Carrier VoIP

STORM Fault Management

NN10088-911

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STORM Fault Management

This section includes procedures for executing fault management tasks for STORage Management (STORM).

Procedures for STORM are performed through the STORM Manager. The STORM Manager is a graphical user interface (GUI), and is accessed from a web browser.

STORM units deployed in the compact peripheral component interconnect (cPCI) hardware platform are also managed from the CS 2000 SAM21 Manager.

New in this release

Feature changes

There are no feature changes.

Other changes

In "Replacing a power supply" (page 45), we added instructions for locating the replacement procedures on the manufacturer's web site.

In "Replacing a disk" (page 38), we added instructions stating if there is only one drive in the SAM-XTS chassis, and if you intend to remove the drive, you must first click the Remove button at the Storage panel of the STORM Manager for the drive.

Fault management concepts

The storage that STORM provides is managed in a redundant manner.

STORM cPCI

The STORM cPCI platform utilizes a persistent storage device that provides RAID-5 protection across at least 3 drives with a fourth drive designated as the spare drive.

STORM SAM-XTS

The STORM SAM-XTS platform uses two 72 GB drives mirrored in a RAID-1 configuration. The STORM SAM-XTS platform mirrors its own software load locally, in addition to exported file systems, so that the STORM application can boot even in the event of a disk failure.

> ***Note:*** STORM SAM-XTS units are used in STORM Integrated Array (STORM-IA). In this document and in the other STORM documents, we use the term STORM-IA to refer to the STORM installation that uses two STORM SAM-XTS shelves. We continue to use the term STORM SAM-XTS to refer to the hardware platform, and to identify the shelf type.

All platforms

STORM units are deployed as a redundant pair and the client applications such as the Call Agent and the USP - Compact store data to both units simultaneously.

Remote host monitoring enables each STORM unit to monitor connectivity to clients that use the STORM services.

Fault management tools and utilities

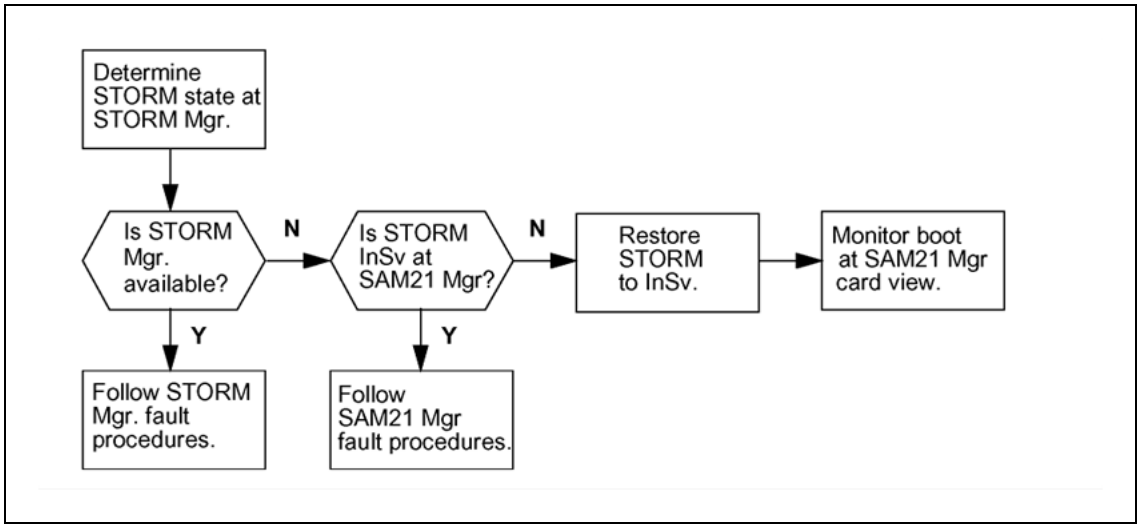
In the event of a disk failure, the fault is reported as an alarm to the STORM Manager and an STM301 log report is generated. LEDs on the face of the STORM SAM-XTS platform also indicate the failure. An LCD display on the face of the persistent storage device reports the failure for the STORM cPCI platform.

If a resource threshold is crossed, an alarm is raised at the STORM Manager and a log report is generated.

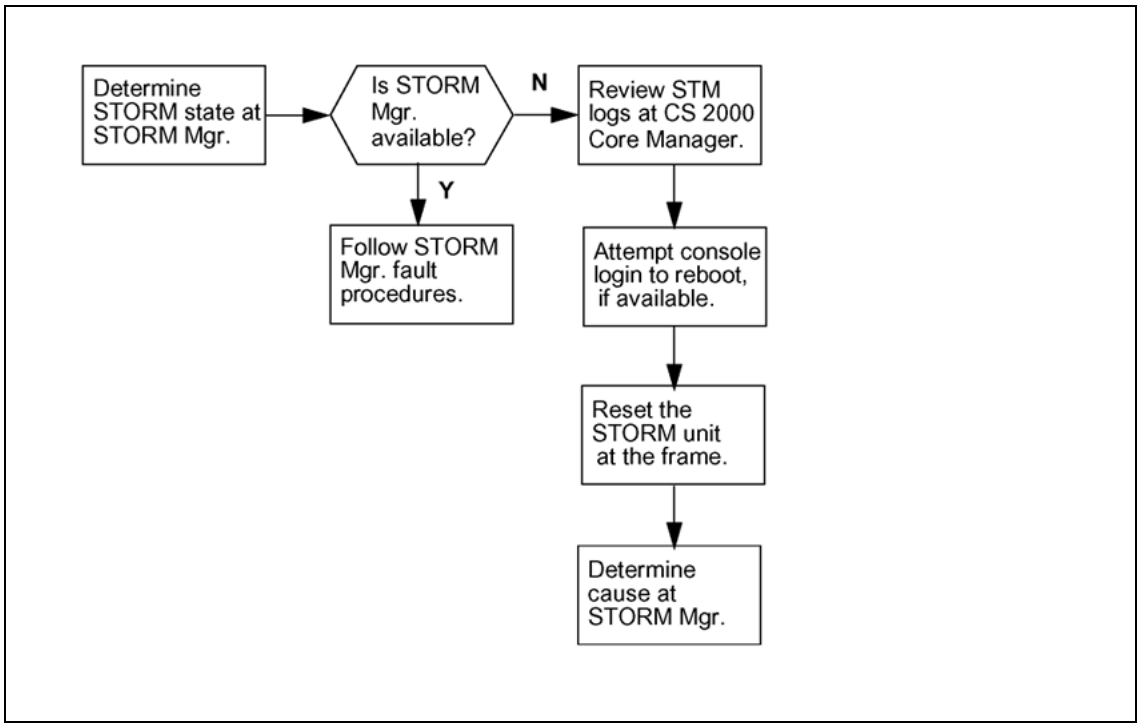
Fault management strategy

Fault management for STORM is completed by provisioning remote host monitors and resource thresholds, monitoring alarms at the STORM Manager, and reviewing log reports at the CS 2000 Core Manager. If the CS 2000 Core Manager is configured to transfer log reports to an OSS network, the logs reports are available on the OSS network as well. For STORM cPCI, monitoring alarms at the CS 2000 SAM21 Manager is also advised.

Fault management flow for the STORM cPCI platform



Fault management flow for the STORM SAM-XTS platform (used in STORM-IA)



The following fault management procedures are available for STORM.

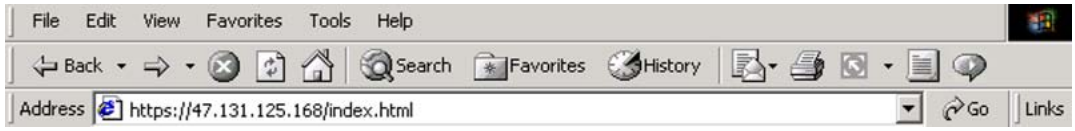
Procedure	Platform
"Clearing STORM faults" (page 11)	STORM SAM-XTS and STORM cPCI
"Quality of service:Threshold Crossed alarm critical, major or minor" (page 14)	STORM SAM-XTS and STORM cPCI

Procedure	Platform
"Connectivity alarm warning" (page 24)	STORM SAM-XTS and STORM cPCI
"Communication:Communications subsystem failure alarm critical" (page 26)	STORM cPCI
"Equipment:Underlying resource unavailable alarm critical or major" (page 28)	STORM SAM-XTS and STORM cPCI
"Equipment:Performance degraded alarm minor" (page 30)	STORM SAM-XTS and STORM cPCI
"Equipment:Equipment malfunction alarm major" (page 32)	STORM SAM-XTS
"Equipment:Input Output Device Error critical or minor" (page 34)	STORM SAM-XTS
"Replacing a STORM unit" (page 53)	STORM cPCI
"Running diagnostics" (page 60)	STORM cPCI
STORM boot troubleshooting	STORM cPCI
Verifying CS 2000 Core Manager services	STORM cPCI

Note: The STORM SAM-XTS platform is used in the STORM-IA.

STORM Manager login

To access the STORM Manager, enter the IP address of the STORM unit into the browser. The following figure shows an example of accessing the STORM Manager from a web browser.



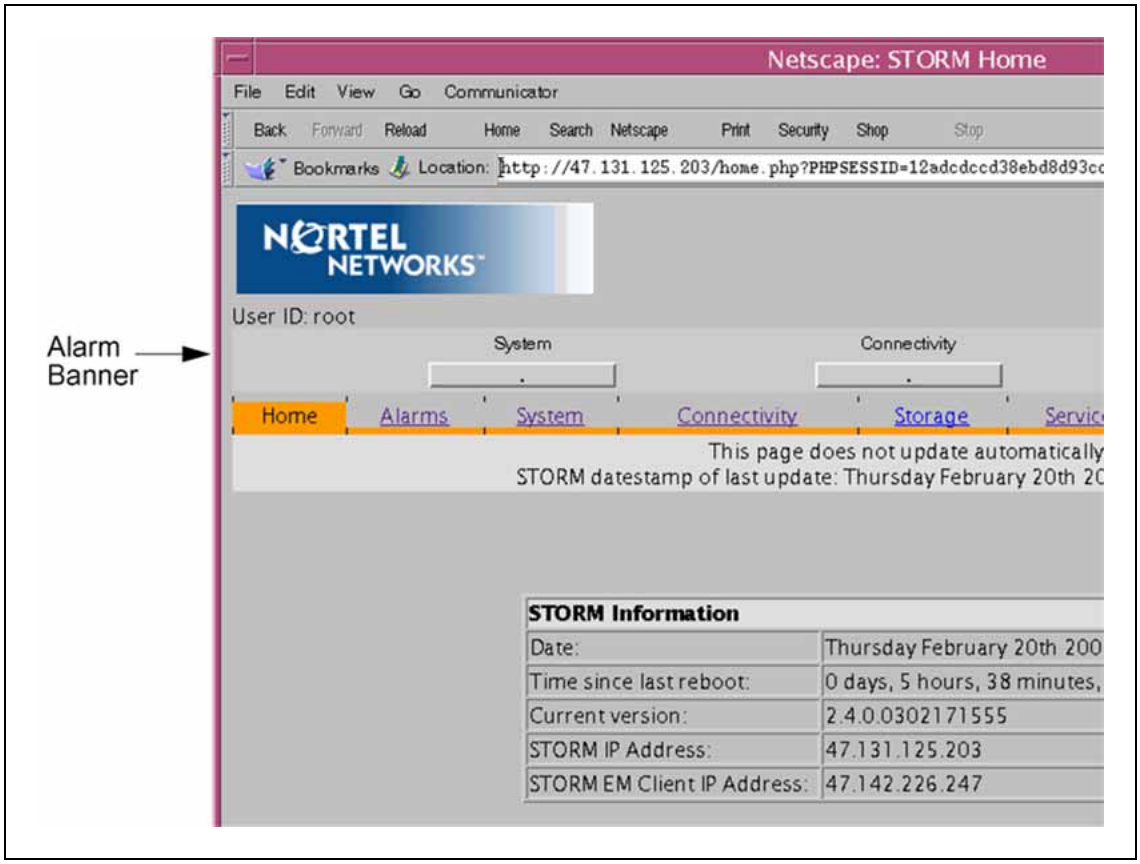
Note: This figure shows loading the STORM Manager using Microsoft Internet Explorer, which requires additional configuration to enable Java applets. Refer to "Configure Internet Explorer preferences" *in STORM Configuration Management*, NN10110-511 for more information.

The Home panel is the first display that appears after an end user has logged into the STORM Manager.

The following figure shows an example of the STORM Home panel on the STORM cPCI platform. The STORM SAM-XTS platform Home panel is similar.

Note: The STORM SAM-XTS platform is used in the STORM-IA.

Home panel on STORM cPCI



Alarm banner

The STORM Manager alarm banner is not available for STORM SAM-XTS. (The STORM SAM-XTS platform is used in the STORM-IA.)

The STORM Manager also includes an alarm banner that enables the end user to execute the following alarm-related tasks on the STORM card:

- view the number and state of currently raised alarms
- navigate to the contents of other STORM Manager panels

Note: The Alarm banner is a Java applet. Therefore, adhere to the following requirements when configuring the browser client running the STORM Manager.

- Enable Java in the client web browser.
- Ensure that additional security configurations are set if Internet Explorer is the selected web browser.
- Ensure that the client web browser is able to communicate directly to the STORM card. The alarm banner is not visible if a proxy interferes.

Alarm states and severity

The STORM alarm banner displays interactive buttons for the following three alarm states:

- System
- Connectivity
- Storage

The buttons for each alarm state include a color-coded alphanumeric that represents the number of alarms in that state being raised and the severity associated with the alarm.

The colored alarm buttons are listed below, in order of severity:

- No alarm -- grey with one dot (.) symbol
- Unknown state -- blue with one dash (-) symbol
- Warning -- yellow with the alphanumeric "1w"
- Minor -- orange with the alphanumeric "1m"
- Major -- red with the alphanumeric "1M"
- Critical -- red with the alphameric "1C"
- No connection from the web browser host machine to the STORM card -- color depends on the previous alarm. (For instance, if connectivity is lost, "No Conn" maintains the color of previous alarms. If it was a red critical alarm, it remains red, but reads "No Conn" instead of "1C.")

  Note: If an alarm state has more than one alarm raised, the alarm button displays the most severe alarm in that state, and the number of alarms in the severity group. The button also includes a plus (+) symbol if multiple alarms of a lower severity exist for that state.

  Example
  Two critical alarms in a particular alarm state display as a red button with "2C."
  Two critical alarms and one warning in a particular alarm state display as a red button with "2C+."
  One major alarm, one minor alarm, and one warning in a particular alarm state display as a red button with "1M+."

Navigating to other panels from the alarms banner

An end user can navigate to the following STORM Manager panels from the alarm banner:

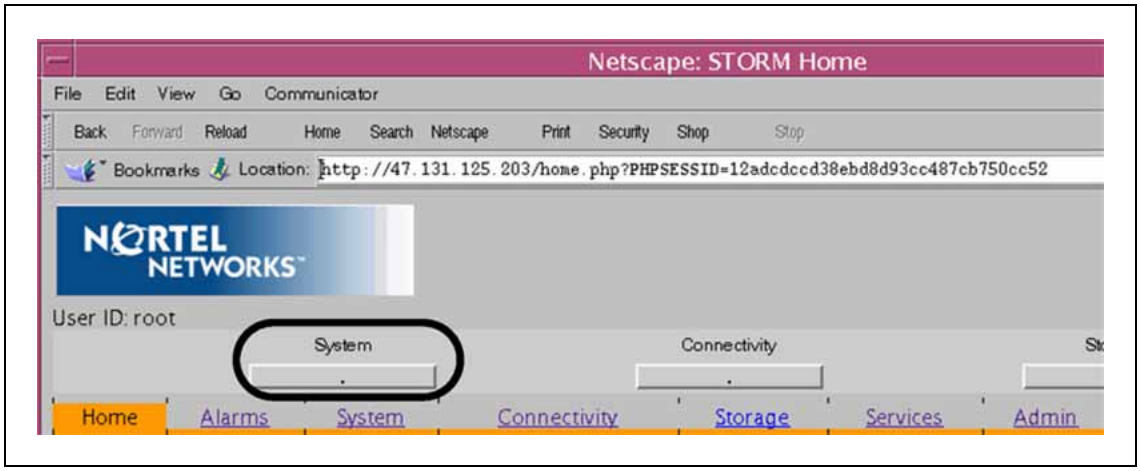
- System
- Connectivity

- Storage

To access the System, Connectivity, or Storage panel from the alarm banner, just click on the corresponding button in the banner.

For example, the following figure shows how to select the System panel from the alarm banner.

Alarm banner on SAM cPCI



STORM card auto-recovery and boot auditing

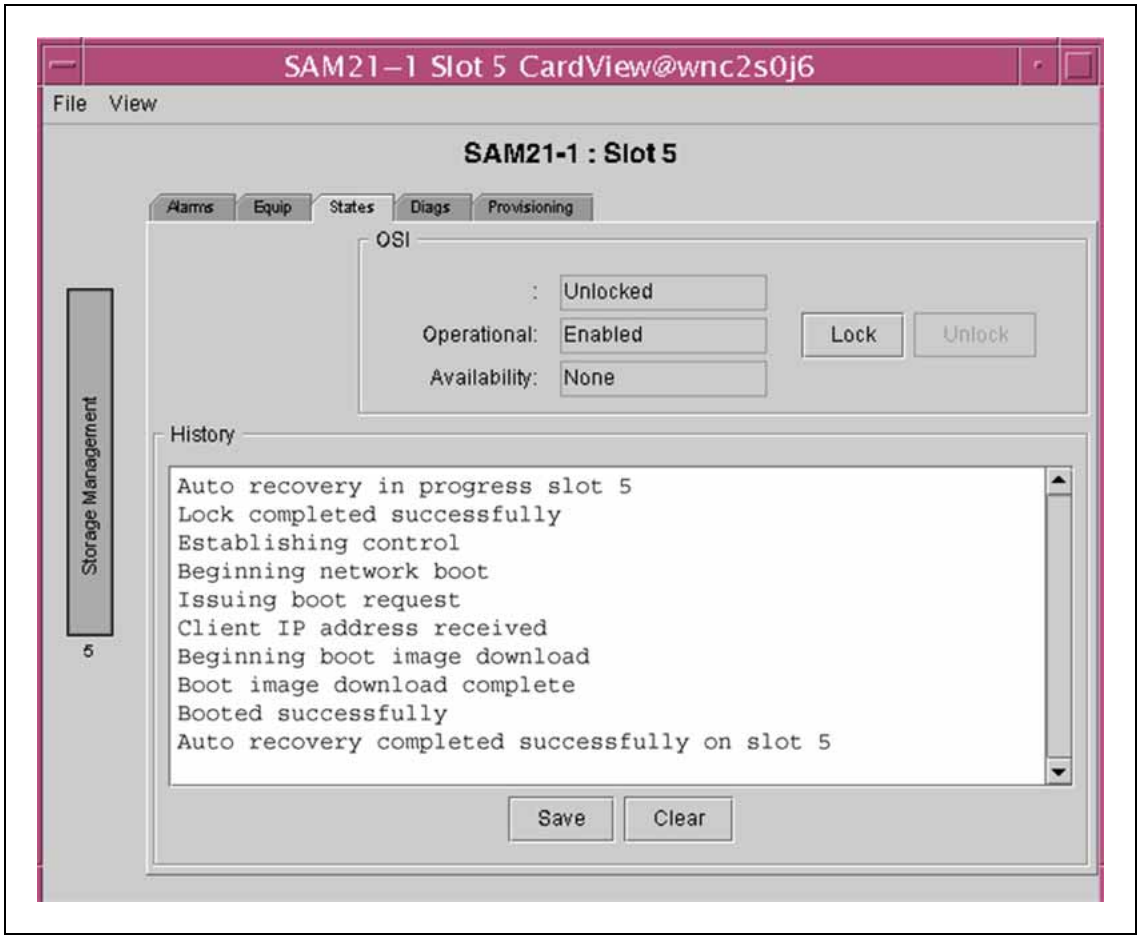
If an application failure occurs on a STORM cPCI, the card performs an auto-recovery sequence to bring the application back to service. (Although the state of STORM card displays "unlocked-enabled" in the CS 2000 SAM21 Manager Card View menu, it is actually disabled and not providing service.)

The auto-recovery sequence consists of two stages:

- If an application failure occurs, the Motorola firmware on the STORM card executes a network autoboot of the card, which forces the card to attempt booting from the CS 2000 Core Manager.
- If the network autoboot fails, then the SAM21 Shelf Controller executes a boot of the STORM card in a backup attempt to bring the application into service. This boot audit occurs routinely across the entire shelf.

The following figure shows an example of a STORM card auto-recovery in progress. (Note the progress messages in the History panel.)

Card View window at CS 2000 SAM21 Manager (STORM cPCI only)



During the boot audit, the state of the STORM card transitions from "unlocked-enabled" to "locked-disabled" to "unlocked-disabled" to "unlocked-enabled." Also, progress messages in the History panel of the States window displays the message "Auto recovery in progress" followed by the boot recovery sequence text.

Clearing STORM faults

Step	Action

At the STORM Manager

1 Check the Alarms panel of the STORM Manager to determine if the fault exists there.

If alarms are present at the STORM Manager, determine the alarm type and identifier. Refer to"STORM Manager procedures" (page 12) for alarm clearing procedures.

2 If the hardware platform is STORM cPCI, also check for alarms at the CS 2000 SAM21 Manager. Refer to"SAM21 Manager procedures" (page 48) for alarm clearing procedures.

3 If STM log reports are available, refer to Viewing customer logs to correlate STM log reports to alarms.

4 This procedure is complete.

—End—

Additional information

If the hardware platform is STORM cPCI and the STORM application fails, the Shelf Controller (SC) tries to recover the STORM card if the STORM card is unable to recover itself. The CS 2000 SAM21 Manager client reflects the failure as the state for the STORM card changes to unlocked-disabled. The status text in the History field indicates that the auto recovery of the card is underway.

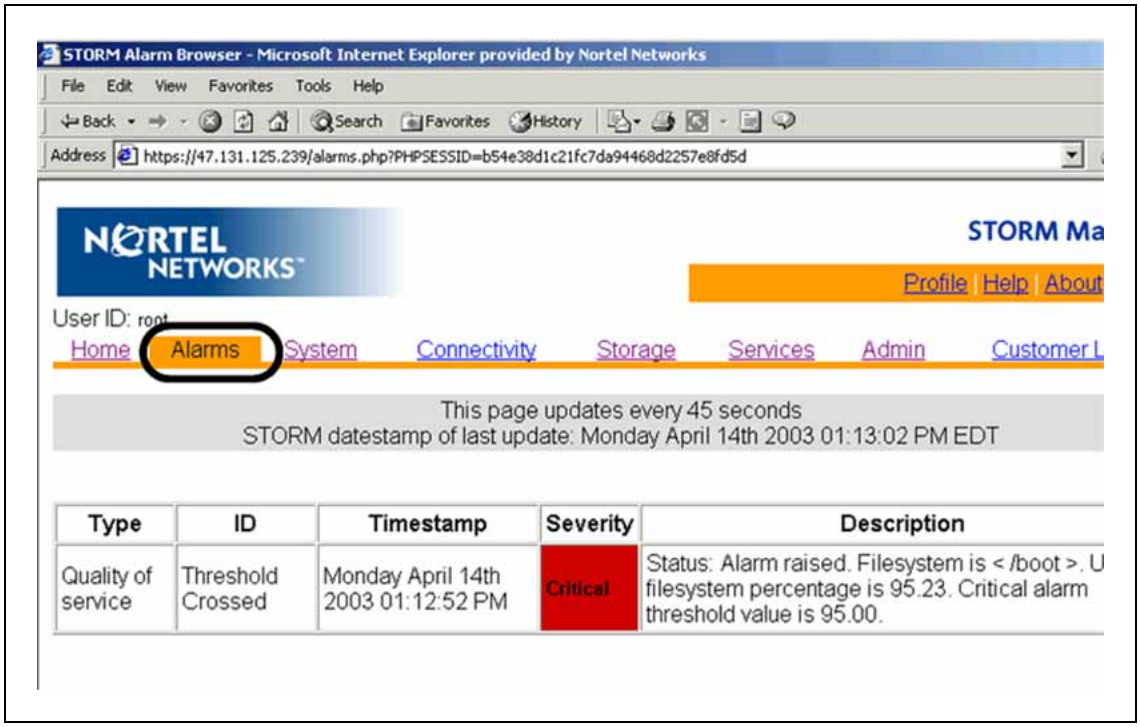
Note: Nortel recommends locking, performing diagnostics, and replacing the STORM card only for a critical fault condition that cannot be resolved through other means. Before locking the card, busy the disk device at the Call Agent. For instructions for using the BSY command, see *Call Agent Security and Administration*, NN10175-611.

STORM Manager procedures

This section provides alarm clearing procedures for the STORage Management (STORM) application.

Alarms in this section are viewed from a web browser that connects to the STORM Manager. The alarms are available from the Alarms panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



Retrieve alarms

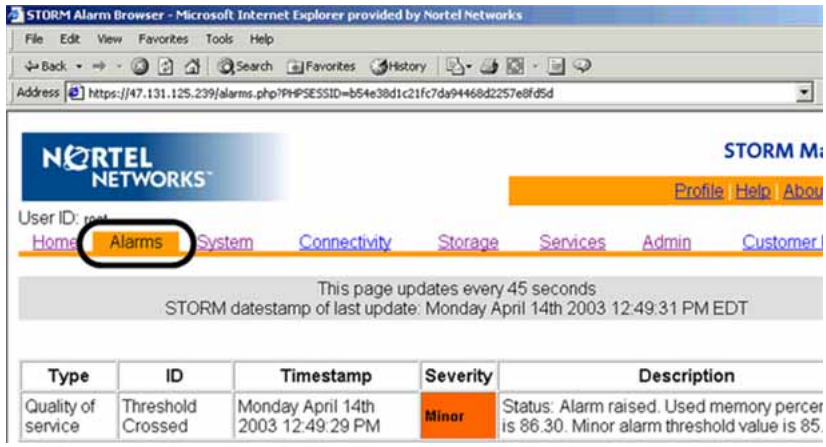
Use this procedure to view alarms from the STORM Manager.

Step	Action

At the STORM Manager client workstation

1 Click on the Alarms panel tab.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



2 Clear alarms in order from greatest severity to least. Critical alarms are the most severe, followed by Major, Minor, and Warning.

Determine the type of alarm and refer to the appropriate alarm clearing procedure in this document.

3 This procedure is complete.

—End—

Quality of service: Threshold Crossed alarm critical, major or minor

Threshold crossed alarms

An alarm is raised on the Alarms panel of the STORM Manager. The STORM application monitors thresholds for CPU, memory, disk space, and zombie processes.

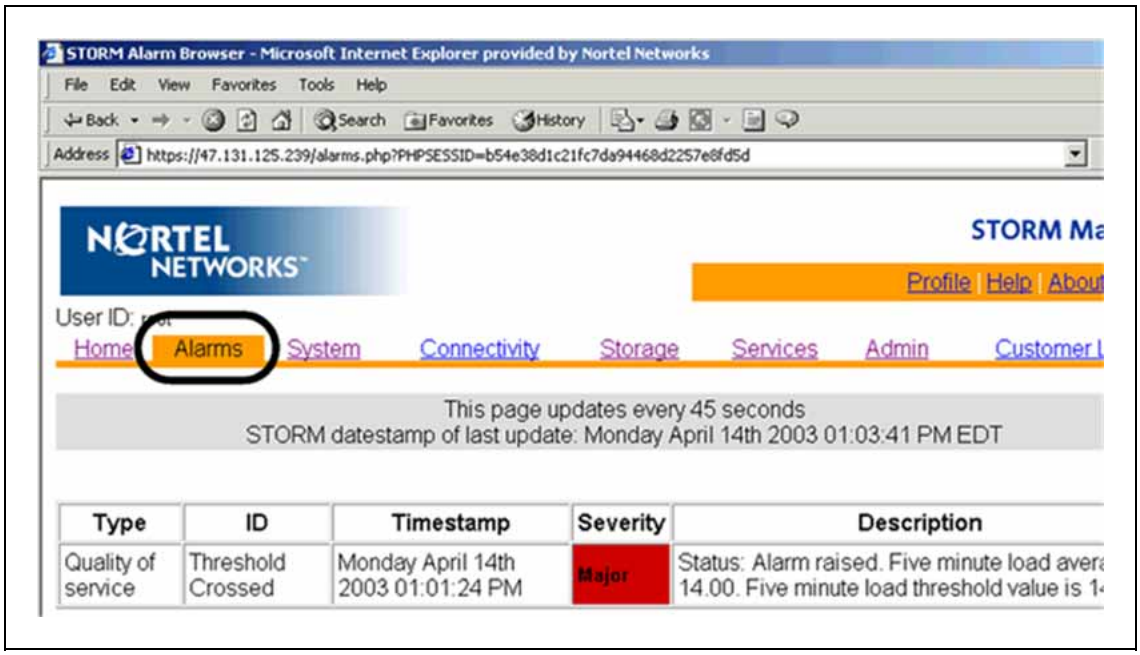
Review the text in the alarm Description to determine which Threshold Crossed alarm is raised and then refer to the appropriate alarm clearing procedure.

CPU usage

Indication

An STM800 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



Meaning

Too many processes are waiting in the process queue.

A minor severity alarm indicates that fewer than 14 processes are processed from the process queue in one minute.

A major severity alarm indicates that fewer than 14 processes are processed from the process queue in five minutes.

A critical severity alarm indicates that fewer than 14 processes are processed from the process queue in 15 minutes.

Note: The default threshold is 14 processes, but the threshold is configurable. If the threshold has been altered, then the alarm indicates the altered threshold level has been crossed.

Action

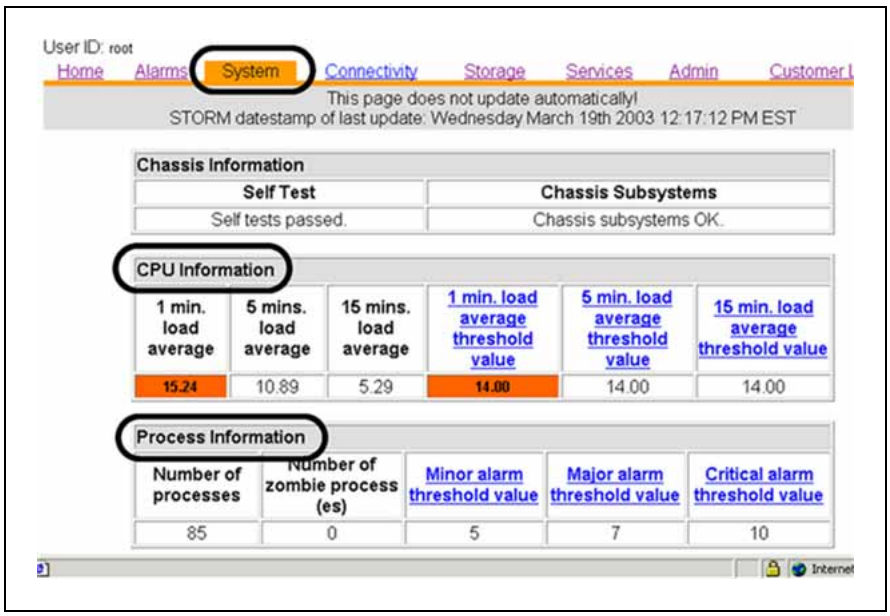
Step	Action

At the STORM Manager client workstation

1 Click on the System panel tab.

2 Review the current load average from the CPU Information table and the number of zombie processes from the Process Information table.

System panel for a STORM SAM-XTS unit (used in STORM-IA)



3 Determine the next action:

If	Do
zombie processes are present the CPU alarm is minor or major	Zombie processes could be causing the CPU high load. Wait for a period of low office traffic, put the NFS client machines into maintenance and reboot the STORM unit from the Admin panel. If the platform is STORM cPCI, prepare the NFS clients and then reboot the STORM card by locking the STORM card from the CS 2000 SAM21 Manager.
the CPU alarm is minor or major and no zombie processes are present	The STORM unit is in a period of heavy load. Monitor the CPU load by clicking the reload button and refer to "Additional information" (page 17) for more information about diagnosing this alarm.
the CPU alarm is critical but the 1 minute and 5 minute loads are less than the 15 minute load	The STORM unit endured a prolonged period of heavy load but the load is diminishing. Monitor the CPU load by clicking on the reload button. If the CPU load is falling, continue to monitor the load and refer to "Additional information" (page 17) for information about diagnosing this alarm.
the CPU alarm is critical and the load for all time periods is rising	The load exceeds the capacity of the STORM unit. Put NFS client machines into a maintenance state and reboot the STORM unit from the Admin panel. If the hardware platform is STORM cPCI, prepare the NFS client machines and lock the STORM unit from the CS 2000 SAM21 Manager.

4 This procedure is complete.

—End—

Additional information

Consider the following factors that could cause a temporary rise in CPU load:

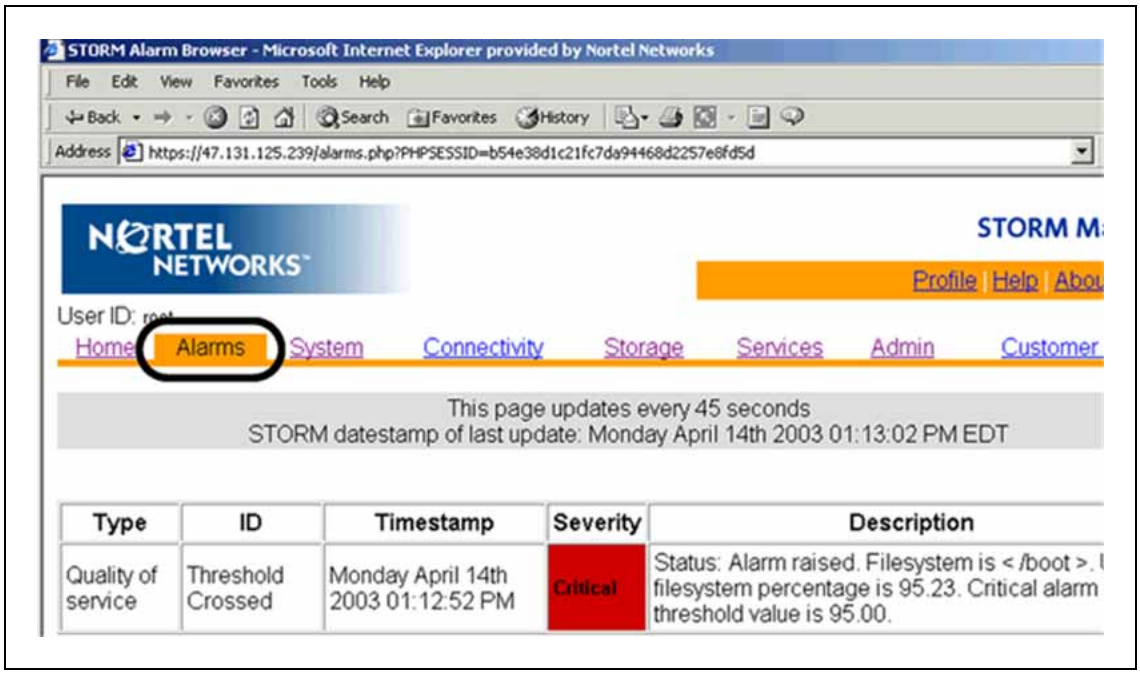
- rebuilding a disk array while under heavy load
- a call processing application image dump while under heavy load
- lack of free space on the / file system. This mount point is a ramdisk and cannot be increased. An alarm and an STM802 log report indicate a lack of storage.
- excessive network traffic on the Communications Server LAN (CS LAN).

File system usage

Indication

An alarm is raised on the Alarms panel of the STORM Manager. An STM802 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



Meaning

Not enough space is available to meet storage needs. In most instances, either enough storage wasn't allocated during file system creation, or an error on the NFS client machine is causing that client to use excessive storage.

If the alarm is against the / file system, as in the example figure, contact Nortel support personnel. The / file system is a ramdisk and it is not possible to increase the capacity of the / file system.

Action

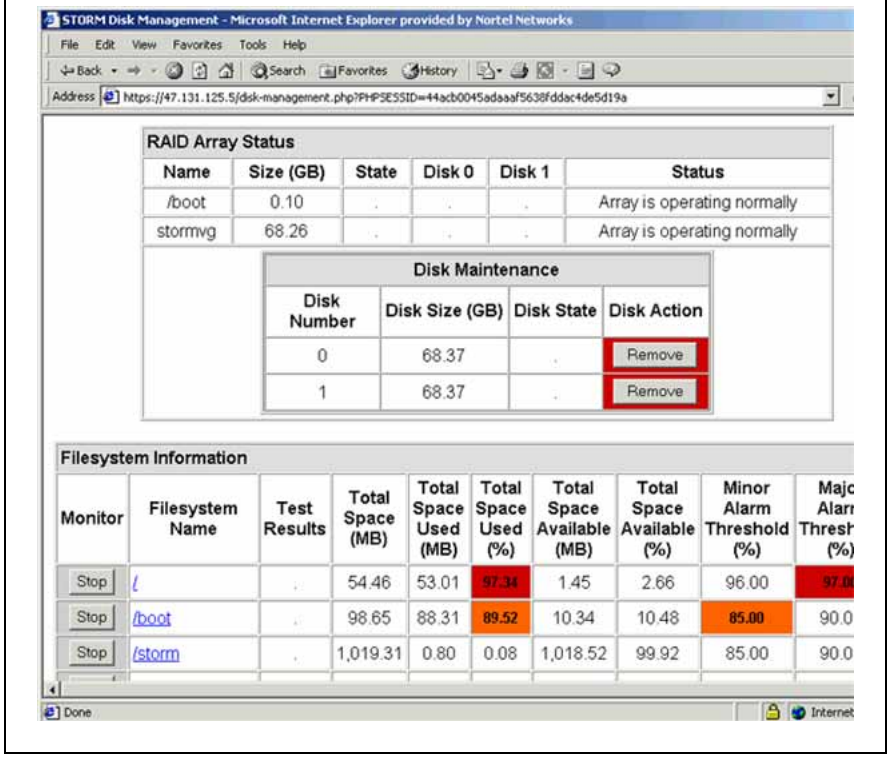
Step	Action

At the STORM Manager client workstation

1 Click on the Storage panel tab.

2 Review the Filesystem Information table.

Storage panel for a STORM SAM-XTS unit (used in STORM-IA)



3 Determine the next action:

If	Do
the alarm is raised against the / file system as in the example	Contact Nortel support personnel.

If	Do
the alarm is raised against the /boot file system as in the example	Remove previous software loads from the Admin panel.
otherwise	Determine if an NFS client is using too much storage. If so, diagnose and reconfigure the client, otherwise, increase the size of the file system. Refer to Increasing file system size in *STORM Configuration management*, NN10110-511.

4 This procedure is complete.

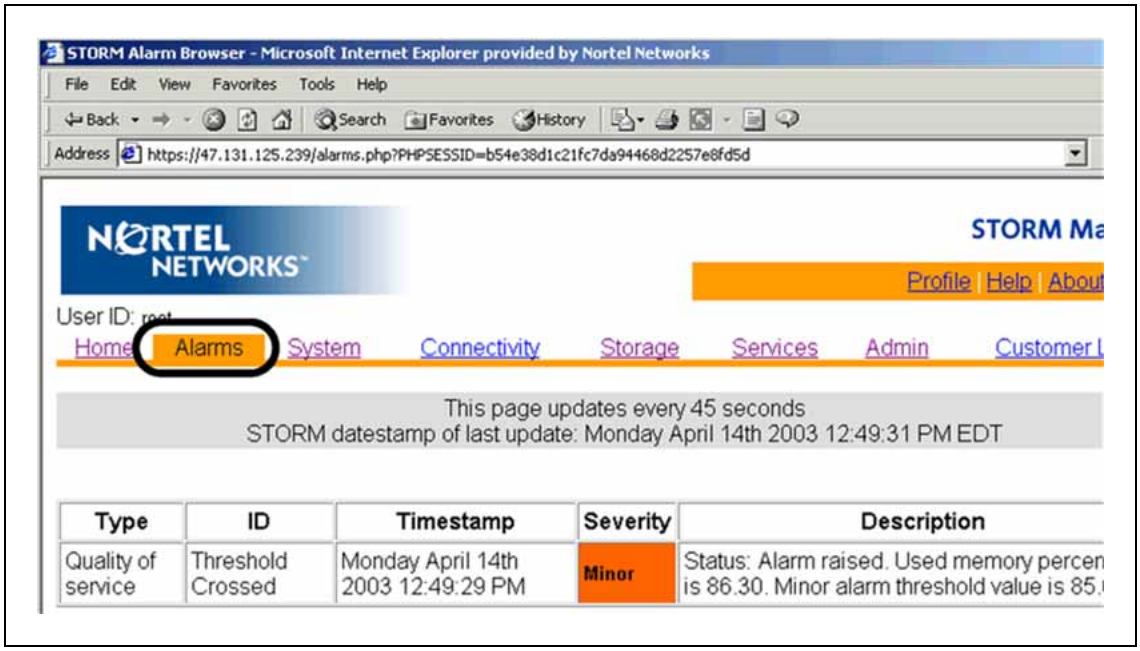
—End—

Memory usage

Indication

An alarm is raised on the Alarms panel of the STORM Manager. An STM801 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



Meaning

Memory usage on the STORM unit is excessive.

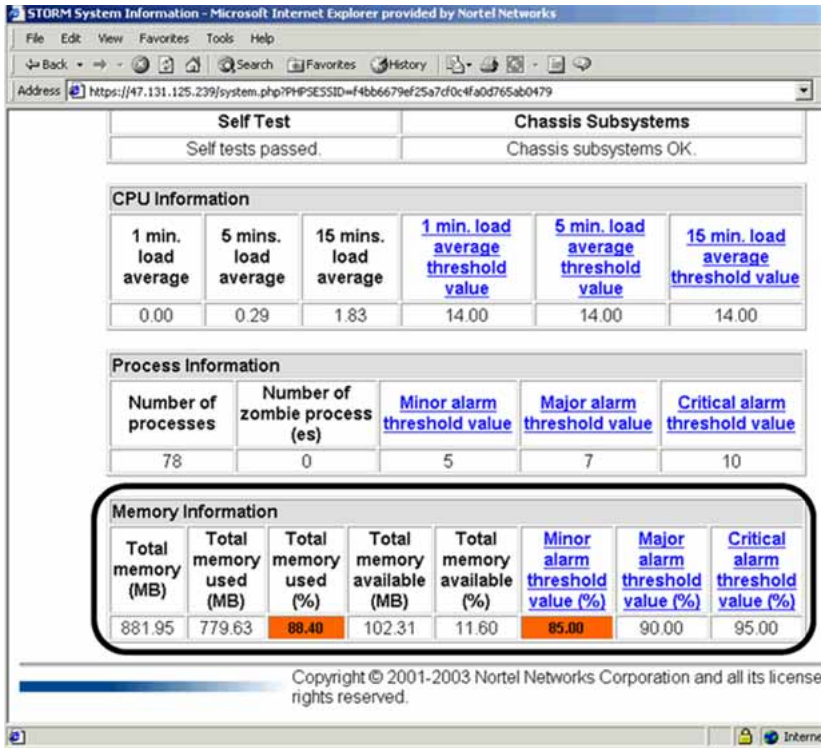
Action

Step	Action

At the STORM Manager client workstation

1 Click on the System panel tab.

2 Review the Memory Information table.



3 Determine the next action:

If the alarm is	Do
minor or major	Monitor the alarm and contact Nortel support personnel.
critical	Place NFS client machines in a maintenance state and reboot the STORM unit from the Admin panel. If the hardware platform is STORM cPCI, prepare the NFS clients and then lock the STORM unit from the CS 2000 SAM21 Manager. Contact Nortel support personnel.

4 This procedure is complete.

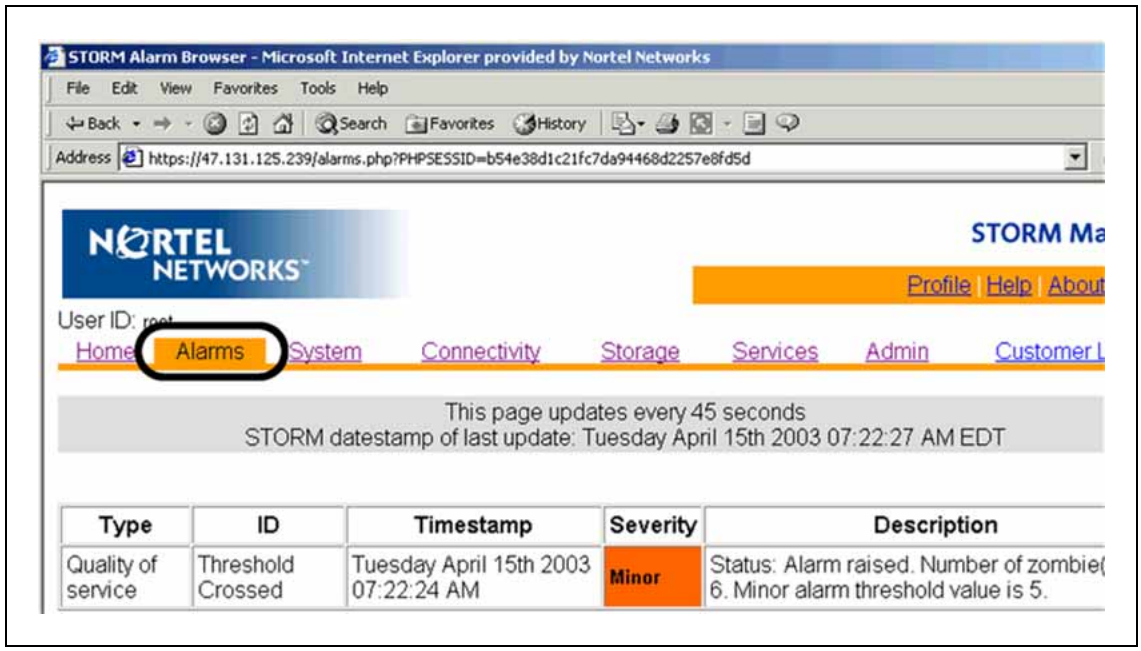
—End—

Zombie processes

Indication

An alarm is raised on the Alarms panel of the STORM Manager. An STM803 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



Meaning

The number of zombie processes has exceeded the threshold specified on the System panel.

Action

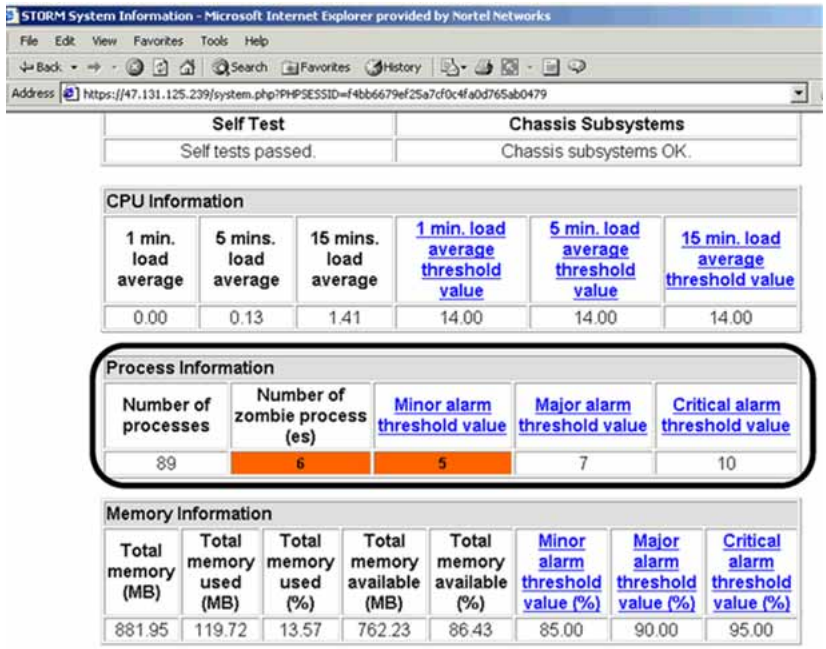
Step	Action

At the STORM Manager client workstation

1 Click on the System panel tab.

2 Review the number of zombie processes.

System panel for a STORM SAM-XTS unit (used in STORM-IA)



3 Determine the next action:

If	Do
the alarm is minor or major and no CPU threshold crossing alarms are present	Wait for a period of low office traffic, put the NFS client machines into maintenance and reboot the STORM unit from the Admin panel. If the platform is STORM cPCI, prepare the NFS clients and then reboot the STORM card by locking the STORM card from the CS 2000 SAM21 Manager.
the alarm is minor or major and CPU threshold crossing alarms are present or the alarm is critical	Put the NFS client machines into maintenance and reboot the STORM unit from the Admin panel. If the platform is STORM cPCI, prepare the NFS clients and then reboot the STORM card by locking the STORM card from the CS 2000 SAM21 Manager.

4 This procedure is complete.

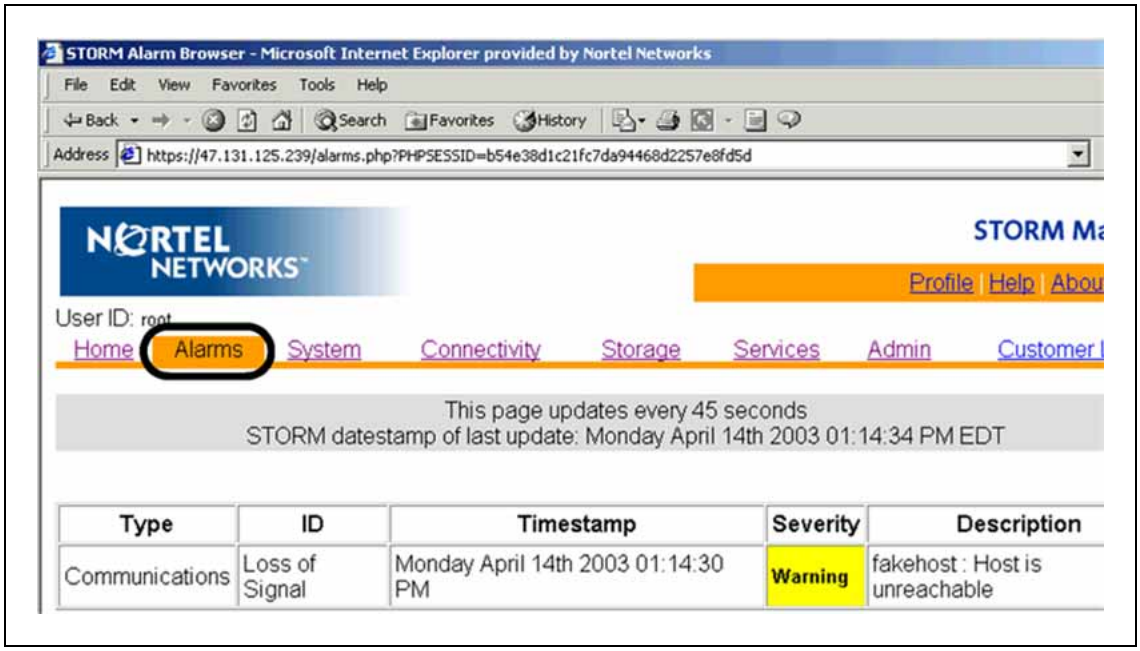
—End—

Connectivity alarm warning

Indication

An alarm is raised on the Alarms panel of the STORM Manager. No log report is generated for this alarm.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)

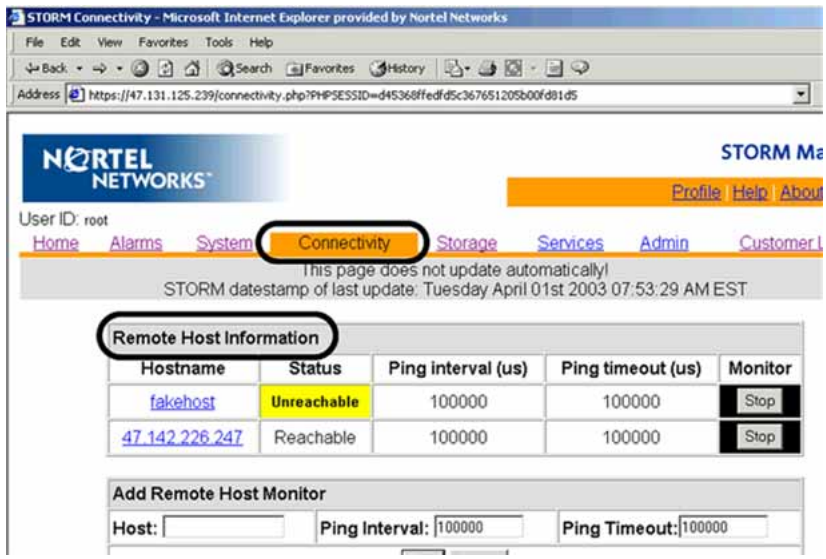


Meaning

A remote host monitor has failed. This failure indicates a loss of connectivity to the monitored host.

Action

Step	Action
	At the STORM Manager client workstation
1	Click on the Connectivity panel tab.
2	Review the Remote Host Information table.



3 Use the following list of possible causes to clear the alarm:

- the host is offline due to maintenance or an uncontrolled failure
- communication to the host is unavailable due to a router failure or misconfiguration
- cable failure at the remote host

4 This procedure is complete.

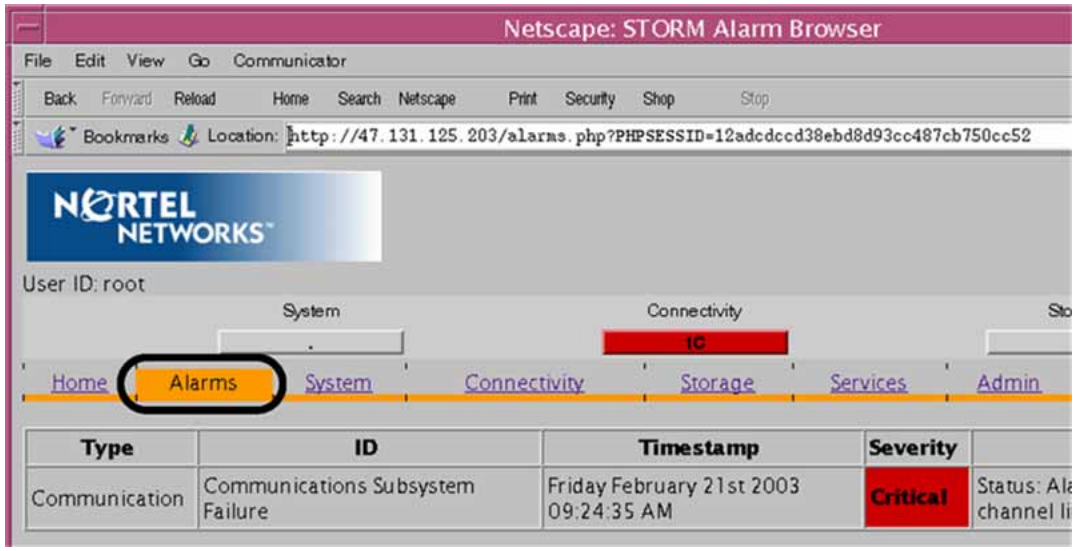
—End—

Communication: Communications subsystem failure alarm critical

Indication

An alarm is raised on the Alarms panel of the STORM Manager. An STM300 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel on STORM cPCI



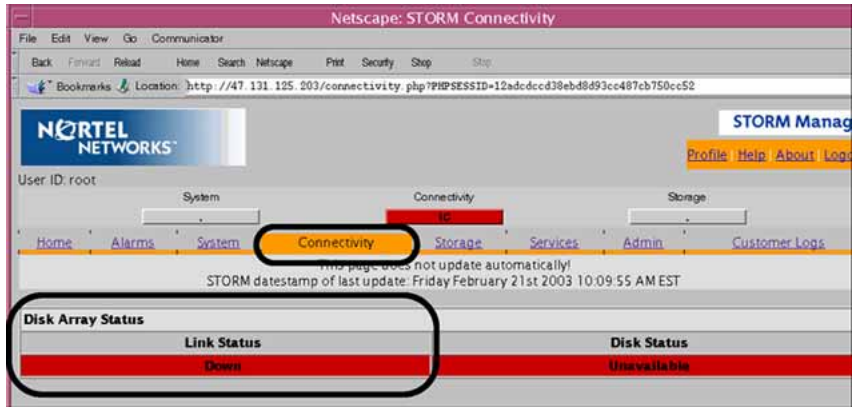
Meaning

This alarm indicates that connectivity between the STORM cPCI unit and the RAID device is unavailable. Data is not being recorded to storage.

Action

Step	Action
	At the STORM Manager client workstation
1	Click on the Connectivity panel tab.
2	Review the Disk Array Status table.

Connectivity panel on STORM cPCI



3 Review the following items to determine the cause of the alarm:

If	Do
the RAID device is offline for maintenance	The alarm clears when the RAID device becomes available.
the RAID device is offline because of a failure	Contact Nortel support personnel.
fiber between the STORM cPCI and the RAID device is disconnected or faulty	Reconnect the fiber. Replace the fiber if it is suspect.
STORM cPCI hardware failure	Lock the STORM cPCI card and run brief diagnostics. If brief diagnostics pass, run full diagnostics. If either diagnostic fails, replace the card.

4 If the problem persists, contact Nortel support personnel.

5 This procedure is complete.

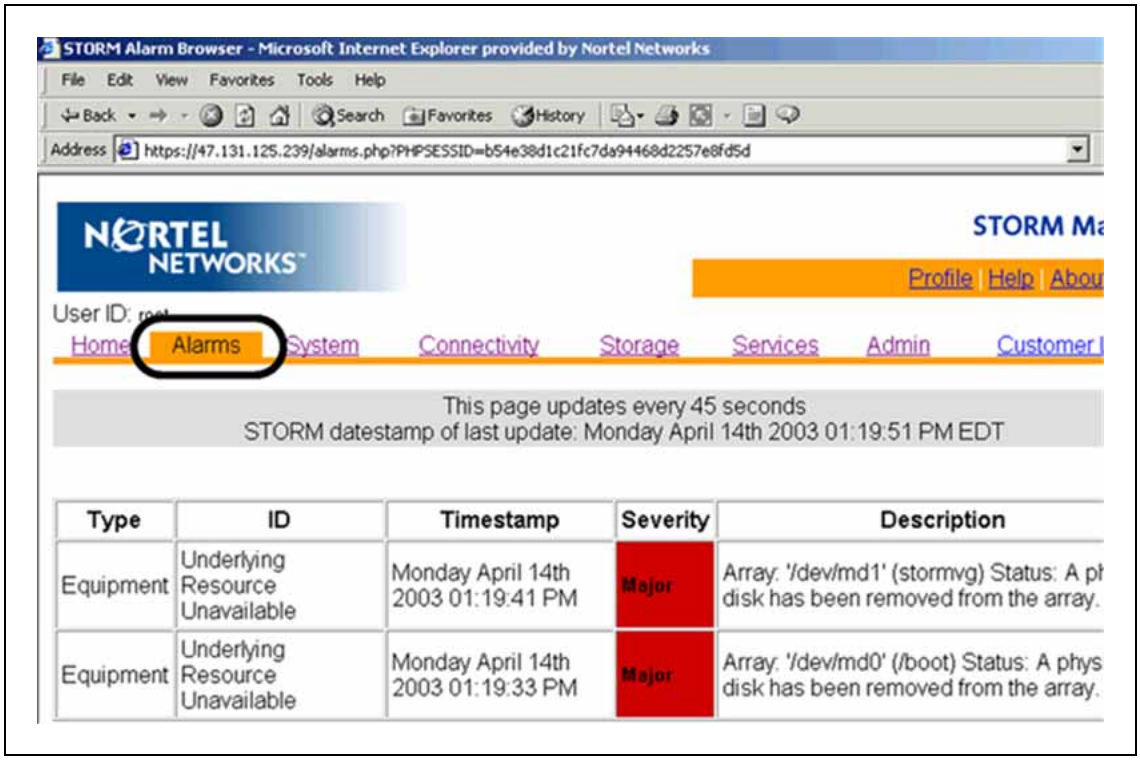
—End—

Equipment: Underlying resource unavailable alarm critical or major

Indication

An alarm is raised on the Alarms panel of the STORM Manager. An STM301 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



Meaning

Major severity alarms indicate that one of the two internal drives is unavailable and that the disk array is broken. Data continues to be written to the remaining drive, but the data is no longer being mirrored.

Critical severity alarms indicate that both of the two internal drives are unavailable and that the disk array is broken. No data is being recorded. Contact Nortel support personnel for assistance with data recovery.

Action

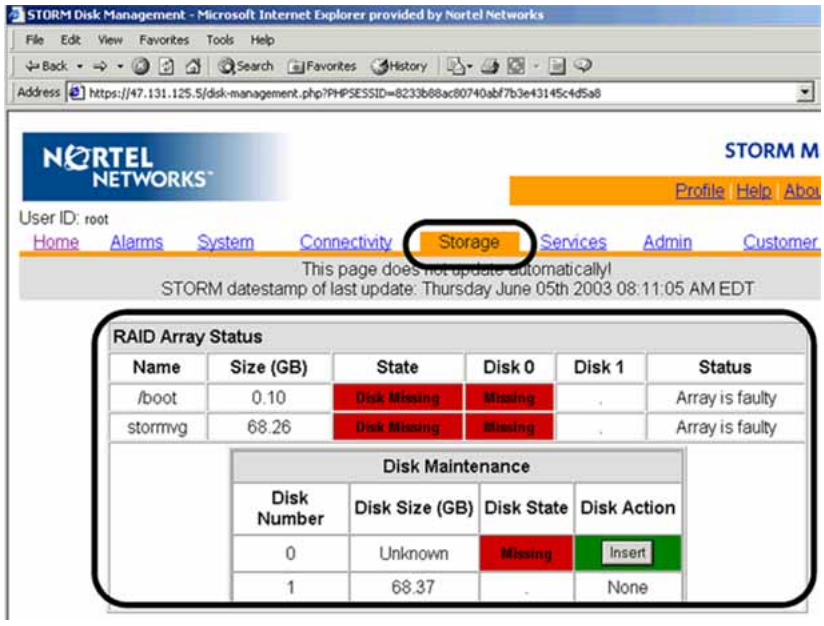
Step	Action

At the STORM Manager client workstation

1 Click on the Storage panel tab.

2 Review the RAID Array Status table.

Storage panel for a STORM SAM-XTS unit (used in STORM-IA)



3 Refer to the customer documentation for the storage device product for information about replacing drives.

4 Once the drive is replaced, click on the Insert button to begin rebuilding the array. The Equipment alarm clears and a minor Equipment:Performance degraded alarm is raised while the array rebuilds.

5 This procedure is complete.

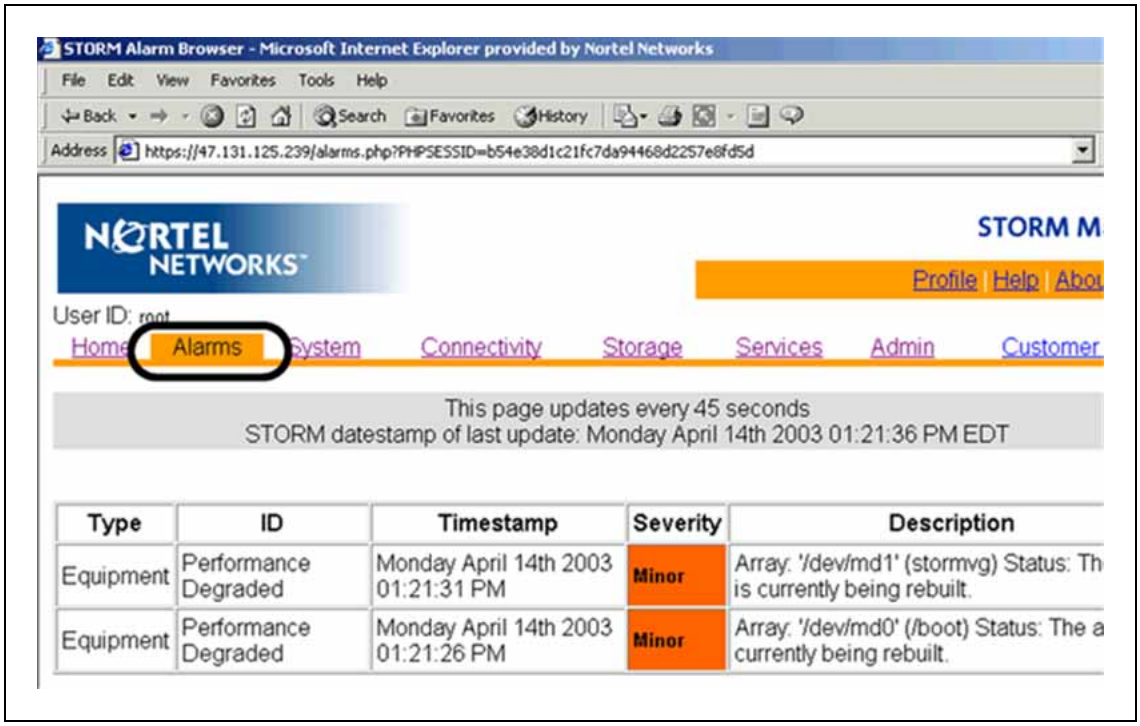
—End—

Equipment: Performance degraded alarm minor

Indication

An alarm is raised on the Alarms panel of the STORM Manager. An STM301 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



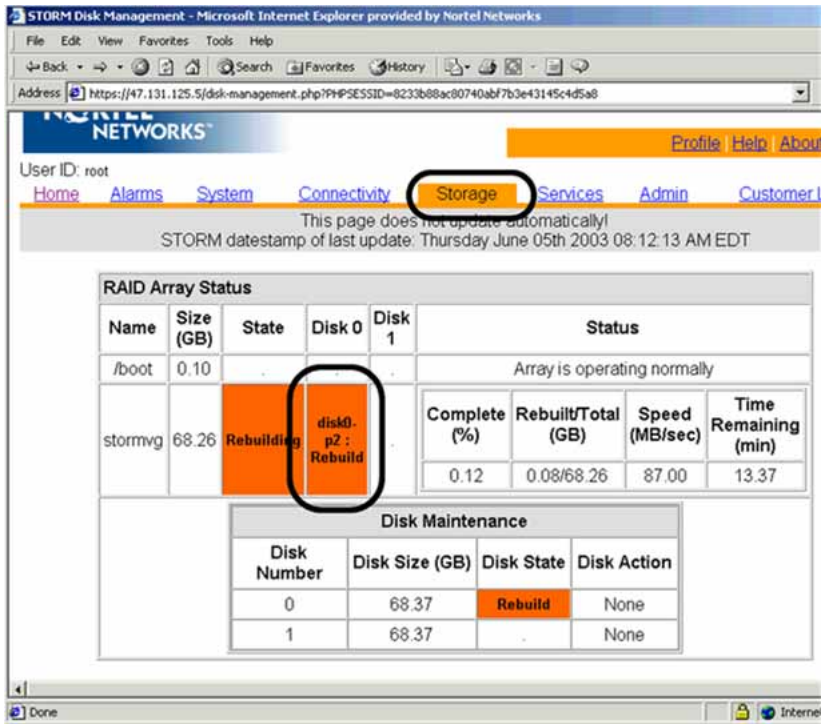
Meaning

This alarm indicates that the disk array is being rebuilt after a disk replacement or an uncontrolled shutdown.

Action

Step	Action
	At the STORM Manager client workstation
1	Click on the Storage panel tab.
2	Review the RAID Array Status table.

Storage panel for a STORM SAM-XTS unit (used in STORM-IA)



3 Monitor the rebuild by periodically clicking the web browser reload button until the rebuild completes.

When the rebuild completes, the alarm clears and an information only STM301 log report is generated.

4 This procedure is complete.

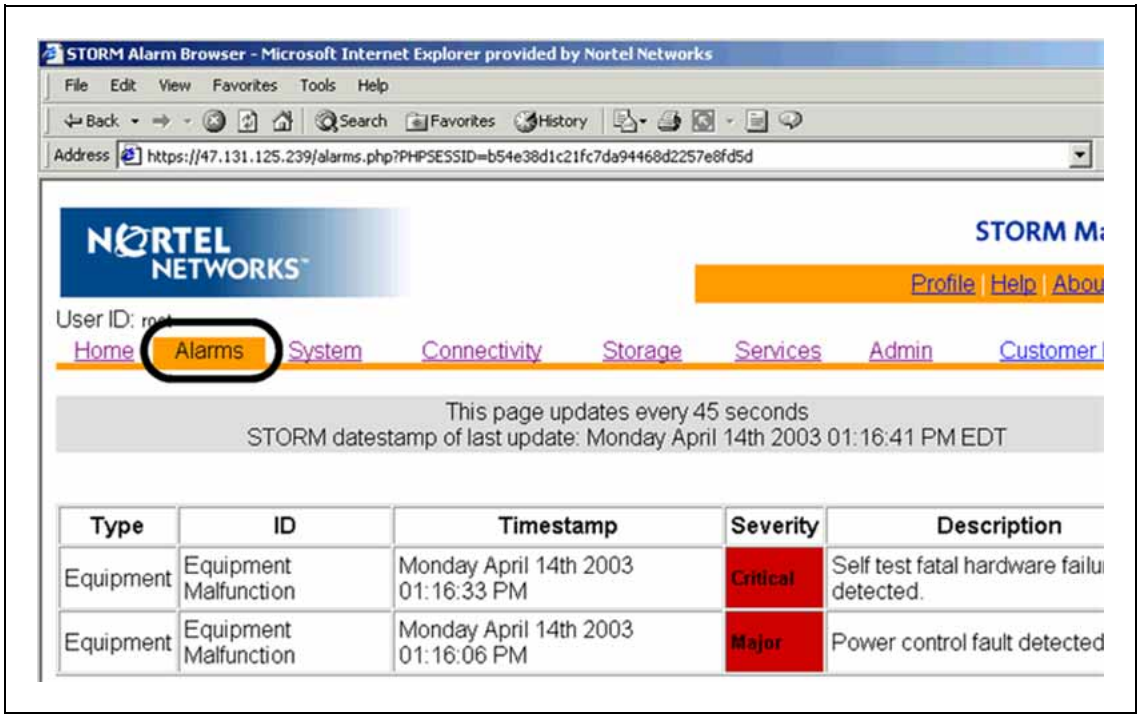
—End—

Equipment: Equipment malfunction alarm major

Indication

An alarm is raised on the Alarms panel of the STORM Manager. An STM302 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



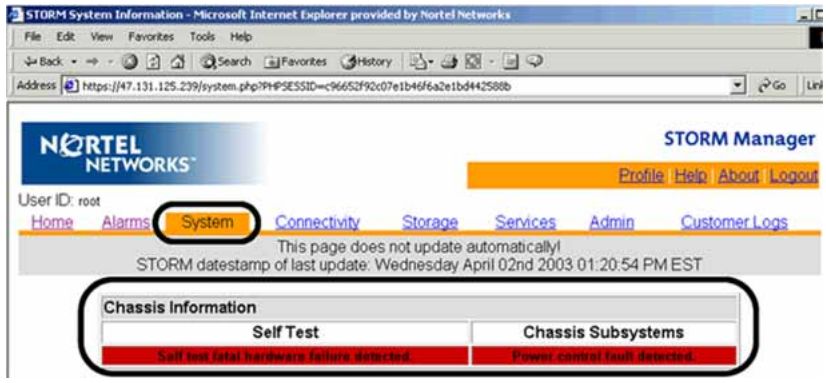
Meaning

The platform hardware has a failure.

Action

Step	Action
	At the STORM Manager client workstation
1	Click on the System panel tab.
2	Review the Chassis Information table.

System panel for a STORM SAM-XTS unit (used in STORM-IA)



3 Record the error message, gather STM log reports, and contact Nortel support personnel for assistance.

4 This procedure is complete.

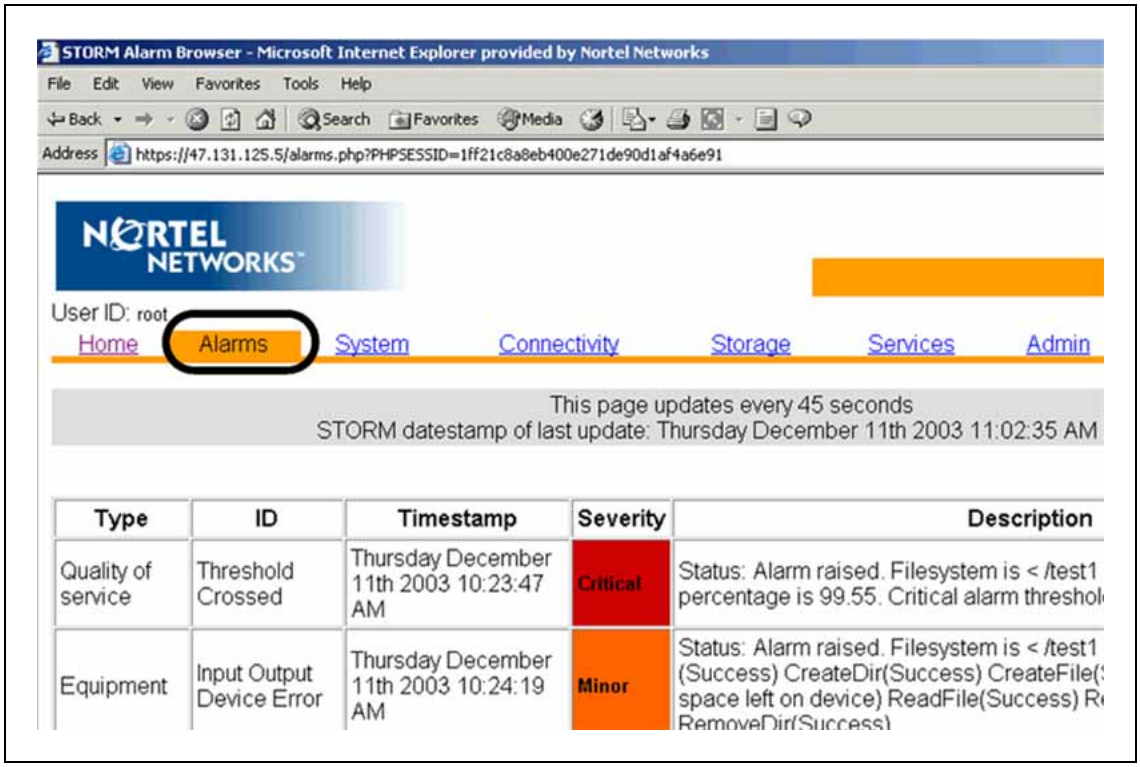
—End—

Equipment: Input Output Device Error critical or minor

Indication

An alarm is raised on the Alarms panel of the STORM Manager. An STM802 log report is generated and is available for viewing from the CS 2000 Core Manager or the Customer Logs panel of the STORM Manager.

Alarms panel for a STORM SAM-XTS unit (used in STORM-IA)



Meaning

Minor severity alarms indicate that the file system is full and a request to write data to the file system by the system test process failed.

Critical severity alarms indicate that the system test process encountered an error with at least one of the following sequential operations:

- create a directory on the file system
- create a file on the file system
- write to the file (if only this test fails because the file system is too full, the alarm is minor)
- read from the file

- delete the file
- delete the directory

Action

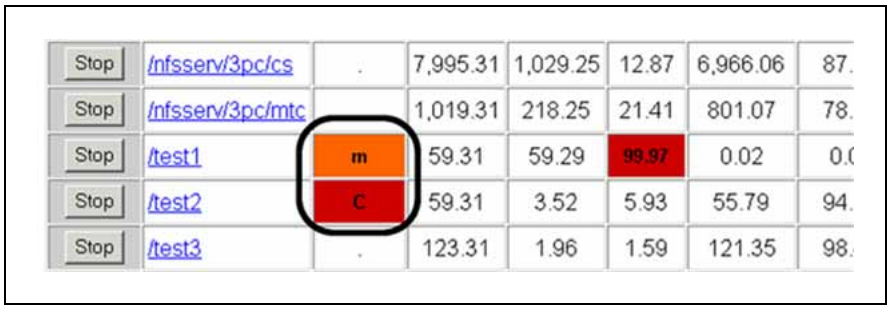
Step	Action

At the STORM Manager client workstation

1 Click on the Storage panel tab.

2 Review the Filesystem Information table.

Storage panel for a STORM SAM-XTS unit (used in STORM-IA)



Note: `/test1` has a minor alarm. Minor alarms are indicated with an 'm' on an orange field. Minor alarms are raised when the file system is full. `/test2` has a critical alarm. Critical alarms are indicated with a 'C' on a red field.

3 If the alarm is minor, determine if the file system size is engineered too low. If so, increase the size of the file system, and the alarm will clear. Determine how the space is being used. If records from processes like DIRP are being recorded faster than they are removed, consider re-engineering the software that uses the storage.

If the alarm is Critical, contact Nortel support personnel for assistance.

4 This procedure is complete.

—End—

Viewing customer logs

STM log reports are recorded at the STORM Manager and the CS 2000 Core Manager. If the CS 2000 Core Manager is configured to operated with an OSS network, the STM log reports are also available on the OSS network.

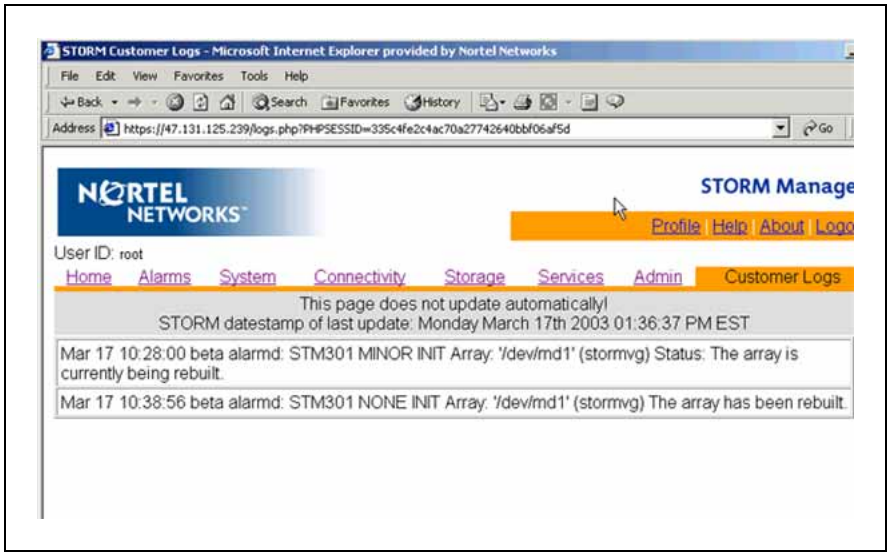
Step	Action

At the STORM Manager client workstation

1 Click on the Customer Logs panel tab.

The STORM Customer Logs panel displays with the most recent logs listed at the bottom of the report.

Customer Logs panel for a STORM SAM-XTS unit (used in STORM-IA)



2 Refer to the following table for information related to STM log reports and associated alarm clearing procedures.

Log report	Associated alarms
STM300	"Communication:Communications subsystem failure alarm critical" (page 26)
STM301	"Equipment:Performance degraded alarm minor" (page 30) "Equipment:Underlying resource unavailable alarm critical or major" (page 28)
STM302	"Equipment:Equipment malfunction alarm major" (page 32)

Log report	Associated alarms
STM800	"Quality of service:Threshold Crossed alarm critical, major or minor" (page 14) section "CPU usage" (page 14)
STM801	"Quality of service:Threshold Crossed alarm critical, major or minor" (page 14) section "Memory usage" (page 19)
STM802	"Quality of service:Threshold Crossed alarm critical, major or minor" (page 14) section "File system usage" (page 17) or "Equipment:Input Output Device Error critical or minor" (page 34)
STM803	"Quality of service:Threshold Crossed alarm critical, major or minor" (page 14) section "Zombie processes" (page 21)

3 This procedure is complete.

—End—

Replacing a disk

Use this procedure to replace a disk in a STORM SAM-XTS unit (used in STORM-IA).

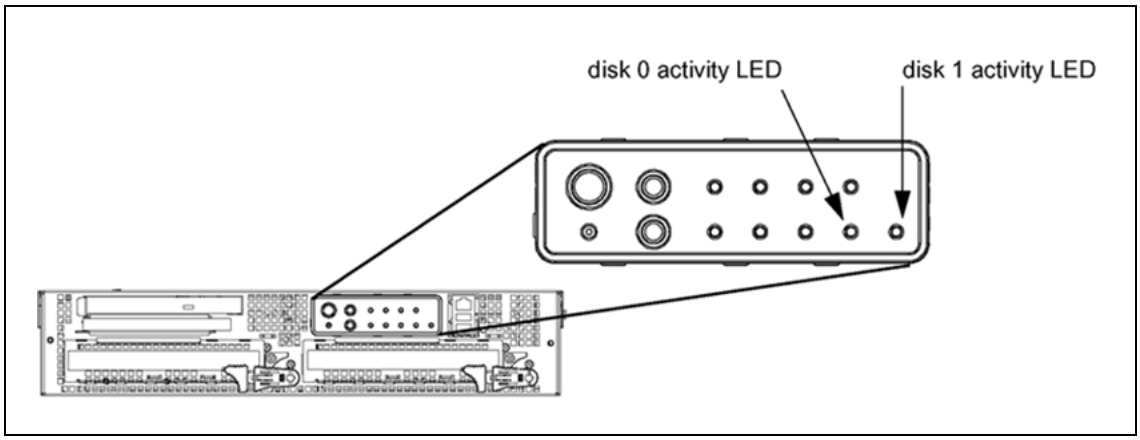
When to use this procedure

Perform this procedure in the event of a disk failure. Disk failure is reported by any of the following indicators:

- an STM301 log report that indicates a physical disk has been removed from the array
- a major alarm of type "Equipment:Underlying resource unavailable alarm critical or major" (page 28)
- the disk activity LED on the face of STORM SAM-XTS chassis for a drive is red

Disk activity LED	Disk condition
off	no disk activity
green	disk is operating normally and active
blinking green and red	disk is rebuilding
red	disk failure or disk is missing

Disk activity LEDS on the front panel of a STORM SAM-XTS unit (used in STORM-IA)



Note: The bezel on the face of the STORM SAM-XTS unit is removed to access the disk drives.

Materials

This procedure requires one NTRX51GT -- 72 Gigabyte disk drive and one ESD wrist strap.

Action

Step	Action

At the STORM SAM-XTS chassis

1 Determine which drive failed. Look for a lit red LED on the SAM-XTS chassis to indicate the failed drive.

If operating company personnel want to remove a functional drive, first click the Remove button at the Storage panel of the STORM Manager for the drive. Clicking the Remove button will change the LED to red.

If there is only one drive in the SAM-XTS chassis, and if you intend to remove the drive, you must first click the Remove button at the Storage panel of the STORM Manager for the drive.

CAUTION
Risk of service interruption
If there is only one drive in the SAM-XTS chassis, and if you remove that drive without first clicking the Remove button at the Storage panel of the STORM Manager for the drive, a service interruption can occur.

2

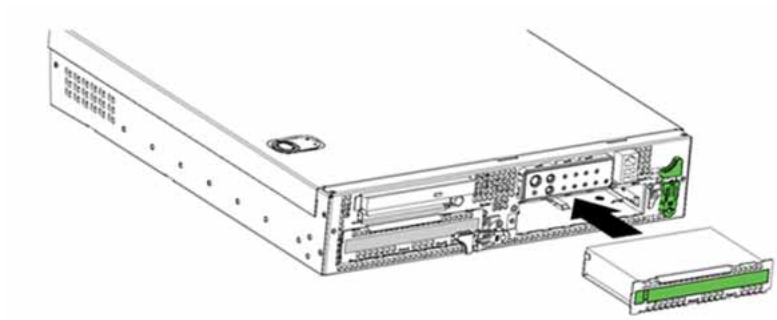
CAUTION
Electrostatic discharge (ESD) damage
Provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground (any unpainted metal surface) on your server or frame when handling parts.

Put on an ESD wrist strap and fasten to a frame ground point.

3 Unlatch the failed disk from the chassis by turning the green latch 90 degrees, clockwise, from the horizontal position to the vertical position. Remove the failed disk from the chassis.

4 Insert the replacement drive into the chassis slot and secure the drive by engaging the green latch.

Insert replacement disk drive



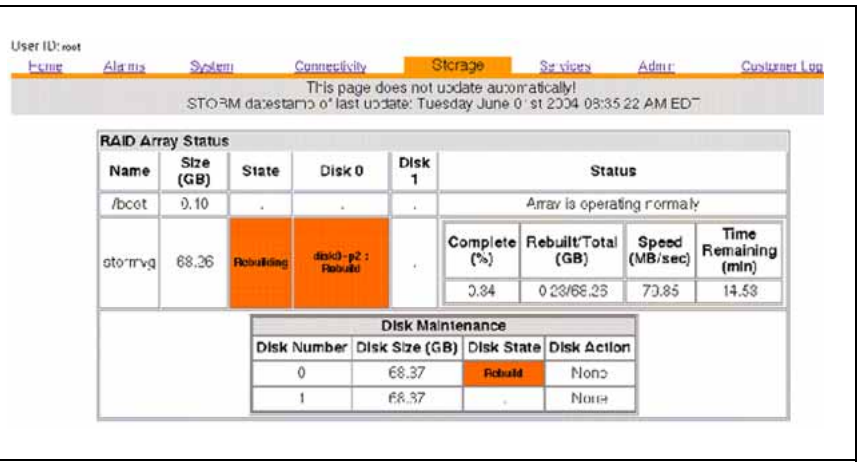
Once the drive is replaced, the STORM unit begins to rebuild the array. During the rebuild, the LED for the disk alternates between red and green. If the STORM chassis is wired to an external alarm system, a minor alarm is indicated with an amber LED.

If the disk is inserted into the STORM chassis and the LED for the disk remains solid red for more than one minute after inserting the disk, reinsert the disk drive.

At the STORM Manager

5 Reload the Storage panel page.

The RAID Array Status table indicates that the array is rebuilding. Four STM301 log reports indicate that a disk has been inserted to each of the arrays and each array is being rebuilt. Two major alarms clear and two minor alarms are raised.



Wait the suggested time indicated in the Time Remaining field for the rebuild to complete. Click the Reload button on the web browser to refresh the data and ensure that the rebuild is complete. Two STM301 log reports are generated and all STORM alarms clear when the rebuild completes.

6 This procedure is complete.

—End—

Replace CD+RW/DVD drive

Use this procedure to replace a damaged or failed CD+RW/DVD drive in a STORM SAM-XTS unit.

When to perform this procedure

Perform this procedure after physical damage to the CD+RW/DVD drive tray or a failure of the drive. A failure of the drive may be indicated by failure to boot the machine from CDROM, or if the STORM unit fails to read the CDROM during a STORM upgrade.

Materials

This procedure requires one NTRX51GQ -- CD+RW/DVD drive and one ESD wrist strap.

Action

Step	Action

At the Call Agent Manager

1 Exit the Call Agent Manager with the **`QUIT ALL`** command and then enter the **`mount`** command to determine which Call Agent volumes use the STORM unit:

```
> quit all
[mtc@ip_address mtc]$ mount
```

```
[mtc@10.40.44.67 mtc]$ mount
/dev/ram0 on / type ext2 (rw)
proc on /proc type proc (rw)
devpts on /dev/pts type devpts (rw,mode=0622)
10.40.44.238:/nfsserv/3pc/mtc/tape0 on /TAPE type nfs (rw,rsize=4096...
10.40.44.239:/nfsserv/3pc/mtc/tape1 on /TAPE1 type nfs (rw,rsize=409...
10.40.44.238:/nfsserv/3pc/cs/sd00 on /3PC/sd00 type nfs (rw,rsize=409...
10.40.44.239:/nfsserv/3pc/cs/sd01 on /3PC/sd01 type nfs (rw,rsize=409...
10.40.44.238:/nfsserv/3pc/mtc/log0 on /var/log_mate type nfs (rw,rsi...
10.40.44.239:/nfsserv/3pc/mtc/log1 on /var/log type nfs (rw,rsize=409...
```

Look for the IP address of the STORM unit with the drive to replace and then determine if `sd01` *or* `sd00` *is provided by this STORM unit*.

At the MAP

2 Rotate DIRP volumes away from either SD00 or SD01 and demount the DRIP volumes as described in procedure "Demount DIRP volumes" of *Upgrading the STORM*, NN10066-461.

3 Busy the SD00 or SD01 disk device as described in procedure "Busy disk device" of *Upgrading the STORM*, NN10066-461.

At the STORM Manager

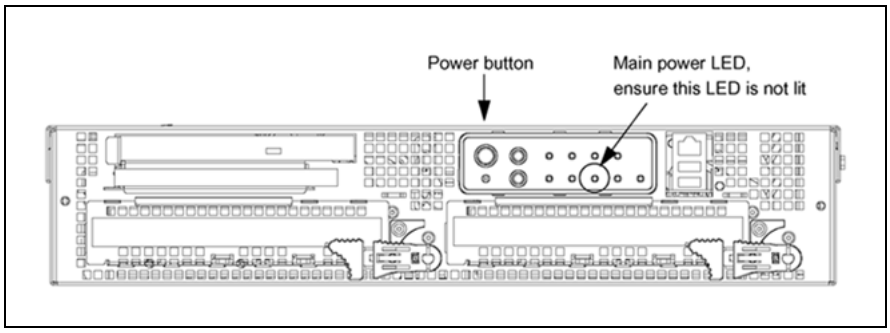
4 Click the Halt button at the Admin panel.

Confirm the prompts.

At the STORM SAM-XTS chassis

5 Ensure that the chassis is powered down by examining the main power LED. Ensure that the main power LED is not lit.

Front view of the STORM SAM-XTS unit (used in STORM-IA)

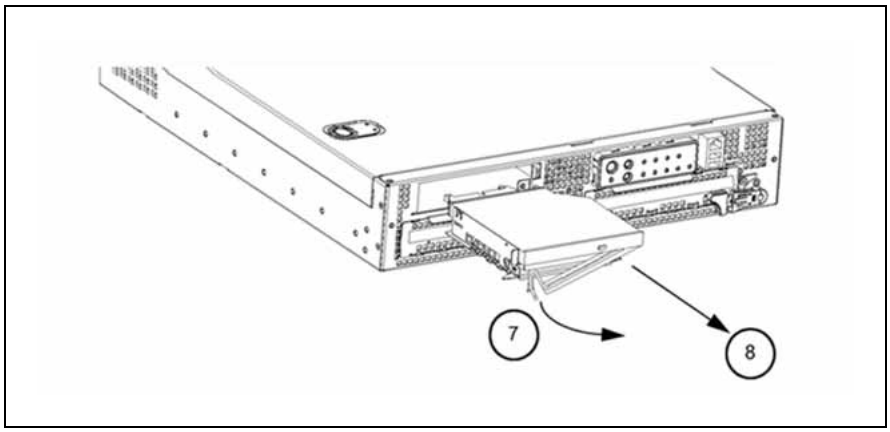


6 Put on an ESD wriststrap and fasten to a frame ground point.

7 Unseat the drive by pulling the blue horizontal lever on the front of the drive. The lever is pulled from the left side of the drive and pivots on the right side of the drive. Refer to figure "Open drive lever and remove drive from chassis" (page 43).

8 Slide the drive from the chassis.

Open drive lever and remove drive from chassis



9 Pull the blue horizontal lever on the front of the replacement drive and slide the replacement drive into the chassis.

10 Press the blue horizontal lever on the front of the drive. The drive is fully seated when the horizontal lever is fully secured.

11 Press the power button to restore power to the chassis.

At the STORM Manager

12 Ensure that the unit returns to service and no alarms are active.

At the MAP

13 Return to service the SD00 or SD01 disk device as described in procedure "Return to service disk device" of *Upgrading the STORM*, NN10066-461.

14 Remount the DIRP volumes as decribed in procedure "Mount DIRP volumes" of *Upgrading the STORM*, NN10066-461.

15 Ensure no alarms are present at the MAP, the Call Agent Manager, or the STORM Manager.

16 This procedure is complete.

—End—

Replacing a power supply

Use this procedure to replace an AC or DC power supply in a STORM SAM-XTS chassis.

When to use this procedure

Perform this procedure when a power supply failure is indicated:

- an STM302 log report indicates a power control fault
- an "Equipment:Equipment malfunction alarm major" (page 32), refer to "Equipment:Equipment malfunction alarm major" (page 32)
- the power supply LED indicates a failure:

Power supply LED indicators

Power supply LED	Power supply condition
off	no power to any power supply units
amber	• no power to this power supply unit • power supply failure (OTP, OVP, OCP, or UV) • current limit -- applies to DC power supplies only
blinking green	power is applied to this power supply unit, but only the standby power DC outputs are on
green	power is applied to this power supply and DC outputs are okay and on
blinking amber	power supply in alert condition -- applies to AC power supplies only

Note: Acronyms are over temperature (OTP), over voltage (OVP), over current (OCP), and under voltage (UV).

Materials

This procedure requires one power supply, NTRX51GS for DC power or NTRX51NE for AC power, an ESD wrist strap, a flat-bladed screwdriver, and a Phillips screwdriver.

Action

To maintain hot-plug capability, ensure that an active AC or DC power supply module is in the adjacent slot before replacing a power supply module.

DANGER
Risk of electrocution
Use caution when disconnecting power from the chassis.

CAUTION
Electrostatic discharge (ESD) damage
Use caution when handling the power supplies. Attach an ESD wrist strap to a chassis or frame grounding point.

Replacing a DC power supply

Step	Action
1	Select the next step as follows.
2	Go to the following URL: http://www.hp.com.
3	Check that you are in the "United States - English" section of the web site. If you are not in that section, use the control on the screen to go to that section.
4	In the "United States - English" section of the web site, search for the following string: HP Carrier-Grade cc3310 Server Replacing Power Supply Modules. In the search results, locate the item titled "HP Carrier-Grade cc3310 Server - Replacing Power Supply Modules". If you cannot locate this item in the search results, contact your next level of support before proceeding.
5	To display the procedures for replacing AC and DC power supplies, click on the title "HP Carrier-Grade cc3310 Server - Replacing Power Supply Modules".
At the STORM SAM-XTS chassis	
6	Replace the DC power supply using the appropriate procedure.
7	This procedure is complete.

—End—

Replacing an AC power supply

Step	Action
1	Select the next step as follows.
2	Go to the following URL: http://www.hp.com.
3	Check that you are in the "United States - English" section of the web site. If you are not in that section, use the control on the screen to go to that section.
4	In the "United States - English" section of the web site, search for the following string: HP Carrier-Grade cc3310 Server Replacing Power Supply Modules. In the search results, locate the item titled "HP Carrier-Grade cc3310 Server - Replacing Power Supply Modules". If you cannot locate this item in the search results, contact your next level of support before proceeding.
5	To display the procedures for replacing AC and DC power supplies, click on the title "HP Carrier-Grade cc3310 Server - Replacing Power Supply Modules".
At the STORM SAM-XTS chassis	
6	Replace the AC power supply using the appropriate procedure.
7	This procedure is complete.

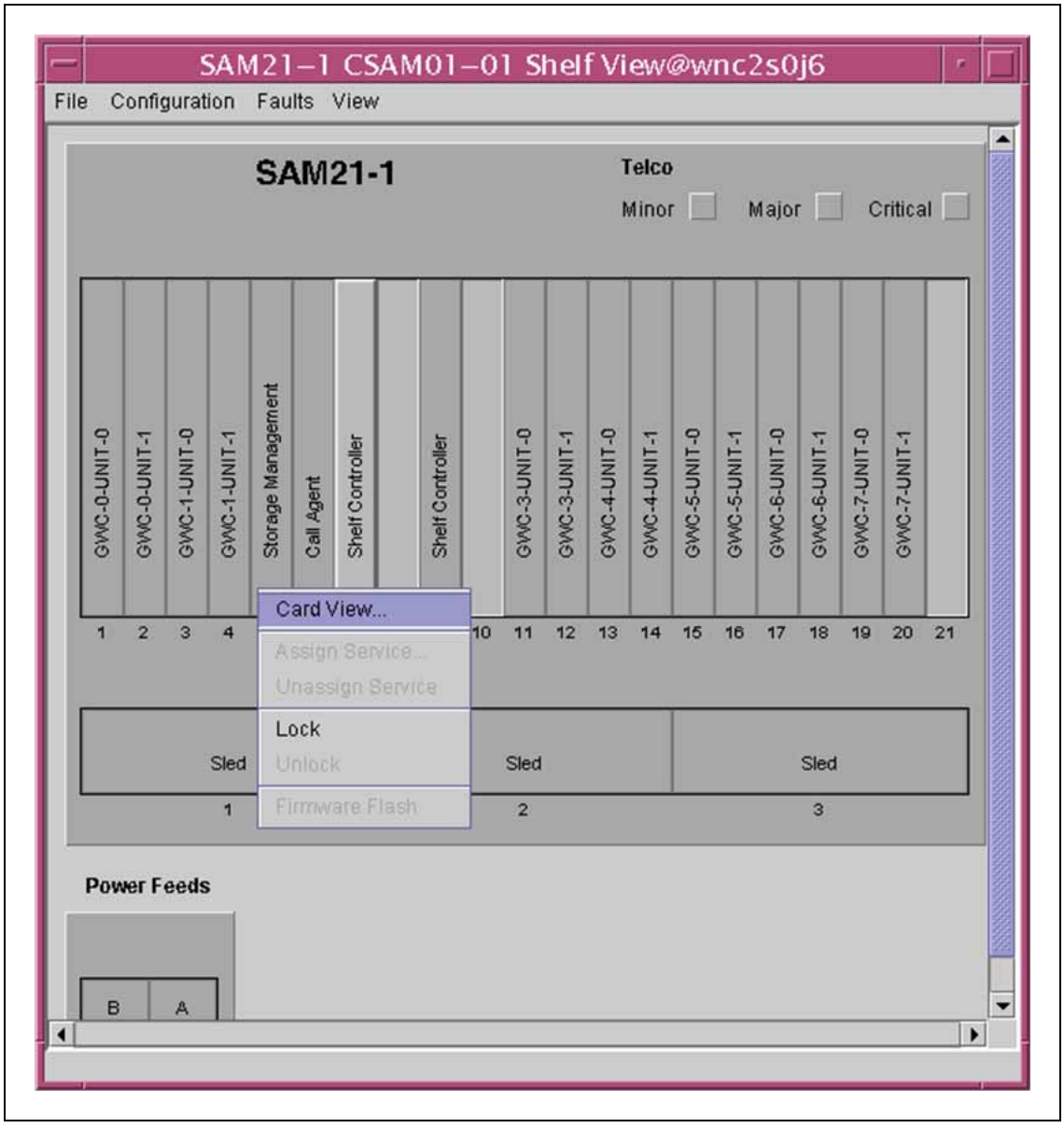
—End—

SAM21 Manager procedures

The fault management procedures in this section are applicable to the STORM compact peripheral component interconnect (cPCI) hardware platform only.

The CS 2000 SAM21 Manager is used to manage the hardware of the STORM cPCI platform.

CS 2000 SAM21 Manager client



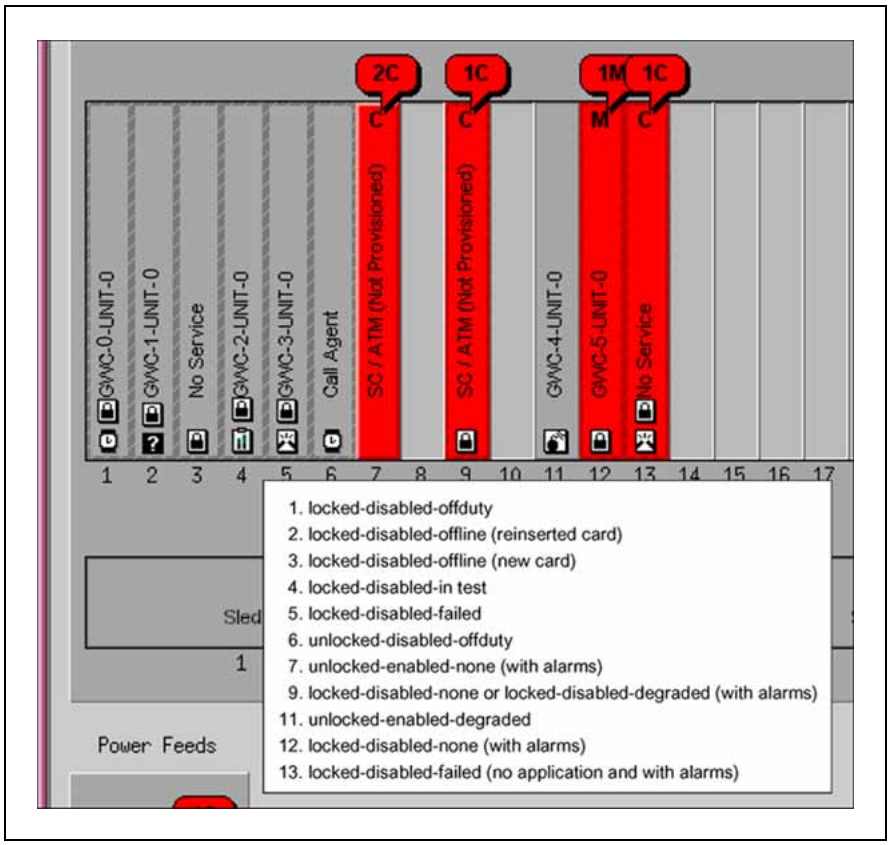
Card icons

Use this procedure to determine the state of a card through the CS 2000 SAM21 Manager client.

Step	Action

At the CS 2000 SAM21 Manager client

1 Review the following figure and determine the card icons that apply.



Note: These states also apply to SAM21 Shelf Controllers.

2 To view the card state tab, right-click on the card icon and select Card View from the card context menu. In the Card View window that opens, select the States tab.

3 Determine the next action.

State	Possible action
locked-disabled-offduty  	Wait for the firmware flash to complete. Verify that the card changes to the locked-disabled-none state. If the card transitions to locked-disabled-degraded, follow the suggestions for that state.
unlocked-disabled-offduty 	For Call Agent cards, this state also represents the restart and reload of the call processing application during a routine exercise test (RExTst). When the SAM21 Shelf Controller performs it's boot audit, any card that is not running or booting is set to this state until the SAM21 Shelf Controller recovers the card.
locked-disabled-offline(new card) 	Right-click on the card icon and select Assign Service from the card context menu. Select the correct service from the Assign Service window. If the question mark icon does not disappear, open the Card View and view the States tab. If the history text area indicates that service assignment failed because the service type is incompatible with the hardware, either replace the card with the correct hardware type, or unassign service from the shelf view and then assign the correct service type.
locked-disabled-offline (reinsertion)  	Wait for SAM21 Shelf Controller to recognize the card and reinstate the provisioning information. The question mark icon disappears and the card transitions to a new state. Refer to the suggestions for the new state. If the question mark icon does not disappear, open the Card View window and view the States tab. If the history text area indicates that service assignment failed because the service type is incompatible with the hardware, either replace the card with the correct hardware type, or unassign service from the shelf view and then assign the correct service type. If the history text area indicates that the service assignment failed because the IP address is already reserved by another unit, contact network engineering to determine if another unit is misconfigured, or if this unit should be reconfigured.

State	Possible action
locked-disabled-none or locked-disabled-degraded  	Unlock the card by right-clicking on the card icon and select Unlock from the card context menu. Rerun diagnostics if the CS 2000 SAM21 Manager client generates a "Degraded state Unlock confirmation window" (page 52) If diagnostics fail a second time, replace the card and contact Nortel support personnel. ***Note:*** The active SAM21 Shelf Controller generates 2 critical alarms when the inactive SAM21 Shelf Controller is locked. A locked-disabled- degraded state for non system slot (NSS) cards is also alarmed.
locked-disabled-failed  	This card is inaccessible. Verify the following items: • SAM21 Shelf Controllers are in service • If the SAM21 Shelf Controllers are in service, reinsert the card. If the card is not recognized, replace the card. If the replacement card does not enter unlocked-enabled-none, contact Nortel support personnel.
locked-disabled-in test  	Wait for diagnostics to complete. Verify that the card changes to the locked-disabled-none state. Optionally monitor diagnostics progress from the Card View window.
unlocked-enabled-degraded 	This card failed one or more diagnostics and was Unlocked. See "Additional information" (page 52) below. This card may not be providing service or may be unreliable. Lock and run diagnostics on this card. If the card fails diagnostics, replace this card and contact Nortel support personnel.
locked-disabled-none and alarmed 	This card has taken more than three minutes to complete a lock or unlock request. The alarm clears when the card completes the request or is removed from the shelf.
locked-disabled-failed (no application)  	The active SAM21 Shelf Controller detects a card in the slot, but cannot through the backplane to the card. Reinsert the card.

Note: Refer to the Fault Management document for the affected card type.

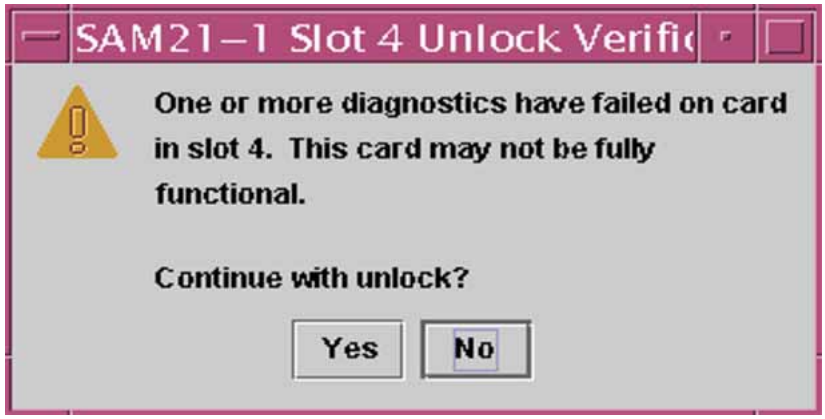
4 This procedure is complete.

—End—

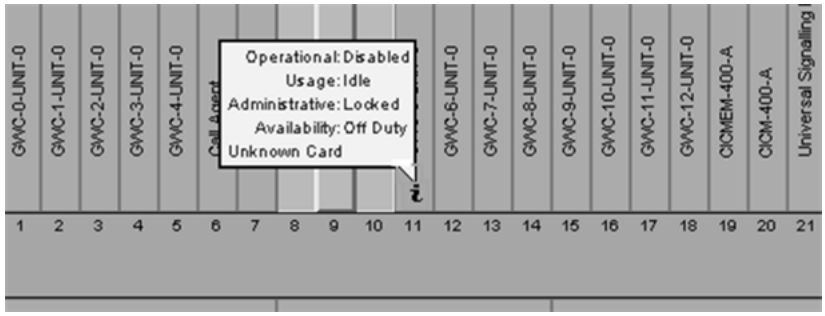
Additional information

The CS 2000 SAM21 Manager application opens the following window if a card failed a diagnostic test and an unlock request is made. Run brief and full diagnostics. If the card fails a second time, replace the card and contact Nortel support personnel.

Degraded state Unlock confirmation window



An additional shelf view card icon indicates that the CS 2000 SAM21 Manager client cannot display all the card icons. Click this information icon to view the card state information in a balloon. This icon normally indicates that the card type is not supported for the current release of the CS 2000 SAM21 Manager software.



Replacing a STORM unit

Perform this procedure at the direction of Nortel support personnel.

Refer to the correct replacement procedure, based on the STORM hardware platform.

ATTENTION

Replacing an in service STORM unit may disrupt service if the client machines are not prepared to lose connectivity with the STORM unit.

If the office is configured as a CS 2000 - Compact, determine which disk device, SD00 or SD01, is provided by the STORM unit to replace, and busy that disk device from the MAP.

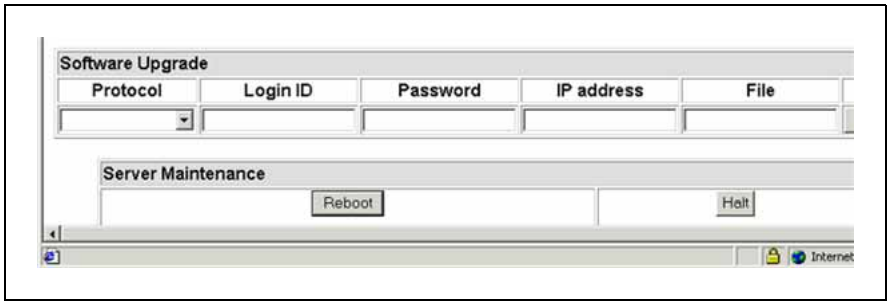
If the office uses USP - Compact devices, prepare the USP - Compact to lose connectivity by inhibiting and deactivating the SS7 links provided by that USP - Compact, and then bring down the ASP paths between the Gateway Controllers and the call processing application.

STORM SAM-XTS unit (used in STORM-IA)

Step	Action

At the STORM Manager

1 If the STORM unit is still in service, halt the machine from the Admin panel.



The connection between the browser and the STORM Manager closes. All connectivity between the STORM unit and the client machines is ended. The STORM unit executes a controlled shutdown.

At the STORM chassis

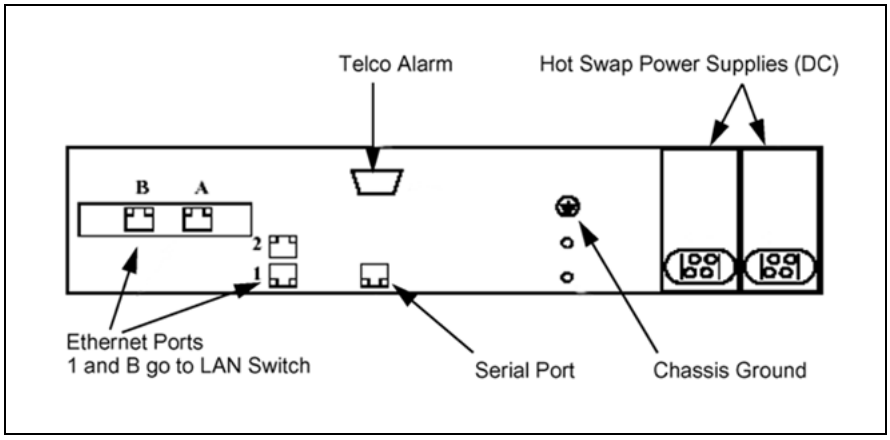
2 Label the disk drives in the STORM unit as disk 0 and disk 1. Disk 1 is drive on the left, disk 0 is the drive on the right. Ensure that when these drives are inserted in the replacement chassis, that they are replaced in the same drive bay from which they were removed.

3 Unlatch and remove the two disk drives from the STORM chassis. Operate the latch by turning it 90 degrees, clockwise, from the horizontal to the vertical position. Place each drive in an Electric Static Discharge (ESD) bag and place each drive in a safe location.

4 Label and remove the Ethernet links from the rear of the chassis.

5 Label and remove the two Ethernet crossover cables (NTRX5145) from the rear of the chassis.

Rear view of ports and ground connection



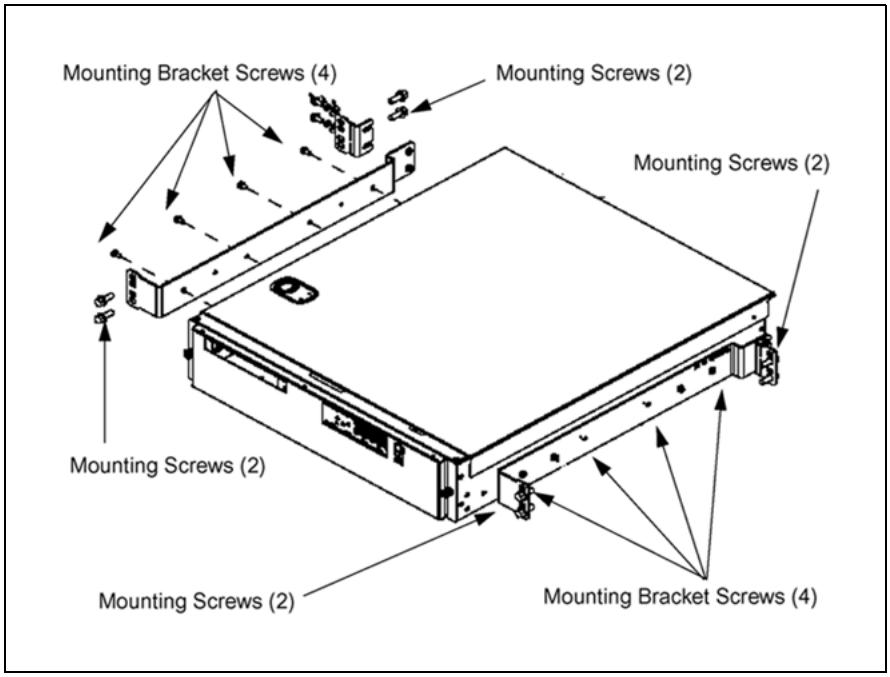
6 At the power supply panel, remove the application of power to the STORM chassis.

7 Remove the power supply cables (NTRX5199, NTRX5146, or NTRX5239 if a SAM16 based UAS is not in the frame) from the rear of the STORM chassis.

8 Remove the ground cable (NTRX5198) from the rear of the unit.

9 Disconnect the DB15 alarm cable (NTRX5179) that exetends to the BIP.

10 Unscrew the screws that support the STORM chassis in the frame and remove the STORM unit from the frame. There are four mounting screws at the front of the chassis and four mounting screws at the back of the chassis, as shown in the following figure.



11 If necessary, remove the mounting brackets from the old unit and mount them on the replacement unit. Each mounting bracket is held in place by four mounting bracket screws as shown in the previous figure.

12 Insert the replacement STORM chassis and secure the mounting screws that hold the chassis in the frame.

13 Reconnect the DB15 alarm cable connector to the chassis.

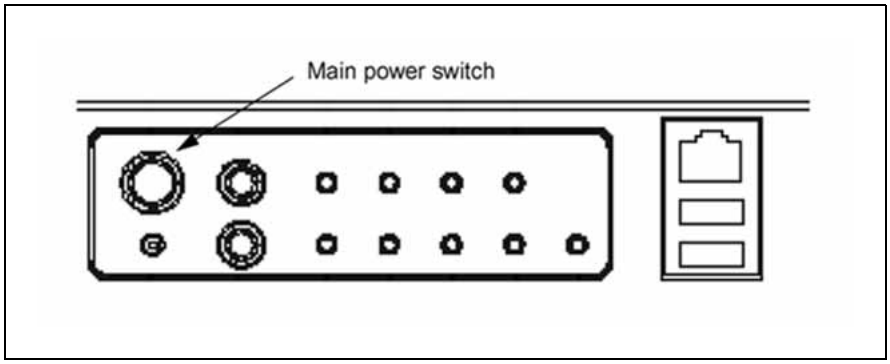
14 Attach and secure the power cables to the rear of the replacement STORM chassis.

15 At the power supply panel, reapply power to the replacement STORM chassis.

16 Replace the Ethernet cables to the replacement STORM chassis.

17 Remove each drive from its ESD bag and insert it into the appropriate drive slot. Close the latch on each drive.

18 Power up the replacement STORM by pressing the main power switch on the front panel of the unit.



The green power LED lights and the STORM unit boots from disk. If the unit fails to boot after a 5 minute period, a watchdog timer on the chassis raises a critical alarm LED on the chassis.

At the replacement unit

19 Ensure that two drives, two power supplies, and the CD reader are inserted in the faulty unit before returning the unit.

At the STORM Manager

20 Log in to the STORM Manager.

21 Ensure that no unexplained log reports or alarms are raised.

22 Reactivate client access to the STORM unit.

23 This procedure is complete.

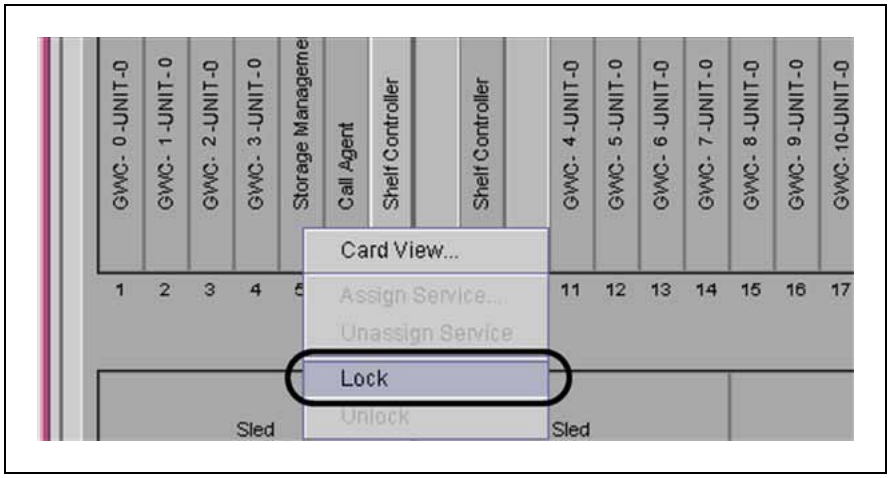
—End—

STORM cPCI

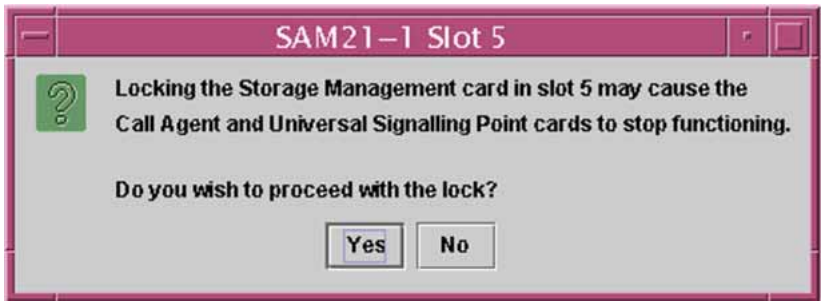
Step	Action

At the CS 2000 SAM21 Manager client workstation

1 Lock the STORage Management (STORM) card.



2 Confirm the lock request by clicking Yes.



3 Wait for the lock icon to appear on the STORM icon.

At the SAM21 shelf

4 Label and remove the fiber channel, Ethernet, and serial connections from the STORM faceplate.

5 Open the bottom ejector lever.

6 Wait for the blue LED to appear at the bottom of the faceplate, and the red out-of-service LED above the card to extinguish.

7 Press both ejector levers until the card is ejected from the shelf.

8

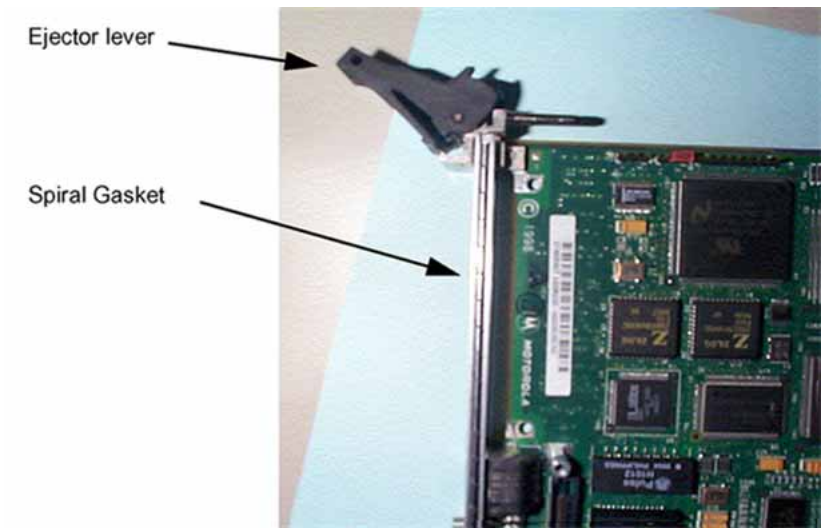
CAUTION
Possible service interruption
A service outage can occur if care is not taken while inserting circuit packs.

The spiral gasket, located on the faceplate of the circuit pack, can become caught on an adjacent card and ripped off of the faceplate. If the spiral gasket ends up making contact with the backplane inside the chassis, an electrical short circuit can result in a service outage.

CAUTION
Static electricity damage
Wear an electrostatic discharge (ESD) grounding wrist strap connected to the SAM21 Shelf Cabinet when handling a card. This protects the card against damage caused by static electricity.

Hold the card by the ejector levers and remove the card from the shelf.

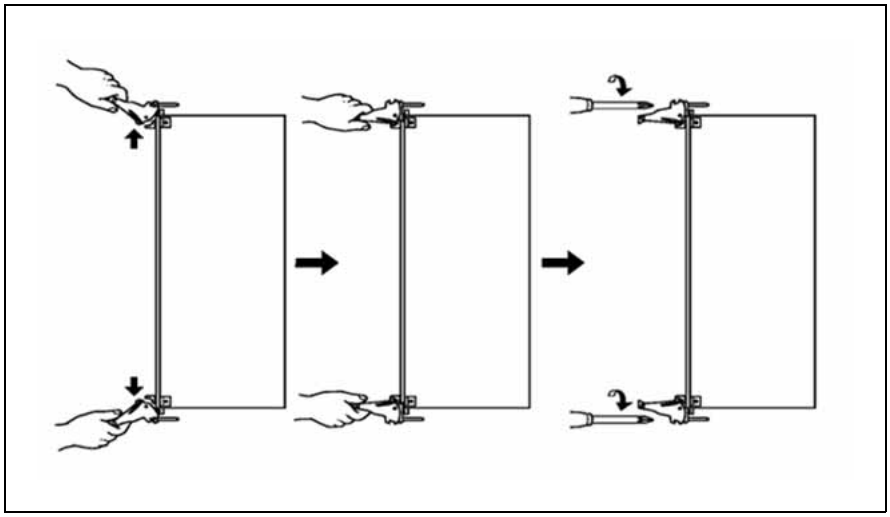
9 Examine the replacement card and verify that the spiral gasket is seated and is not loose.



10 Hold the replacement card by the ejector levers and insert the card into the shelf.

Note 1: Do not push on the faceplate to seat the card.

Note 2: Verify that the CPU LED lights. If the CPU LED does not light, reseat the card. If the CPU LED fails to light a second time, replace the card.

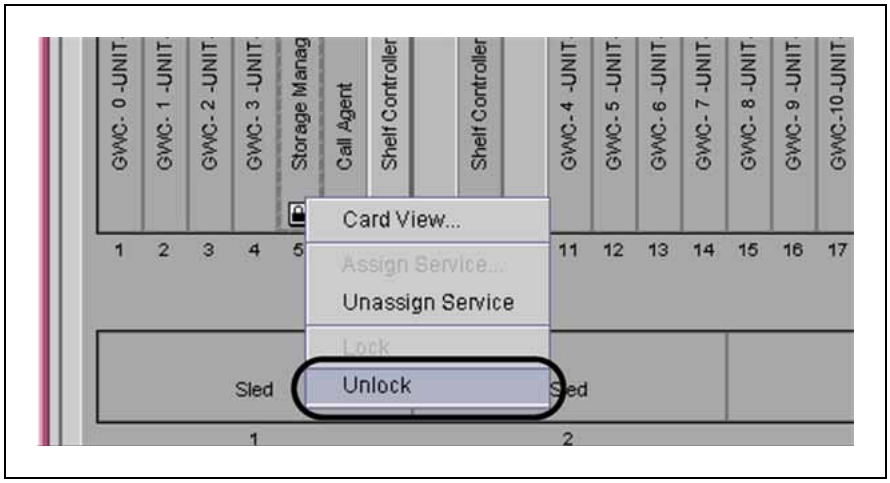


11 Replace the fiber channel, Ethernet, and serial connections on the faceplate.

At the CS 2000 SAM21 Manager client workstation

12 Wait for the card icon to reappear in the Shelf View.

13 Right click on the card icon and select Unlock from the card context menu.



14 Reactivate client access to the STORM unit.

15 This procedure is complete.

—End—

Running diagnostics

This procedure is applicable to the STORM cPCI hardware platform only.

CAUTION
Possible service interruption
This procedure requires locking the STORM unit.

Ensure that clients of the STORM unit are in a maintenance or offline state before locking the STORM unit or those clients could fail and cause a service interruption.

Ensure that the storage provided to the call processing application on the Call Agent card is busied. Refer to Disk Administration in the *Call Agent Security and Administration*, NN10175-611.

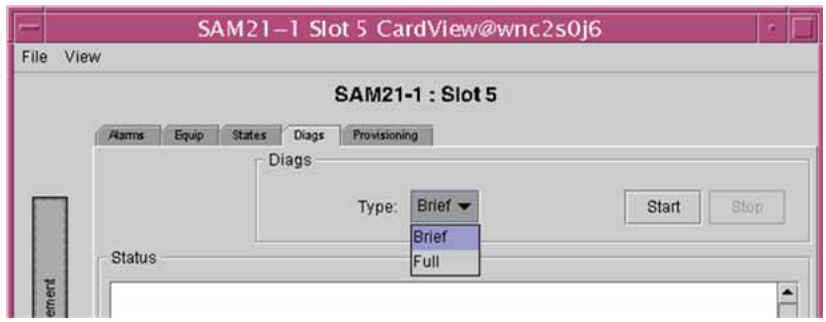
If a USP - Compact uses the STORM unit, ensure the USP - Compact is in a maintenance state by inhibiting and deactivating the SS7 links and then stopping the application server processes (ASP) between the call processing application and the Gateway Controllers (GWC). Refer to *USP - Compact Operational Configuration*, NN10094-511.

Step	Action

At the CS 2000 SAM21 Manager client

1 Lock the STORM unit.

2 From the Card View window, select the Diags tab.



3 Use the pull down menu to select Brief or Full diagnostics and click the Start button.

Diagnostics begin and the progress is displayed in the Status window. Wait for the Status window to indicate success.

4 Optionally save the results by clicking the Save button.

5 Unlock the STORM unit.

6 This procedure is complete.

—End—

Additional information

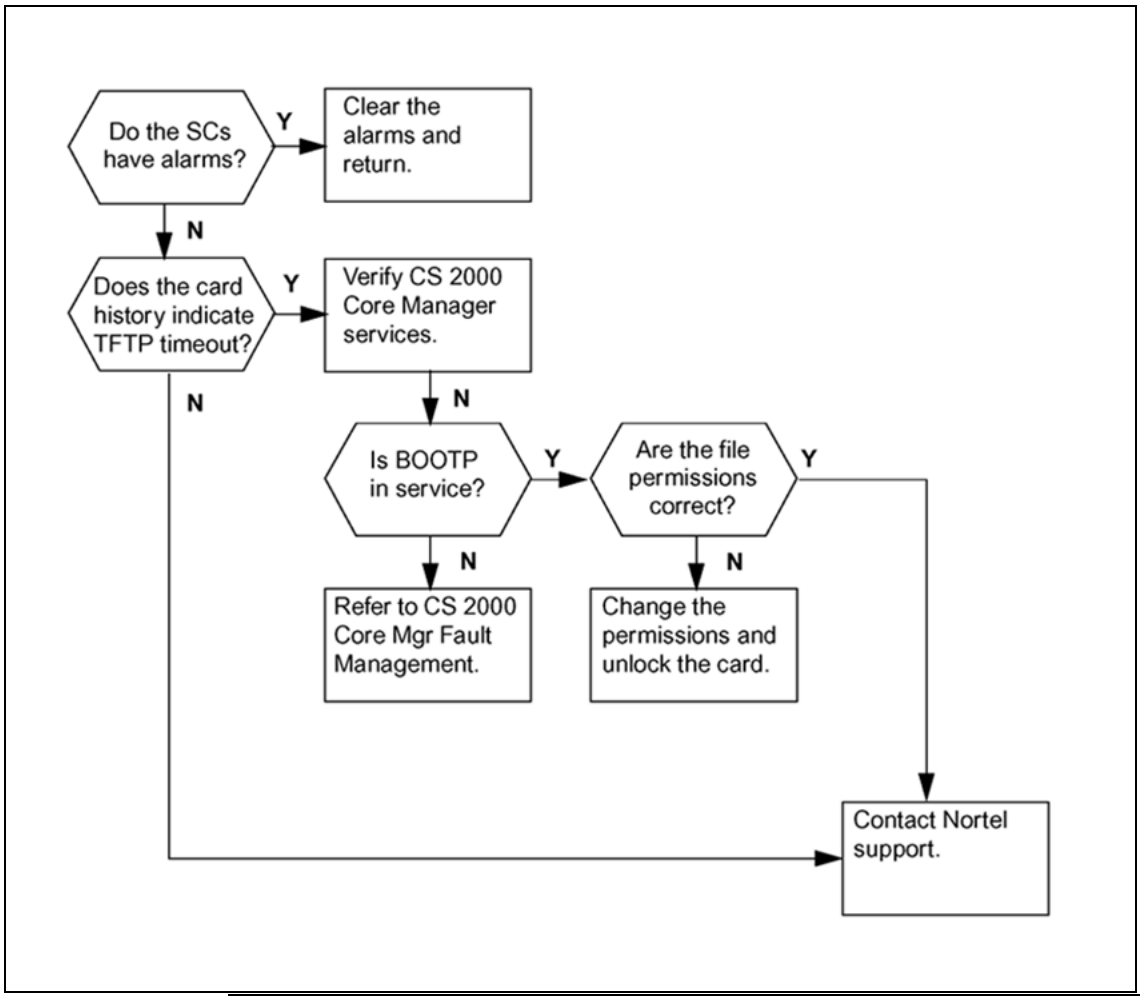
If the STORM unit fails diagnostics, save the results, record the failure in office documents and then attempt brief and then full diagnostics. If the STORM unit fails a second time, replace the card.

Contact Nortel support personnel for assistance with replacing STORM cards.

Troubleshooting STORM boot

This procedure applies to the STORM cPCI hardware platform only.

Use the flowchart and following information to diagnose a no boot condition from the CS 2000 SAM21 Manager client.

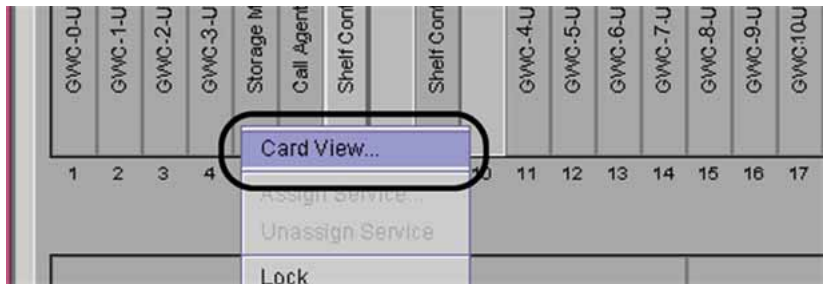


Step Action

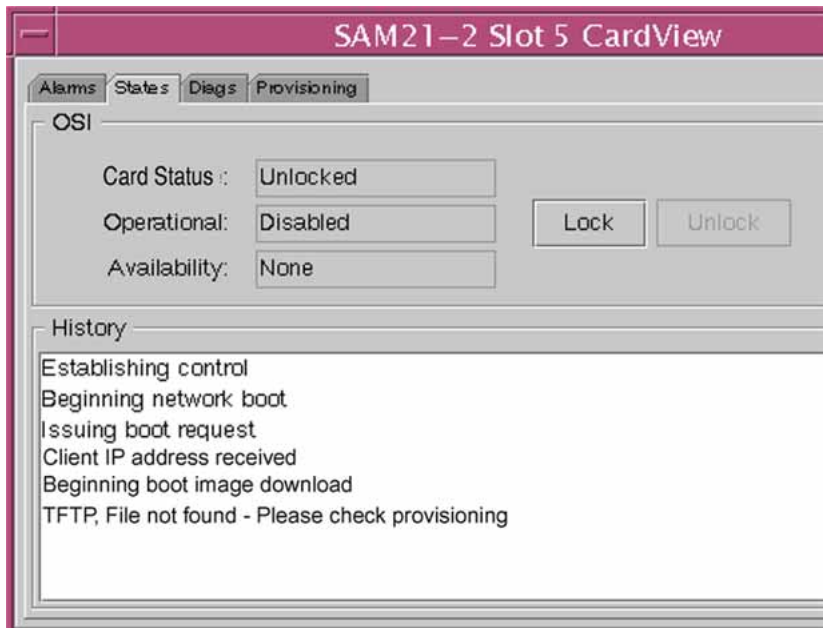
At the CS 2000 SAM21 Manager client workstation

1 If the Shelf Controllers are colored yellow or red then clear the Shelf Controller alarms and then try to Unlock the card again.

2 Right-click on the card and click on Card View.



3 Click the States tab from the Card View window.



Use the table to determine appropriate action.

If	Do
the History text indicates that the File was not found	Procedure "Verifying CS 2000 Core Manager services" (page 64)
the History text indicates some other problem	Contact Nortel Support Personnel.

4 This procedure is complete.

—End—

Verifying CS 2000 Core Manager services

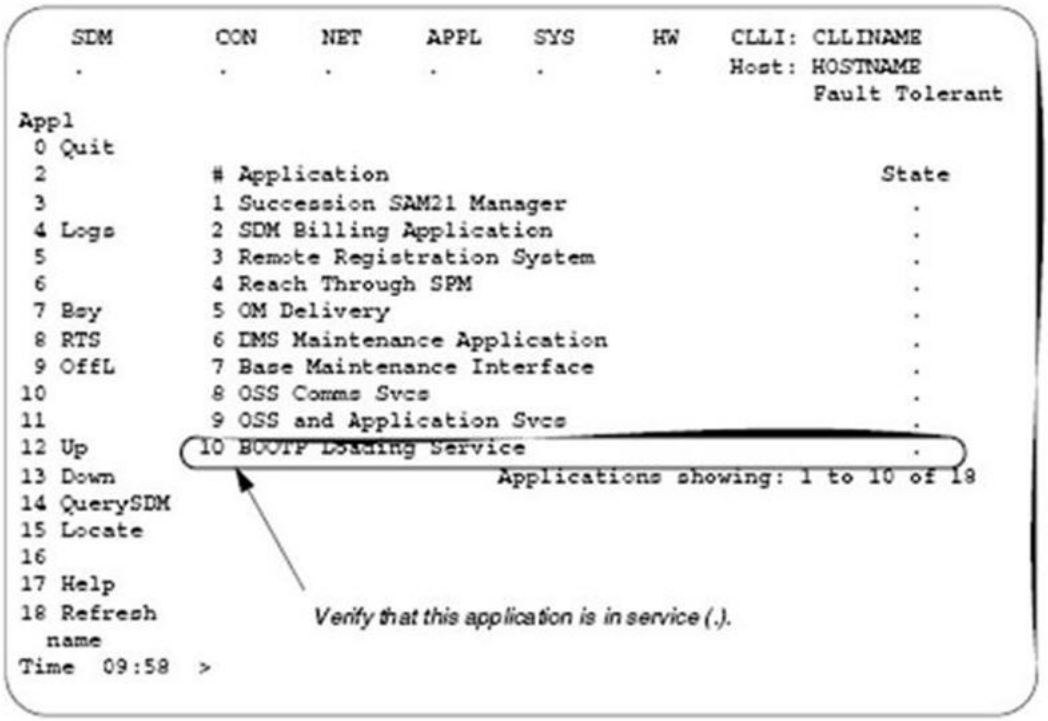
Use this procedure to verify CS 2000 Core Manager services.

Step	Action

At the CS 2000 Core Manager console

1 Start the SDMMTC application and navigate to the Application level.

2 Verify that the BOOTP Loading Service is in service.

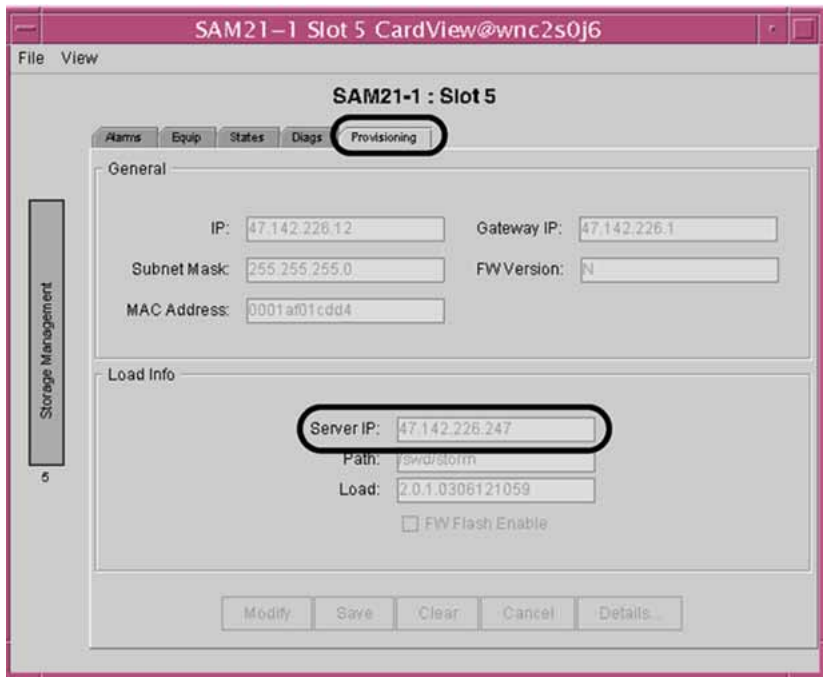


Determine next action.

If	Do
the BOOTP service is in service	continue to step 3
the BOOTP service is not in service	Refer to the CS 2000 Core Manager documentation for procedures.

At the CS 2000 SAM21 Manager client workstation

3 To verify that the load file exists on the CS 2000 Core Manager, retrieve the load information from the Card View at the CS 2000 SAM21 Manager client.



Note: The Server IP address must be the IP address of the CS 2000 Core Manager.

At the CS 2000 Core Manager console

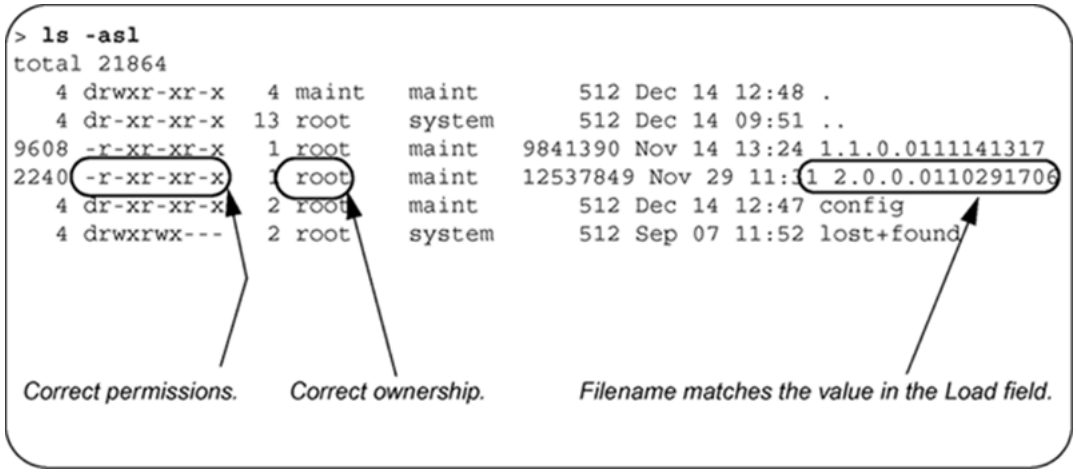
4 Change directory to the location listed in the Path field.

```
> cd /swd/storm
```

5 List the directory contents will the long listing and attributes.

```
> ls -asl
```

6 Verify that the file listed in the Load field exists and has read and write permissions for owner, group, and others.



Determine next action.

If	Do
permissions are not correct	`> chmod 555 <filename>`
ownership is not correct	`> chown root:maint <filename>`
file name is not correct	Alter the Load value on the Provisioning tab at the CS 2000 SAM21 Manager client to match the file on the CS 2000 Core Manager or verify installation of the software fileset from the SWIM level of the SDMMTC application.
all the information is correct	Verify physical connectivity between the card and the CS 2000 Core Manager.

7 Issue another Unlock request from the CS 2000 SAM21 Manager client. If card does not boot, contact Nortel support personnel.

8 This procedure is complete.

—End—

Carrier VoIP

STORM Fault Management

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