



Pillar Axiom® 500	Document Number: 4420-00026-2500
	Document Title: Customer Release Notes

Revision History

Rev Description	Rev Date	Effective Date
Release 2.10	2008-07-21	2008-08-19
Release 2.9	2008-04-11	2008-04-14
Release 2.8	2008-01-10	2008-01-14
Release 2.7	2007-10-29	2007-11-05 [expand list of fixed issues]
Release 2.7	2007-10-01	2007-10-22
Release 2.6 GA	2007-06-29	2007-06-29
Release 2.6 Beta	2007-06-08	2007-06-08
Release 2.5	2007-04-13	2007-04-13
Release 2.4	2007-02-11	2007-02-12
Release 2.3	2006-11-17	2006-11-20
Release 2.2	2006-10-31	2006-11-4
Release 2.1	2006-10-11	2006-10-11 [corrected Slammer PROM version]
Release 2.1	2006-09-28	2006-09-29
Release 2.0	2006-08-17	2006-08-17
Release 1.7	2006-06-19	2006-06-19

1 Purpose

This document describes new features, capacities, configuration requirements, operating constraints, known issues and their workarounds, and other items for release 2.10 of the Pillar Axiom 500 storage system. The document covers hardware, firmware, software, cabling, and documentation. The information provided is accurate at the time of printing. Newer information may be available from your Pillar Data Systems authorized representative.

2 Product Release Information

Release 2.10 is a maintenance release of the unified NAS/SAN Pillar Axiom 500 storage system.

2.1 System Enhancements

This update provides quality improvements to release 2.9 of the Pillar Axiom 500 storage system. This update improves system robustness and includes a rollup of all defects fixed in customer patches up to release 2.10.

This release includes QLogic iSCSI firmware version 3.01.45.

For the list of defects that this release resolves, see Table 6 beginning on page 16.

2.2 Available Licenses

Licenses available for this release include the following:

- CIFS
- NFS
- SNMP
- NDMP
- SecureWORMfs
- Snap FS
- Snap LUN
- Volume Copy
- Volume Backup
- Volume Copy and Backup
- Fibre Channel Protocol
- iSCSI Protocol
- Support Tool
- Axiom File Replicator
- Axiom Volume Replicator
- Virtual Tape Library

The features that you have licensed each have a unique feature key. These feature keys are listed in a separate document[†] and are associated with your Pillar Axiom storage system. These keys allow access to the features that you have licensed. Please keep the license key document in a secure place for future reference. For additional information, please contact Pillar Data Systems at 1-877-4PILLAR or go to www.pillardata.com.

[†] Feature keys are listed on the packing slip associated with your product shipment. You can also obtain the keys on the Support portal.

2.3 Pillar Axiom System Software Update

This release may be installed through the GUI Software Update process. Be sure to select all of the software components that have selection boxes available; otherwise, the update may not proceed due to a potential incompatible combination of components.

Important! After updating the system software to Release 2.10, you can reverse the update and downgrade to an earlier 2.x release level, but it will be disruptive to the data path. Before downgrading, contact Pillar Worldwide Customer Support Center.

Please be aware of the following notes before you begin the software update process:

- Pillar recommends that all updates be performed during a maintenance window.
- For NAS/SAN or SAN systems at 01.07.xx, the system cannot be updated directly to 2.10. The system must first be updated to 02.07.00 (or later) before it can be updated to 2.10. Contact the Pillar Worldwide Customer Support Center for assistance in updating any system below release 2.3. Do not attempt to perform this update without this assistance.
- You should observe the following during this update:
- Non-disruptive update is not supported in this release for the following configurations:
 - Pillar Axiom systems that support clustered operating systems.
 - Pillar Axiom systems that contain both NAS and SAN Slammers.
- It is not necessary to disconnect channel attachments from the Pillar Axiom system.
- Pillar recommends that all I/O to the system be minimized.
- If the Pillar Axiom system contains one or more NAS Slammers:
 - CIFS connections are dropped but most applications will attempt to reconnect automatically.
 - Dropping CIFS connections is not a timing issue and is not related to how the update process is performed. Connections are dropped because the system does not maintain connection states across failover or warmstart events.
 - This behavior is consistent with competitive storage systems and should not be a detractor for Pillar.
 - NFS access survives NDU process. The Pillar Axiom system is not reachable for 25 sec but normal networking retry mechanisms will restart I/O.
 - Pillar encourages users to employ hard mounts, in which the client will retry.
 - If users employ soft mounts, they will get an I/O error immediately when the owner control unit of the filesystem warmstarts.
 - If users employ soft mounts, the application will typically handle the error gracefully.
 - NDMP protocol does not tolerate server reboots. Therefore all backup applications will fail if a non-disruptive update happens in the middle of a backup session.

- Do not start any new management, service, or functional processes (such as snapshots) until the update process completes.

Important! If your system contains Fibre Channel Bricks and is running Pillar Axiom software below release 02.04.02, contact the Pillar Worldwide Customer Support Center to update the system.

- After updating the system software, if you need to revert the system, do not use “Revert Software to Previous Version”. Instead, please contact the Pillar Worldwide Customer Support Center.

Note: If you’d like, you can have Pillar Professional Services update your system software. For more information, refer to Table 2 Contact information.

Software provided in this release includes the versions listed below. After updating your system, check your software versions in the GUI by going to Support > Software Modules.

Pilot OS	02.07.00
Pilot Software	02.10.00
Slammer PROM	01.80.00
Slammer Software	02.10.00
SATA Brick Firmware	01.13.57
Fibre Channel Brick Firmware	00.57.34
Brick Disk Drive Firmware	<i>(Version depends on the disk drive capacity and whether it is the spare or array disk drive.)</i>

Note: If your Pillar Axiom system does not have FC Bricks installed, the GUI won’t display the Fibre Channel Brick Firmware entry.

Important! Starting with the 2.x releases, the WWN was changed to use a common base World Wide Node Name. When updating a Pillar Axiom system from 1.7.x to 2.x, be prepared for a change in how WWNs are managed. For more information, see Section 9.13 on page 25.

2.4 AxiomONE Path Manager Software

The AxiomONE Path Manager (APM) software provides for the following:

- Automatic data path failover
- Automatic recognition of SAN hosts in the AxiomONE Storage Services Manager.
- Management of the APM driver from within the AxiomONE Storage Services Manager.

The current release of APM for SAN hosts varies by platform, as shown in Table 1.

Table 1 APM support

Platform	APM release	Notes
AIX	2.2.3 [‡]	Supports SAN boot on AIX 5.2 and 5.3.
HP-UX	2.0.3	-
LINUX	2.1.8 & 2.2.2	Red Hat Enterprise Linux 3

[‡] See also Section 9.76 APM Supports AIX 5L 5.3.

Platform	APM release	Notes
	2.1.3	Red Hat Enterprise Linux 4 Novell SUSE Linux Enterprise Server 9
Solaris	2.0.2	Solaris 10
	01.04.05	Solaris 8
	2.0.2	Solaris 9
Windows	2.3	-

Note: Unless otherwise explicitly stated in your APM Release Notes, there are no co-requisite relationships between the AxiomONE Path Manager and Pillar Axiom 500 software versions.

For release information, refer to the *AxiomONE Path Manager Installation Guide and Release Notes* for your platform. For the latest information on supported platforms and hardware, see the *Pillar Axiom Support and Interoperability Guide* or ask your Pillar Data Systems representative.

3 Terms and Conditions of Use

All systems are subject to the terms and conditions of the software licensing agreements and relevant copyright, patent, and trademark laws. Refer to those documents for more information.

4 Support

Pillar Data Systems provides various levels of customer service on a contract basis. If you have purchased a service contract from Pillar Data Systems, authorized Pillar Data Systems personnel will perform support and repair according to the terms and conditions of that agreement.

Table 2 Contact information

For help with...	Contact...
Pillar Worldwide Customer Support Center	U.S. and Canada: 877-4PILLAR (877-474-5527) Europe: +800 PILLAR FS (+800 74 55 27 37) Asia Pacific: +1-408-518-4515 South Africa: +0 800 980 400 Have your system serial number ready. Email: support@pillardata.com Web: support.pillardata.com
<ul style="list-style-type: none"> • Implementation assistance • System information • Professional Services • Enhancement requests 	sales@pillardata.com . USA: 1-877-4PILLAR (1-877-474-5527)—request Sales at the prompt. International: +1 408 503 4200
Documentation improvements and resources	docs@pillardata.com . www.pillardata.com/techdocs —log in with your username and password.

4.1 Supported Hardware Components in a Pillar Axiom System

Pillar Data Systems supports only Pillar-supplied parts for Pillar Axiom storage systems. Hardware that does not conform to Pillar specifications or is not a Pillar-supplied part voids the warranty and may compromise data integrity.

4.2 Access to Pillar Axiom Systems

You manage a Pillar Axiom system by means of the standard user interfaces:

- The AxiomONE Storage Services Manager (GUI)
- The AxiomONE Command Line Interface (CLI)

Remote access by any other means (ssh, telnet, ftp, and others) is not supported and voids the warranty for your Pillar Axiom system. Furthermore, remote access may also compromise integrity of data that is stored on the system.

4.3 Download Software or Firmware Updates

To download software or firmware updates:

1. Point your browser to support.pillardata.com.
2. Click the Log In link at the top right of the navigation bar.
3. Enter your username and password.
4. Click the Login button.
5. On the main view, go to the Downloads area.
6. Click the appropriate software release. Download details for that software appears on the right side of the display.
7. Click the green download button.

Note: To obtain a license to enable a feature that is in addition to those that you initially purchased, contact a Pillar sales representative. (See Table 2 Contact information.)

4.4 Configuration Documentation

For information on the connectivity and interoperability of Pillar Axiom systems with various third-party software and hardware, see your Pillar Account Representative.

For detailed configuration guidelines in a CIFS environment, see the *Pillar Axiom Windows Integration Guide for NAS Systems*.

For information regarding the primary features of a Pillar Axiom storage system and how to configure them:

- Navigate through the AxiomONE Storage Services Manager, the graphical user interface (GUI).
- Read the *Administrator's Guide* PDF.
- Read the online help in the AxiomONE Storage Services Manager GUI.

The above documents are available on the Pillar Data Systems Web portal at www.pillarata.com/techdocs/.

5 Pillar Axiom System Limits

This version of the Pillar Axiom storage system operates within the supported limits listed below.

Important! Use care when operating a system that has been configured to run at or near the system operating limits. The system may exhibit anomalies when all limits are exercised concurrently. Also, the time to start up a Pillar Axiom 500 system from a powered-off state and the responsiveness of the GUI are extended under the following conditions:

- You configure a system near one or more of its limits.
- You increase the number of customer-defined system objects—File Servers, filesystems, LUNs, shares, exports, snapshots, and so on.

Consult with Pillar Professional Services to plan your Pillar Axiom 500 system configuration prior to actual installation and configuration.

5.1 Pillar Axiom System Operating Limits

For detailed information on system limits, refer to the online help or to the *Administrator's Guide* PDF file (search for *Ranges for Field Definitions*).

Table 3 Operating limits of a Pillar Axiom 500 NAS system

Item	Description and Range
File Servers	Maximum = 8 per Slammer VLAN tagging must be enabled for more than 1 File Server. Each File Server must have a unique VLAN tag (one File Server may be untagged).
VIFs per File Server	Minimum = 1 Maximum = 32
VIFs per Slammer port	Maximum = 16 (across all File Servers)
Virtual Interfaces	Minimum = 1 per File Server Maximum = <ul style="list-style-type: none"> • 16 per port • 32 per File Server (primary plus 31) • 5 per filesystem if VLAN tagging is enabled
VLANs	Maximum = 1 per File Server
Static and default network routes for each File Server	Minimum = 0 Maximum = 5
NIS alternative file size	Up to 50 MB
Volume groups	From 1 to 5000, out to four levels

Filesystems	<p>Minimum = 1</p> <p>Maximum =</p> <ul style="list-style-type: none"> • 128 per Pillar Axiom 500 system • 128 per NAS Slammer
Filesystem size	<p>Minimum of 1 GB and 50% of maximum capacity</p> <p>Minimum growth increment of 1 GB</p> <p>Maximum = system capacity</p>
Snapshots	<p>Maximum =</p> <ul style="list-style-type: none"> • 250 per filesystem • 10,000 per Pillar Axiom 500 system
Volume Backups	<p>Maximum =</p> <ul style="list-style-type: none"> • 1024 per Pillar Axiom 500 system • 1024 per filesystem <p>Maximum concurrent = 5</p> <p>Maximum outstanding I/O requests = 128 across all backups</p>
NDMP	Maximum concurrent backup/restore sessions per system = 5
NFS exports	Maximum = 1000 per File Server
NFS host entries	Maximum = 4000 per File Server
CIFS shares	Maximum = 128 per File Server
User security groups	Maximum = 254 per CIFS user
CIFS connections	<p>Maximum per Slammer:</p> <ul style="list-style-type: none"> • 1200 for 12 GB memory (total) • 3000 for 24 GB memory (total)

Table 4 Operating limits of a Pillar Axiom 500 SAN system

Item	Description and Range
SAN LUNs	<p>Maximum =</p> <ul style="list-style-type: none"> • 2048 visible per system • 256 visible per host • 1024 visible per SAN Slammer
SAN LUN size	<p>Minimum of 1 GB and 50% of maximum capacity.</p> <p>Minimum growth increment of 1 GB</p> <p>Maximum = system capacity</p>

Volume Copies	Maximum = <ul style="list-style-type: none"> • 128 per Pillar Axiom 500 system • 12 active per LUN
Snap LUNs	Maximum = number of unallocated SAN LUNs, up to 1024
iSCSI	Maximum = <ul style="list-style-type: none"> • 256 TCP connections per iSCSI port • 256 iSCSI Initiators per iSCSI port • 32 persistent reservation registration keys per LUN • 512 simultaneous commands per iSCSI port

5.2 Fibre Channel Brick Limits

- Fibre Channel (FC) Brick storage enclosures normally come in pairs of one FC RAID Brick plus one FC Expansion Brick. A FC RAID Brick however can be installed without an Expansion Brick.
- One-Slammer systems have a limit of 16 FC Bricks. Two-Slammer systems can have up to 32 FC Bricks.
- Both SATA and FC Bricks may co-exist in the same Brick string subject to current configuration recommendations (see Section 6.1).
- A given Brick string can contain up to a total of four FC Bricks (RAID or Expansion). Maximum number of FC Expansion Bricks in any string, however, is two.

6 System Requirements

6.1 Slammer / Brick Configuration Limits[§]

Number of Slammers	Minimum number of Bricks **		Maximum number of Bricks
	Supported	Recommended	
1	2	3	32
2	4	All NAS or all SAN = 5 NAS / SAN combo = 6	64

This release supports up to two Slammer storage controllers.

[§] See Section 5.2 for information concerning mixtures of FC and SATA Bricks.

** The minimum number of Bricks in any configurations is two of the same type.

6.2 Using Browsers on Windows XP Operating Systems

When using Microsoft Windows XP, set the Windows Desktop appearance to something other than the default XP theme to ensure that lines and boxes are displayed correctly.

Important! If you use the default theme, some controls (such as radio buttons) will appear as though they were not there.

Configure the browser:

- Set security to medium-low (or lower) to enable the security certificate.
- Enable image support (if not enabled).
- Enable JavaScript.
- For Microsoft Internet Explorer, disable the Script Debugger.
- Set the displayed text size to the smallest comfortable viewing size.

When logging into the AxiomONE Storage Services Manager using Secure HTTP, you may see warnings that the server certificate is not issued by a trusted authority. The server certificate is installed and signed by Pillar Data Systems during the manufacturing process.

6.3 Network Requirements

6.3.1 Pilot Network Requirements

The Pilot requires:

- Two 100 BaseT ports for the public connection to the management network. For added redundancy, the two connections should be to separate switches. The Pillar Axiom system provides a standard Cat 5 RJ-45 jack on each Pilot control unit (CU) for this connection.
- The external switch ports must be set to auto-negotiation for the Pilot interfaces.
- Three IP addresses on the same subnet: one IP for each physical interface and one shared IP.

Note: VLAN tagging is not supported on the management interfaces.

The AxiomONE Path Manager communicates with the Pilot over secure, encrypted XML. If the Path Manager is installed on a SAN host, that host will require an Ethernet interface for communication with the AxiomONE Storage Services Manager. The network configuration must allow the SAN host to reach the Pilot management IP Ethernet interfaces.

6.3.2 Slammer Network Requirements

NAS data paths require gigabit Ethernet connections. Both fiber and copper are supported.

SAN data paths require 1 Gbps, 2 Gbps, or 4 Gbps Fibre Channel (optical) connections, which can be single- or multi-mode.

The type of connection should be specified when ordering your Pillar Axiom system. Contact your Account Representative if you need to change the type of physical connection for either Gigabit or Fibre Channel.

6.4 NDMP Requirements

For a list of data management applications (DMAs) that Pillar Axiom systems support, see the *Pillar Axiom Support and Interoperability Guide*.

6.4.1 File Server

The NDMP subsystem uses the networking configuration from a single File Server, which can be selected by means of the AxiomONE Storage Services Manager (GUI). Currently, a File Server must be set in the NDMP configuration portion of the GUI.

6.4.2 NDMP Command Interface

The NDMP command and response interface on a Pillar Axiom 500 system is the Pilot management interface. Data movement is performed over the data path interfaces. Be sure that any external NDMP backup servers are able to reach the Pilot management IP addresses.

6.4.3 Virtual Interface (VIF)

Only one VIF is required. For local backups, the networking configuration must be on the Slammer control unit (CU) to which the tapes are attached. The tape menu in the GUI lists the CU as a control unit number.

There are two ways to ensure there is networking on the CU with tapes:

- The first method is to create the File Server on the CU with tapes (or alternatively move it once it has been created).
- The second method is to create a second VIF on the CU to which the tapes are attached.

Note: The File Server used must be the File Server listed in the NDMP configuration.

6.4.4 Fibre Channel (FC) Tape Library LUNs

Even though the AxiomONE Storage Services Manager (GUI) allows you to configure tape library LUNs from 0 to 255, the FC tape driver only supports eight (0-7). To avoid difficulties, don't define library LUNs above number 7.

6.5 Power-Off Requirements

If you need to turn off the system, use the Shutdown capability in the GUI. Because of the redundant architecture, you may not turn off the system by switching off components (including the power distribution units).

Note: If you will be powering down the system for more than a day, remove the Slammer batteries so they do not discharge.

6.6 Power Cycling

Contact the Pillar Worldwide Customer Support Center before power cycling a Pillar Axiom 500 system except in the event of an emergency, in which case, drop all power and then contact the Support Center. Contact the Support Center before touching any power cables or switches. There are some situations where *not* power cycling the entire system is the correct action.

For *failure* testing, do not power cycle individual components without first contacting the Pillar Worldwide Customer Support Center.

7 Known Issues

The Pillar Axiom 500 server issues listed in Table 5 are known at the time of this release. They are planned for resolution in upcoming releases. When available, Pillar Data Systems will provide updated software or hardware.

For additional information or help on any of the issues below, please contact your Pillar Data Systems authorized representative (see Table 2 Contact information).

Table 5 Known Pillar Axiom 500 server issues

Slammer type	Pillar Axiom server issue or impact	Workaround or planned fix
ALL	In rare circumstances, if a Slammer warmstart occurs when a scheduled filesystem snapshot is being created, creation of that snapshot may fail.	This issue will be fixed in a future release.
	In rare instances, the software upgrade process is not able to move uploaded software to the backup Pilot control unit. This failure results in the wrong versions of software displaying in the GUI.	Upload the package and start the upgrade again.
	When attempting to start the AxiomONE CLI, if the program is not present, the error message is not clear that the file is missing.	Download the AxiomONE CLI package from the GUI and make sure both the axiomcli and pdscli executables are present. Note: You should download this package with each new release. This issue will be fixed in a future release.
	When creating a filesystem or LUN, the "Optimizer" dialog, which pops up from the "Quality of Service" tab on the Create dialog, might display incorrect values for the amount of capacity that can be used in Triple redundancy volumes. Only Triple redundancy is affected; the numbers reported for Standard and Double redundancy are correct.	Try again with a smaller capacity. If you are still unable to create a Triple redundancy volume, contact the Pillar Worldwide Customer Support Center. In the next major release, support for Triple redundancy will not be available.

Slammer type	Pillar Axiom server issue or impact	Workaround or planned fix
	When changing the Pilot management IP from static to DHCP in the GUI, the change does not get committed.	Run the CLI command <code>ModifyManagementConfig</code> with <code>DHCPEnabled</code> set to true and the <code>pilot1</code> and <code>pilot2 IPAddress</code> fields set with proper static values. This issue will be fixed in a future release.
	Under Guided Maintenance, the Prepare step does not fail over the Slammer control unit (CU) being targeted for replacement.	Power off the targeted CU. The system will fail over the resources to the partner CU. This issue will be resolved in a future release.
	AxiomONE Capacity Planner does not give the user a choice of Premium for the performance priority, even when Fibre Channel bricks are present in the storage array.	Use the Storage icon in AxiomONE Storage Services Manager and navigate to the appropriate Quality of Service tab. This issue will be fixed in a future release.
NAS	If a user is modifying the Host Lookup search order located on the Services tab for File Servers and it involves all three types of search (Files, DNS, and NIS), the GUI does not update the requested change to the search order if the user lists Files, NIS, and DNS (in that order).	To achieve a search order of Files, NIS, and DNS, use the command line. Note: In the GUI, when Files is listed first in the search order, DNS must follow NIS. Also, any other combination in which Files is not listed first should work accordingly. This issue will be fixed in a future release.
	In rare circumstances, when a NLM lock table notification table is full, the system may not be able to shutdown properly.	Call the Pillar Worldwide Customer Support Center for assistance. This issue will be fixed in a future release.
	After renaming a File Server that is configured for NDMP backups, backup operations will no longer work.	After changing a File Server name, you may need to update the NDMP configuration on the Pilot. In the GUI, select System > NDMP Backup Settings, then choose Modify NDMP Backup Settings from the Actions menu. If the File Server field contains a value of None, select the new name of the File Server from the drop-down list, and click OK. Note: The resulting screen might not refresh immediately. CLI users: Refer to <code>GetNDMPConfigDetails</code> and <code>ModifyNDMPConfig</code> requests. This issue will be fixed in a future release.

Slammer type	Pillar Axiom server issue or impact	Workaround or planned fix
	When deleting a large file, the filesystem may encounter long delays due to resource contention. On rare occasions, the delay is severe, causing the system to warmstart.	This issue will be fixed in a future release.
	When trying to download a quota report, you sometimes may get a system error.	Try collecting and downloading the quota report again. If you still get the error, contact the Pillar Worldwide Customer Support Center. This issue will be fixed in a future release.
	A Pillar Axiom NAS system may not finish a software update successfully when it is under extremely heavy loads or has Brick issues that prevent I/O requests from completing in a reasonable amount of time. In such cases, the NAS control units may fail.	Stop all I/O traffic to the Pillar Axiom system before updating the system software. Note: Refer to Section 2.3 for more information. This issue will be fixed in a future release.
	The GUI displays the amount of space that belongs to a single snapshot (the amount of space that will be freed if a single snapshot is deleted). The display can show "0 GB", even though there is data associated with that snapshot. The GUI does not show the amount of space that belongs to more than one snapshot. That space is not freed if a single snapshot is deleted since it belongs to more than one snapshot.	If all the snapshots that contain the space are deleted, the space will show in the last snapshot that contains the space. The space and will be freed when the last snapshot that contains the space is deleted. This issue will be fixed in a future release.
	Creating a SecureWORMfs filesystem by means of the Configuration Wizard will generate an error.	Create the filesystem manually through the regular GUI pages. This issue will be fixed in a future release.
SAN	Using a software iSCSI initiator when an issue in an ESX server configuration (misconfigured LUN) exists can cause performance issues.	Be sure the ESX server is correctly configured or switch to a hardware iSCSI initiator. This issue will be resolved in a future release.

Slammer type	Pillar Axiom server issue or impact	Workaround or planned fix
	<p>When a software update is performed under the following conditions, write failures may occur due to I/O timeouts:</p> <ul style="list-style-type: none"> • After a redundant LUN loses consistency. • The mirror rebuild is in process. • Writes are occurring on the LUN. <p>Depending on how the SAN host handles the write failure, data corruption could occur.</p>	<p>Quiesce I/O before performing a software update.</p> <p>Note: This issue does not apply to LUNs with standard redundancy.</p> <p>This issue will be resolved in a future release.</p>
	<p>Migration of LUNs from SATA Bricks (Archive through High Priority) to more than two FC Bricks (Premium Priority) may result in a less-than-optimal distribution over the target Bricks.</p> <p>Also, a "Temporary" Priority might be set that makes the LUNs appear to have the same performance level after migration.</p>	<p><i>Preventive workaround:</i> List the LUNs that are planned for migration to Premium Priority and make a note of the LUN Assignment for each. Then, in the "Identity" tab of the Modify LUN dialog, change the "Default Configured Slammer" if needed so that the LUNs are balanced across different CUs. Then migrate those LUNs.</p> <p><i>After-the-fact workaround:</i> Contact the Pillar Worldwide Customer Support Center. They will examine your system logs and recommend the proper steps to rebalance the LUNs across the Bricks.</p> <p>If an undesired Temporary Priority appears after migration, uncheck the "Temporary" checkbox in the "Quality of Service" tab of the "Modify LUN" dialog, and click OK.</p> <p>This issue will be fixed in a future release.</p>
	<p>If during a Copy LUN process the background task invoked by the Copy is cancelled, the resulting LUN displayed in the GUI is a Snap LUN, which was used to begin the Copy LUN. If data is written to this LUN, it will be deleted once the repository space is full.</p>	<p>This issue will be resolved in a future release.</p>
iSCSI	<p>It is not possible to create multiple iSCSI sessions to Pillar Axiom systems through a QLogic 4052C iSCSI HBA when using the latest QLogic 4052C HBA software and the latest Microsoft iSCSI Initiator software.</p>	<p>Pillar Data Systems is investigating to determine the appropriate combination of QLogic and Microsoft software versions to use as a workaround for this problem.</p> <p>This issue will be fixed in a future release.</p>

8 Resolved Issues

A number of issues, some previously undocumented, have been resolved in this release. Items that were documented as known issues in the previous release and are resolved with this release are described below. These are no longer product issues.

Table 6 Resolved Pillar Axiom 500 server issues

Fixed in Release	Slammer type	Pillar Axiom server issue or impact
2.10	All	When a Pillar Axiom 500 is upgraded from R2.x, the QoS flags may not be set correctly causing the write cache to be turned off for SAN LUNs, which reduces performance on the LUN.
	NAS	Sometimes when a "showmount" request is issued at the same time as a "umount" request, the Slammer may panic and warmstart resulting in client hosts timing out. The fix prevents the Slammer from panicking.
		If a quota operation is applied when a filesystem is full, the error handling that tries to remove the record of the quota operation for replaying purpose can erroneously fault the system. This can happen repeatedly as the record is stored on disk.
		When copying data with the "safecopy" application, .snapshot directories are incorrectly included in the copied data.
		Slammer allocates a finite amount of memory for opened objects. When more than 1200 files are opened from a single CIFS connection, a memory allocation failure occurs, resulting in a warmstart rather than an error returned to the CIFS client.
		A request to shut down or reconfigure CIFS may result in a warmstart when oplocks are outstanding. If clients do not respond quickly to Pillar Axiom requests to break oplocks during the CIFS shutdown process, the time limit for shutdown will be exceeded, and the node will be restarted. The fix allows shutdown to proceed without waiting for oplocks to be broken.
		During user authentication, CIFS may warmstart when processing an unrecognized credential structure. The fix returns an error for the unsupported credential.
		When a RHEL client uses the NFSv3 "create" operation with the option "Unchecked", the Pillar Axiom NFS software will not handle the request correctly, which causes the client to receive error status "File not found".
	SAN	Due to a very large number of NOAs in Pilot memory, thread processing slows greatly resulting in a core dump and Pilot failover.
		Pillar Axiom software does not properly handle iSCSI login requests that specify the AuthMethod key before the InitiatorName key.

Fixed in Release	Slammer type	Pillar Axiom server issue or impact
	iSCSI	In some circumstances, the versions of the iSCSI Initiator name table (which contains information about iSCSI hosts) maintained by the Pilot and that by the SAN module in the Slammer can get out of sync with one another, resulting in the Pilot endlessly trying to update the table in the SAN module. This looping causes a depletion of stack space, resulting in the Pilot control unit failing over to its buddy. This condition might occur when SAN hosts are starting up.
2.9	ALL	<p>When setting up an email address using Notifications, the name to the left of the "at" (@) symbol incorrectly ensures that a period (.) is not present in the address. However, the system will still store the address and send alerts.</p> <p>When Call-Home is disabled, the Pilot may report that a periodic Call-Home has failed.</p> <p>In rare circumstances, a Slammer control unit (CU) may warmstart repetitively approximately once every minute because of a persistence error, resulting eventually in a disabled Slammer CU.</p> <p>For Release 02.08.00 systems, the transfer of large Call Home log bundles by means of a proxy server may exceed the built-in 5-min timeout, causing the transfer to fail.</p> <p>Using a DC Pilot as a Pilot replacement could lead to a problem with the Pilot not being recognized properly. Please contact the Pillar Worldwide Customer Support Center if any problems are encountered.</p> <p>When updating Brick software while the Brick has a heavy I/O load, it is possible for the Brick to become unresponsive for a short time.</p> <p>The Pilot may become unresponsive, and an attempt to power cycle the Pilot results in continuous Pilot failure and restarting. This may be more likely to happen after a software update or when a Pilot is having hardware problems.</p>
	NAS	<p>After running for a while, due to a memory leak and especially when the number of open files is considerably large, a Slammer control unit (CU) may warmstart or drop a CIFS connection, which results in the client needing to reconnect.</p> <p>Sometimes while processing a directory list, the CIFS server may run out of buffer space and subsequently panic, which warmstarts the Slammer control unit.</p> <p>Under certain conditions, a CIFS NTLM authentication failure may cause a warmstart. The failure occurs when the Pillar Axiom CIFS server is able to initiate communication with the domain controller, but the subsequent authentication steps fail (for example, when the machine account password is rejected). A configuration where the CIFS server has an active VIF on each control unit is more likely to encounter this failure.</p>

Fixed in Release	Slammer type	Pillar Axiom server issue or impact
		<p>In some circumstances, the filesystem over time leaks an internal resource: inode entries in the inode cache. When the inodes run out, the system normally recovers by a warmstart to free all inodes, allowing system operation to continue. Occasionally, this recovery does not occur. If the inodes run out while the filesystem is being mounted and quota files are being accessed, instead of warmstarting, the system incorrectly marks a filesystem as being corrupted.</p> <p>NAS Slammer control unit warmstarts when an oplock break takes more than five minutes, which can occur because of slow persistence. (Persistence can be slow for reasons like Bricks being busy.)</p> <p>Under certain circumstances when a large number of users are doing many file operations, the system may detect unfreed memory resources when a filesystem is unmounted, resulting in a warmstart.</p> <p>For a given File Server, statistics are returned only for the primary VIF, not TCP/IP or secondary VIFS.</p> <p>The Slammer control unit with the VIF warmstarts when an NT_RENAME CIFS request having one of the following information levels is received: RENAME_FLAG_HARD_LINK(0x103) RENAME_FLAG_COPY(0x105)</p> <p>No error is reported when authentication fails, for example when a user mistypes the password.</p> <p>Oplock breaks may fail repeatedly when a client tries to open a file, leading to a Slammer control unit (CU) failure. After the CU recovers, the Oplock break will proceed.</p> <p>If CIFS encounters a delay during Join Domain processing or Join Domain status queries, the system may warmstart. Delays could be due to DNS servers, NIS servers, or Domain Controllers that are not responding. This condition led to a CIFS bug that did not properly handle the delay.</p> <p>Two SecureWORMfs scans on the same filesystem at the same time while no other filesystem is being accessed can cause the system to warmstart.</p> <p>In very rare occasions, a filesystem might miscalculate its outstanding I/O count, which leads to a thread that waits for I/O indefinitely. The condition is self corrected by the system healthcheck detector causing the control unit to warmstart.</p>
	SAN	<p>Sometimes, when the cables connecting the SAN hosts to the Slammer are disconnected for more than 10 sec and then reconnected, the GUI may report 0 hosts connected and the ports as an unknown topology.</p>

Fixed in Release	Slammer type	Pillar Axiom server issue or impact
		<p>Large read tasks (greater than 2560 blocks) can occasionally time out, resulting in a warmstart of the Slammer control unit.</p> <p>SAN runs LUN configuration commands through the task set. If an ACA is in the task set, the configuration command is not able to run. The fix permits the configuration command to run while an ACA is active.</p> <p>In rare situations, an interrupt storm may occur that overruns the QLogic chip.</p> <p>An improper help link for the LUN Errors tab dialog results in Page Not Found error.</p> <p>Environmental issues such as fan speed and temperature out-of-range events can trigger LUNs to go into and out of conservative mode.</p>
2.8	ALL	<p>File data may get compromised when the I/O load on a Brick storage enclosure is extremely high.</p> <p>After making changes to the priority settings of a LUN or filesystem, subsequent changes to the same LUN or filesystem result in an "Internal error" message, and the latest change does not take effect.</p> <p>When replacing a fan module under Guided Maintenance, if the old and new fan modules are swapped too quickly (less than 5 sec), the system may not have enough time to sense that the new module has been inserted and run diagnostics properly. In such a case, the system reports that the new fan has failed. The fix allows the fan module to be detected.</p> <p>After saving a LUN configuration created in the AxiomONE Capacity Planner, the saved configuration cannot be used to create the actual configuration.</p>
	NAS	<p>When a Windows domain controller locks out a CIFS user account (for an unknown reason), the client retries to authenticate the locked out user several times. Sometimes this activity causes the client connection to reach its imposed memory limit. When the limit is reached, the affected Slammer control unit (CU) warmstarts. The fix terminates the client connection to avoid a Slammer CU warmstart.</p> <p>When the preferred server is set in the CIFS Server Comment field by specifying an IP address, the "set kerberos password" request does not contact the KDC host specified but instead depends on the server address returned by the DNS server. The fix is to modify the set kerberos password code path, so that it overrides the KDC host returned by the DNS server with that read.</p>

Fixed in Release	Slammer type	Pillar Axiom server issue or impact
		<p>When copying a filesystem and one of the internal tasks hangs (a background task in the GUI or CLI task response is not proceeding), if you attempt to stop the task, the active Pilot control unit will restart.</p> <p>Note: Be patient while copying large filesystems, as such an operation takes a while.</p>
		<p>A File Server can hold 256 unique client host names for the purpose of lock reclaim notification. Some clients (such as PC-NFS and DHCP) that occupy the lock reclaim table may never return to clear the locks during the grace period after a system restart. If client locks are not reclaimed during the grace period, the Pillar Axiom system may not clear those un-reclaimed locks properly when the grace period after a system restart expires, which can cause the host limit to be exceeded.</p> <p>The fix for Release 02.08 properly clears these locks when the system is restarted. (A future release allows the stale locks to be cleared by an operator action.)</p>
		<p>When a Pillar Axiom system has joined a Windows domain consisting of multiple Domain Controllers and those controllers become unreachable, adding a new VIF operation which is part of the server configuration process will cause the owning Slammer control unit to warmstart.</p>
		<p>On Pillar Axiom NAS systems running under extremely heavy loads, the TCP/IP stack software may (by design) run out of buffer resources to continue processing I/O, resulting in a software deadlock, which eventually causes the Slammer control unit to warmstart.</p>
		<p>The CIFS domain user on the client was locked out on the Domain Controller. When this occurs, the CIFS client repeatedly tries to authenticate the CIFS user at a rapid rate. All these authentication requests are rejected. This situation consumes a large amount of memory and causes the connection to exceed its self-imposed memory budget, resulting in a warmstart.</p> <p>The fix simply closes the connection.</p>
		<p>The share name "homes" may map to a different filesystem than the one configured in the share definition.</p>
		<p>Sometimes internal house-keeping tasks on the Pillar Axiom system consumes all available CPU and prevents any user-initiated operations from completing. In such a case, the system may fail to process protocol requests for up to five min, after which the system warmstarts.</p>
		<p>During CIFS I/O, when an SMB signature verification fails, attempts to end the CIFS connection will fail and cause a software recovery.</p>

Fixed in Release	Slammer type	Pillar Axiom server issue or impact
	SAN	<p>Under some scenarios during Auto Contingent Allegiance (ACA) compliant error handling, valid transfer to a LUN may be blocked, causing an internal SAN software failure.</p> <p>This situation occurs when an error is returned on I/O transfer and, while processing this error, an ACA occurs, which can result in the blocking of on-going commands to the same LUN. Because we had overloaded a variable to handle I/O errors and blocking, blocking the command caused us to mishandle the data handshake, resulting in the panic.</p> <p>The fix treats these conditions separately.</p> <hr/> <p>In very rare circumstances, if persistent loop instability is detected between the Bricks and the Slammers, a race condition developed where ports could end up doubly counted, causing the system to restart.</p> <hr/> <p>If the Administrator, using the GUI, modifies a LUN to change either the LUN's Slammer CU assignment or the LUN's Relative Priority or Redundancy, without having first viewed the (LUN) Mapping tab, the mappings for the modified LUN will be removed.</p> <hr/> <p>The SAN host issued a SCSI Mode Select command to change some configuration settings of a LUN. These settings are written to both CUs of a Slammer. When syncing these changes, the other CU warmstarted, preventing a return response to the sync, which after two min caused a health check to be generated. LUN configuration is automatically resynced on restart, so waiting for the return was unnecessary.</p> <p>The fix removed the wait for completion.</p> <hr/> <p>In cases where there is an extremely unstable Fibre Channel link (in other words, multiple link downs in succession), it is possible to not clean up a task that has been aborted by the host during link down processing.</p> <p>The task is missed because we have not identified the sending host at the time of the link down. This task will begin to run if the host that sent that I/O logs back in after link up. When we try to transfer data, the Fibre Channel chip no longer recognizes this I/O, and we fail.</p> <p>The fix aborts all tasks properly.</p>

9 Additional Notes

For items in this section that refer to inserting and/or removing field replaceable units (FRUs), please refer to the *Pillar Axiom Service Guide* for more information.

For items in this section that refer to provisioning and/or configuring a Pillar Axiom storage system, please refer to the *Pillar Axiom Administrators Guide* for more information.

9.1 Host Queue Depth on SAN Hosts

The recommended maximum queue depth for all SAN hosts attached to a Pillar Axiom storage system is 64. This value is the maximum number of outstanding I/O requests to the Pillar Axiom system. Exceeding this value may cause I/O errors if the input/output queue of the Pillar Axiom system is exceeded.

This value is typically set in the BIOS or similar firmware configuration of the HBA on the SAN Host. Consult your HBA documentation for the setting that controls the maximum I/O queue depth for your HBA and for configuring this setting.

9.2 Limitation of the Linux sginfo Utility

The `sginfo -l` utility (part of the Linux `sg3_utils` package) has a limitation by which it can only display up to 31 LUNs. To display the actual number of devices recognized by a host, use the `fdisk -l` utility instead.

9.3 LUN Ranges in Windows

Windows 2000 and 2003 will not configure LUN 255. If you configure a LUN in the Slammer at address 255, Windows will not see the LUN.

9.4 Issues with LUN Capacity Calculations on Solaris

The Solaris operating system calculates the size of a LUN using disk geometry information from Mode Sense queries rather than the more common and accurate practice of using the response to a Read Capacity Query. For Pillar Axiom LUNs larger than approximately 400 Gigabytes, this calculation can result in a reported capacity that is different from the Pillar Axiom configured value.

The Solaris format utility may return an error stating that it is adjusting the number of sectors on the Pillar Axiom LUN or may indicate that the number of heads is something other than 64 or that the number of sectors is something other than 128 when Solaris adjusts the number of cylinders to be 65,533 during the size calculation. If format returns an error, it is typically:

Mode sense page(3) reports nsect value as 128, adjusting it to 127

Disk geometry information does not apply to SAN LUN arrays on Pillar Axiom systems. This information is returned, however, in Mode Sense with the number of heads and sectors being 64 and 128 and with the number of cylinders varying for those operating systems (such as Solaris) that calculate LUN size rather than using the actual Capacity.

If the difference between the information calculated by Solaris and the actual LUN size is an issue for your applications, create and use a unique disk label or `/etc/format.dat` entries for the Pillar Axiom LUNs.

9.5 VMware ESX Server 3.0.1 Connections to Pillar Axiom iSCSI Systems

When booting from SAN, only one path to the Pillar Axiom system should be configured in the iSCSI HBA BIOS. The boot LUN is assigned a LUN ID of 0 (zero) to which the iSCSI adapter ports must be mapped.

9.6 HP-UX HBA Connections to Pillar Axiom Systems

The AxiomONE user interfaces show that host Fibre Channel (FC) HBA ports are either Connected or Not Connected to the Slammer ports. The meaning of Connected is that the HBA port on the SAN host has logged in to the port on the Slammer using the FC protocol.

In most operating systems, host ports log in to the Slammer ports immediately after the two are physically connected and enabled and remain logged in until the physical connection is broken. Therefore, Connected in the UI effectively means that there is an enabled physical connection between the ports.

Some HBA device drivers on HP-UX, however, use a different approach—they log out from the connection when there is no traffic to send. An HP-UX HBA port often shows as Not Connected even though there is an enabled physical connection between the ports.

9.7 LUN Assignment and Accessibility

If you use Pillar Axiom LUN masking or switch zoning and do not use LUN assignment, you may create a situation in which a LUN is not exposed on the ports on which you want to access it. To avoid this situation, it is recommended that you assign the LUN to the Slammer control unit (CU) on which you have the mapping set.

9.8 LUNs Created Through Capacity Planner Accessible by All Hosts

When you create a LUN using the Capacity Planning Manager, the LUN is created without port mapping or masking information. To configure port mapping or masking for a LUN that was created through the Capacity Planner:

1. In the Storage>LUN section of the GUI, click the link for the LUN you want to configure.
2. In the LUN Access section, select the “Only selected hosts” option.
3. Click the Mapping tab.
4. Configure the LUN for mapping and port masking as needed.

9.9 Resetting the Primary System Administrator Password

If you forget the Primary System Administrator password, you can reset it in these ways:

- Use a Type 1 Administrator account, if one exists, to reset the password. A Support Administrator cannot reset the Primary Administrator password.
- Contact the Pillar Worldwide Customer Support Center for the encrypted file (for resetting the password), which may be placed in a USB key. Use the USB key as instructed.

It is strongly recommended that you set up an additional Type 1 Administrator account when you install the system. A Type 1 Administrator can modify account passwords without knowing the previous password for any accounts.

9.10 Uploading Software Update Packages over Slow Connections

It is not recommended that you upload a software update to your Pillar Axiom system over a slow connection (such as a WAN connection). Use an internal network connection (10 Mbit/sec or greater) only.

9.11 When Updating the Software

Whenever you update Pillar Axiom software, ensure that all non-Pillar Data Systems components are working correctly with all redundant paths enabled and no maintenance being performed on any other component in the network.

9.12 Non-Disruptive Software Updates

The Pillar Axiom system implements non-disruptive software updates by warmstarting the Slammer control units (CUs) and restarting the Pilot CUs to bring up the new software. As each Slammer CU warmstarts, there is a temporary protocol service disruption of a few seconds on each CU. This disruption is typically non-disruptive to most applications and protocols.

For NAS Slammers, the brief protocol disruption is such that most client applications either time out and recover or see a fast reboot of the Pillar Axiom server.

Important! For Pillar Axiom systems that have one or more NAS Slammers, try to quiesce all I/O to the system before performing a non-disruptive software update.

For SAN Slammers, if the HBA timeouts and retries are set correctly, this brief protocol disruption should be handled gracefully by most operating systems and applications.

However, any application or operating system that bypasses the Fibre Channel protocol stack and issues SCSI commands with short timeouts may not be capable of handling the brief interruption of a non-disruptive software update. For example, the Microsoft Cluster Service will initiate retries in 3 seconds and, at 7 seconds, will begin reconfiguration and recovery that will probably disrupt any applications using the Cluster Service. Microsoft, however, is promising to fix this issue in the upcoming release of the Windows "Longhorn" server (successor to Windows Server 2003).

9.13 WWN Designation Changed in Release 2.0

Starting with the 2.0 release, the WWN was changed to use a common base World Wide Node Name (WWNN):

- In Release 1.x, each Slammer was assigned a unique WWNN with the Slammer Fibre Channel ports being assigned World Wide Port Names based on the WWNN of the Slammer. For each Slammer, CU0 would have World Wide Port Names using 1 and 3 and Slammer CU1 would have World Wide Port Names using 2 and 4 to indicate the port, based off the Slammer WWNN.
- Starting with Release 2.0, the entire Pillar Axiom system has a single base WWNN based on the MAC address of Slammer CU0. The World Wide Port Names are derived by a fixed formula from this single base WWNN using the Slammer, Slammer CU, Slammer Port Number, and Port Type.

9.14 Possible Errors When Running Unsupported Linux Variants

When attempting to run the Command Line Interface (CLI) application on unsupported Linux variants (such as Fedora Core 3 and Core 4 versions of Linux), you may see the following message:

```
pdsccli-Linux: error while loading shared libraries: libstdc++.so.5: cannot open shared
object file: No such file or directory.
```

These and certain other variants of Linux do not include the necessary libraries in their standard installation. Although these are unsupported Linux variants, you may be able to use these versions of Linux by installing the appropriate version of the compat-libstdc++ rpm package.

Note: If you need support for another operating system, contact your Pillar Account Representative.

9.15 Status of Filesystems and LUNs

System Health screens in the GUI display the status of hardware and firmware components of the Pillar Axiom system. The overall system status icon on the bottom of the screen is a summary of the hardware status and does not reflect the status of LUNs or filesystems.

A hardware problem will typically cause filesystems and LUNs to go offline or to a degraded state. Because this is not always the case, you should check the state of the filesystems and LUNs or any associated Administrator Actions that may be listed.

9.16 Change in Default Failback Configuration of NAS Slammers

Automatic failback of NAS Slammers is the default configuration beginning with Release 02.00.00. If this is not desired, automatic failback of NAS Slammer CUs can be disabled in the GUI Global Network settings menu (System>Global Settings>Network).

Automatic failback of SAN Slammer CUs is always enabled.

9.17 Avoid Setting the Time by Means of Pillar Axiom Facilities

If the time on a Pillar Axiom system is being controlled by a time server, the date and time should *only* be changed on that time server.

If you are not using an NTP server, we recommend not changing the date by means of the GUI or CLI once the initial installation is complete and the system is operational. If you change the date on a Pilot or Slammer by more than 15 minutes, the NTP daemon will mistrust the request and exit.

9.18 Automatic Snapshots

When you create a filesystem, the default action is to also create a snapshot schedule that will create filesystem snapshots every four hours. If this schedule is not appropriate for your data, perform one of these actions:

- On the Create Filesystem menu, clear the Create Automatic Snap FS Schedule (every 4 hours) checkbox.
- Modify the automatically created snapshot schedule to satisfy your requirements.

To avoid SAN filesystem inconsistencies, AxiomONE Storage Services Manager does not provide for creation of schedules for Snap LUNs. Before creating a Snap LUN for a LUN, be sure that the SAN host has placed the filesystems on that LUN in a state where they will be consistent. If desired, you can use the CLI with a scripting language to create Snap LUNs periodically.

9.19 Keeping Snap LUNs from Being Deleted

When a Snap LUN repository consumes more than 90% of its allocated capacity, the system is likely to begin automatic deletion of Snap LUNs. When repository usage crosses this 90% threshold, the system creates a SnapLUNStorageFillingButCannotGrow (“Extra space for Snap LUNs has reached maximum and is nearly full”) administrative action to warn of this possibility. If you see this Administrative Action, you should manually delete some of the Snap LUNs.

If you want to use lots of I/O on a Snap LUN, to keep the Snap LUN from being deleted, you should allocate a size of 120% of the source LUN. For multiple Snap LUN descendents of a source LUN, each one requires more space, so you should allocate an additional 50% for each Snap LUN that you intend to have in existence at a given time. Actual storage space used for the repository is only grown to the amount of space being used.

Snap LUNs are not intended for heavy I/O, they are intended to be temporary—anywhere from minutes to several weeks in existence. As long as they are deleted the space will be recycled. All repository space is recycled when the last Snap LUN is deleted.

9.20 Small Maximum Snap LUN Space

When creating a LUN, you can now specify Max space for Snap LUNs that is as little as 50% of the LUN capacity, or lower (minimum 1 GB). Choosing a small number is only appropriate for LUNs that have the following characteristics:

- It has only a few Snap LUNs at any given time.
- Its Snap LUNs will have short lifetimes (for example, they will be deleted after making a backup).
- It will get minimal write activity while there are Snap LUNs.

Specifying a larger Max space for Snap LUNs (for example, up to 300% of the LUN capacity) is safe and reasonable. The system will allocate a small fraction of the specified Max and will increase the space automatically as warranted by Snap LUN activity up to that Max.

It is good practice to delete Snap LUNs when you are done with them. Old Snap LUNs run the risk of running out of space and losing synchronization with their source LUN. If that occurs, their data will be corrupt, and they will be automatically deleted. If you need a long-term copy of an active LUN, consider using the Backup to Disk option instead.

9.21 Reassigning a SAN LUN to another Slammer or Control Unit

If you reconfigure the Slammer or the Slammer control unit (CU) to which a SAN LUN is assigned, the Pillar Axiom restarts the LUN at the new location. As a result, users may experience a momentary loss of access to that LUN, possibly disrupting some applications. SAN hosts should be able to re-establish LUN access automatically. However, Pillar Data Systems recommends that you change LUN ownership only when I/O is not occurring.

9.22 System Scaling

You may increase storage capacity on a system by adding components and increasing assigned capacities. You may not decrease storage capacity of a system without the help of a Pillar Data Systems authorized representative.

9.23 Running Slammer Diagnostic Tests from the GUI

When you run diagnostics on a Slammer through the GUI, read the instructions and warnings concerning the removal of external cables.

As the diagnostic executes, resources on the Slammer control unit (CU) will fail over to the other CU. The CU being tested will go offline, which generates an Administrator Action indicating that the CU has failed. The system status will show Critical.

If the diagnostic passes:

- The Slammer CU is placed online, the Administrator Actions are automatically deleted, and the system Status shows Normal.
- For SAN Slammer CUs, all resources will automatically fail back.
- For NAS Slammer CUs, if automatic failback has not been enabled, you need only execute the Administrator Action associated with the failed over CU to fail back the resources to the CU that has successfully completed diagnostics.

Important! Do not attempt to run Diagnostics on more than one Slammer CU at a time. Doing so may cause additional resources to go offline.

9.24 Information Screens for Slammer Power Supplies

In the System Health screens for the Slammer Components, the information fields for Slammer power supplies are intentionally blank.

9.25 GUI Accurately Displays the Status of Components

In earlier releases, during system or core restart, all components would show a status of "Booting". Beginning with Release 02.00.00, the GUI more accurately displays the status of the components as they are discovered and initialized by the management software. For example:

- The typical initial display shows the active Pilot CU as Booting. The standby Pilot CU may show Warning, Offline, or Booting, then transition to Online when start-up finishes.
- The initial Slammer state shows as Unknown and then proceeds to Boot State Ready, Booting, "Booting 0xnnn", and then Online as the Slammers are discovered and initialized.
- The initial Brick state shows as "Offline" and then "Booting" as the storage enclosures are discovered and initialized.

9.26 A Disk Drive May Display Blank Data in the GUI

In this release, disk drives are validated by the Pillar Axiom system. In some cases, the GUI may report a blank part number and/or serial number for a disk drive. However, the system will perform normally. In such a case, you should contact your Account Representative for a replacement disk drive.

9.27 Changing Components

Use Guided Maintenance in the GUI when changing hardware components. Guided Maintenance provides instructions for you and performs tasks to get the system ready for the component replacement. Make sure to follow the instructions provided.

Notes:

- Adding memory to existing Slammer CUs in the field is not supported in this release. Contact your Account Representative for assistance.
- Replacing Brick and Slammer chassis are not supported in this release. If you have attempted to replace a Brick chassis, contact the Pillar Worldwide Customer Support Center for assistance in recovering.

9.28 Pilot CUs Must Not Be Powered On Independent of Replacement Procedures

After receiving a replacement 1U Pilot control unit (CU), do not power it on outside of the Pilot replacement procedure documented in the *Pillar Axiom Service Guide*. If a Pilot CU is powered on prematurely, you must contact the Pillar Worldwide Customer Support Center. Also, when you need to replace a Pilot CU, contact the Customer Support Center for assistance.

9.29 Differentiate Between FC RAID Bricks and FC Expansion Bricks.

The system must be able to tell one Fibre Channel (FC) Brick from another. The thumbwheel in the ES component at the back of a FC Brick enables you to make this distinction. As such, you must set the FC RAID Brick thumbwheel to 0 and the FC Expansion Brick thumbwheel to 1.

9.30 Guided Maintenance on FC Bricks

If you have Fibre Channel (FC) Bricks, Guided Maintenance on them should be done very carefully with only light to medium I/O traffic. Please contact the Pillar Worldwide Customer Support Center for help in running Guided Maintenance on FC Bricks.

9.31 Replacing a Disk Drive

When replacing a disk drive, always use a new one from Pillar Data Systems.

- If a disk drive fails, do not attempt to recover by removing and reinserting that disk drive. Contact Pillar Data Systems for a new disk drive.
- If a disk drive fails, use a sealed spare disk drive from Pillar Data Systems. Do not use a disk drive of unknown status.
- Do not attempt to replace a failed disk drive with one from another Brick or from another Pillar Axiom system.
- If testing Drive Pull, wait a few seconds after removing the disk drive before reinserting it. Be sure to check for Administrator Actions to accept the disk drive.
- If a disk drive fails to be accepted into a Brick and the disk drive is set to Rejected status, do not attempt to use that disk drive. Contact Pillar Data Systems for another disk drive and for assistance.
- If an Administrator Action asking you to accept the disk drive is generated, be sure to select the Accept Drive option, which will initiate a copyback operation.

Important! If an Administrator Action to Accept a Drive is ever answered negatively, do not attempt to use that disk drive again. Contact Pillar Data Systems for another disk drive.

Contact the Pillar Worldwide Customer Support Center for a new replacement disk drive.

9.32 Moving Disk Drives

Do not move disk drives from their original positions. If you move a disk drive, all data on that disk drive will be lost. If multiple drives are moved, you will lose data.

If a disk drive is defective, use Guided Maintenance in the AxiomONE Storage Services Manager GUI to replace the drive.

9.33 Reseat Disk Drives before Powering On New or Replacement Bricks

The disk drive latch may appear to be fully latched, but sometimes the disk drive is not making good contact with the Brick chassis midplane. With poor contact, the disk drive will fault, and the GUI will typically display a state of Unknown for that disk drive:

```
Drive 06  05_Fault      00_Unknown
```

To prevent loose disk drives and as a precaution, before powering on a new or a replacement Brick, visually inspect each disk drive to verify that they are fully seated.

If a disk drive is not fully seated, either or both of the following will be true:

- The metal portion of the carrier will be visible.
- The front of the disk drive carrier will not be flush with the other carriers.

To seat an improperly seated disk drive, perform the following steps:

1. Fully unlatch the disk drive carrier.
2. Press the disk drive carrier firmly until it snaps into place.
3. Snap shut the latch to lock the carrier in place.

Important! Do not unlatch and re-latch a disk drive carrier unnecessarily. Doing so can lead to potential troubles in the future.

9.34 Testing Multiple Disk Drive Failures

Important! Do not test multiple disk drive failure scenarios in the same Brick storage enclosure without contacting the Pillar Worldwide Customer Support Center for guidance.

9.35 ACT LEDs on Disk Drives Can Blink When Inactive

When there is no I/O activity on a Brick storage enclosure, the RAID firmware runs a background operation that scans all disk drives for media errors and, if media errors are found, performs repair operations. This background activity causes the ACT LEDs to blink green on the idle system or Brick. Such activity can take several hours to complete. When host I/O resumes, this background operation stops; it resumes only when there are no further I/Os from a host.

9.36 Replacement of Brick Storage Enclosures

To avoid data loss, contact the Pillar Worldwide Customer Support Center before you attempt to replace an entire Brick storage enclosure or Slammer storage controller. The Support Center can help you determine whether a particular filesystem or LUN is physically on the Brick.

9.37 Adding a Brick Generates Error and Warning Messages

When you add a Brick storage enclosure to an existing Pillar Axiom system, the system begins the process to bring the Brick online. While the system is bringing the Brick online, you may see a series of error and warning messages similar to these:

- Fibre Channel RAID Array Inaccessible
- Fibre Channel Path to Brick Failed

These messages are normal and to be expected. During the bring-up process, the status of the Brick will go from red to yellow to green. After the system completes the process, the Brick will show a Normal status.

9.38 FC Bricks in SATA/FC Systems Support Only the Premium Band

When adding Fibre Channel (FC) Bricks to a SATA system, the FC Bricks can only be used for the Premium priority band. This means, for example, that if you have a mixed SATA/FC system, the maximum possible space for the Archive performance band will be the total amount of SATA disk space you have. It also means that the FC space on the system cannot be used for any performance band except the Premium band. In other words, *bleed up* of lower-performance bands from SATA to FC storage in a mixed SATA/FC system is not supported in this release.

9.39 Testing RAID Rebuild and Simulated Drive Fault

You can use Guided Maintenance to identify a Brick and to show the location of an individual disk drive for testing disk drive pulls. But the “Prepare System” and “Replace Hardware” functions should not be used when testing or demonstrating RAID rebuild and drive replacement where the existing drive is to be removed and then re-installed.

The Guided Maintenance process is intended for use only when a drive, or other FRU, has encountered a fault and is to be replaced with a new drive or other FRU. If Guided Maintenance “Prepare System” and “Replace Hardware” is used to replace a drive, you will be instructed to remove and replace the drive. The Pillar Axiom system may defer any further actions on the Brick until this is done, which may result in the Brick Redundancy repair actions not being initiated properly.

To test Drive Fault, simply pull the drive. Wait a few seconds until drive activity is observed on either the top or bottom drive LEDs on all other members of that RAID array, then carefully reinsert the drive and make sure it is fully seated and latched in place. The background tasks to rebuild the array and then copyback the array data to the re-inserted drive should start automatically and be displayed within a few minutes, depending on overall system activity. If an Administrator Action to accept the drive is displayed, be sure to select “yes” to accept the drive.

If a drive is genuinely faulted, use the Guided Maintenance menus to Identify the Brick, note the position of the drive in the Brick, Prepare the System for replacement, and then “Replace Hardware” to remove the old drive and replace it from spares as instructed.

9.40 Testing Failure Recovery from Loss of Slammer Power

Testing failure recovery by removing all power from a Slammer in a dual-Slammer system may result in the remaining Slammer going offline or the system restarting.

The power inputs, power supplies, management paths, and control units in the Slammer are redundant, making this failure injection a multiple failure. Perform this type of multiple fault injection only when it is acceptable to lose the services of the remaining Slammer. Consider contacting Pillar Professional Services who can assist in testing Slammer failover through the use of a support-level CLI command.

9.41 Reverse Name Lookups for NFS Exports

NFS mount authentication time has been improved by adding reverse name lookups for NFS exports defined by hostnames. For this to be effective, you should configure external naming servers with the reverse records.

- DNS servers should be configured with PTR records for all client hostnames.
- NIS servers should be configured with host.byaddr records for all client hostnames.

Important: On the File Server Services tab, you should specify the appropriate order for “Host Name Resolution Search Order”. Name resolution policies must be applied consistently. Configure the reverse and the forward name lookup systems to provide matching names (both must return fully qualified names—such as “myhost.mycompany.com”—or both must return unqualified names—such as “myhost”). NFS mount requests may be rejected when a DNS server returns a fully qualified name and an NIS server returns an unqualified name.

For example, if the DNS server returns the host name as “myhost.mycompany.com”, the customer’s netgroup must have a membership list that includes the fully qualified name “myhost.mycompany.com”. Similar restrictions apply to name resolution by means of local files.

9.42 Deleting Files from a Full Filesystem with Snapshots

If a filesystem containing snapshots is allowed to completely consume the allocated space, it may become impossible to delete files from that filesystem to recover space.

Snapshots consume space from the original filesystem allocation in order to preserve QoS. If a file is deleted, the data from that file would need to be placed in the appropriate snapshot copies to preserve the integrity of existing filesystem snapshots. If there is no space left, the file deletion will be failed in order to preserve these views.

To delete files from such a filesystem, delete one or more snapshots to recover filesystem space, or allocate more space if there is storage available in the current or higher QoS pool.

9.43 Uploading Empty Files Not Allowed

You cannot upload empty files (zero bytes) to a Pillar Axiom system. This restriction applies to all system interfaces where a file upload is allowed.

9.44 Filesystem Checking (FSCK) and Consistency

In this release, FSCK is fully functional in repairing filesystems.

As an additional data protection measure, when a filesystem is created, the default behavior is to create a four-hour snapshot schedule for the filesystem. These snapshots are recommended, because in rare circumstances, the FSCK may fail to repair the filesystem and will provide an Administrator Action choice to revert the filesystem to a snapshot or to delete the filesystem.

If the repair is unsuccessful and there are no available snapshots, you may still place the filesystem online for recovery of the data. Exporting such a filesystem read-only for this recovery is recommended. Contact the Pillar Worldwide Customer Support Center if this occurs or before deleting a filesystem due to a failure of the filesystem check.

You have the option to place the filesystem online to revert to a known good snapshot to avoid a lengthy FSCK. Contact the Pillar Worldwide Customer Support Center for assistance in determining candidates for good snapshots before reverting in this manner.

It is possible to recover from some filesystem conditions by placing the filesystem online and reverting to a snapshot. The recommendation is to export such a filesystem read-only for recovery of the data.

If the filesystem becomes inconsistent and a Snap FS exists, FSCK can revert the filesystem back to when the snapshot was created. Any data saved, stored, or modified on the filesystem after the snapshot was created will be lost.

The snapshot frequency defined by a Snap FS schedule is also important. The time lapse between when a Snap FS was created and the discovery of filesystem inconsistency determines how much data will be recovered should the filesystem need to be reverted.

If filesystem inconsistency is detected, the system performs the following:

1. Takes the filesystem offline so that no further changes can be made to the data.
2. Generates an Administrator Action that provides multiple options to the administrator:
 - Perform a filesystem consistency check.
 - Delete the filesystem.
 - Revert to a previous snapshot.
If you choose this option, all changes to the filesystem between the time of that snapshot and the time the filesystem issue was detected is lost.

3. Checks the filesystem for consistency.
 - If the filesystem is consistent, the check is complete and FSCK automatically puts the filesystem online.
 - If the filesystem is inconsistent, FSCK takes one of these courses of action:
 - If the filesystem is fixable, FSCK fixes it and puts the filesystem online.
 - If the filesystem is unfixable, FSCK performs the following actions:
 - Reverts the filesystem to an earlier snapshot.
In this case, FSCK reports “FSCK Complete” along with the snapshot ID.

Note: Any data saved, stored, or modified between when the snapshot was taken and when the filesystem issue occurred will be lost.
 - Verifies the consistency of that snapshot.
If it is fixable, FSCK fixes it and puts the filesystem online; otherwise, FSCK repeats the above steps.

Note: If no good Snap FSs exist and the initial FSCK fails to recover the filesystem, it is recommended that you *not* delete the filesystem but instead contact the Pillar Worldwide Customer Support Center. The Support Center may be able to help you recover the filesystem.

Once the consistency check is complete and the filesystem is online, end-users may need to remount the filesystem so they can reconnect.

We strongly recommend that you run only one FSCK process at a time. Even though multiple FSCK processes will queue, the best practice is to check a single filesystem and wait until that check completes before starting a subsequent FSCK process.

9.45 Journal Data for SecureWORMfs Filesystems Always in Physical Storage

For compliance filesystems using SecureWORMfs, the journals for those filesystems are always kept on physical storage and the battery-backed memory is intentionally disabled. This feature does cause a small loss in performance but is necessary for data integrity.

9.46 Replication of a SecureWORMfs Filesystem

When you target a SecureWORMfs filesystem for an AFR file replication operation, you must set the delivery mode under the file transfer options to “fast”; otherwise, AFR attempts to create a working file and rename it when the transfer is complete. Because SecureWORMfs filesystems are read only, that is not possible. Setting the file transfer options to “fast” prevents the creation and renaming of a working file.

9.47 Increasing Redundancy Requires More Space Than Requested

When increasing the Redundancy QoS parameter of a filesystem, the actual amount of additional space the system allocates for the increased redundancy is typically greater than what is requested. For example, you should expect that, when increasing the redundancy of a filesystem to Double, the system could allocate an additional 2 GB and, when increasing the redundancy to Triple, the system could allocate an additional 5 GB.

9.48 Creating Quotas on Non-Empty Directories

When creating a quota on a non-empty directory, you have a choice of allowing the filesystem to go offline temporarily or failing the quota request.

- *Allow the filesystem to go offline.* The system takes the filesystem offline temporarily to calculate quota usage of the directory. The system traverses the entire directory and counts the number of blocks consumed by the directory. The duration of the offline state of the filesystem depends on the number of objects contained in that directory.
- *On empty directories only.* The system tells you about any non-empty directories and fails the quota request in those cases. These quotas can be implemented when taking the filesystem offline is acceptable or by creating a new directory and quota and moving the data to the new directory.

9.49 Number of Directory Quotas

The current limit to the number of directory quotas that can be managed is 100,000 per filesystem.

9.50 CIFS Support

A File Server can act as a native member server to an Active Directory environment or emulate a Windows NT member file server.

In the Active Directory environment, Kerberos authentication is supported. A DNS server is required for name resolution, and a Domain Controller is required to provide Active Directory support and to act as the Kerberos Key Distribution Center (KDC). Customers that have implemented higher security policies should be aware that LDAP signing is not supported (the Pillar Axiom CIFS server cannot join the domain when "LDAP server signing requirements = Require signing" is specified on the Domain Controller).

As a Windows NT member file server, NTLM authentication is supported. It uses NetBIOS naming services and requires a Domain Controller and WINS server with static IP addresses and legal NetBIOS names.

A File Server may be used in Windows 2000 or Windows 2003 domains with some special configuration requirements. These requirements are discussed in the *Windows Integration Guide for NAS Systems*.

Additional CIFS features will be supported in future releases.

9.51 Create CIFS Share

This release implements the `\\<fileserver-name>\IPC$` administrative share, which allows CIFS clients to browse the filesystems that are shared by a File Server. Pillar Axiom systems do not automatically create the `C$`, `D$`, and `<share-name>$` style hidden administrative shares. If these shares are desired, share the filesystem as `C$`, `D$`, and `<share-name>$`. For example, to create a hidden administrative share for a filesystem named `foo`, create a share named `foo$`.

9.52 DHCP Behavior on the Pilot

In the current release, the DHCP feature has the following behavior characteristics:

- Dynamically assigns only the public IP address of the Pilot.
- Locks the two private IP addresses.
- Retains DHCP settings during a Pilot failover.
- Does not reflect the updated IP address or the status of the DHCP setting in the GUI until the Pilot restarts or fails over.
- Updates the values correctly without a need to restart when you change back to static addresses.

Note: You should configure the two private IP addresses to be on the same network as the dynamically assigned public IP address; otherwise, the private interfaces may not work.

If DHCP is enabled on the Pilot and DNS lookup is available on the management console, you can log in to the Pillar Axiom system using the system name rather than its IP address.

9.53 Changing Slammer Port IP Addresses from Static to Dynamic

When changing the IP address from static to DHCP, the change is not instantaneous. The static IP address is retained until a lease is obtained and the system refreshes the status. In other words, the GUI will experience a delay in reporting the newly acquired DHCP address when you change a port from static IP to DHCP.

9.54 SMI-S Should Not Be Enabled on 512 MB Pilots

Important! By default, all 512 MB (older, non-RoHS) Pilots have SMI-S disabled on startup. Because of limited memory, you should not enable SMI on these Pilots.

9.55 VSS Provider Event Numbers Incorrectly Mapped to Descriptions

For VSS Provider events sent to the Windows event log, the VSS Provider plug-in doesn't correctly set the mapping of event number to event description. However, when you click on the event to see its properties, the event text is viewable.

9.56 Disabled/Excluded Slammer States

Repeated failure of a Slammer control unit (CU) can result in that CU becoming non-operational. If the repeated failures occur during normal operation of the Pillar Axiom system, the system marks the CU as Disabled; if the failures occur during startup, the system marks the CU as Excluded. This behavior may be triggered by repeatedly testing power failure simulation for Slammers.

Contact the Pillar Worldwide Customer Support Center for assistance in checking the status of the Pillar Axiom system and the recovery process.

9.57 Hardware Lockout Due To Repeated Power Cycling

IMPORTANT! Do not repeatedly power cycle a Pillar Axiom system or any of its hardware components. Doing so may automatically trigger the hardware-fault lockout mechanism. The current thresholds for repeated power cycles are:

- Two power cycles in a 1-hr period
- Three power cycles in a 24-hr period

If either of these thresholds is exceeded, the affected hardware component may be locked out.

Contact the Pillar Worldwide Customer Support Center for assistance in recovering and restoring the components to service.

9.58 Powering Off a Pillar Axiom System

If you expect to shut down the system for longer than 12 hours, you should remove the batteries from the Slammer after you power off the system. Reinstall the batteries before restarting the system.

9.59 Battery Removal

When removing a Slammer battery, be sure to use Guided Maintenance. After you click the Prepare System button in the GUI, Guided Maintenance prepares the system for replacement of the battery:

- Flushes cached data to the Bricks.
- Places the target CU in conservative mode.
- Powers down the battery charger.

After the system is prepared, Guided Maintenance displays a completion message and enables the Next button. At that point, you can safely remove the battery.

9.60 Battery Insertion

After the insertion of a battery into a Slammer control unit, the battery will show a Warning status in the GUI for a period of time. How long the Warning status remains depends on the charge level of the battery. The time can be up to 18 hrs for a severely discharged battery. If the battery takes longer than 18 hrs to reach a full charge, you should replace the battery. Contact the Pillar Worldwide Customer Support Center for assistance in checking the state of the batteries or for a replacement.

9.61 Slammer Warmstart and Startup Failure Handling

Slammer CUs have independently maintained fault thresholds. If any of these are exceeded, the system will disable the Slammer CU to allow the rest of the system to continue operation:

- If a Slammer CU warmstarts four times in one hour, it will fail over. If there is a successful failback, the warmstart history count will be cleared.
- If a Slammer CU fails three times in one hour or four times in one week, it will be disabled.
- If a Slammer CU fails during the startup process, it will be Excluded from the startup. If the system startup succeeds, the system will attempt to recover the CU with the failover/failback process. If that fails, the CU will be disabled.

Contact the Pillar Worldwide Customer Support Center for recovery assistance for any Slammer CU that is Excluded or Disabled.

9.62 Preventing Filesystem Corruption Due To Multiple Component Failures

In the unlikely event that more than one disk drive has failed, filesystem corruption may occur. To avoid this possibility, take advantage of the redundancy and availability options available when creating filesystems.

9.63 When Pinned Data Is Not Written to Stable Storage

Pinned data is the data stored in Slammer cache in the event of the failure of both control units or one of the arrays; this data cannot be written to stable storage. If the conditions are resolved but the pinned data is not written to stable storage, contact the Pillar Worldwide Customer Support Center.

9.64 Feature License Reconfiguration

When you change the feature license configuration on a Pillar Axiom system, the AxiomONE Storage Services Manager (GUI) will restart and you will need to log back in. Wait for several minutes before logging in to give the system time to reconfigure; otherwise, you may receive a Page Not Found error.

9.65 Hardware Component States

The state of Slammers, Bricks, and the Pillar Axiom system may not update correctly if the Pilot receives hardware events in rapid succession. To view these hardware states, wait 15 sec. If the AxiomONE Storage Services Manager does not show updated states correctly, refresh your browser display.

9.66 NDMP Backup Operations on Full Filesystems

As an NDMP backup operation begins, the system takes an immediate snapshot of the filesystem. This snapshot is the NDMP data source for the backup. At the end of the backup operation, this snapshot is deleted. Working from this snapshot allows clients to use the filesystem during the NDMP backup operation.

If the filesystem is full, the backup operation may fail or it may be impossible to delete files from the original filesystem during the backup operation, because the data from those files would need to be stored in the backup image snapshot.

The space allocated to the filesystem should be increased to allow any data that is modified or deleted during backup operations to be safely stored in the snapshot created for the backup. If it becomes necessary to recover space, delete any unnecessary snapshots and wait for the space to become available. If there are no snapshots, delete at least 16 KB of data prior to running the backup.

9.67 NDMP DMAs May Disable Tape Storage Devices During a Software Upgrade

Installing 02.01.00 software may cause tape drives or libraries attached to a Pillar Axiom system to go offline. For example, VERITAS has designed their products to take the tape storage devices down the first time a problem appears. In this case, use the administrative tools provided by your NDMP-based data management application (DMA) to bring the tape storage devices back online. If you need assistance, contact the Pillar Worldwide Customer Support Center.

9.68 Time Zone Must Be Reset after a Software Upgrade

As of release 2.6, the time zone fields were updated to provide a more comprehensive and descriptive list of time zones. It is recommended that, after the upgrade completes, you reset the time zone for your system through the Modify Time Settings action in the System > Summary content pane. To reset the time zone, select the appropriate entry in the Time Zone field. This action will update the saved time zone values to the new field choices.

Resetting the time zone need be done only once when upgrading your software to release 2.6 or higher.

9.69 Point-in-Time Volume Copy Space Allocation

The system can use point-in-time Volume Copies to support NDMP backup requests against non-WORM filesystems. When using an NDMP Volume Copy, there is an additional space limitation above the amount required for file-based NDMP backups. The Volume Copy implementation requires an additional amount of storage equal to the maximum size of the filesystem being backed up.

9.70 Jumbo Frames

To implement jumbo frames, be sure that all Ethernet NICs in all systems, Ethernet switches, local router interfaces, and all other network devices on the same local networks as the Pillar Axiom system are capable of supporting jumbo frames and are configured for the same effective MTU.

Refer to your switch documentation for information on prerequisite software and firmware and for instructions on configuring the switch for jumbo frames. Refer to the documentation for the NIC interface in all client systems and other network devices for information and restrictions on configuring jumbo frames.

The performance boost with jumbo frames will be most noticeable for client systems with slower processors or interrupt handlers that may benefit from the lower interrupt rate offered by jumbo frames. The increase in performance will be most noticeable for single-client stream data transfers.

9.71 Link Aggregation over Fast and Gigabit Ethernet Switches

Link aggregation groups several network links into a single logical link. Link aggregation provides load balancing and fault tolerance for multiple Ethernet links. Using extensions of Ethernet auto-negotiation, the link partners exchange MAC control frames to provide for load balancing and link fault detection.

To make use of link aggregation on a Pillar Axiom system, be sure that:

- All ports that will be used for a given logical aggregated link are on the same Slammer control unit (CU). Ports from multiple Slammers or Slammer CUs must not be configured into the same aggregation group.
- Many Ethernet switches require that all links in an aggregated link be on the same blade or Ethernet controller chip. Consult the switch vendor's documentation for restrictions.
- The Slammer connects to a 100/1000 BaseT switch that has Auto-speed enabled.
- The Ethernet switch must conform to the IEEE 803.2ad link aggregation standard and use link aggregation control protocol (LACP) for managing the links.
- The Ethernet switch should be configured to actively advertise link aggregation capability. The Slammer ports will respond to but not advertise link aggregation.

Note: To provide for continued operation in the event of a Slammer CU failover, if link aggregation is enabled on one Slammer CU, it should also be configured on the partner Slammer CU.

9.72 Vulnerability Scanners May Report False Positives

The Pilot management controller is protected by means of a firewall to help prevent unauthorized access. Some vulnerability scanners may report a false positive by claiming a large quantity of UDP ports are open when in fact they are not.

9.73 Shutting Down a Pillar Axiom System

In some cases, when you attempt to shut down the system, the system may not shut down but instead return an error message. Before attempting a shutdown or restart, ensure that no background tasks are running. If you are unable to cancel a task, contact the Pillar Worldwide Customer Support Center.

9.74 Login to Oracle EM Plugin Fails

The login to the Oracle EM plugin may fail even though you enter the correct username and password. This is fixed in Oracle EM release 10.2.0.3. When using earlier releases, place a blank character at the end of the password field, which will enable the login to work correctly.

9.75 Changes to Host Associations and LUN Mappings

Release 02.07.00 introduces many changes to host associations and LUN mappings for the AssociateInitiatorsToHost feature and to APM.

The GUI page for PerformAssociateInitiatorsToHost enforces many of the changes. For example, Modify can no longer be used to change the name of an Associated host. It also prevents the user from associating an already associated Initiator or port without first removing its association.

9.75.1 Definitions

Initiator. Equivalent to a port (WWN) when using FC or IQN when using iSCSI.

Wrapper host. A host with a single Initiator and has the same name as the Initiator. It is created internally by the Pillar Axiom system when an Initiator is discovered.

Associated host. A host that the user has created with the PerformAssociateInitiatorsToHost request (one or more Initiators). This request is referred to as *PAITH*.

APM host. A host created from a PerformConfigureSANHost request from APM (one or more Initiators). This request is referred to as *PCSH*.

The Pillar Axiom system always creates a Wrapper host for all discovered Initiators and moves each according to Associations and/or APM relevance. A user can map to all of these hosts.

9.75.2 Behavior

9.75.2.1 Moving an Initiator from a Wrapper Host

When an Initiator belonging to a Wrapper host is moved into another host by either a PAITH or PCSH request, the LUN mappings of the Wrapper host are moved to the new host and removed from the Wrapper host. The Wrapper host is deleted. The original mappings belonging to the new host are unaffected. Mappings from the Wrapper host that conflict in LUID or Number with mappings in the new host are deleted and a LUNMappingDeleted event is generated.

9.75.2.2 Moving an Initiator from an Associated Host

When an Initiator is moved from an Associated host by a PAITH request, the mappings of the previous owner Associated host are removed from the Initiator, and the Initiator is mapped with the mappings of the new owner Associated host. The old owner Associated host (even if it has no Initiators left) is left with its LUN mappings in place. No mappings associated with any old owner Associated host are moved to the new Associated host.

The old host must be manually deleted if it's no longer needed.

9.75.2.3 Using PCSH to Move an Initiator to an APM Host

An Initiator can be moved to an APM host from an Associated host or from another APM host by a PCSH(V2) request. For the previous Associated host, its mappings are moved to the new APM host. For the previous APM host, its mappings are not moved to the new APM host.

Important! When moving an initiator to an APM host, APM on the new host (and on the previous owning APM host, if applicable) must be able to log in to the Pillar Axiom system and achieve a "Communicating" status in the AxiomONE Storage Services Manager (see Storage > Hosts display screen). In this way, APM can exchange the necessary information with the Pillar Axiom system:

- The new APM host can report the initiator to the system (but not get the LUNs unless they too have been moved).
- If applicable, the previous owning APM host can remove the initiator(s) when it logs in to the system.

Note: Be sure port 26004 is open so APM can communicate properly with the Pillar Axiom system.

9.75.2.3.1 Moving an Initiator from an Associated Host to an APM Host

Mappings from the Associated host that conflict in LUID or Number with mappings in the new APM host are deleted and a LUNMappingDeleted event is generated. A LUNMappingCreated event is generated for each mapping successfully moved. All of the LUN mappings of the previous owning Associated host stay in place for that host, even if no Initiators are associated with the host.

The old Associated host stays in place until the user deletes it.

9.75.2.3.2 Moving an Initiator from an APM Host to another APM Host

The old mappings to the Initiator are removed and the Initiator is mapped to the configuration of the new owning APM host.

9.75.2.4 Combinations

For combinations, the processing goes from Wrapper host to Associated host to APM host with no order within the different types.

Example:

If an APM claims ownership of Initiators from a Wrapper, Associated, and APM host at the same time, mappings are moved from all Wrapper hosts to the APM host first, followed by moving mappings from the Associate hosts. Then the APM Initiator is moved and remapped.

9.75.2.5 Notes

9.75.2.5.1 Deleting a Host

When deleting a Wrapper, Associated, or APM host, all Initiators that are connected are wrapped with a Wrapper host and all of the LUN mappings belonging to the host are preserved with the new Wrapper host. No Wrapper host is created for a disconnected Initiator.

9.75.2.5.2 Renaming an Associated Host

To rename an Associated host while preserving the mappings, the Associated host must be deleted and then the Initiators can be associated with the new named host.

9.75.2.5.3 Renaming an APM Host

To rename an APM host while preserving the mappings, the APM driver must be stopped, the host deleted, and then the APM driver started with the new name.

9.76 APM Supports AIX 5L 5.3

AxiomONE Path Manager 2.2 for AIX supports AIX 5L 5.3 (TL07 and later) with 32-bit and 64-bit kernels. That release of APM requires the following minimum software releases to be installed on associated Pillar Axiom systems:

- Pillar Axiom 300 release 1.6.6 or release 2.0.1
- Pillar Axiom 500 release 2.8.6
- Pillar Axiom 600 release 3.0.1

10 Technical Documentation Errata

The following sections describe topics in the technical documentation that were not able to be corrected in time for the current release of the Pillar Axiom 500 system.

10.1 Pillar Axiom Administrators Guide

- Some 32-bit operating systems cannot access or manage NFS or combined NFS/CIFS filesystems of 2 terabytes or greater in size. If in doubt, check the operating system limits for your client and filesystem. For mixed 32-bit and 64-bit clients, limit filesystem sizes such that both clients will be able to work with those filesystems.
- The Guided Maintenance menu in the AxiomONE Storage Services Manager (GUI) incorrectly implies that you can replace Brick and Slammer chassis. Replacing Brick and Slammer chassis are not supported in this release.
- To check CPU utilization of the Slammer, bring up the Support >Tools > Resolve Connectivity Trouble utility and enter the following command:

```
perf [-c]
```

This command returns the CPU statistics for the idle process, the kernel time, and all process IDs that are running. The `-c` option resets the counters after returning the statistics; in that way, the next invocation will contain data accumulated from that point.

- On the Support > Command Line Interface page, the Actions drop-down box lists two entries for the Solaris platform:

Download CLI for Solaris

Download CLI for Solaris 10

Those two entries should be:

Download CLI for Solaris SPARC

Download CLI for Solaris10 x86

- On the Resolve Connectivity Trouble page (page 257), the title of the second column in Table 18 (“Environment Variables”) is incorrect. It should be “Syntax”.

Also, the examples shown in the Description column in Table 18 are not clear. The commands that include examples in the Description column should be as follows:

Command	Description	
ping	Command:	ping -c 5 198.168.1.2
	Environment Variables:	
route	Command:	route show
	Environment Variables:	
arp	Command:	arp -a
	Environment Variables:	

Command	Description	
ifconfig	Command:	ifconfig
	Environment Variables:	SOCK=node_ID

10.2 Pillar Axiom CLI Reference Guide

- For the PerformFileSystemDuplication request, setting AccessMode to ReadOnly is not intended to be functional and, hence, is deprecated.
- The command to enable SMI-S on a Pilot can be called using pdscli, which can be downloaded from the Support page of the AxiomONE Storage Services Manager (GUI). Once you have downloaded and unpacked the platform-appropriate file, issue the following command from the directory into which the package was unpacked:

```
$ pdscli submit -u <user> -p <password> -H <host-name-or-IP>
PerformEnableSMIStartup
```

Restart the Pilot using the following command:

```
$ pdscli submit -u <user> -p <password> -H < host-name-or-IP>
PerformRestart
```

When the system comes back online, the smProvider service should be enabled. Once enabled, the service will remain on through power cycles until you manually disable it with PerformDisableSMIStartup.

- Important!** By default, all 512 MB-based Pilots have SMI-S disabled on startup. Because of limited memory, you should not enable SMI on these Pilots. For anything other than testing purposes, contact your Pillar Account Representative for a memory upgrade to your Pilot.
- Values for the SessionTimeout parameter of the ModifyManagementConfig command (pp 363-5) must be between 1 and 999 min.
- New commands are now available:

Command	Description
GetCallHomeMatrixDetails	Returns the Format, Version, and Last Upload time.
PerformTidyMediaPlacement	Migrates a filesystem or a LUN to a better location according to its current QoS settings. If there is no better location available, the request immediately returns an error 4401, "The media placement of the specified volume cannot be improved at this time."
PerformSlammerCommand command=perf	Returns the CPU statistics for the idle process, the kernel time, and all process IDs that are running.

10.3 Pillar Axiom 500 Service Guide

- At the bottom of page 40, add this additional information:

When removing power from an active Pilot control unit (CU), the GUI will show a Warning state for that CU and one of the Slammer CUs. The Slammer CU shows a Warning state because it lost its connection to the Pilot CU that was taken offline.

This is a normal, expected state for the Slammer CU in that case. However, the Pilot CU should be brought back up as soon as possible to avoid any potential problems.

- Add the following notices to Step 7 of the "Insert a Slammer Motherboard Tray" procedure on page 73 in the Service Guide—

Important! After the target CU powers up, the system may need to update the firmware on the replacement motherboard. To allow this update to occur, wait 20 min before continuing with the next step.

CAUTION Pressing the Next button prematurely may result in having to recover the system manually or replace the motherboard.

- Add the following note to Step 6 on page 135 in the Service Guide—

Note: The length of time for the verification step to complete and the system to return a Normal status depends on the I/O load being carried by the Brick. For that reason, it is recommended that the I/O load be lightened as much as possible before replacing the RAID controller.

- The Service Guide incorrectly states that the Pillar Axiom system powers down and powers up the target Slammer control unit (CU) during Guided Maintenance. The power down and power up sequence is initiated by the person performing the maintenance by removing the power cords and reattaching them, respectively. The following pages contain that incorrect information:

Page 24; 2nd paragraph

Page 68, 3rd paragraph

Page 74; 2nd paragraph

Page 74; 4th paragraph

Page 88; 5th paragraph

Page 96; 2nd paragraph

Page 101; 3rd paragraph

- If you remove one NAS Slammer and replace it with another, you will need to reconfigure existing File Servers and VIFs to use the control units (CUs) of the new Slammer after you have restarted the Slammer and the system recognizes it. This reconfiguration will not occur automatically.

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- On page 3, under “Discovering a Pillar Data Systems Storage Manager,” Step 2, change the description of the Namespace property to read:

If the Pillar Axiom system is running release 2.6 software or higher, enter
`\root\pillar1_2`. If the system is running an earlier release, leave the default
value in place.