Pillar Axiom Path Manager 2.1

Installation Guide and Release Notes

for Oracle Solaris 9

ORACLE

PILLAR AXIOM

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Preface

Audience

This document is intended for individuals who install and maintain Oracle's Pillar Axiom Path Manager (APM) software.

Expected experience includes:

- Understanding of storage area networks (SANs) and disk storage systems.
- Understanding of Fibre Channel technology
- Practical knowledge of Pillar Axiom storage systems.
- Basic Solaris administration skills.
- Experience installing software packages on Solaris 9 systems.

Related Documentation

Refer to the following related documents:

- *Pillar Axiom Customer Release Notes*: Includes late-breaking important information about the installation and operation of the Pillar Axiom system.
- *Pillar Axiom Administrator's Guide*: Provides detailed information on creating and managing storage resources.
- *Pillar Axiom CLI Reference Guide* (for Pillar Axiom CLI) or *CLI Reference Guide* (for pdscli): Provides detailed information about functions available in the Pillar Axiom command line interfaces (CLIs).

Access Documentation

Technical documentation (including installation, service, cabling, integration, and administration guides) for Oracle's Pillar Axiom 600 storage system is available from several sources.

Pillar Axiom GUI	After logging in to the Pillar Axiom Storage Services Manager on the Pilot, navigate to **Support > Documentation** and click on the document of interest.
Websites	Technical documents (http://www.pillardata.com/techdocs) Customer support portal (https://support.pillardata.com/login.do) After logging in to the website, click on **Documents** in the left navigation pane, and then click the appropriate category in the expanded list. Click on the document of interest.
Product CD-ROM	Insert the Technical Documentation CD-ROM that came with your Pillar Axiom storage system into the CD player in a computer. Open the DocMenu PDF and click on the document of interest. **Tip:** To search all technical documents on the CD-ROM, click the **Search all PDFs** icon in the top right corner. In the Search dialog, enter the word or phrase for which you would like to search.

Typographical Conventions

Table 1 Typography to mark certain content

Convention	Meaning
italics	Within normal text, words in italics indicate: • A reference to a book title. • New terms and emphasized words. • Command variables.
`monospace`	Indicates one of the following, depending on the context: • The name of a file or the path to the file. • *Output* displayed by the system on the command line.
`monospace` (bold)	*Input* provided by an administrator on the command line.

Table 1 Typography to mark certain content (continued)

Convention	Meaning
>	Indicates a menu item or a navigation path in a graphical user interface (GUI). For example, “Click **Storage > Clone LUNs**” means to click the **Clone LUNs** link on the **Storage** page in the graphical user interface (GUI).
...	Used within an expression of a navigation path or within a cascading menu structure. The ellipsis indicates that one or more steps have been omitted from the path or menu structure. For example, in the **Groups > Volume Groups > Actions > ... > Data Protection > Create** menu structure, the **...** implies that one or more menu items have been omitted.

Oracle Contacts

Table 2 Oracle resources

For help with...	Contact...
Support	https://support.oracle.com
Training	https://education.oracle.com
Documentation	• Oracle Technical Network: http://www.oracle.com/pls/topic/lookup?ctx=pillardocs • From the Pillar Axiom Storage Services Manager (GUI): **Support > Documentation** • From Pillar Axiom HTTP access: http://*system-name-ip*/documentation.php where *system-name-ip* is the name or the public IP address of your system.
Documentation feedback	http://www.oracle.com/goto/docfeedback

Table 2 Oracle resources (continued)

For help with...	Contact...
Contact Oracle	http://www.oracle.com/us/corporate/contact/index.html

CHAPTER 1

Introduction to Pillar Axiom Path Manager

About Pillar Axiom Path Manager

The information in this document is for system administrators who want to use the Pillar Axiom Path Manager (APM) for Oracle Solaris 9 software on a SAN host running Oracle Solaris 9 on 64–bit Solaris systems.

This document describes how to install and configure the APM for Oracle Solaris 9 software.

This APM release requires release 3.5 or higher of the Pillar Axiom software.

Note: If you are updating your Pillar Axiom software, complete that update before installing the APM software on the SAN host.

This release supports only Fibre Channel (FC) SAN; that is, FC HBA ports on the host connected to FC ports on Pillar Axiom Slammers.

Pillar Axiom Path Manager 2.1 Features

Pillar Axiom Path Manager (APM) is defined as:

> Optional software installed on a storage area network (SAN) host to manage multiple paths to the Pillar Axiom system.

APM performs the following primary functions:

- Routes I/O to Pillar Axiom LUNs using only the best available data paths.
- Shares traffic among the available paths and ensures that access to the LUNs is not interrupted if some paths fail.
- Automatically configures the host into the Pillar Axiom Storage Services Manager and updates the configuration if the host information changes.

The function described in the last bullet enables the Pillar Axiom Storage Services Manager to report information about APM running on the host, such as the number of working paths, and, in some environments, to configure features such as load balancing.

Each APM release provides different features, and the features provided for each platform may vary. The following table describes the specific features implemented in this release.

Table 3 APM 2.1 for Oracle Solaris 9 Features

Feature	Benefit
Automatic data path failover	Automatically switches to the highest priority optimized path available after a path failure or fail back.
Automatic recognition of SAN hosts by the Pillar Axiom Storage Services Manager	Sends a description of the host to each Pilot management controller on connected Pillar Axiom systems, allowing the Pillar Axiom Storage Services Manager GUI and CLI tools to create a definition for the host. This definition includes such information as the WWNs for each of the host's Fibre Channel ports, and the version of APM running on the host.
Call-Home log collection	When a Pillar Axiom administrator uses the Pillar Axiom Storage Services Manager to collect system information (refer to the *Pillar Axiom Administrator's Guide* for details), the Pillar Axiom system sends a request to each connected APM host. The APM hosts collect useful diagnostic information and send it to the Pillar Axiom system, where it is bundled with any other requested information. The Pillar

Table 3 APM 2.1 for Oracle Solaris 9 Features (continued)

Feature	Benefit
	Axiom system can then transmit this information to Oracle Pillar Customer Support. The information collected from each APM host includes: • Logs from the APM components. • Configuration and status information from the operating system. • System and error logs from the operating system. No customer data is transmitted.
Support for FC connections to FC Slammers	Makes connections to Pillar Axiom storage arrays over high-speed FC network infrastructure.
Support for Boot from SAN	Supports using a Pillar Axiom LUN on a Fibre Channel SAN as a boot disk.
Support for FC clustering	Oracle's clustering capability on certified servers

Pillar Axiom Path Manager Architecture

The Pillar Axiom Path Manager (APM) 2.1 software for Oracle Solaris 9 consists of a daemon that runs on the host system along with the StorageTek Traffic Manager software (STMS). STMS is also referred to as the Sun StorEdge Traffic Manager Software, MPxIO, Leadville, scsi_vhci, or SSTM, and it is a component of the SAN Foundation Software. The software prevents multiple paths from being presented as multiple disk drives. Every configured multipathed Pillar Axiom system LUN is presented as a single disk drive to the operating system.

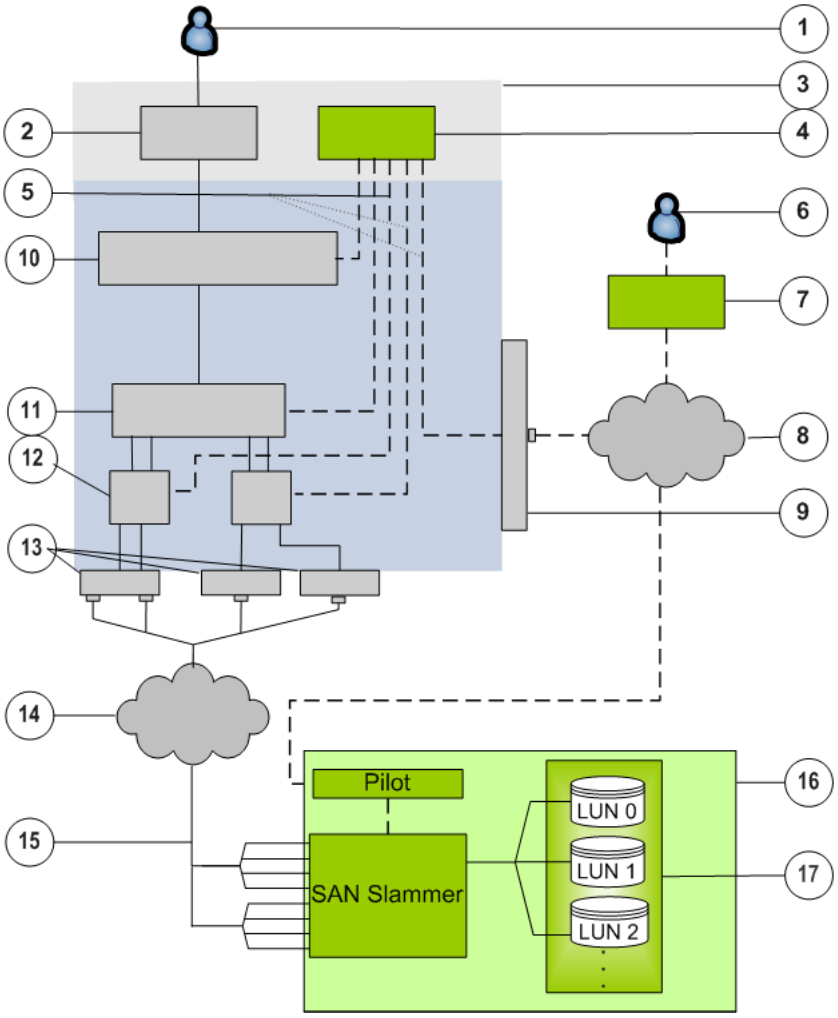
The STMS driver supports failover across redundant paths. The daemon assists with driver configuration and uses the control path to send and receive information about the hosts. It runs as a background process at the user level and looks after management tasks. The daemon sends host attributes to the Pilot. The software then takes control of the paths, hides actual paths from the operating system, and behaves like a virtual HBA with a single path to each LUN.

Figure 1: APM interaction with a Pillar Axiom server illustrates how the APM software installed on a storage area network (SAN) host interacts with a Pillar Axiom system. Refer to the table below to determine the significance of the lines and colors in the figure.

Table 4 Line and color key for APM interaction diagram

Graphic element	Description
———	Data path
- - - - -	Control path
	Pillar-supplied hardware and software
	Non-Pillar hardware and software
	SAN host kernel space
	SAN host user space

Figure 1 APM interaction with a Pillar Axiom server



Legend

1 User	10 SCSI disk software
2 User application	11 STMS
3 User space	12 HBA driver
4 APM daemon	13 HBA
5 Control paths (all dashed lines)	14 SCSI over Fibre Channel
6 Pillar Axiom administrator	15 Data path (all solid lines)
7 Pillar Axiom command line interface (CLI) or graphical user interface (GUI)	16 Pillar Axiom server
8 Encrypted XML over TCP/IP	17 Brick storage enclosure pool
9 Network card	

About the Pillar Axiom Path Manager Control Path

The Pillar Axiom Path Manager (APM) control path provides a path separate from the data path to manage multipathing and communication.

The APM software uses a daemon running in the background to control multipathing and communication. The APM daemon uses the control path to:

- Get information from the Pilot management controller, such as the load balancing algorithm for each LUN.
- Get path information from the host bus adapter (HBA) drivers.
- Configure the StorageTek Traffic Manager Software (STMS).
- Send information such as host attributes and statistics to the Pilot management controller, and collect logs from the host on request.

The APM daemon sends a description of the host to the Pilot on each connected Pillar Axiom system. This description creates a definition for the host in the Pillar Axiom Storage Services Manager. The definition includes any Fibre Channel (FC) ports in the host. The graphical user interface (GUI) and command line interface (CLI) list the port World Wide Names (WWNs) of the FC ports that are used to make connections to the Pillar Axiom system.

To establish the control path to a Pillar Axiom host, that host must be able to connect to the Pillar Axiom system over the data path. The Slammer returns the IP address of its Pilot to the APM host over the data path as part of the connection sequence.

About the Pillar Axiom Path Manager Data Path

Pillar Axiom Path Manager (APM) uses the StorageTek Traffic Manager Software (STMS) to provide paths for reading and writing data to LUNs on the Pillar Axiom system.

See Figure 1 for an illustration of how data flows from the host to the Pillar Axiom system.

STMS:

- Controls and manages all data paths to Pillar Axiom LUNs.

- Groups multiple data paths to a Pillar Axiom LUN and presents this group to the operating system as a single LUN or drive.
- Identifies and uses optimized data paths when possible. An optimized path provides the best performance and is the preferred path for data transfer.
- Determines which data paths to use.
- Handles data path failover.
- Manages data path errors.

About the StorageTek Traffic Manager Software

The StorageTek Traffic Manager software (STMS) is also referred to as the Sun StorEdge Traffic Manager Software, MPxIO, Leadville, scsi_vhci, or SSTM.

STMS performs the following tasks:

- Controls and manages all data paths to the LUNs.
- Groups multiple paths to a LUN and presents this group to the Solaris operating system as a single LUN or disk.
- Identifies and uses optimized paths when possible.
- Determines which path to use when load balancing is enabled.
- Handles path failover and failback.
- Manages data path errors.

About Boot from SAN

Oracle supports booting the host using a LUN on a Pillar Axiom system as the system disk. Verify with Oracle that your system and configuration can support booting from a SAN-attached disk *before* you install the Pillar Axiom Path Manager (APM) software.

Setting up a SAN with boot technology requires hardware dependencies and has many deployment scenarios which are beyond the scope of this document. For information on how to set up an Oracle system to boot from a multipathed SAN-attached disk, including system requirements, refer to Boot from SAN documentation on the SAN software website (http://download.oracle.com/docs/cd/E19310-01).

About Clustering

Pillar Axiom Path Manager supports cluster configurations on Oracle Solaris 9 with STMS as specified by Oracle.

Refer to the clustering documentation on the Solaris Cluster 3.2 documentation website (http://www.oracle.com/technetwork/documentation/solaris-cluster-32-193000.html) for more information.

Note: Although this release of APM supports clustering, these features were not tested by Pillar Data Systems. For problems in clustering configurations, contact Oracle support.

About Configuring Load Balancing

In the Pillar Axiom Path Manager (APM) software for Oracle Solaris 9, load balancing is configured using the StorageTek Traffic Manager software (STMS) mechanisms. Load balancing settings that are configured in the Pillar Axiom Storage Services Manager (GUI) are ignored by APM for Oracle Solaris 9.

Refer to the Oracle Solaris SAN Foundation Software documentation (http://download.oracle.com/docs/cd/E19310-01) for load balancing options and configuration mechanisms.

Minimum Supported Oracle Solaris Software

SAN hosts running Pillar Axiom Path Manager 2.1 for Oracle Solaris 9 must be running update 9 or later of the Oracle Solaris 9 operating system. In addition, the following versions, or later, of the Oracle Solaris software components are required:

Table 5 Minimum supported Oracle Solaris versions

Software	Minimum supported version
Oracle Solaris	Solaris 9 Update 9 (also known as Solaris 9 9/05 release)
Kernel update	Patch 122300-03 or a later replacement
Solaris patch	Patch 114478-09 or a later replacement
SAN Foundation Software	SFS 4.4.12 or a later replacement

Note: These are the minimum versions of this software. We recommend updating to the latest versions supported by Oracle, unless you have a reason not to.

Supported Hardware

All SPARC servers and HBAs must be qualified for use with Oracle Solaris 9, as well as with the StorageTek Traffic Manager Software (STMS).

Table 6 Supported servers and HBAs

Item	Supported Hardware
SPARC servers	All SPARC servers with 64-bit processors are qualified for use with Oracle Solaris 9.
HBAs	All host bus adapters (HBAs) supported by Oracle for use with STMS on Oracle Solaris 9 on the qualified servers.

Operating Limits

Pillar Axiom Path Manager (APM) provides access over multiple data paths to LUNs defined on a Pillar Axiom system. APM, StorageTek Traffic Manager Software (STMS), and the Pillar Axiom software limit the following aspects of this access.

Table 7 APM operating limits

APM capabilities	Maximum value
Target Pillar Axiom systems	Eight for each SAN host
Connect to SAN Slammer storage controllers	Four for each Pillar Axiom system
Connect to LUNs	256
Handle data paths	32 to each LUN
Handle FC HBA ports	32 for each SAN host

Important! Not all combinations of the limits shown have been tested. Use care when operating a system that has been configured to run at or near these limits. The system may exhibit anomalies when all limits are exercised concurrently.

CHAPTER 2

Install Pillar Axiom Path Manager

Prepare to Install the Pillar Axiom Path Manager Software

To ensure a successful installation of Pillar Axiom Path Manager (APM), perform the following tasks in sequence:

1. Read the Release Notes at the end of this document.
2. Ensure that the Pillar Axiom system is running release 3.5 or higher of the Pillar Axiom software.
3. Verify that your Fibre Channel (FC) storage area network (SAN) components and host bus adapters (HBAs) are supported and installed properly.
4. Pre-Configure the SAN Host for Pillar Axiom Integration.

Management Network Requirements

The Pillar Axiom Path Manager (APM) software communicates with the Pilot over secure, encrypted XML. The SAN host on which the APM software is installed requires a TCP/IP connection for communication with the Pillar Axiom Storage Services Manager.

The network configuration must allow the SAN host to connect to TCP port 26004 on the Pilot's management Ethernet interfaces to connect the control path. Connecting to the control path is optional if you are using the APM configuration from the host feature. This connection is used to implement the control path, so it is optional but recommended.

Tip: To check your network connectivity, issue a simple `pdscli` or `axiomcli` request from the host to the Pillar Axiom system. Both `pdscli` and `axiomcli` use the same port and protocols as those used by APM.

Supported Host Bus Adapters

Oracle and other suppliers provide Fibre Channel (FC) host bus adapters (HBAs) that run on the systems that have been qualified for this version of Pillar Axiom Path Manager (APM) 2.1 for Oracle Solaris 9.

APM 2.1 for Oracle Solaris 9 supports all HBAs that support StorageTek Traffic Manager Software (STMS) multipathing. To find out which HBAs are supported, refer to any of the following sources:

- Oracle technical support
- Your Pillar sales representative
- Pillar Technical Support at the numbers listed in Pillar Contacts.

Verify Fibre Channel Drivers

The Pillar Axiom Path Manager (APM) 2.1 for Oracle Solaris 9 software requires compatible host bus adapters (HBAs) and Fibre Channel (FC) drivers.

The precise HBAs, firmware versions, and driver versions required are determined by the StorageTek Traffic Manager Software (STMS). Refer to the STMS release notes and other Oracle documentation (http://download.oracle.com/docs/cd/E19310-01) for details. All HBAs and drivers supported by STMS are also supported by APM.

Required Oracle Solaris Packages and Patches

The following Oracle Solaris package versions and patches have been tested and are required by Pillar Data Systems.

Note: Log in with your Oracle Support Account. If you don't have an account, you are prompted to register. If you have difficulties locating or downloading any of these patches or packages, contact Oracle Support.

- Oracle Solaris 9 Update 9 (9/05 Release) with a mandatory kernel update (patch 122300-03 or a later replacement), available from Oracle Support.
- Patch 114478-09 or a later replacement.

- StorageTek SAN Foundation Software version 4.4. APM 2.1 supports version 4.4.12 and later of the SAN Foundation Software. Pillar recommends that you use the latest version (4.4.15).

Note: The StorageTek Traffic Manager software (STMS), otherwise known as Sun StorEdge Traffic Manager Software, MPxIO, Leadville, scsi_vhci, or SSTM, is installed with the SAN Foundation Software by default. For information on how to install and configure the SAN Foundation Software and STMS, refer to the SAN Foundation Software documentation (http://download.oracle.com/docs/cd/E19310-01).

Verify Oracle Solaris Patches

After you install the supported HBAs, verify that your SAN host has the required Oracle Solaris patches installed.

1. To verify that the required patches or their replacements are installed, run the `showrev -p` command.

   Result:
   This command returns a list of all installed patches. Verify that the required patches or their replacements are included.

2. If necessary, follow Oracle instructions for installing any missing patches before you install Pillar Axiom Path Manager.

Pre-Configure the SAN Host for Pillar Axiom Integration

Before you install the Pillar Axiom Path Manager (APM) software, verify that the required components are configured properly on the Pillar Axiom system.

1. Verify that all HBAs and their components are installed on the host according to the vendor's instructions.

   See Supported Host Bus Adapters for more information.

2. Verify that the mandatory Solaris packages and patches have been installed on the SAN Host.

   See Verify Oracle Solaris Patches for more information.

3. Set the queue depth to 5. The queue depth should never exceed 64.

4 Set up the physical connectivity and any required switch zoning for the SAN. Proper setup is required so that all required host HBA ports can access the required Slammer ports.

5 In the Storage SAN Hosts page on the Pillar Axiom Storage Services Manager, check the connection. Each host port should show up individually as an entry with Hostname Unknown, and its Port WWN given as the HBA Port Name.

   See Figure 2: Example host ports before APM installation for an illustration.

Download and Install the Pillar Axiom Path Manager Software

To install the Pillar Axiom Path Manager (APM) software, download the APM for Oracle Solaris 9 package, install the package, and configure your Pillar Axiom system to work with APM.

Prerequisites:

- Install any applicable Oracle Solaris 9 patches.
- Configure the SAN. Follow the instructions listed previously in this chapter.
- Verify that your system meets the preinstallation requirements.

1. Download the APM software.
2. Install the APM software if you are installing APM for the first time.
3. Complete the installation by configuring access from the SAN host to Pillar Axiom LUNs.

- If you are updating an existing APM installation, see the instructions for updating the APM software.
- To remove the software from your SAN host, see the instructions for removing the APM software.

Download the Pillar Axiom Path Manager Software

Download the Pillar Axiom Path Manager (APM) software from the Pillar Support website.

1. Log in to the Pillar Support website (http://supportportal.pillardata.com/csportal/login.seam).
2. Click **Software Downloads > Pillar Axiom Path Manager** in the left-hand navigation pane.
3. Navigate to the name of the installation package in the right-hand content pane.
4. Click the name of the package to download.
5. Click the green arrow in the **Software Download Details** pane below, and follow the download prompts.
6. Choose the **Save** option to download the package to your SAN host.

Install the Pillar Axiom Path Manager Software

The APM 2.1 for Oracle Solaris 9 software uses the StorageTek Traffic Manager software (STMS), otherwise known as MPxIO, to support multiple physical paths to storage. The APM daemon works with STMS to make the LUNs visible to Oracle Solaris 9 without manual configuration.

Before you install the APM 2.1 for Oracle Solaris 9 software on the host, you must first install the Sun components, including the Fibre Channel drivers, the supported HBAs, and the Oracle Solaris patches. STMS must also be enabled by setting the following in the `/kernel/drv/scsi_vhci.conf` file:

```
# mpxio global enable/disable switch: setting mpxio-
disable="no" will activate
# I/O multipathing; setting mpxio-disable="yes" disables this
feature (do not remove this property).
#
mpxio-disable="no";
```

1. Extract the APM software package you downloaded from the Pillar Customer Support website and copy the package to the host system.
2. Log in as root and change to the directory where the downloaded package is located.
3. Install the APM 2.1 software:

   `pkgadd -d APM-sparc-`*`version`*`.pkg`

   Note: In the command above, *version* is the name of the release version you downloaded.

Complete the LUN Configuration

Complete the LUN configuration after you have installed the software.

1. In the Pillar Axiom Storage Services Manager, navigate to **Storage > SAN > Hosts**.
2. Verify that the individual entries for the host ports have been replaced with a single entry under the host name.

   Examples:

Figure 2 Example host ports before APM installation

Host Name	Host Port	Type	AxiomONE Path Manager	Number of LUNs	Host Port Status
Hostname Unknown	10:00:00:00:c9:36:84:6e	FC	Not Registered	0	Connected
Hostname Unknown	10:00:00:00:c9:36:84:6f	FC	Not Registered	0	Connected
Hostname Unknown	10:00:00:00:c9:36:85:20	FC	Not Registered	6	Connected
Hostname Unknown	10:00:00:00:c9:41:32:c3	FC	Not Registered	0	Connected
Hostname Unknown	10:00:00:00:c9:41:32:c4	FC	Not Registered	0	Connected

Figure 3 Example host ports after APM installation

Host Name	Host Port	Type	AxiomONE Path Manager	Number of LUNs	Host Port Status
happy	10:00:00:00:c9:36:84:6e	FC	Communicating	0	Connected
	10:00:00:00:c9:36:84:6f	FC			Connected
Hostname Unknown	10:00:00:00:c9:36:85:20	FC	Not Registered	6	Connected
Hostname Unknown	10:00:00:00:c9:41:32:c3	FC	Not Registered	0	Connected
Hostname Unknown	10:00:00:00:c9:41:32:c4	FC	Not Registered	0	Connected

Note: The Hosts page may display differently in your version of Pillar Axiom Storage Services Manager.

You will see one or more of the following **Pillar Axiom Path Manager Status** and **Host Port Status** messages on the Hosts page:

APM Status	**Communicating**: The host control path is currently logged into the Pilot. **Note: Communicating** status is required for the APM control path to report path status, configure load balancing, and use the Pillar Axiom system to collect APM diagnostic logs. **Not Registered**: A control path from an APM host with this name has never logged into the Pilot. **Not Communicating**: The APM host control path has previously logged into the Pilot, but it is not currently logged in.
Host Port Status	**Connected**: The host SAN connection is logged in to the SAN Slammer. **Not connected**: The host SAN connection is not logged in to the SAN Slammer.

See the Pillar Axiom Storage Services Manager Help for information about the remaining fields on the Hosts page.

3 Create any new LUNs on the Pillar Axiom system for this host, and set up any mappings of LUNs to the new host entry.

4 If the LUNs do not appear automatically on the host within one or two minutes, run the following command:

```
devfsadm
```

Result:
The LUNs should become available as drives on the host. If the drives do not appear, restart the host.

5 In the Pillar Axiom Storage Services Manager, navigate to the **Storage > SAN > Hosts** page.

6 Click the name of the new host and, on the Host Information page, verify the APM software version.

7 Click the **LUN Connections** tab and verify that the host and LUN connections are as expected.

The column titled **LUN Name on Host** should show the name that Solaris has allocated to theLUN device on the host.

Note: After you map a LUN to the host, it may take two or three minutes for APM to make the LUN accessible at the host and report its name and other information to the Pillar Axiom Storage Services Manager. You may need to refresh the Pillar Axiom Storage Services Manager screen to see the information when it is reported.

Result:
The **LUN Connections** tab should display the LUNs that are mapped to the host, and the connection state between the host ports and the Slammer ports. If the APM control path is communicating, the **LUN Connections** tab should also display each LUN name as allocated by Oracle Solaris 9 on the host, along with the numbers of optimized and non-optimized paths currently being controlled by APM.

Configure and Display the LUNs

Use the following procedures to perform these configure and display LUNs tasks.

Table 8 How to configure and display LUNs

Task	Procedure
List available LUNs	Use the following command: `luxadm probe`
List datapaths	Use the following command: `luxadm display` *path* **Note:** *path* is the logical path name reported by `luxadm probe`.

Upgrade from Earlier Versions of Pillar Axiom Path Manager

If you are upgrading to Pillar Axiom Path Manager (APM) 2.1 for Oracle Solaris 9 from an earlier version of APM, you must perform the following steps in order.

1. Uninstall the earlier version of APM. Refer to the *Installation Guide* for the earlier version of APM.
2. Upgrade the Oracle Solaris operating system to the level required to provide StorageTek Traffic Manager Software (STMS) support for the Pillar Axiom storage system, including all packages and patches.
3. Install STMS and the SAN Foundation Software, ensuring that all hardware firmware and patch requirements as specified in the SAN Foundation Software documentation are met.
4. Install the APM 2.1 for Oracle Solaris 9 software.

Remove the Pillar Axiom Path Manager Software (Optional)

If you want to uninstall the software (if, for example, you are upgrading to a newer version), run the following command.

1. Log in as root.
2. Run the following command: `pkgrm axiompmd`.

CHAPTER 3

Pillar Axiom Path Manager Release Notes

New in This Release

Pillar Axiom Path Manager (APM) 2.1 for Oracle Solaris 9 supports original equipment manufacturer (OEM)-branded HBAs.

Release 2.0 supported only Sun-branded HBAs. This release supports all HBAs certified for use with STMS, which includes both Sun-branded and OEM-branded HBAs.

Known APM Issues

The following Pillar Axiom Path Manager (APM) issues are known in this release.

Table 9 Known issues

Issue	Workaround or planned fix
When the TCP/IP connection between the daemon and the Pilot is lost (for example, if you restart the Pillar Axiom system, or if the Pillar Axiom Management IP is changed), the Pillar Axiom Storage Services Manager will show the host as Not Communicating. The daemon may not automatically re-establish communication until the TCP/IP KEEPALIVE period has expired on the host. By default this period is two hours. You can reconfigure the host to change this period, but doing so will affect all programs on the host that use TCP/IP KEEPALIVE. Before changing this value, you should ensure that the chosen value is acceptable to all programs that depend on it.	Force communications to be re-established by restarting the daemon on the host.

Known Pillar Axiom Issues

The following issues might be associated with the version of the Pillar Axiom software you are using.

Table 10 Known Pillar Axiom issues

Issue	Workaround or planned fix
When a Fibre Channel HBA is removed from a host running APM, it remains associated with that host. If the HBA is moved to a host that is either not running APM or on which APM is shown as not communicating with the Pillar Axiom Pilot, any LUNs mapped to the host will continue to be accessible through the HBA ports. The GUI and CLI will continue to report the HBA as being present in the original host. If the HBA is moved to a host where APM is running and communicating with the Pilot, its association and mappings for the old host will be removed, and the mappings for the new host will be applied.	This issue is fixed in release 4.0 of the Pillar Axiom software.
If you use the GUI or CLI to change the default configured Slammer control unit (CU) of a LUN to the other CU on the Slammer, the Slammer port mask for the LUN will be reversed. For example, if CU0 Port 0 is enabled and Port 1 is excluded, and the LUN is moved to CU1, then CU1 Port 0 will become excluded and CU1 Port 1 will become enabled.	After you change the default configured Slammer CU for a LUN, be sure to update the LUN port mask to the required value. This issue is fixed in release 4.0.0 of the Pillar Axiom software.
If all paths to a LUN's configured Slammer control unit (CU) fail, APM will re-route all traffic through the non-optimized paths to the LUN's alternate CU. In response, the Pillar Axiom system will initially log events indicating	This issue is fixed in release 4.0 of the Pillar Axiom software.

Table 10 Known Pillar Axiom issues (continued)

Issue	Workaround or planned fix
non-optimized access, then when this traffic continues it will temporarily move the LUN to the alternate CU. This process leaves the host using optimized paths to the LUN, but the LUN is resident on a CU other than its configured home. Normally, the system will attempt to move the LUN back to its configured CU from time to time, and if the paths to the other CU have recovered the traffic will transfer back and the system returns to its normal configured state. However, if the Pilot software is restarted while a LUN is in this temporary state, as might happen during a software update that includes the option to update the Pilot software, two problems occur: 1 The graphical user interface (GUI) and command line interface (CLI) wrongly report that the LUN's current CU is its configured CU. 2 Non-optimized access events are no longer logged for the LUN, and the system does not attempt to move the LUN back to its configured CU. If subsequent path failures and recoveries cause traffic to be sent to the CU on which the LUN is not resident, the system will not move the LUN to the CU receiving the traffic. This means that all traffic to the LUN would have non-optimized access, which decreases performance, and this non-optimized access would not be logged.	
After recovery from a Slammer control unit (CU) failure, the Pillar Axiom system may become incapable of automatically moving LUNs between the CUs on that Slammer. When the	Use the GUI or CLI to re-assign the LUNs to the CUs through which access is currently taking place. Alternatively, restart the Pillar Axiom system to restore optimized access.

Table 10 Known Pillar Axiom issues (continued)

Issue	Workaround or planned fix
system attempts to move the LUNs automatically in response to non-optimized access from a host, the attempts fail, and non-optimized access persists.	This issue is fixed in release 4.1 of the Pillar Axiom software.
When a Pilot restart occurs on a Pillar Axiom system running release 4.0 (4.0.4 or later) or release 4.1 (4.1.0 or later) of the Pillar Axiom software, all LUNs on the system move from their current Slammer control unit (CU) to the other Slammer CU. As a result, the optimization of all paths to the LUNs changes. **Note:** A non-disruptive upgrade to release 4.0 (4.0.4 or later) or release 4.1 (4.1.0 or later) of the Pillar Axiom software will cause a Pilot restart, which will trigger this problem.	If all relevant SAN hosts have paths to both CUs on the Slammers, and those paths are managed by an ALUA-aware path management system such as Pillar Axiom Path Manager, it should not be necessary to take any action. The LUNs will remain balanced across the CUs, and the path management software will ensure that only optimized paths to the LUNs are used. Be aware that traffic may be moved to alternate paths when a Pilot restart occurs. Other hosts may need their path configuration to be changed to ensure that they access each LUN through its new current home CU. Alternatively, all LUNs can be moved back to their default configured CU by restarting the Pillar Axiom system. This issue is fixed in release 4.1.4 of the Pillar Axiom software.

Known Operating System Issues

The following operating system issues may have an impact on running APM on Oracle Solaris 9 systems.

Ports Not Reconnected After Recovery from Failure

If a link through an Emulex HBA port fails and later recovers (such as for replacement of a faulty cable), and the host is using a specific version of the Emulex HBA driver, the host may not be able to reconnect to storage devices through that port.

The Pillar Axiom Storage Services Manager (GUI) will report the host port as `Not Connected`, and the `Solaris cfgadm -al -o show_FCP_dev` command will report Pillar Axiom Slammer ports as `Type unknown` and `Condition unusable`. This problem does not occur with driver version 1.12b (2006.12.12.00.10) from Solaris patch 119914-11, but it does occur with subsequent versions, including the latest version available at the time of writing: 1.20gx10 (2009.03.25.12.04) from Solaris patch 119914-15.

This problem is being investigated by Oracle as bug number 7004997.

If you are using one of the affected versions of the driver, revert to driver version 1.12b(2006.12.12.00.10) from Solaris patch 119914-11. Alternatively, monitor the Oracle bug report (https://support.oracle.com/CSP/main/article?cmd=show&type=BUG&id=7004997&productFamily=Sun) for an updated patch with a fix for this problem.

Note: Log in with your Oracle Support Account to view the Oracle bug report. If you don’t have an account, you are prompted to register.

Resolved APM Issues

The issues listed in the following table have been resolved in the current release of Pillar Axiom Path Manager (APM).

Table 11 Resolved issues

Issue
APM did not reliably update the Pillar Axiom Storage Services Manager when new LUNs were dicovered on the host, or the numbers of available paths changed.
The APM daemon sometimes gets into a state in which it sends invalid messages to the Pillar Axiom Storage Services Manager (GUI). When it is in this state, the GUI will report that APM is `Not Communicating`, and messages such as `parse_xml_msg 10.10.9.22 failed XMLLIB_XML_PARSE_ERROR` will appear in the Solaris logs.
The APM daemon in APM 2.0 for Solaris 9 suffers from a number of memory leaks, some in APM itself and some in Solaris libraries which the daemon uses. These leaks cause the daemon to use ever more virtual memory over time, until it exits and creates a core dump when its size exceeds the configured limit. The Solaris library memory leaks are fixed by the Solaris patches required for APM 2.1, and the APM 2.0 leaks are fixed in APM 2.1.
When the administrator changes the Pillar Axiom management IP address, all APM hosts are initially reported as `Not Communicating` but should start communicating again shortly afterwards. Hosts running Oracle Solaris 9 should start communicating again after the `TCP KEEPALIVE` period has expired, but hosts running APM 2.0 fail to do so.

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