03.com.ibm:sn.101173314	Target NAME	False																																																										
18	(AIX Host) Restart the AIX server so that it boots from the boot LUN with the MPIO and SCSI-2 Reserve parameters you set.																																																												
19	(AIX Host) Invalidate the current bootlist and create a bootlist that boots only from the primary paths of the boot LUN. You can use the following commands to perform these steps: <pre>bootinfo -b bootlist -m normal -i bootlist -m normal <BootDeviceHandle></pre> These commands: ◆ Return information on the last boot device. ◆ Invalidate the normal mode boot list ◆ Set a the new boot device to a normal boot list. Note_____ This procedure helps prevent a common boot issue where the boot list becomes filled with paths that cannot be used during the boot cycle. _____																																																												

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