

SAN Host 1.0 for Fibre Channel Protocol on IBM® AIX® **Release Notes**

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SAN Host 1.0 for Fibre Channel Protocol on IBM AIX overview

Host Attach Kit components

The SAN Host Attach Kit 1.0 for AIX includes the software components you need to configure an AIX server as the host component in a Network Appliance™ SAN environment. The Host Attach Kit contains the following items:

- ◆ *SAN Setup Overview for FCP*
- ◆ *SAN Host Attach Kit 1.0 for Fibre Channel Protocol on AIX Installation and Setup Guide*
- ◆ Media kit
 - ❖ *SAN Host 1.0 for Fibre Channel Protocol on AIX Release Notes* (this document)
 - ❖ CD-ROM. The CD-ROM contains the following NetApp software packages in a standard installable package format:
NetApp.fcp_attach_kit
NetApp.fcp_toolkit
These packages contain the NetApp device definitions and other utilities that NetApp supplies with this release.
 - ❖ (Multipathing version only) CD-ROM SANpath® software. This software, provided by Dot Hill®, is necessary to enable multipathing.
 - ❖ License agreement

Getting the NetApp software from the CD-ROM

To get the NetApp software from the CD-ROM, complete the following steps.

Step	Action
1	Insert the CD-ROM into the CD-ROM drive.
2	Change to the root directory, which contains the install script and the software packages: ◆ NetApp.fcp_attach_kit ◆ NetApp.fcp_toolkit

Step	Action
3	Copy the <code>install</code> shell script from the CD-ROM's root directory to a temporary location on the host. Example: If you mount the CD-ROM on <code>/mnt</code> and want to place the <code>install</code> script in the <code>/tmp</code> directory, you might enter commands similar to the following: <pre># mount -v cdrfs -o ro /dev/cd0 /mnt # cp /mnt/install /tmp # cd /tmp</pre>

System requirements

System requirements

The following table lists the minimum system requirements at the time this document was printed for using an AIX server with a NetApp storage appliance.

For the most current and complete system requirements, see the online FCP/iSCSI Configuration Guide at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/.

Note

NetApp does not provide the host operating system components. If you have questions about setting up these components, see the AIX documentation that came with your system.

Component	Requirement
Host OS	AIX 5.1 ML4
AIX platforms	◆ Entry level: F80, p610, p615, p620, p630, p640 ◆ Mid Range: H80, p650, p655, p660H, M80, p660M, p670 ◆ High-end: p690
HBA	Native AIX: ◆ 2 GB Fibre Channel PCI Adapter 64-bit PCI HBA: FC 6228 Type 4 ◆ 2 GB Fibre Channel PCI-X Adapter: FC 6239 Type 5704 Note Make sure that you have a copy of the following driver file sets: ◆ devices.common.IBM.fc.hba-api version 5.1.0.0 ◆ devices.pci.df1000f7.com version 5.1.0.57

Component	Requirement
Multipathing software	SANpath 4.0.5 Note_____ Multipathing version of the Host Attach Kit only.
Host clustering	HACMP/ES 4.5
Logical partitioning	LPAR qualified Note_____ Dynamic LPAR is not available on AIX 5.1.
Storage appliances	◆ NetApp F8xx series ◆ NetApp FAS9xx series ◆ NetApp FAS270 ◆ NetApp NearStore® Rxxx Caution_____ Only NetApp Fibre Channel storage appliances are supported with this release of the Host Attach Kit. This release does not support mixed SAN storage arrays (other than NetApp storage appliances) on the same host or Fibre Channel switch.
Filer OS	Data ONTAP™ 6.5 software and later
Cable	50 micron multimode fiber optic cable Purchase the length of optical cable appropriate for your site requirements. Note_____ The <i>Cable Support for FCP</i> page in the <i>FCP/iSCSI Configuration Guide</i> on the NetApp NOW site contains the most up-to-date information about cabling specifications and requirements. It also has information about ordering cables.

**Configuration
considerations with
SANpath**

(Multipathing only) SANpath has the following upper limits:

- ◆ Maximum number of supported HBA is 4.
- ◆ Maximum number of LUNs supported on a host is 128.
- ◆ Maximum number of paths per SANpath device is 32.

Limitations, known problems, and troubleshooting tips

About this section

This section lists known problems and limitations of the SAN Host 1.0 for Fibre Channel Protocol on AIX at the time of this release. For the most up-to-date list of limitations and known problems, see the NetApp NOW Web site.

Accessing information about bug fixes

From time to time, problems with the SAN Host Attach Kit are listed in an online system called Bugs Online. For a list of fixed bugs, access Bugs Online by completing the following steps.

Step	Action
1	Use a Web browser to go to http://now.netapp.com .
2	Log into NOW and click Service & Support.
3	Click Bugs Online and Release Tools.
4	Enter the Bug ID in the Quick Search text box and click Go.

System compatibility issues

The NetApp installation program checks your system before it installs the software to ensure that it meets the minimum system requirements. If your system doesn't meet the minimum requirements, the installation program does not install the SAN Host Attach Kit software.

If the installation halts because of compatibility issues, correct your system setup and rerun the installation program.

Note

Do not run the uninstall program if the installation halts.

sanlun displays more LUNs than expected

Problem: The `sanlun lun show` command reports LUN information for LUNs that are on clustered filer heads where the fcp service is stopped.

Explanation: Stopping the fcp service on a filer head disables only the target HBAs. The interconnect proxy still allows for LUNs to be accessed from a clustered filer head that has an active fcp service.

What to do: If you do not want to see the LUNs from the a filer when the fcp service is stopped, either offline the LUNs or destroy them.

sanlun does not display data for all HBAs

Problem: The `sanlun fcp show adapter` with either the `-v` or `-c` option does not show information for all the HBAs installed on the host.

Explanation: The `sanlun fcp show adapter` command uses IBM's implementation of the SNIA HBA API, which has a problem in its implementation. As a result, calls are made to an HBA that does not have a link so they fail.

What to do: Cable the HBA into a switch or target HBA to establish link on the HBA. Re-run `sanlun fcp show adapter` to obtain information about the HBA.

sanlun does not show HBA hardware version

Problem: The `sanlun fcp show adapter -v` command does not display the HBA hardware version.

Explanation: This is a problem with the `sanlun` utility that will be fixed in a future version.

What to do: Use the `lscfg -vpl fcsn` command to obtain additional hardware information about the HBA.

sanlun shows wrong speed for negotiated link

Problem: The `sanlun fcp show adapter -v` command sometimes reports a negotiated link speed of 1GB/sec even though the fibre channel switch or direct-attached filer correctly report a link speed of 2 GB/sec.

Explanation: As reported in IBM APAR #IY46278, IBM's implementation of the SNIA HBA API has a bug that incorrectly displays the negotiated link speed.

What to do: IBM APAR #IY46278 was fixed in the 5.1.0.1 version of the `device.common.IBM.fc.hba-api` fileset. Update the fileset to fix the bug, or rely on the link speed reported by the fibre channel switch or the filer.

SANpath does not support HBA hot swap

Problem: (Multipathing only) SANpath does not support PCI hot swap in hot-swap capable IBM hosts even though the IBM FC6228 and FC6239 HBAs support it.

Explanation: To hot-swap an HBA, you must disable any child devices. Child devices of the HBA include the FCP protocol driver and the hdisk devices. SANpath uses the hdisk devices to do multipathing. As a result, the individual hdisks associated with a SANpath multipathed LUN can not be removed. This means I/O to SANpath-enabled LUNs would have to be completely quiesced.

What to do: Stop any host application I/O to LUNs that contain faulty HBA paths. Disable SANpath and disable any child devices of the failed HBA. Follow the IBM recommended procedure to hot-swap the HBA for that particular host platform. Re-enable the child devices and SANpath.

fsck inode allocation map errors

Problem: When you run the `fsck` command on AIX JFS2 file systems, the command might report the message: "Errors detected in the file system inode allocation map."

Explanation: This appears to be a problem with AIX JFS2 file systems instead a problem specific to any type of storage. We have never encountered any data corruption and the `fsck` command has always been able to correct the problem.

What to do: At the time this document was printed, there was not a work-around. Check the NOW site for the most recent information on this problem.

sppath, setsp, and sanlun lun show slow to display data

Problem: (Multipathing only) The Dot Hill SANpath commands `sppath` and `setsp` as well as the NetApp `sanlun` utility sometimes take a long time to display information about the paths and LUNs.

Explanation: It is likely that one of the physical paths to the filer has very recently become unavailable (because of a takeover or some other problem) and SANpath has not yet detected that the path is bad. The I/O down these paths eventually times out. When that happens, the utilities should display some information about the paths and LUNs, although it may not be complete information.

What to do: Try to locate and repair the problem that is causing the path to fail. Otherwise, wait several minutes for SANpath to properly detect all the failed paths and rerun the utility.

Primary path changes

Problem: (Multipathing only) Although SANpath lets you set the primary path, that setting might not remain persistent.

Explanation: SANpath uses a SANpath device number (spd*N*) to associate LUNs to physical volume mapping. This mapping expressed as "spd*N* = hdisk*N*" (as shown by the command `setsp -v`) remains persistent. The primary path, denoted with an "X" under the column "Pri", is not persistent.

What to do: Use the SANpath spd*N* alias to determine the persistent physical volume to which the LUN maps.

Example: The following example shows a typical LUN. The physical volume seen by the operating system is "hdisk1" as indicated by the "spd0 = hdisk1" mapping. Regardless of which paths SANpath uses (hdisk1, hdisk26, hdisk20 or hdisk32), AIX always points to physical volume hdisk1.

=====									
spd	Path/disk	Status	Pri	Exc	Buf	Balance	RtrCnt	RtrDly	FailBack
=====									
0	hdisk1(41,5)	P Good		X		32	1	9	1000
	hdisk26(41,28)	P Good							1
	hdisk20(41,19)	S Good							
	hdisk32(41,24)	S Good							
spd0 = hdisk1						ID = "NETAPP LUN 0ckti3ne2xFD"			
=====									

If you used the SANpath command `setsp -p` to change the primary path, AIX would still use hdisk1. SANpath, however, would then direct that I/O down the hdisk26 path, as illustrated in the following example. As a result, the spd alias would remain persistent on the host, but the path selection would not.

```
# setsp -p1 -l0
# setsp -v -l0
```

```
=====
```

spd	Path/disk	Status	Pri	Exc	Buf	Balance	RtrCnt	RtrDly	FailBack
=====									
0	hdisk1(41,5)	P Good			32	1	9	1000	1
	hdisk26(41,28)	P Good		X					
	hdisk20(41,19)	S Good							
	hdisk32(41,24)	S Good							
spd0 = hdisk1						ID = "NETAPP LUN 0ckti3ne2xFD"			
=====									

Problem with SANpath LUNs and HACMP/ES

Problem: (Multipathing only) You cannot use SANpath-controlled LUNS while using HACMP/ES.

Explanation: Problems can occur when you use HACMP/ES if SANpath's balance setting is incorrect.

What to do: To use SANpath-controlled LUNs under HACMP/ES, you must perform the following steps after you use the `cfgmgr` to discover LUNs intended for use by HACMP/ES.

Step	Action
1	Stop HACMP/ES (if it is running) by entering the following command: smit hacmp
2	Stop all the SANpath devices by using the following command: setsp -T -lall Note _____ You can also stop an individual LUN using the command setsp -T -lX where <i>X</i> is the number of the spd device. _____
3	Set the balance to 2 for all the devices that you want to use with HACMP/ES. Enter the following command: setsp -b2 -lall Note _____ You can also set the balance for an individual LUN using the command setsp -b2 -lX where <i>X</i> is the number of the spd device. _____
4	Restart SANpath for all your devices by entering the following command: setsp -S -lall
5	Configure HACMP/ES and place the LUNs under its control.

Problem with performance of large files on JFS2

Problem: Performance on a very large file (over 200 GB) in a JFS2 file system may decline as the file increases in size.

Explanation: This problem appears to be inherent to JFS2. NetApp is working with IBM on this problem. When additional information is available, it will be posted to the NetApp Now site.

SANpath access device has changed

Problem: (Multipathing only) The SANpath access device changed after discovering additional paths to the LUN. This is a very rare problem.

Explanation: SANpath always uses the lowest-numbered hdisk device among paths to a LUN as the access device. Sometimes the host discovers only a fraction of the paths to a LUN the first time. Then, if you delete some lower-numbered hdisk devices and run `cfgmgr` to discover the remaining paths, the new paths have lower hdisk numbers. As a result, the access devices for the LUN change. If you integrated the LUN in a volume group right after the first path discovery, this change affects your LVM configuration. However, when you vary the volume group back on after discovering the new paths, LVM automatically finds the new access device without a problem.

What to do: You do not need to do anything; your setup will continue to operate correctly. You should, however, make a note of the new access device.

SANpath does not recover some paths

Problem: (Multipathing only) After a clustered takeover, SANpath only uses some of the secondary paths to the takeover filer. After a giveback, SANpath continues to use the same secondary paths instead of falling back to the primary paths.

Explanation: The SANpath daemon probes failed paths to check if they are up. If the daemon is not running, SANpath does not become aware that the failed paths are up again.

What to do: Run the `/etc/rc.sanpath start` command to start the SANpath daemon.

LUN devices come up 'Defined'

Problem: (Multipathing only) After a reboot, NetApp LUN devices come up as "Defined," while an identical number of new disk devices appear with the type "Other FC SCSI Disk Drive."

Explanation: If the `bosboot` command fails to run at the end of the install program, the system boot image does not include NetApp device definitions. This causes the system to identify NetApp LUNs as generic Fibre Channel Disk Drives at boot time.

Note

The `bosboot` command might fail if there is not enough space in the `/tmp` file system.

What to do: First, fix the problem that caused `bosboot` to fail. If the `/tmp` file system is out of space, free up some space or increase the size of the file system. Then run `bosboot -a`. Once it succeeds, stop all SANpath devices by using the `setsp -T` command and delete the new “Other FC SCSI Disk Drive” device definitions. Now run the `cfgmgr` command or reboot again. The NetApp LUN devices should come back up as “Available.”

Getting the IBM SNIA HBA API fileset

Problem: None of the AIX CD-ROMs contain a copy of the `devices.common.IBM.fc.hba-api` base level fileset, and it does not appear to be on IBM's fix download page.

Explanation: Support for the SNIA HBA API appeared at the time of the AIX 5.1 ML3 maintenance release and was included only in the AIX installation media, not the ML3 update CD-ROMs. Meanwhile, IBM's fix download page is intended for update filesets, not to distribute base level filesets with new functionality.

What to do: IBM has worked around this problem by bundling the `devices.common.IBM.fc.hba-api` version 5.1.0.0 base-level fileset with a 5.1.0.50 update of the `devices.common.IBM.fc.rte` fileset in PTF number U495166. Go to IBM's fix download page. Search for 5.1 fixes by PTF number. You must enter U495166 as a search string. The search should return one match: `devices.common.IBM.fc.rte` version 5.1.0.50. That fileset is part of ML4, so you must cheat and enter 5100-03 (that is, ML3) as your current maintenance level in order to be directed to a download page. The `devices.common.IBM.fc.rte.5.1.0.50.bff` file you download contains the `devices.common.IBM.fc.hba-api` base level fileset.

Errors due to SCSI queue full conditions

Problem: Applications receive I/O errors. The error log shows these are FC adapter errors and disk operation errors.

Explanation: These errors could be caused by SCSI QFULL conditions and might indicate incorrect Queue Depth settings. AIX interprets repeated SCSI Task Set Full conditions as real I/O errors that mean the disk might be defective, even if there is nothing fundamentally wrong with your NetApp Filer or your LUN. Traditionally, Fibre Channel disk drives have a fixed maximum queue depth, and the AIX predefined queue depth attribute for that device type does not

allow a user to exceed the device's maximum queue depth. An FCP-enabled NetApp storage appliance, though, allows a flexible allocation of target HBA queue entries among filer initiator groups and LUNs, something that AIX is not programmed to handle.

What to do: Ensure that your host queue depth settings (the `num_cmd_elems` attributes for host HBAs and the `queue_depth` attributes for host NetApp LUN devices) do not permit the host to exceed the queue entries available for the LUNs mapped to this host. If you need assistance, contact NetApp.

cfgmgr discovers only a few of the paths

Problem: (Multipathing only) You have a setup where more than one host HBA is connected to the same fabric. After you run the `cfgmgr` command and list the discovered devices, you see only a fraction of the paths to LUNS that you expected to see. In addition, the `cfgmgr` command might have displayed some error messages.

Explanation: This is known AIX behavior.

What to do: To discover all the paths, try running the `cfgmgr` command once for each HBAs on the same fabric. After doing that, stop all SANpath devices and restart them using the command `setsp -T` followed by the `setsp -S` command. Doing this should correctly enable all the paths.

cfgmgr discovers devices but displays errors

Problem: (Multipathing only) On a setup with only one host HBA per fabric, the `cfgmgr` command displays some error messages even though the devices are discovered correctly.

Explanation: This happens because of an AIX device discovery bug. SANpath has a work-around for it that allows the devices to be discovered correctly, but it does not suppress the error messages.

What to do: You can safely ignore those messages.

SANpath does not see all the devices

Problem: (Multipathing only) The `cfgmgr` command discovers some NetApp LUN devices, but not all of them and it displays error messages. These devices, though, are not seen by SANpath. When you run `setsp -v` it returns the message "No spd devices found."

Explanation: This happens if SANpath is unlicensed. You can confirm that SANpath is unlicensed by running the command `cfgmgr -v`, which returns the error message: “To activate SANpath, you must enter a valid authorization code.”

What to do: Run the `sppath -a` command to enter your authorization codes and activate SANpath. Then run `cfgmgr` again to configure your devices with SANpath.

Cannot modify disk queue depth via SMIT

Problem: You cannot modify the `queue_depth` attribute for NetApp LUNs using SMIT.

Explanation: At this time, there are no SMIT screens that allow you to modify the `queue_depth` attribute for NetApp LUN devices.

What to do: Use the `chdev` command to set the attribute.

install command runs even though the kit is installed

Problem: The `install` command runs even if the Host Attach Kit is already installed.

Explanation: The `install` command is designed to complete any steps that were potentially left out on a previous installation attempt. Consequently, the `install` command runs all the way through even if the Host Attach Kit is already installed and working correctly. This does not damage your configuration in any way.

What to do: Use the AIX commands for Licensed Product Programs to check the installation status of your kit. For example, run `lspp -l "NetApp.*"` to list the NetApp filesets installed. If you think you may have damaged your NetApp installation (for example, by modifying a file in it), uninstall and reinstall your kit, or call Network Appliance for assistance.

Running the uninstall command

Problem: (Multipathing only) If you run the `uninstall` command from the `/opt/NetApp/santools/bin/` directory, the program might not uninstall SANpath.

What to do: Copy the `uninstall` command to `/tmp` and run it from there.

install command and unsupported HBAs

Problem: When running the `install` command, you see the following lines at the beginning of the output:

```
# ./install
Checking HBAs on the system... /tmp/install[851]: got_other:
not found.
/tmp/install[851]: got_other: not found.
done.
```

Explanation: Your system is running with HBA models that are not supported by NetApp. Due to a known bug in the `install` command, the installation proceeds and displays the output above instead of displaying an error and aborting.

What to do: Please abort the installation using Ctrl-C and refer to the System Requirements section earlier in this document for a list of supported HBA models.

sanlun warns that a LUN's volume is offline

Problem: You get a warning message similar to the following when you run the `sanlun lun show` command:

```
# sanlun lun show all
filer:          lun-pathname      device filename
adapter         lun size          lun state
filerX:         <unknown>         hdisk2          fcs0
0 (0)           GOOD
WARNING: filerX:<unknown> The LUN's volume may be offline;
check filer console and run vol status
Or the LUN may be have been unmapped; check filer console and run
lun show
filerX:         <unknown>         hdisk3          fcs0
0 (0)           GOOD
WARNING: filerX:<unknown> The LUN's volume may be offline;
check filer console and run vol status
Or the LUN may be have been unmapped; check filer console and run
lun show
```

Explanation: Warning messages such as these are generated because the filer LUN associated with the host `hdisk` devices has been either offlined or removed on the filer. The `sanlun` utility is unable to retrieve information about the LUNs if they have been offlined on the filer.

This problem can occur if the LUNs volume is offline. Check filer console and run the `vol status` command. Another possibility is that the LUN may be have been unmapped.

What to do: Either online the LUNs on the filer or remove the hdisk devices on the host if the filer LUNs have been removed.

Obtaining the latest version of the NetApp software

What you need

The SAN Host Attach Kit 1.0 for AIX package that you download from the NOW site is the most recent version of the NetApp software. You can check the NOW site to see whether the software available there is more recent than the file you have on CD-ROM. If it is, use it instead of this version of the software.

Obtaining the software from NOW

To download the software from the NOW site, complete the following steps.

Step	Action
1	Log in to the NOW site at http://now.netapp.com . In the fields on the right side of the page, complete the following steps: 1. Enter your user name and password. 2. From the Select Start Page list box, click Download Software. 3. Click the Login button.
2	Go to the SAN (FCP) Host Attach Kit product row of the Software Download table and select AIX from the Select Platform drop-down list.
3	Click Go!
4	Follow the prompts to reach the Software Download page.
5	Download the NetApp software file to a local directory. Note _____ At the time this document was printed, the software was in a file called <code>ntap_aix_fcp_1.0.tar.Z</code> . _____

Step	Action
6	To get the software necessary for multipathing, download the SANpath software file to the same directory where you downloaded the other software. Note_____ To get the activation key you need when you install SANpath, follow the instructions on the page from which you downloaded the SANpath software. _____
7	If you download the files to a computer other than the AIX host, you must move them to the host.
8	For instructions about extracting and installing this file, see the <i>SAN Host Attach Kit 1.0 for Fibre Channel Protocol on IBM AIX Installation and Setup Guide</i> .

Obtaining other NetApp SAN information

Obtaining additional SAN documentation

NetApp's NOW Web site contains the most current documentation for the SAN Host Attach Kits and Support Kits, SAN filer components, and various interconnect methods. For information about this documentation, see the following:

- ◆ The online FCP/iSCSI Configuration Guide at http://now.netapp.com/NOW/knowledge/docs/san/fcp_iscsi_config/
- ◆ The *SAN Host Attach Kit 1.0 for Fibre Channel Protocol on IBM AIX Installation and Setup Guide*
- ◆ The NOW Description Page for this SAN Host Attach Kit

Locating the NOW Description Page for this kit

The SAN Host 1.0 for Fibre Channel Protocol on IBM AIX Description Page contains pointers to additional SAN documentation. To get to this page, complete the following steps.

Step	Action
1	Log in to the NOW site at http://now.netapp.com . In the fields on the right side of the page, complete the following steps: 1. Enter your user name and password. 2. From the Select Start Page list box, click Download Software. 3. Click the Login button.
2	Go to the SAN (FCP) Host Attach Kit product row of the Software Download table and select AIX from the Select Platform drop-down list.
3	Click Go!
4	Follow the prompts to reach the SAN Host 1.0 for Fibre Channel Protocol on IBM AIX Description Page.
5	Scroll down the page until you reach the section “Where to go for Host and Filer Information.”

