IBM System Storage SAN Volume Controller

Service Guide

Version 4.3.0

GC26-7901-03

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Note:
Before using this information and the product it supports, read the information in **Notices** and **Safety and environmental notices**.

This edition applies to the IBM System Storage SAN Volume Controller, release 4.3.0, and to all subsequent releases and modifications until otherwise indicated in new editions. This edition replaces GC26-7901-02.

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About this guide

This guide describes how to service the IBM System Storage SAN Volume Controller.

The chapters that follow introduce you to the SAN Volume Controller, the redundant ac power switch, and the uninterruptible power supply and describe how you can install and maintain the software for the SAN Volume Controller. The vital product data (VPD) topic provides information about the VPD that uniquely defines each hardware and microcode element that is in the SAN Volume Controller.

You can also learn how to configure and check the status of one SAN Volume Controller node or a cluster of nodes through the front panel, as well as to diagnose problems using the SAN Volume Controller, the uninterruptible power supply, IBM System Storage Productivity Center, and the master console.

The maintenance analysis procedures (MAPs) can help you analyze failures that occur in a SAN Volume Controller. With the MAPs, you can isolate the FRUs (field replaceable units) of the SAN Volume Controller that fail. Begin all problem determination and repair procedures from MAP 5000: Start.

You are also provided with step-by-step procedures to remove and replace parts for the SAN Volume Controller and the uninterruptible power supply. The parts are outlined for you in our parts catalog.

Who should use this guide

This guide should be read by the Systems Services Representative who is responsible for the service of the SAN Volume Controller, the redundant ac power switch, the uninterruptible power supply, the IBM System Storage Productivity Center, and the master console.

Summary of changes

This summary of changes describes new functions that have been added to this release.

This document contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Summary of changes for GC26-7901-03 SAN Volume Controller Service Guide

The Summary of changes provides a list of new, modified, and changed information since the last version of the guide.

New information

This section lists new information that was added to this document.

- A brief description of IBM System Storage Productivity Center, which has replaced the master console that was offered in previous releases.

- Updated information about ports and connections to include IPv6 (Internet Protocol Version 6) support.
- A description of the new Version option on the front panel display that allows you to display the version of the SAN Volume Controller software that is active on the node and and the build level of the SAN Volume Controller cluster software that is active on the node.
- A description of the new Validate WWNN? option on the front panel display that allows you to choose between the WWNN that is stored either on the service controller or on the disk when the WWNN is not the same on both.
- Updated MAP 5600 to include information about replacing the small form-factor pluggable (SFP) connector rather than the entire fibre-channel adapter assembly.
- Instructions for removing and replacing the SAN Volume Controller fibre-channel SFP connector
- Instructions for removing and replacing the SAN Volume Controller 2145-8G4 system board.
- Boot error code 250.
- Node error codes 556 and 565.
- Cluster error codes 1600, 1623, 1624, 1625, 1695, 1860, 1862, 1865, 1870, 1950, 3029, 3030, 3031, 3032, and 3033.

Changed information

This section lists the topics that were updated in this document.

- Reorganized the SAN Volume Controller chapter into three chapters that provide an overview, describe the hardware, and discuss console and command line service tasks.
- Enhanced the data and event notification information to include the Call Home e-mail addresses.
- Added information about the improvements to the front panel displays that allow you to more easily display and edit the node's WWNN and the Validate WWNN? option that allows you to choose between the WWNN that is stored either on the service controller or on the disk when the WWNN is not the same on both.
- Updated the description of the Select language menu option, which now allows you to display only the English and Japanese languages on the front panel display.
- Updated the part number for the SAN Volume Controller 2145-8G4 cable retention bracket.
- Enhanced the information about the 2145-1U uninterruptible power supply power switch.
- Boot error codes 100, 120, 137, 145, 174, 175, 180, and 181.
- Node error codes 520, 540, 570, and 576.
- Cluster error codes 1060, 1065, 1093, 1011, 1013, 1025, 1060, 1065, 1092, 1093, 1100, 1101, 1105, 1106, 1110, 1146, 1210, 1400, and 1920.

Summary of changes for GC26-7901-02 SAN Volume Controller Service Guide

The following information describes the changes to this guide since the previous edition (GC26-7901-01).

New information

This section lists new information that was added to this document.

- An example of redundant ac power switch cabling.
- The description of a configuration node.
- Instructions on discovering, or rescanning, MDisks using the CLI and the SAN Volume Controller Console.
- Procedures for removing and replacing the SAN Volume Controller 2145-8G4 cable retention bracket.
- Procedures for removing and replacing the 2145-1U uninterruptible power supply power cable retention bracket.
- Cluster error codes 1627, 2600, and 2601.

Changed information

This section lists the topics that were updated in this document.

- Preparing your redundant ac power switch environment.
- "Using the SAN Volume Controller Console to power off a node"
- "Using the SAN Volume Controller CLI to power off a node"
- Understanding the fields for the cluster VPD
- Create cluster?
- Recover cluster navigation
- Error reporting
- Sending notifications
- Boot codes 110, 130, 135, 137, 140, 150, 155, 180, 181, 185, 186, 190, 191, 195, 196, 200, 205, 206, 210, 211, 215, 216, 220, 221, 225, 226, 230, 231, 235, 236, 240, 241, 245, and 246.
- Performing the node rescue
- Node rescue code 350.
- Node error code 550.
- Cluster error code 2040.
- *MAP 5000: Start*.
- *MAP 5350: Powering off a SAN Volume Controller node*
- *MAP 5400: Front panel*
- *MAP 5500: Ethernet*
- *MAP 5600: Fibre channel*
- *MAP 5700: Repair verification*
- *MAP 5800: Light path*
- "Removing the service controller"
- "Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate"
- "Replacing the frame assembly"
- "Replacing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly"
- "Removing the SAN Volume Controller 2145-8G4 microprocessor"

Emphasis

Different typefaces are used in this guide to show emphasis.

The following typefaces are used to show emphasis:

Boldface	Text in **boldface** represents menu items and command names.
Italics	Text in *italics* is used to emphasize a word. In command syntax, it is used for variables for which you supply actual values, such as a default directory or the name of a cluster.
`Monospace`	Text in `monospace` identifies the data or commands that you type, samples of command output, examples of program code or messages from the system, or names of command flags, parameters, arguments, and name-value pairs.

SAN Volume Controller library and related publications

A list of other publications that are related to this product are provided to you for your reference.

The tables in this section list and describe the following publications:

- The publications that make up the library for the IBM System Storage SAN Volume Controller
- Other IBM publications that relate to the SAN Volume Controller

SAN Volume Controller library

The following table lists and describes the publications that make up the SAN Volume Controller library. Unless otherwise noted, these publications are available in Adobe portable document format (PDF) from the following Web site:

http://www.ibm.com/storage/support/2145

Title	Description	Order number
IBM System Storage SAN Volume Controller: CIM Agent Developer's Reference	This reference guide describes the objects and classes in a Common Information Model (CIM) environment.	SC26-7904
IBM System Storage SAN Volume Controller: Command-Line Interface User's Guide	This guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI).	SC26-7903
IBM System Storage SAN Volume Controller: Software Installation and Configuration Guide	This guide provides guidelines for configuring your SAN Volume Controller.	SC23-6628

Title	Description	Order number
IBM System Storage SAN Volume Controller: Host Attachment Guide	This guide provides guidelines for attaching the SAN Volume Controller to your host system.	SC26-7905
IBM System Storage SAN Volume Controller: Hardware Installation Guide	This guide includes the instructions that the IBM service representative uses to install the SAN Volume Controller hardware.	GC27-2132
IBM System Storage SAN Volume Controller: Planning Guide	This guide introduces the SAN Volume Controller and lists the features you can order. It also provides guidelines for planning the installation and configuration of the SAN Volume Controller.	GA32-0551
IBM System Storage SAN Volume Controller: Service Guide	This guide includes the instructions that the IBM service representative uses to service the SAN Volume Controller.	GC26-7901
IBM Systems Safety Notices	This guide contains translated caution and danger statements. Each caution and danger statement in the SAN Volume Controller documentation has a number that you can use to locate the corresponding statement in your language in the *IBM Systems Safety Notices* document.	G229-9054

Other IBM publications

The following table lists and describes other IBM publications that contain additional information that is related to the SAN Volume Controller.

You can download IBM eServer xSeries, IBM xSeries, and IBM System x publications from the following Web site:

http://www-304.ibm.com/jct01004c/systems/support/

Title	Description	Order number
IBM System Storage Productivity Center Introduction and Planning Guide	This guide introduces the IBM System Storage Productivity Center hardware and software.	SC23-8824
IBM System Storage Productivity Center Hardware Installation and Configuration Guide	This guide describes how to install and configure the IBM System Storage Productivity Center hardware.	SC23-8822

Title	Description	Order number
IBM System Storage Productivity Center Software Installation and User's Guide	This guide describes how to install and use the IBM System Storage Productivity Center software.	SC23-8823
IBM System Storage Multipath Subsystem Device Driver: User's Guide	This guide describes the IBM System Storage Multipath Subsystem Device Driver Version 1.6 for TotalStorage Products and how to use it with the SAN Volume Controller. This publication is referred to as the *IBM System Storage Multipath Subsystem Device Driver: User's Guide*.	GC27-2164
IBM TotalStorage DS4300 Fibre Channel Storage Subsystem Installation, User's, and Maintenance Guide	This guide describes how to install and configure the IBM TotalStorage DS4300 Fibre-Channel Storage Subsystem.	GC26-7722
IBM eServer xSeries 306m (Types 8849 and 8491) Installation Guide	This guide describes how to install the IBM eServer xSeries 306m, which is the hardware delivered for some versions of the hardware master console.	MIGR-61615
IBM xSeries 306m (Types 8849 and 8491) User's Guide	This guide describes how to use the IBM eServer xSeries 306m, which is the hardware delivered for some versions of the hardware master console.	MIGR-61901
IBM xSeries 306m (Types 8849 and 8491) Problem Determination and Service Guide	This guide can help you troubleshoot and resolve problems with the IBM eServer xSeries 306m, which is the hardware delivered for some versions of the hardware master console.	MIGR-62594
IBM eServer xSeries 306 (Type 8836) Installation Guide	This guide describes how to install the IBM eServer xSeries 306, which is the hardware delivered for some versions of the hardware master console.	MIGR-55080
IBM eServer xSeries 306 (Type 8836) User's Guide	This guide describes how to use the IBM eServer xSeries 306, which is the hardware delivered for some versions of the hardware master console.	MIGR-55079

Title	Description	Order number
IBM eServer xSeries 306 (Types 1878, 8489 and 8836) Hardware Maintenance Manual and Troubleshooting Guide	This guide can help you troubleshoot problems and maintain the IBM eServer xSeries 306, which is the hardware delivered for some versions of the hardware master console.	MIGR-54820
IBM eServer xSeries 305 (Type 8673) Installation Guide	This guide describes how to install the IBM eServer xSeries 305, which is the hardware delivered for some versions of the hardware master console.	MIGR-44200
IBM eServer xSeries 305 (Type 8673) User's Guide	This guide describes how to use the IBM eServer xSeries 305, which is the hardware delivered for some versions of the hardware master console.	MIGR-44199
IBM eServer xSeries 305 (Type 8673) Hardware Maintenance Manual and Troubleshooting Guide	This guide can help you troubleshoot problems and maintain the IBM eServer xSeries 305, which is the hardware delivered for some versions of the hardware master console.	MIGR-44094
IBM TotalStorage 3534 Model F08 SAN Fibre Channel Switch User's Guide	This guide introduces the IBM TotalStorage SAN Switch 3534 Model F08.	GC26-7454
IBM System x3250 (Types 4364 and 4365) Installation Guide	This guide describes how to install the IBM System x3250, which is the hardware delivered for some versions of the hardware master console.	MIGR-5069761
IBM System x3250 (Types 4364 and 4365) User's Guide	This guide describes how to use the IBM System x3250, which is the hardware delivered for some versions of the hardware master console.	MIGR-66373
IBM System x3250 (Types 4364 and 4365) Problem Determination and Service Guide	This guide can help you troubleshoot and resolve problems with the IBM System x3250, which is the hardware delivered for some versions of the hardware master console.	MIGR-66374
IBM TotalStorage SAN Switch 2109 Model F16 User's Guide	This guide introduces the IBM TotalStorage SAN Switch 2109 Model F16.	GC26-7439

Title	Description	Order number
IBM TotalStorage SAN Switch 2109 Model F32 User's Guide	This guide introduces the IBM TotalStorage SAN Switch 2109 Model F32. It also describes the features of the switch and tells you where to find more information about those features.	GC26-7517

Some related publications are available from the following SAN Volume Controller support Web site:

http://www.ibm.com/storage/support/2145

Related Web sites

The following Web sites provide information about the SAN Volume Controller or related products or technologies.

Type of information	Web site
SAN Volume Controller support	http://www.ibm.com/storage/support/2145
Technical support for IBM storage products	http://www.ibm.com/storage/support/

How to order IBM publications

The IBM publications center is a worldwide central repository for IBM product publications and marketing material.

The IBM publications center offers customized search functions to help you find the publications that you need. Some publications are available for you to view or download free of charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM publications center through the following Web site:

http://www.ibm.com/shop/publications/order/

How to send your comments

Your feedback is important to help us provide the highest quality information. If you have any comments about this book or any other documentation, you can submit them in one of the following ways:

- e-mail

  Submit your comments electronically to the following e-mail address:

  starpubs@us.ibm.com

  Be sure to include the name and order number of the book and, if applicable, the specific location of the text you are commenting on, such as a page number or table number.
- Mail

Fill out the Readers' Comments form (RCF) at the back of this book. If the RCF has been removed, you can address your comments to:

International Business Machines Corporation
RCF Processing Department
Department 61C
9032 South Rita Road
Tucson, Arizona 85775-4401
U.S.A.

Safety and environmental notices

Safety must be a concern for anyone using a SAN Volume Controller, redundant ac power switch, or an uninterruptible power supply.

The **Danger** and **Caution** notices for the SAN Volume Controller and any related uninterruptible power supply units can be found in the *IBM Systems Safety Notices*. Please review the topics concerning the safety notices to ensure that you are in compliance.

Important: Be sure to read the multilingual safety instructions on the SAN Volume Controller web site before you use the product. Go to http://www.ibm.com/storage/support/2145, click the current product documentation link, and then click **Multi-language**.

Definitions of notices

Ensure that you understand the typographic conventions that are used to indicate special notices.

The notices throughout the SAN Volume Controller documentation and in the *IBM Systems Safety Notices* document follow specific guidelines for their content.

The following notices are used throughout this library to convey specific meanings:

Note: These notices provide important tips, guidance, or advice.

Attention: These notices indicate possible damage to programs, devices, or data. An attention notice appears before the instruction or the situation in which damage might occur.

CAUTION:
These notices indicate situations that can be potentially hazardous to you. A caution notice precedes the description of a potentially hazardous procedural step or situation.

DANGER

These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice precedes the description of a potentially lethal or extremely hazardous procedural step or situation.

The caution and danger notices that appear in this document are also in the multilingual *IBM Systems Safety Notices* document. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

General safety

When you service the SAN Volume Controller or the uninterruptible power supply, follow general safety guidelines.

Use the following general rules to ensure safety to yourself and others:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object, do the following:
  1. Ensure that you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 18 kg (40 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes a hazard to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconducting clip, approximately 8 cm (3 in.) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

  Remember: Metal objects are good electrical conductors.
- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly after you have finished servicing the machine.

Electrical safety

Observe the these rules when working on electrical equipment.

CAUTION:
Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the machine covers, unless instructed otherwise in the installation and configuration procedures. (26)

Important: Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents. Many customers have, near their

equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before the following activities:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.

    Remember: Another person must be there to switch off the power, if necessary.
  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

    Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

  Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine. (This practice ensures correct grounding of the units.)
  - Power supply units
  - Pumps

  - Blowers and fans
  - Motor generators
  - And similar units
- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

Inspecting the SAN Volume Controller for unsafe conditions

Use caution when working in any potential safety hazardous situation that is not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you can continue before you correct the problem.

Before you start the safety inspection, make sure the power is off, and the power cord is disconnected.

Each machine has required safety items installed to protect users and IBM service personnel from injury. This guide addresses only those items.

Important: Good judgment must also be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem. For example, consider the following conditions and their potential safety hazards:

Electrical hazards (especially primary power)
Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards
A damaged CRT face or a bulging capacitor can cause serious injury.

Mechanical hazards
Loose or missing items (for example, nuts and screws) can cause serious injury.

Perform the following steps to inspect each SAN Volume Controller node for unsafe conditions. If necessary, see any suitable safety publications.

1. Turn off the SAN Volume Controller and disconnect the power cord.
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables using the following steps:
   a. Ensure that the third-wire ground connector is in good condition. Use a meter to check that the third-wire ground continuity is 0.1 ohm or less between the external ground pin and the frame ground.
   b. Ensure that the power cord is the appropriate type, as specified in the parts listings.
   c. Ensure that the insulation is not worn or damaged.
4. Check for any obvious nonstandard changes, both inside and outside the machine. Use good judgment about the safety of any such changes.

5. Check inside the SAN Volume Controller for any obvious unsafe conditions, such as metal particles, contamination, water or other fluids, or marks of overheating, fire, or smoke damage.
6. Check for worn, damaged, or pinched cables.
7. Ensure that the voltage that is specified on the product-information label matches the specified voltage of the electrical power outlet. If necessary, verify the voltage.
8. Inspect the power supply assemblies and check that the fasteners (screws or rivets) in the cover of the power-supply unit have not been removed or disturbed.
9. Before connecting the SAN Volume Controller to the SAN, check the grounding.

   Related tasks

   "Checking the grounding of a SAN Volume Controller, the uninterruptible power supply, and the redundant ac power switch" on page xxviii
   Ensure that you understand how to check the grounding of a SAN Volume Controller, the uninterruptible power supply, and the optional redundant ac power feature.

External machine check

Ensure that you perform an external machine check before you install the SAN Volume Controller.

Perform the following steps to conduct an external machine check:

1. Verify that all external covers are present and are not damaged.
2. Ensure that all latches and hinges are in the correct operating condition.
3. If the SAN Volume Controller is not installed in a rack cabinet, check for loose or broken feet.
4. Check the power cord for damage.
5. Check the external signal cable for damage.
6. Check the cover for sharp edges, damage, or alterations that expose the internal parts of the device.
7. Correct any problems that you find.

Internal machine checks

Ensure that you perform an internal machine check before you install the SAN Volume Controller.

Perform the following steps to conduct the internal machine check:

1. Check for any non-IBM changes that might have been made to the machine. If any are present, obtain the "Non-IBM Alteration Attachment Survey," form number R009, from the IBM branch office. Complete the form and return it to the branch office.
2. Check the condition of the inside of the machine for any metal or other contaminants, or any indications of water, other fluid, fire, or smoke damage.
3. Check for any obvious mechanical problems, such as loose components.
4. Check any exposed cables and connectors for wear, cracks, or pinching.

Checking the grounding of a SAN Volume Controller, the uninterruptible power supply, and the redundant ac power switch

Ensure that you understand how to check the grounding of a SAN Volume Controller, the uninterruptible power supply, and the optional redundant ac power feature.

All SAN Volume Controller models support the use of the 2145-1U uninterruptible power supply and the optional redundant ac power switch. The SAN Volume Controller 2145-4F2 also supports the use of the 2145 uninterruptible power supply.

Perform the following steps to test the grounding of a SAN Volume Controller. Follow the steps for the SAN Volume Controller configuration you are using. Before you start, confirm you know the SAN Volume Controller model type, the uninterruptible power supply type, and whether you are using redundant ac power. Note the location of the signal cables that are attached to the SAN Volume Controller.

When you are asked to test the grounding continuity, use your local procedures to perform the test. The test is successful if the measured resistance is 0.1 ohm or less.

Attention: Some electrical circuits can be damaged if the external signal cables are present at the SAN Volume Controller while it is undergoing a grounding test.

1. Ensure that the SAN Volume Controller node is powered off. See "MAP 5350: Powering off a SAN Volume Controller node" in the *IBM System Storage SAN Volume Controller: Service Guide*.
2. If the uninterruptible power supply is a 2145 uninterruptible power supply, ensure that other SAN Volume Controller nodes that are powered from the uninterruptible power supply are powered off.
3. Use the power button to power off the uninterruptible power supply.
4. Disconnect all signal cables from the SAN Volume Controller node, which includes the following cables:
   - The fibre-channel cables
   - The Ethernet cable
   - The serial cable that is connected to the uninterruptible power supply.
5. Disconnect all signal cables from the uninterruptible power supply. If the uninterruptible power supply is a 2145 uninterruptible power supply, there might be multiple signal cables.
6. If the uninterruptible power supply is a 2145 uninterruptible power supply, disconnect any power cables that are connected to SAN Volume Controller nodes, except the one that is being tested.
7. If redundant ac power is not used, disconnect the uninterruptible power supply power cable from the site power distribution unit.
8. If redundant ac power is used, power off any SAN Volume Controller that is being supplied from the redundant ac power switch, and remove the power cable to this system from the redundant ac power switch.
9. If redundant ac power is used, disconnect ***both*** input power leads from the site power distribution units.
10. If redundant ac power is not used, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of the uninterruptible power supply input power cable.

11. If redundant ac power is used, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of the main power cable of the redundant ac power switch. If the test is successful, test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of the backup power cable of the redundant ac power switch. Both tests must be successful.
12. After you have completed testing the grounding continuity, perform one of the following procedures, depending on the outcome of the test.
    - If the test is successful, reconnect any cables that were removed, and power on any uninterruptible power supply units and SAN Volume Controller nodes that were powered off.
    - If the test was not successful, ensure that all cables are securely connected. If the test still fails, test the individual system components. Before you test the individual components, remove all cables from the components. If any component test fails, replace the component. After each component has been tested and the failing ones have been replaced, repeat the complete system test by returning to step 1 on page xxviii. Test the components in the following order:
      a. The SAN Volume Controller node, from the frame to the ground pin of the input power receptacle.
      b. The uninterruptible power supply from the ground pin of the input power receptacle to the ground conductor of the output power receptacle.
      c. If used, the redundant ac power switch from the ground pin of the main input power receptacle to the ground conductor of the output power receptacle, and from the ground pin of the backup input power receptacle to the ground conductor of the output power receptacle.
      d. The SAN Volume Controller node to uninterruptible power supply power cable assembly, between the two ground conductors of the power cable.
      e. The uninterruptible power supply input power cable, between the two ground conductors of the power cable.
      f. If used, the redundant ac power switch main input power cable, between the two ground conductors of the cable.
      g. If used, the redundant ac power switch backup input power cable, between the two ground conductors of the cable.

Inspecting the uninterruptible power supply for unsafe conditions

Ensure that you take the time to inspect the uninterruptible power supply for unsafe conditions.

Consider the following conditions and their potential safety hazards:

Electrical hazards (especially primary power)
Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards
A bulging capacitor can cause serious injury.

Mechanical hazards
Loose or missing items (for example, nuts and screws) can cause serious injury.

Use caution when working in a potential safety hazard that is not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you can continue before you correct the problem.

Using the following inspection checklist as a guide, inspect the uninterruptible power supply for unsafe conditions. If necessary, see any suitable safety publications.

1. If any equipment has been damaged during the shipment, keep the shipping cartons and packing materials.
2. Perform the following steps to file a claim for the shipping damage:
   a. File with the carrier within fifteen days of receipt of the equipment.
   b. Send a copy of the damage claim within fifteen days to your service support representative.

Uninterruptible power supply requirements

Ensure that you comply with the requirements for the uninterruptible power supply.

The following list describes requirements for the 2145 uninterruptible power supply:

- Each uninterruptible power supply must be connected to a separate branch circuit.
- A UL listed 15 A circuit breaker must be installed in each branch circuit that supplies power to the uninterruptible power supply.
- The voltage that is supplied to the uninterruptible power supply must be 200–240 V single phase.
- The frequency that is supplied must be 50 or 60 Hz.

The following list describes requirements for the 2145-1U uninterruptible power supply:

- The voltage that is supplied to the 2145-1U uninterruptible power supply must be 200-240 V single phase.
- The frequency that is supplied must be 50 or 60 Hz.

Note that the 2145-1U uninterruptible power supply has an integrated circuit breaker and does not need external protection.

Note: If the uninterruptible power supply is cascaded from another uninterruptible power supply, the source uninterruptible power supply must have at least three times the capacity per phase and the total harmonic distortion must be less than 5%. The uninterruptible power supply also must have input voltage capture that has a slew rate of no more than 3 Hz per second.

Emergency power-off shutdown

The SAN Volume Controller and each uninterruptible power supply support emergency power-off (EPO) shutdowns.

In the event of a room EPO shutdown, the 2145 uninterruptible power supply detects a loss of input power. This power loss is reported to the SAN Volume Controller 2145-4F2, which completes the process of shutting down the uninterruptible power supply within five minutes.

Attention: The 2145 uninterruptible power supply power off shutdown is normally controlled by the SAN Volume Controller 2145-4F2. If an EPO event occurs, but no SAN Volume Controller 2145-4F2 nodes that are connected to a 2145 uninterruptible power supply have been powered on since the 2145 uninterruptible power supply was powered on, you must remove output power from the uninterruptible power supply. To do this, press and hold the off button on the front panel of the 2145 uninterruptible power supply for at least four seconds.

Checking the safety labels on the SAN Volume Controller

Before you install, use, or service the SAN Volume Controller, you must ensure that you understand the safety labels.

1. Locate the following labels for the SAN Volume Controller:
   - **Agency/ratings label for the SAN Volume Controller 2145-8G4**
     - Certified in San Jose, CA USA

svc00280

     - Certified in Vac, Hungary

svc00279

   - **Agency/ratings label for the SAN Volume Controller 2145-8F4**

svc00207

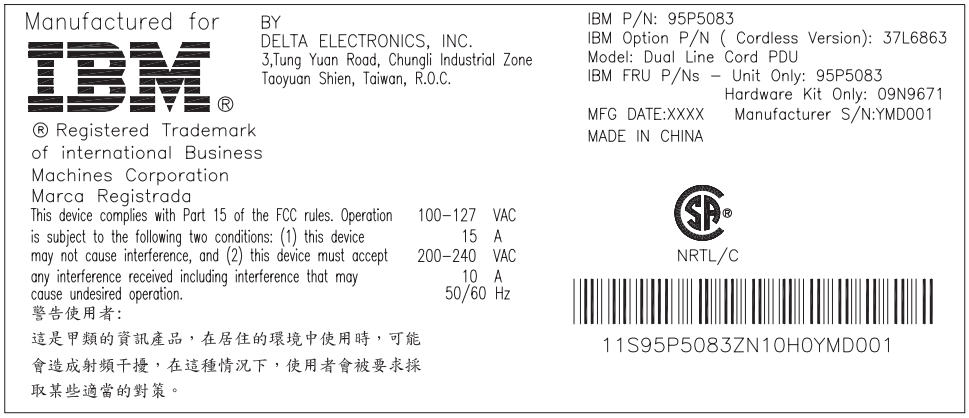
   - **Agency/ratings label for the SAN Volume Controller 2145-8F2**

olume Controller 2145-4F2

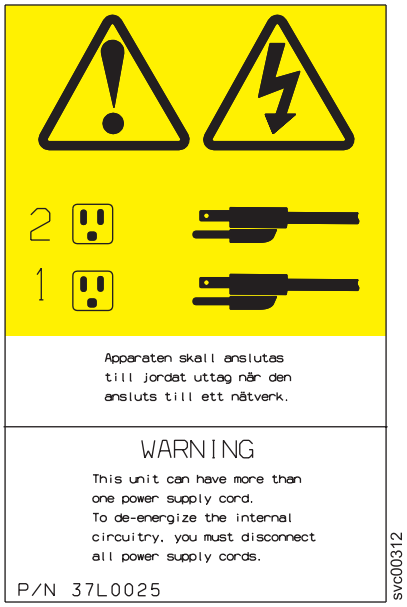
警告使用者:
這是甲類的資訊產品，在

この装置は、クラス A 情報技術装置
この装置を家庭環境で使用する
電波妨害を引き起こすことがあ
場合には使用者が適切な対
するよう要求されること

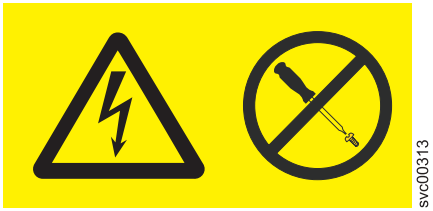
- **No u**



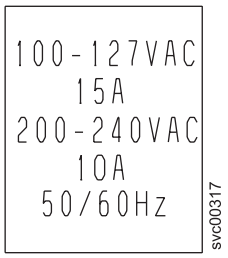
- **Dual power cord warning label**



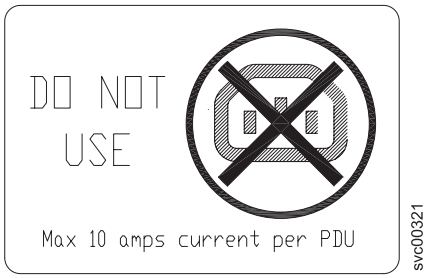
- **No user access label**



- **Input ratings label**



- **Output port warning label**



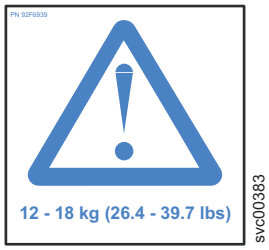
Checking the labels on the outside of the uninterruptible power supply

Before you install, use, or service the uninterruptible power supply, you must ensure that you understand the safety labels.

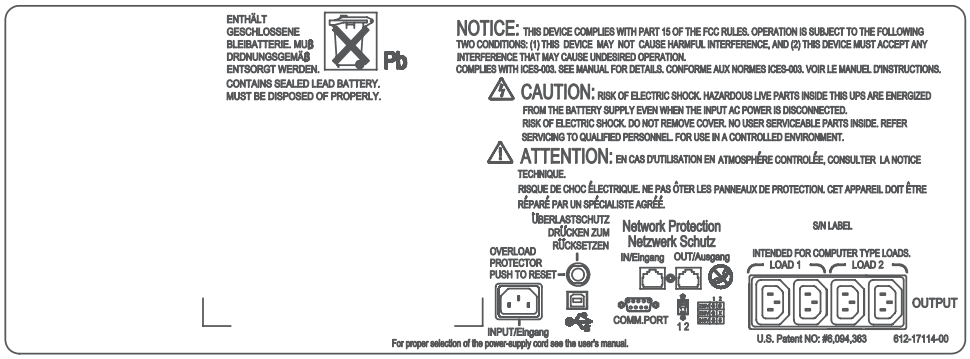
Checking the 2145-1U uninterruptible power supply labels

Before you continue, ensure that you locate and understand each of the following 2145-1U uninterruptible power supply labels:

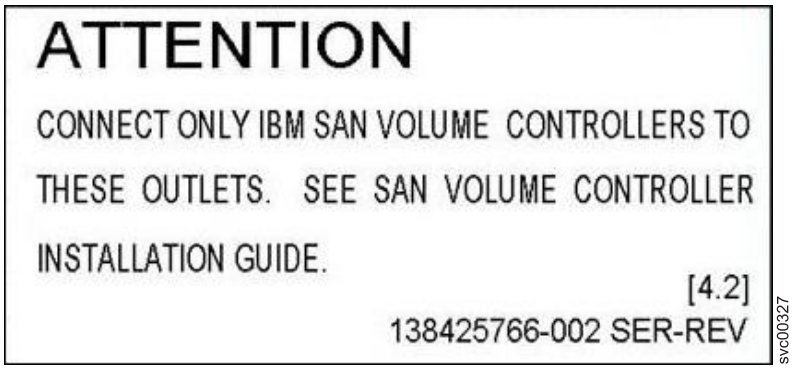
- **Weight caution label**



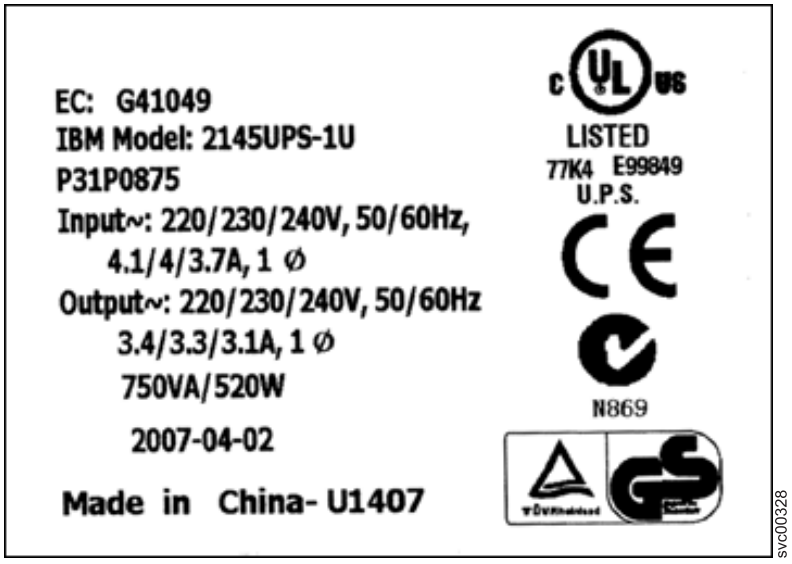
- **Safety label**



- **Power output warning label**



- **Agency label**



- **People's Republic of China Electronic Information Products (EIP) mark - 20 years**

- **Taiwan agency label**

- **IT compatible label**

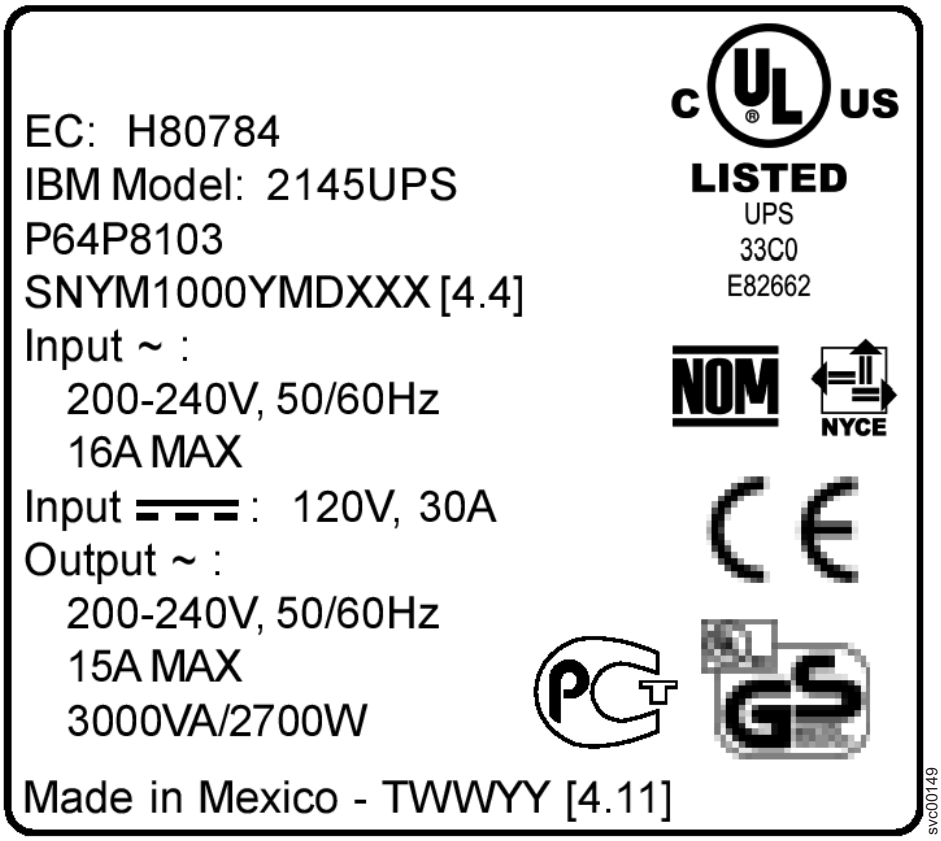
- **Do not discard the uninterruptible power supply or the uninterruptible power supply batteries in the trash label**

  Note: The uninterruptible power supply can contain sealed, lead-acid batteries, which must be recycled.

Checking the 2145 uninterruptible power supply labels

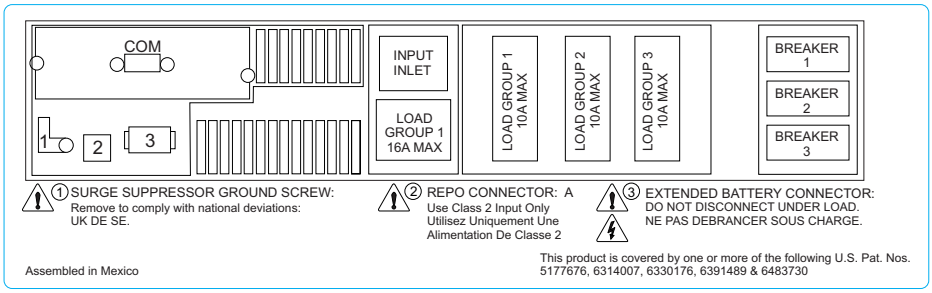
Ensure that you locate and understand each of the following 2145 uninterruptible power supply labels:

- **Agency label**



- **Rear panel configuration label**

  Note: This label is installed on the cover of the power supply of the SAN Volume Controller.

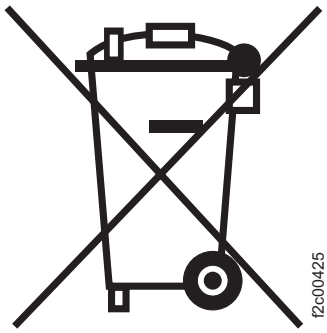


- **Do not discard the uninterruptible power supply or the uninterruptible power supply batteries in the trash label**

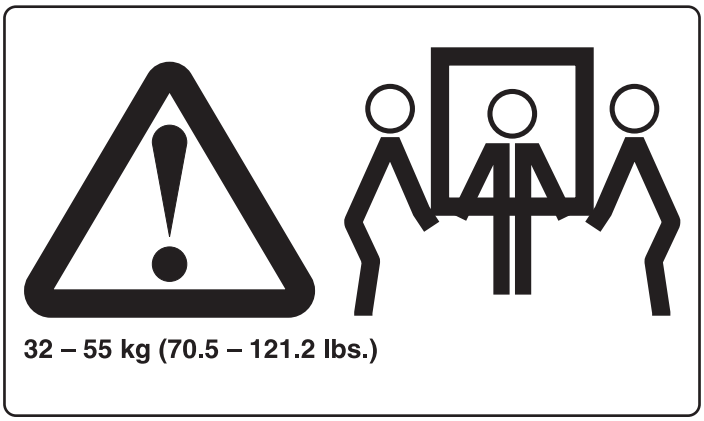
  Notes:

  – The uninterruptible power supply can contain sealed, lead-acid batteries, which must be recycled.

  – If you have a 2145 uninterruptible power supply unit that is already installed, you might not have this label affixed to the outside of the uninterruptible power supply due to changing labeling requirements.



- **Three-person lift label**



- **Weight caution label**

- **IT compatible label**

- **Power ratings and no user access label**

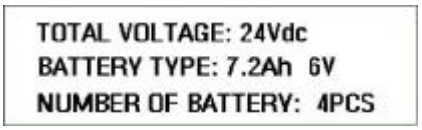
Checking the labels on the battery of the uninterruptible power supply

Before you install, use, or service the battery of the uninterruptible power supply, you must ensure that you understand the safety labels.

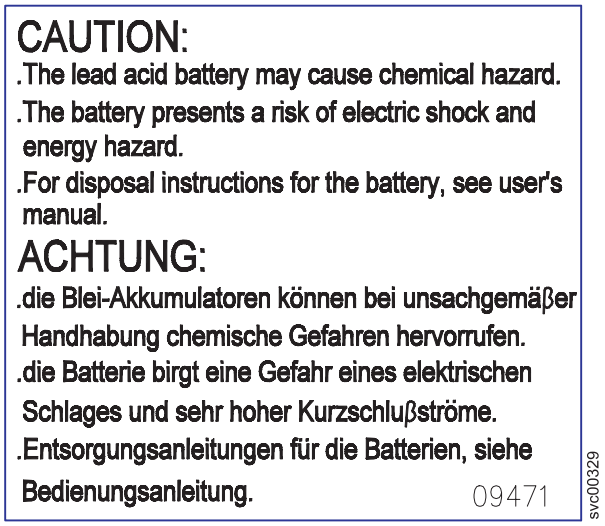
Checking the battery label of the 2145-1U uninterruptible power supply

Locate the following labels for the battery of the 2145-1U uninterruptible power supply.

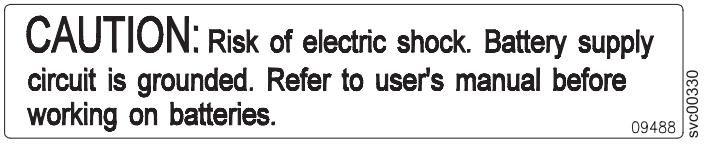
- Battery rating label



- Battery safety label



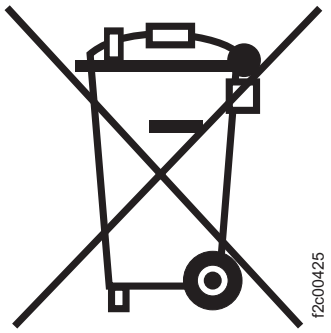
- Electric shock hazard



- **People's Republic of China Electronic Information Products (EIP) mark - 5 years**

- **Do not discard the uninterruptible power supply or the uninterruptible power supply batteries in the trash label**

  Note: The uninterruptible power supply can contain sealed, lead-acid batteries, which must be recycled.

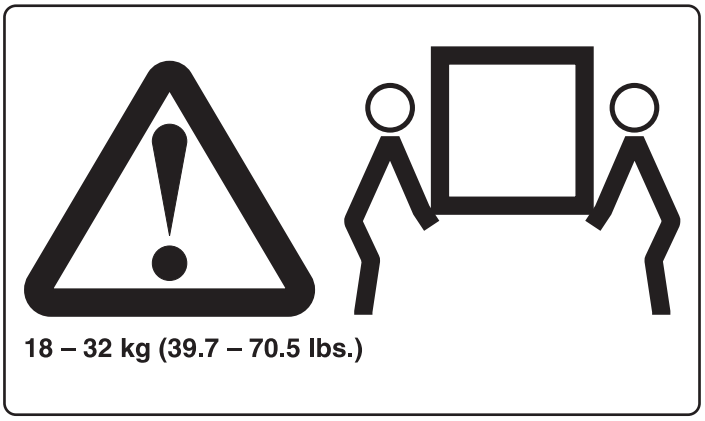


- **Recycling label**

Checking the battery labels of the 2145 uninterruptible power supply

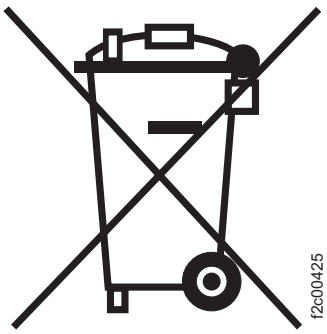
Ensure that you can locate and understand the battery labels for the 2145 uninterruptible power supply.

- **Two-man lift label**



- **Do not discard the uninterruptible power supply or the uninterruptible power supply batteries in the trash label**

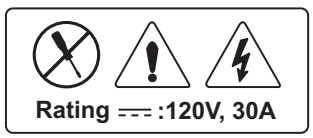
  Note: The uninterruptible power supply can contain sealed, lead-acid batteries, which must be recycled.



- **Recycling label**

- **Weight label**

- **Power ratings and no user access label**



- **Battery faceplate label**

  Note: You must remove the front panel to see the faceplate.

Environmental notices and statements

You must become familiar with the environmental notices and statements.

The following topics describe the environmental notices and statements that are applicable to this product.

1089CORE

The following comments apply to the IBM® servers that have been designated as conforming to NEBS (Network Equipment-Building System) GR-1089-CORE.

Power and cabling information for NEBS (Network Equipment-Building System) GR-1089-CORE

The equipment is suitable for installation in the following:

- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

The intrabuilding ports of this equipment are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of this equipment *must not* be metallically connected to the interfaces that connect to the OSP (outside plant) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

Note: All Ethernet cables must be shielded and grounded at both ends.

The ac-powered system does not require the use of an external surge protection device (SPD).

The dc-powered system employs an isolated DC return (DC-I) design. The DC battery return terminal *shall not* be connected to the chassis or frame ground.

Product recycling and disposal

Ensure that you are aware of the materials that must be recycled.

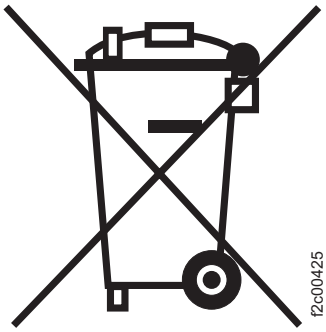
This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist

equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at

http://www.ibm.com/ibm/environment/products/index.shtml

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. IBM recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. IBM dispone de una serie de programas y servicios de devolución de productos en varios países, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de IBM en el sitio web de IBM.

http://www.ibm.com/ibm/environment/products/index.shtml



Note:

This mark applies only to countries within the European Union (EU) and Norway.

Appliances are labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'étiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

注意：このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or

recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown previously, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential affects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

Battery return program

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion batteries. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, contact your local waste disposal facility or go to the following Web site:

http://www.ibm.com/ibm/environment/products/index.shtml

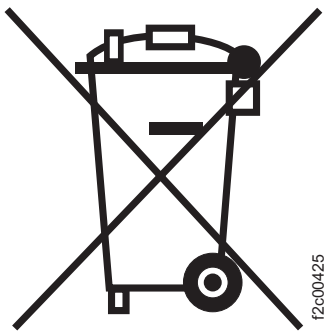
In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and other battery packs from IBM Equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please have the IBM part number listed on the battery available prior to your call.

For Taiwan:

Please recycle batteries

廢電池請回收

For the European Union:



Note: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries

and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

バッテリーあるいはバッテリー用のパッケージには、EU 諸国に対する廃電気電子機器指令 2006/66/EC のラベルが貼られています。この指令は、バッテリーと蓄電池、および廃棄バッテリーと蓄電池に関するものです。この指令は、使用済みバッテリーと蓄電池の回収とリサイクルの骨子を定めているもので、EU 諸国にわたって適用されます。このラベルは、使用済みになったときに指令に従って適正な処理をする必要があることを知らせるために種々のバッテリーに貼られています。

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

This notice is provided in accordance with Royal Decree 106/2008 of Spain: The retail price of batteries, accumulators and power cells includes the cost of the environmental management of their waste.

For California:

Perchlorate Material - special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5, Chapter 33. Best Management Practices for Perchlorate Materials. This product, part, or both may include a lithium manganese dioxide battery which contains a perchlorate substance.

Flat panel display

The fluorescent lamp or lamps in the liquid crystal display contain mercury. Dispose of it as required by local ordinances and regulations.

Monitors and Workstations

New Jersey – For information about recycling covered electronic devices in the state of New Jersey, go to the New Jersey Department of Environmental Protection web site at http://www.state.nj.us/dep/dshw/recycle/Electronic_Waste/index.html

Oregon - For information about recycling covered electronic devices in the state of Oregon, go to the Oregon Department of Environmental Quality site at http://www.deq.state.or.us/lq/electronics.htm.

Washington - For information about recycling covered electronic devices in the State of Washington, contact the Washington Department of Ecology at 1-800Recycle or go to the Department of Ecology Web site at http://www.ecy.wa.gov/programs/swfa/eproductrecycle/.

Handling static-sensitive devices

Ensure that you understand how to handle devices that are sensitive to static electricity.

Attention: Static electricity can damage electronic devices and your system. To avoid damage, keep static-sensitive devices in their static protective bags until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its anti-static bag, touch it to an unpainted metal part of the system unit for at least 2 seconds. (This action removes static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your SAN Volume Controller, without putting it down. If it is necessary to put the device down, place it onto its static-protective bag. (If your device is an adapter, place it component side up.) Do not place the device onto the cover of the SAN Volume Controller or onto a metal table.
- Take additional care when you handle devices during cold weather because heating reduces indoor humidity and increases static electricity.

Chapter 1. SAN Volume Controller overview

The SAN Volume Controller combines software and hardware into a comprehensive, modular appliance that uses symmetric virtualization.

Symmetric virtualization is achieved by creating a pool of managed disks (MDisks) from the attached storage subsystems. Those storage systems are then mapped to a set of virtual disks (VDisks) for use by attached host systems. System administrators can view and access a common pool of storage on the SAN. This lets the administrators use storage resources more efficiently and provides a common base for advanced functions.

A *SAN* is a high-speed fibre-channel network that connects host systems and storage devices. It allows a host system to be connected to a storage device across the network. The connections are made through units such as routers, gateways, hubs, and switches. The area of the network that contains these units is known as the *fabric* of the network.

SAN Volume Controller software

The SAN Volume Controller software performs the following functions for the host systems that attach to SAN Volume Controller over the SAN:

- Creates a single pool of storage
- Provides logical unit virtualization
- Manages logical volumes
- Mirrors logical volumes

The SAN Volume Controller also provides the following functions:

- Large scalable cache
- Copy Services
  - FlashCopy® (point-in-time copy)
  - Metro Mirror (synchronous copy)
  - Global Mirror (asynchronous copy)
  - Data migration
- Space management
  - Mapping that is based on desired performance characteristics
  - Metering of service quality
  - Space-efficient logical volumes (thin provisioning)

SAN Volume Controller hardware

Each SAN Volume Controller node is an individual server in a SAN Volume Controller cluster on which the SAN Volume Controller software runs.

The nodes are always installed in pairs, with a minimum of one and a maximum of four pairs of nodes constituting a *cluster*. Each pair of nodes is known as an *I/O group*. All I/O operations that are managed by the nodes in an I/O group are cached on both nodes.

I/O groups take the storage that is presented to the SAN by the storage subsystems as MDisks and translates the storage into logical disks, known as VDisks, that are used by applications on the hosts. A node resides in only one I/O group and provides access to the VDisks in that I/O group.

The SAN Volume Controller 2145-8G4 is the most current model that is available. In addition, the following models of SAN Volume Controller nodes have been available in previous releases and are still supported with the latest SAN Volume Controller software:

- SAN Volume Controller 2145-8F4
- SAN Volume Controller 2145-8F2
- SAN Volume Controller 2145-4F2

Related reference

"SAN Volume Controller front panel controls and indicators" on page 7
The controls and indicators are used for power and navigation and to indicate information, such as system activity, service and configuration options, service controller failures, and node identification.

"SAN Volume Controller 2145-8G4 hardware" on page 33
It is good to familiarize yourself with the SAN Volume Controller 2145-8G4 hardware.

"SAN Volume Controller 2145-8F4 hardware" on page 35
It is good to familiarize yourself with the SAN Volume Controller 2145-8F4 hardware.

"SAN Volume Controller 2145-8F2 hardware" on page 36
It is good to familiarize yourself with the SAN Volume Controller 2145-8F2 hardware.

"SAN Volume Controller 2145-4F2 hardware" on page 38
It is good to familiarize yourself with the SAN Volume Controller 2145-4F2 hardware.

"SAN Volume Controller 2145-8G4 environment requirements" on page 40
Before the SAN Volume Controller 2145-8G4 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Clusters

All of your configuration and service tasks are performed at the cluster level. Therefore, after configuring your cluster, you can take advantage of the virtualization and the advanced features of the SAN Volume Controller.

A cluster can consist of two nodes, with a maximum of eight nodes. Therefore, you can assign up to eight SAN Volume Controller nodes to one cluster.

All configurations are replicated across all nodes in the cluster; however, only some service actions can be performed at the node level. Because configuration is performed at the cluster level, an IP address is assigned to the cluster instead of each node.

Cluster addressing

Each SAN Volume Controller cluster has an IP address. You can use this address to access the cluster either through the SAN Volume Controller graphical user interface or the command-line interface.

You assign an IPv4 address, an IPv6 address, or both to a cluster. When a node has been assigned to a cluster, you can display the cluster IP address on the front panel by selecting **Cluster** from the menu.

Configuration node

A *configuration node* is a single node that manages configuration activity of the cluster.

The configuration node is the main source for configuration commands. The configuration node manages the data that describes the cluster configuration.

If the configuration node fails, the cluster chooses a new configuration node. This action is called configuration node failover. The switch that contains the new node takes over the cluster IP address. Thus you can access the cluster through the same IP address although the original configuration node has failed. During the failover, there is a short period when you cannot use the command-line tools or SAN Volume Controller Console.

Figure 1 shows an example cluster containing four nodes. Node 1 has been designated the configuration node. User requests (*1*) are targeted at Node 1. This can cause requests that are targeted at the other nodes in the cluster to have their data returned to Node 1.

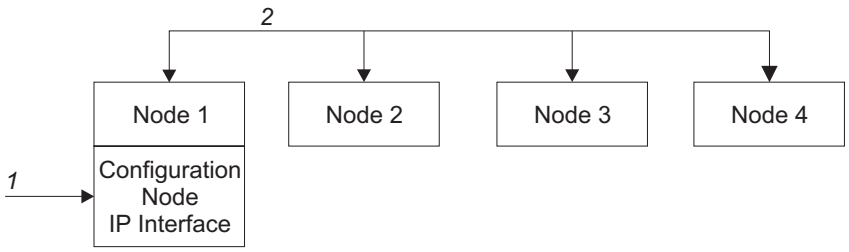


Figure 1. Configuration node

Configuration node addressing

Only one node within a SAN Volume Controller cluster can be set to use the cluster IP address.

This node then acts as the focal point for all configuration and other requests that are made from the SAN Volume Controller Console application or the CLI. This node is known as the *configuration node*.

If the configuration node is stopped or fails, the remaining nodes in the cluster determine which node will take on the role of configuration node. The new configuration node binds the cluster IP address to its Ethernet port. It broadcasts this new mapping so that connections to the cluster configuration interface can continue.

The new configuration node broadcasts the new IP address mapping using the Address Resolution Protocol (ARP). You must configure some switches to forward the ARP packet on to other devices on the subnetwork. Ensure that all Ethernet devices are configured to pass on unsolicited ARP packets. Otherwise, if the ARP packet is not forwarded, a device loses its connection to the SAN Volume Controller cluster.

If a device loses its connection to the SAN Volume Controller cluster, it can regenerate the address quickly if the device is on the same subnetwork as the cluster. However, if the device is not on the same subnetwork, it might take hours for the address resolution cache of the gateway to refresh. In this case, you can restore the connection by establishing a command line connection to the cluster from a terminal that is on the same subnetwork, and then by starting a secure copy to the device that has lost its connection.

Cluster IP failover

If the configuration node fails, the cluster IP address is transferred to a new node. The cluster services are used to manage the IP address transfer from the failed configuration node to the new configuration node.

The following changes are performed by the cluster service:

- If software on the failed configuration node is still operational, the software shuts down the IP interface. If the software cannot shut down the IP interface, the hardware service forces a shut down.
- When the IP interface shuts down, all remaining nodes choose a new node to host the configuration interface.
- The new configuration node initializes the configuration daemons, sshd and httpd, and then binds the configuration IP interface to its Ethernet port.
- The router is configured as the default gateway for the new configuration node.
- The new configuration node sends five unsolicited address resolution protocol (ARP) packets to the local subnet broadcast address. The ARP packets contain the cluster IP and the media access control (MAC) address for the new configuration node. All systems that receive ARP packets are forced to update their ARP tables. Once the ARP tables are updated, these systems can connect to the new configuration node.

  Note: Some Ethernet devices might not forward ARP packets. If the ARP packets are not forwarded, connectivity to the new configuration node cannot be established automatically. To avoid this problem, configure all Ethernet devices to pass unsolicited ARP packets. You can restore lost connectivity by logging into the SAN Volume Controller and starting a secure copy to the affected system. Starting a secure copy forces an update to the ARP cache for all systems connected to the same switch as the affected system.

Ethernet link failures

If the Ethernet link to the SAN Volume Controller cluster fails because of an event unrelated to the SAN Volume Controller itself, such as a cable being disconnected or an Ethernet router failure, the SAN Volume Controller does not attempt to failover the configuration node to restore IP access to the cluster.

SAN fabric overview

The SAN fabric is an area of the network that contains routers, gateways, hubs, and switches. A SAN is configured into a number of zones. A device using the SAN can only communicate with devices that are included in the same zones that it is in. A SAN Volume Controller cluster requires two distinct types of zones: a host zone and a disk zone.

In the host zone, the host systems can identify and address the SAN Volume Controller nodes. You can have more than one host zone. Generally, you create one host zone for each host type. In the disk zone, the SAN Volume Controller nodes identify the disk drives. Host systems cannot operate on the disk drives directly; all data transfer occurs through the SAN Volume Controller nodes. Figure 2 shows several host systems that are connected in a SAN fabric.

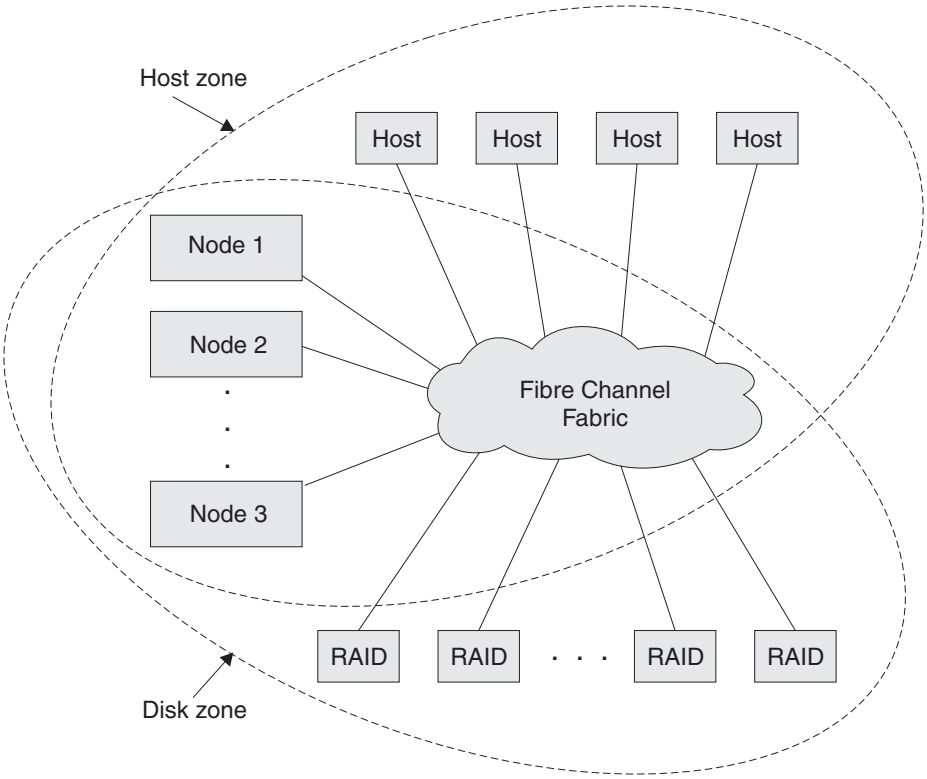


Figure 2. Example of a SAN Volume Controller cluster in a fabric

A cluster of SAN Volume Controller nodes is connected to the same fabric and presents virtual disks (VDisks) to the host systems. You create these VDisks from units of space within a managed disk (MDisk) group. An MDisk group is a collection of MDisks that are presented by the storage subsystems (RAID controllers). The MDisk group provides a storage pool. You specify how each group is created, and you can combine MDisks from different manufacturers' controllers in the same MDisk group.

Note: Some operating systems cannot tolerate other operating systems in the same host zone, although you might have more than one host type in the SAN fabric. For example, you can have a SAN that contains one host that runs on an AIX® operating system and another host that runs on a Windows® operating system.

Cluster configuration information is stored on every SAN Volume Controller node that is in the cluster to allow concurrent replacement of field replaceable units (FRUs). You can remove one SAN Volume Controller node in each I/O group from a cluster when hardware service or maintenance is required. After you remove the SAN Volume Controller node, you can replace the FRUs in the SAN Volume Controller node. When a new FRU is installed and when the SAN Volume

Controller node is added back into the cluster, the configuration information that is required by that SAN Volume Controller node is read from other SAN Volume Controller nodes in the cluster.

All communication between disk drives and all communication between SAN Volume Controller nodes is performed through the SAN. All SAN Volume Controller node configuration and service commands are sent to the cluster through an Ethernet network.

Each SAN Volume Controller node contains its own vital product data (VPD). Each cluster contains VPD that is common to all the SAN Volume Controller nodes in the cluster, and any system, with the correct access authority, that is connected to the Ethernet network can access this VPD.

Service mode overview

The service mode allows you to access vital product data (VPD), logs, and dump data on the node. It also provides you with a method of forcing the installation of a different version of software.

A SAN Volume Controller is assigned two IP addresses. The first address is the cluster IP address that is used for all normal configuration and service activity. The second address is not normally active; you can activate the second address for a single SAN Volume Controller by setting it into service mode.

The cluster can only be accessed through its IP address when the SAN Volume Controller nodes have formed into a cluster. If not enough cluster nodes can access each other through the fibre channel fabric or the node is not currently a member of a cluster, the node is inaccessible through the cluster IP address. The normal repair procedure for cluster access problems is to repair any faults on the fibre channel fabric and repair any nodes that are indicating failure conditions on their front panel displays. If, after performing these repair actions, it is still not possible to access the cluster, it might be necessary to enable service mode to help isolate or repair the problem.

Note: Use service mode only under the direction of IBM Support Center. Setting service mode for a node that is in an active cluster might cause data to be lost.

Service mode can only be reset through the Web browser or by turning the power to the node off and on.

Related reference

"Recover cluster navigation" on page 153
The Recover cluster? option is useful if the administrator password has been lost or forgotten.

"Service mode" on page 163
While in service mode, you can use the front panel to view or change a service IPv4 or an IPv6 address. You can also view the version and build level of the SAN Volume Controller software that is installed and active on the node.

Chapter 2. Introducing the SAN Volume Controller hardware components

A SAN Volume Controller system consists of SAN Volume Controller nodes and related hardware components, such as uninterruptible power supply units and, optionally, redundant ac power switches. Note that nodes and uninterruptible power supply units are installed in pairs.

SAN Volume Controller nodes

There are four different SAN Volume Controller node types.

The SAN Volume Controller 2145-8G4 is the most current model that is available. In addition, the following models of SAN Volume Controller nodes have been available in previous releases and are still supported with the latest SAN Volume Controller software:

- SAN Volume Controller 2145-8F4
- SAN Volume Controller 2145-8F2
- SAN Volume Controller 2145-4F2

A label on the front of the node indicates the SAN Volume Controller node type and serial number.

SAN Volume Controller front panel controls and indicators

The controls and indicators are used for power and navigation and to indicate information, such as system activity, service and configuration options, service controller failures, and node identification.

SAN Volume Controller 2145-8G4 controls and indicators

The controls and indicators are used for power and navigation and to indicate information, such as system activity, service and configuration options, service controller failures, and node identification.

Figure 3 shows the controls and indicators on the front panel of the SAN Volume Controller 2145-8G4.

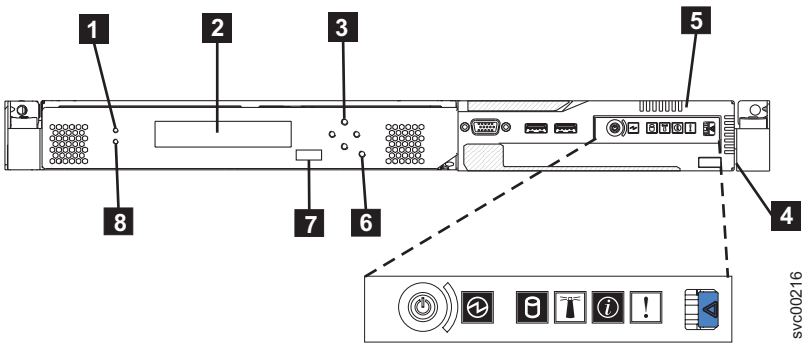


Figure 3. SAN Volume Controller 2145-8G4 front panel assembly

1 Cache LED

2 Front panel display

3 Navigation buttons

4 Serial number label

5 Operator information panel (see the operator information panel topic)

6 Select button

7 Node identification label

8 Error LED

SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 controls and indicators

The controls and indicators are used for power and navigation and to indicate information, such as system activity, service and configuration options, service controller failures, and node identification.

Figure 4 shows the controls and indicators on the front panel of the SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2.

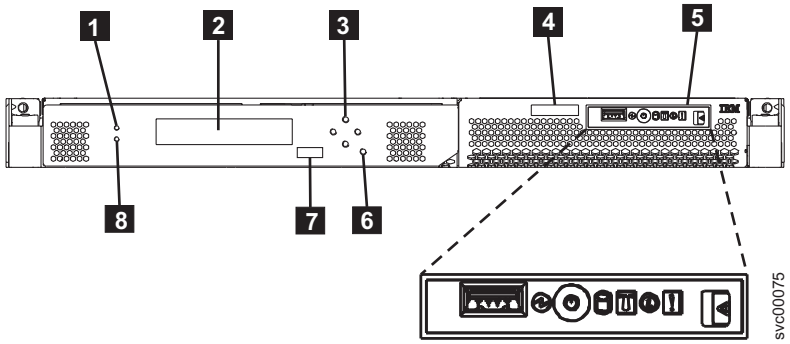


Figure 4. SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 front panel assembly

1 Cache LED

2 Front panel display

3 Navigation buttons

4 Serial number label

5 Operator information panel (see the operator information panel topic)

6 Select button

7 Node identification label

8 Error LED

SAN Volume Controller 2145-4F2 controls and indicators

The controls and indicators are used for power and navigation and to indicate information, such as system activity, service and configuration options, service controller failures, and node identification.

Figure 5 on page 9 shows the controls and indicators on the front panel of the SAN Volume Controller 2145-4F2.

SAN Volume Controller 2145-4F2 controls and indicators

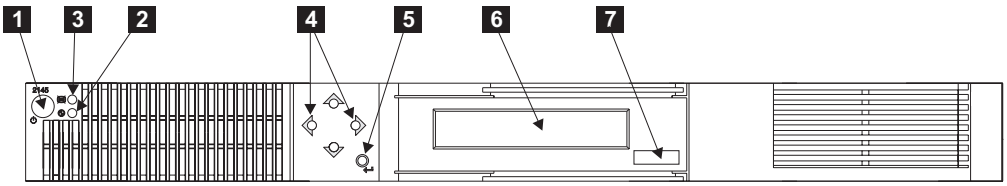


Figure 5. SAN Volume Controller 2145-4F2 front panel assembly

1. Power button
2. Power LED
3. Check LED
4. Navigation buttons
5. Select button
6. Front panel display
7. Node identification label

Cache LED

System activity is indicated through the green, cache LED.

Table 1 describes the system activity indicators.

Table 1. Cache LED settings

Cache LED status	Result
Off	The system has not yet started processing.
On	The system is functionally active, has joined a working cluster, and is processing data.
Flashing	The node is dumping cache and state data to the local disk in anticipation of a system reboot (from a pending power-off action or other controlled restart sequence). Do not remove the power cable or force a power-off action while this LED is flashing.

Front panel display

The front panel display shows service, configuration, and navigation information.

You can select the language that is displayed on the front panel. The display can show both alphanumeric information and graphical information (progress bars).

The front panel displays configuration and service information about the SAN Volume Controller node and the SAN Volume Controller cluster, including the following items:

- Boot progress indicator
- Boot failed
- Charging
- Hardware boot
- Node rescue request
- Power failure

- Powering off
- Recovering
- Restarting
- Shutting down
- Validate WWNN?
- Error codes

Related reference

Chapter 6, "Using the front panel of the SAN Volume Controller," on page 143
The front panel of the SAN Volume Controller has a display, various LEDs, navigation buttons, and a select button that are used when servicing your SAN Volume Controller node.

Navigation buttons

You can use the navigation buttons to move through menus.

There are four navigational buttons that you can use to move throughout a menu: up, down, right and left.

Each button corresponds to the direction that you can move in a menu. For example, to move right in a menu, press the navigation button that is located on the right side. If you want to move down in a menu, press the navigation button that is located on the bottom.

Note: The select button is used in tandem with the navigation buttons.

Product serial number

The node contains a SAN Volume Controller product serial number that is written to the system board hardware. The product serial number is also printed on the serial number label on the right side of the front panel.

This number is used for warranty and service entitlement checking and is included in the data sent with error reports. It is essential that this number is *not* changed during the life of the product. If the system board is replaced, you must follow the system board replacement instructions carefully and rewrite the serial number on the system board.

SAN Volume Controller operator information panel

The operator information panel is located on the front panel of the SAN Volume Controller.

Related tasks

"Removing the operator information panel assembly" on page 533
You might be prompted to remove the SAN Volume Controller operator information panel.

"Replacing the operator information panel assembly" on page 539
You might be prompted to replace the SAN Volume Controller operator information panel assembly.

Related reference

"Release latch" on page 12
The release latch gives you access to the light path diagnostics panel, which provides a method for determining the location of a problem.

"System-error LED" on page 12
When it is lit, the system-error LED indicates that a system-board error has occurred.

| “Information-Error LED” on page 13
| When the information-error LED is lit, a noncritical event has occurred.
| “Location LED” on page 13
| The SAN Volume Controller does not use the location LED.
| “Hard disk drive activity LED” on page 13
| When it is lit, the green hard disk drive activity LED indicates that the hard disk drive is in use.
| “Power control button” on page 13
| The power control button switches on or switches off the main power to the SAN Volume Controller.
| “Power LED” on page 13
| The green power LED indicates the power status of the SAN Volume Controller.

| **SAN Volume Controller 2145-8G4 operator information panel:**

| The operator information panel contains buttons and indicators, such as the release latch for the light path diagnostics panel, the power-control button, and LEDs that indicate information, such as system-board errors, hard drive activity, and power status.

| Figure 6 shows the operator information panel for the SAN Volume Controller 2145-8G4.

|

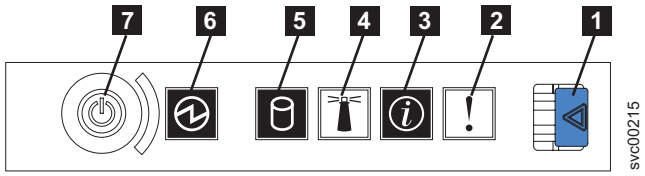


Figure 6. SAN Volume Controller 2145-8G4 operator information panel

| **1** Release latch for light path diagnostics panel
| **2** System-error LED (amber)
| **3** System-information LED (amber)
| **4** Location LED (blue)
| **5** Hard disk drive activity LED (green)
| **6** Power LED (green)
| **7** Power-control button

| **SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 operator information panel:**

| The operator information panel contains buttons and indicators, such as the release latch for the light path diagnostics panel, the power-control button, and LEDs that indicate information, such as system-board errors, hard drive activity, and power status.

| Figure 7 on page 12 shows the operator panel used by the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2 models.

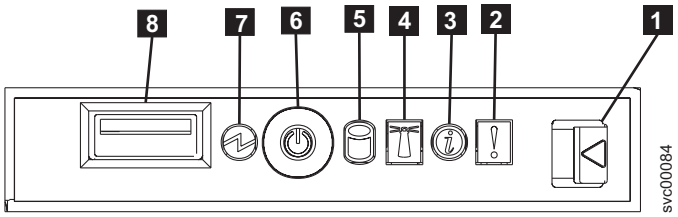


Figure 7. SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 operator information panel

1. Release latch for light path diagnostics panel
2. System-error LED (amber)
3. Information LED (amber)
4. Location LED (blue)
5. Hard disk drive activity LED (green)
6. Power control button
7. Power LED (green)
8. USB connector

Release latch:

The release latch gives you access to the light path diagnostics panel, which provides a method for determining the location of a problem.

After pressing the release latch on the information panel, you can slide the light path diagnostics panel out to view the lit LEDs. The LEDs indicate the type of error that has occurred. See "MAP 5800: Light path" for more detail.

To retract the panel, push it back into the node and snap it into place.

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

System-error LED:

When it is lit, the system-error LED indicates that a system-board error has occurred.

This amber LED lights up if the SAN Volume Controller hardware detects a fatal error that requires a new field replaceable unit (FRU).

Note: See "MAP 5800: Light path" in the *IBM System Storage SAN Volume Controller: Service Guide* to help you to isolate the faulty FRU.

A system-led error LED is also on the rear of the SAN Volume Controller.

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN

Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

Related reference

"Release latch" on page 12
The release latch gives you access to the light path diagnostics panel, which provides a method for determining the location of a problem.

Information-Error LED:

When the information-error LED is lit, a noncritical event has occurred.

Check the light path diagnostics panel and the error log. Light path diagnostics are described in more detail in the light path maintenance analysis procedure (MAP).

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

Location LED:

The SAN Volume Controller does not use the location LED.

Hard disk drive activity LED:

When it is lit, the green hard disk drive activity LED indicates that the hard disk drive is in use.

Power LED:

The green power LED indicates the power status of the SAN Volume Controller.

The green power LED has the following properties:

Off One or more of the following are true:

- No power is present at the power supply input
- The power supply has failed
- The LED has failed

On The SAN Volume Controller is powered on.

Flashing
The SAN Volume Controller is turned off but is still connected to a power source.

Note: A power LED is also on the rear of the server.

Power control button:

The power control button switches on or switches off the main power to the SAN Volume Controller.

To turn on the power, press and release the power control button.

To turn off the power, press and release the power control button. For more information about how to power off the SAN Volume Controller node, see "MAP 5350: Powering off a SAN Volume Controller node" in the *IBM System Storage SAN Volume Controller: Service Guide*.

Notes:

1. When the node is operational and you press and immediately release the power control button, the SAN Volume Controller indicates on its front panel that it is powering off and writes its control data to its internal disk. This can take up to five minutes. If you press the power control button but do not release it, an immediate power off occurs without the SAN Volume Controller control data being written to disk. Service actions are then required to make the SAN Volume Controller operational again. Therefore, during a power-off operation, do not press and hold the power control button for more than two seconds.
2. The 2145-1U uninterruptible power supply does not power off when the SAN Volume Controller is shut down from the power control button.

Select button

You can use the select button to select an item from a menu.

The select button and navigation buttons help you to navigate and select menu and boot options, and start a service panel test.

The select button is located on the front panel of the SAN Volume Controller, near the navigation buttons.

Node identification label

The node identification label on the front panel displays a six-digit node identification number. Sometimes this number is called panel name or front panel id.

The node identification label is the same as the six-digit number that is used in the **svctask addnode** command. It is readable by system software and is used by configuration and service software as a node identifier. The node identifier can also be displayed on the front panel display when `node` is selected from the menu.

If the service controller assembly front panel is replaced, the configuration and service software displays the number that is printed on the front of the replacement panel. Future error reports contain the new number. No cluster reconfiguration is necessary when the front panel is replaced.

Error LED

Critical faults on the service controller are indicated through the amber, error LED.

The error LED has the following two states:

OFF The service controller is functioning correctly.

ON A critical service controller failure was detected and you must replace the service controller.

Power button

The power button turns on or off the main power to the SAN Volume Controller 2145-4F2.

To turn on the power, press and release the power button.

To turn off the power, press and release the power button. For a preferred method of powering off, see "MAP 5350: Powering off a SAN Volume Controller node".

Note: When the SAN Volume Controller is operational and you press and immediately release the power button, the SAN Volume Controller indicates on its front panel that it is powering off and writes its control data to its internal disk. This can take up to five minutes. If you press the power button but do not release it, an immediate power off occurs without the SAN Volume Controller control data being written to disk. Service actions are then required to make the SAN Volume Controller operational again. Therefore, during a power-off operation, do not press and hold the power button for more than two seconds.

Attention: If a SAN Volume Controller is powered off for more than five minutes and it is the only SAN Volume Controller that is connected to a 2145 uninterruptible power supply, the 2145 uninterruptible power supply also powers off. To power on the SAN Volume Controller, you must first power on the 2145 uninterruptible power supply to which it is connected.

Note: The 2145-1U uninterruptible power supply does not power off when the SAN Volume Controller is shut down from the power button.

Check LED

The amber check LED is used to indicate critical failures on the service controller.

If the check LED is off and the power LED is on, the service controller is working correctly.

If the check LED is on, a critical service controller failure was detected.

The check LED is also on while the service controller code is being reprogrammed. For example, when the SAN Volume Controller cluster code is being upgraded, the **check LED** is on. It is normal for the power LED to be on at this time.

SAN Volume Controller rear panel indicators and connectors

The rear panel indicators for the SAN Volume Controller are located on the back panel assembly. The connectors are located on the SAN Volume Controller node and the power supply assembly.

SAN Volume Controller 2145-8G4 rear panel indicators

The rear panel indicators consist of LEDs that indicate the status of the fibre-channel ports, Ethernet connection and activity, power, electrical current, and system board errors.

Figure 8 on page 16 shows the rear panel indicators on the SAN Volume Controller 2145-8G4 back panel assembly.

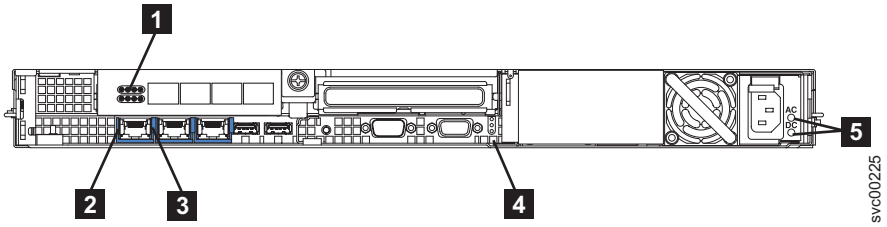


Figure 8. SAN Volume Controller 2145-8G4 rear panel indicators

1 Fibre-channel LEDs

2 Ethernet activity LED

3 Ethernet link LED

4 Power, location, and system error LEDs

5 Ac and dc LEDs

Related reference

"Fibre-channel LEDs" on page 22
The fibre-channel LEDs indicate the status of the fibre-channel ports.

"Ethernet link LED" on page 23
The Ethernet link LED indicates that there is an active connection on the Ethernet port.

"Power, location, and system error LEDs" on page 23
The power, location, and system error LEDs are housed together on the rear of the SAN Volume Controller.

"Ac and dc LEDs" on page 24
The ac and dc LEDs indicate whether the node is receiving electrical current.

"System board power LED" on page 26
The system board power LED indicates the power supply status that is detected by the system board.

"System board fault LED" on page 26
The amber system board fault LED indicates that the system board has detected a critical failure.

"Lower Ethernet link LED" on page 26
The lower Ethernet link LED indicates the operational status of Ethernet port 1. This LED is illuminated when a good Ethernet connection exists between the SAN Volume Controller 2145-4F2 and the Ethernet network.

"Upper Ethernet link LED" on page 26
The upper Ethernet link LED indicates the operational status of Ethernet port 2. This LED is illuminated when a good Ethernet connection exists between the SAN Volume Controller 2145-4F2 and the Ethernet network.

"Monitor LED" on page 26
The green monitor LED is not used on the SAN Volume Controller.

SAN Volume Controller 2145-8G4 connectors

The external connectors consist of fibre-channel, serial, and Ethernet ports, and the power supply.

Figure 9 on page 17 shows the external connectors on the SAN Volume Controller 2145-8G4 back panel assembly.

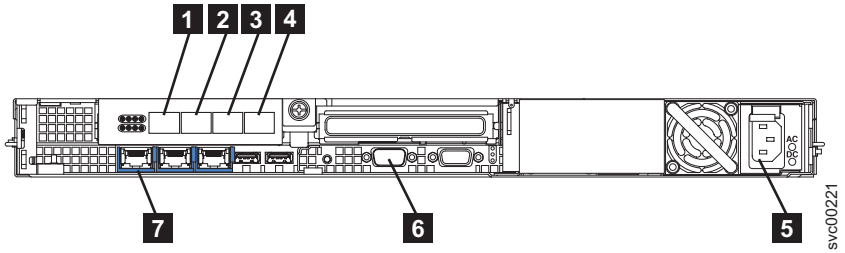


Figure 9. SAN Volume Controller 2145-8G4 external connectors

1. Fibre-channel port 1
2. Fibre-channel port 2
3. Fibre-channel port 3
4. Fibre-channel port 4
5. Power supply
6. Serial connection
7. Ethernet port 1

Figure 10 shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8G4 to the power source from the uninterruptible power supply.

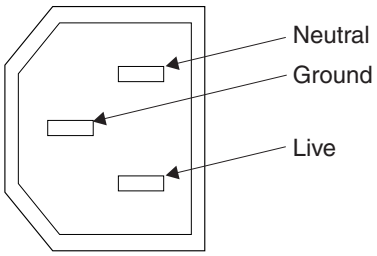


Figure 10. Power connector

SAN Volume Controller 2145-8G4 ports used during service procedures

The SAN Volume Controller 2145-8G4 contains a number of ports that are only used during service procedures. These ports are shown in Figure 11 on page 18.

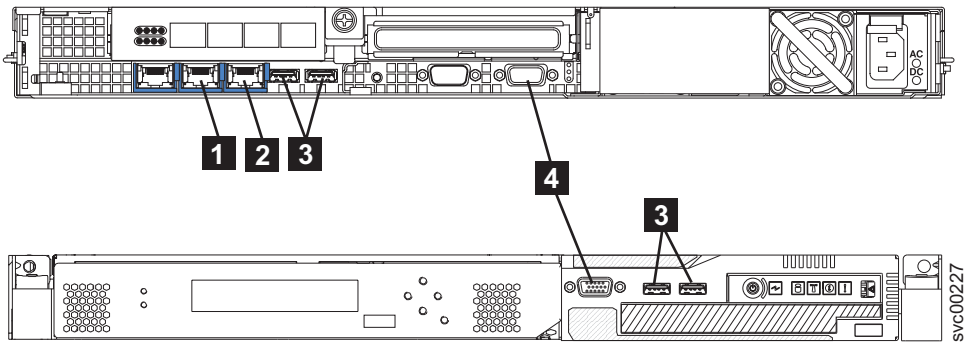


Figure 11. Service ports of the SAN Volume Controller 2145-8G4

1. Ethernet port 2
2. System management port
3. Four USB ports, two on the front and two on the rear
4. Two monitor ports, one on the front and one on the rear

During normal operation, none of these ports are used. Connect a device to any of these ports only when you are directed to do so by a service procedure or by your IBM service representative.

SAN Volume Controller 2145-8G4 ports not used

The SAN Volume Controller 2145-8G4 has no unused ports.

SAN Volume Controller 2145-8F4 rear panel indicators

The rear panel indicators are located on the back panel assembly.

Figure 12 shows the rear panel indicators on the SAN Volume Controller 2145-8F4 back panel assembly.

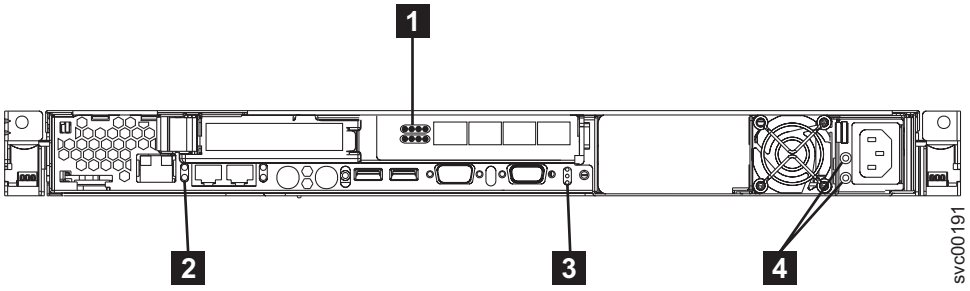


Figure 12. SAN Volume Controller 2145-8F4 rear panel indicators

1. Fibre-channel LEDs
2. Ethernet link LED
3. Power, location, and system error LEDs
4. Ac and dc LEDs

SAN Volume Controller 2145-8F4 connectors

The external connectors consist of Ethernet, serial, and fibre-channel ports, and the power supply.

Figure 13 shows the external connectors on the SAN Volume Controller 2145-8F4 back panel assembly.

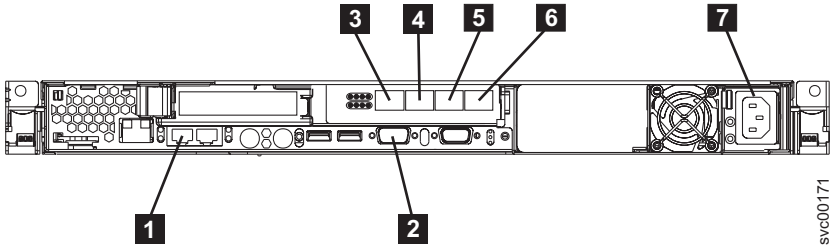


Figure 13. SAN Volume Controller 2145-8F4 external connectors

1. Ethernet port 1
2. Serial connection
3. Fibre-channel port 1
4. Fibre-channel port 2
5. Fibre-channel port 3
6. Fibre-channel port 4
7. Power supply

Figure 14 shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8F4 to the power source from the uninterruptible power supply.

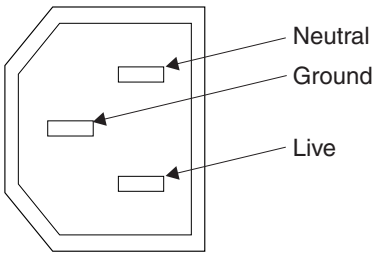


Figure 14. Power connector

SAN Volume Controller 2145-8F4 ports used during service procedures

The SAN Volume Controller 2145-8F4 contains three service ports: Ethernet port 2, the keyboard port, and the monitor port. These ports are currently not in use. Figure 15 on page 20 provides the locations of the service ports.

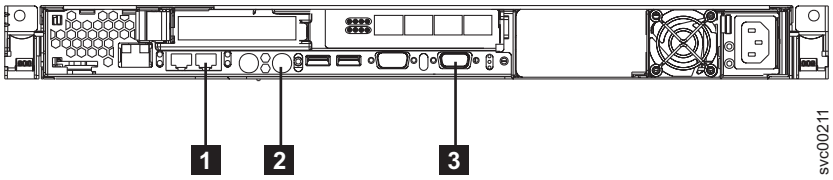


Figure 15. Service ports of the SAN Volume Controller 2145-8F4

1 Ethernet port 2

2 Keyboard port

3 Monitor port

SAN Volume Controller 2145-8F4 ports not used during normal operation

The SAN Volume Controller 2145-8F4 is equipped with several ports that are not used by the SAN Volume Controller during normal operation and that have not been tested. Use of these ports in conjunction with the SAN Volume Controller 2145-8F4, or any other application that might be run on this hardware, is not supported. Figure 16 and Figure 16 show the ports that are not used by the SAN Volume Controller.

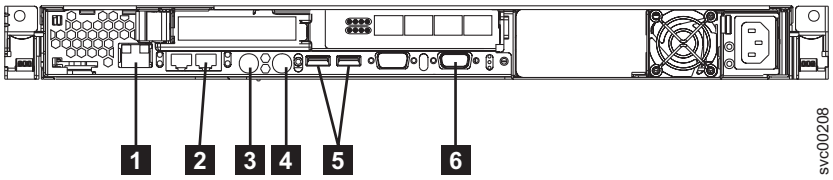


Figure 16. Ports not used by the SAN Volume Controller 2145-8F4

1 System management port

2 Ethernet port 2

3 Mouse port

4 Keyboard port

5 USB ports

6 Monitor port

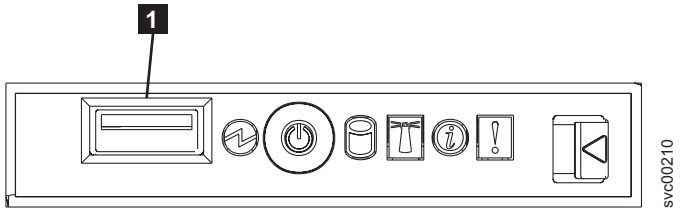


Figure 17. Ports not used on the front panel of the SAN Volume Controller 2145-8F4

1 USB port

SAN Volume Controller 2145-8F2 rear panel indicators

The rear panel indicators are located on the back panel assembly.

Figure 18 shows the rear panel indicators on the SAN Volume Controller 2145-8F2 back panel assembly.

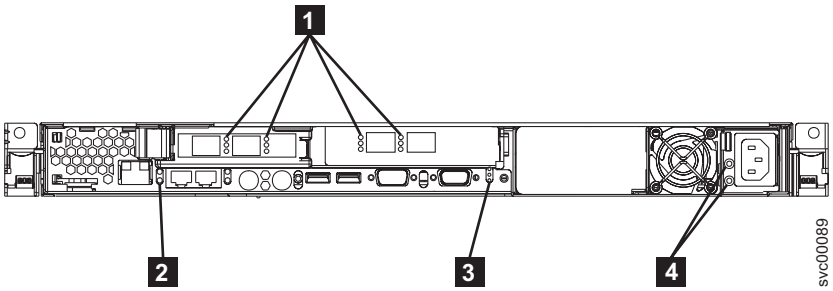


Figure 18. SAN Volume Controller 2145-8F2 rear panel indicators

1. Fibre-channel LEDs
2. Ethernet link LED
3. Power, location, and system error LEDs
4. Ac and dc LEDs

SAN Volume Controller 2145-8F2 connectors

The external connectors consist of the power supply and Ethernet, fibre-channel, and serial ports.

Figure 19 shows the external connectors on the SAN Volume Controller 2145-8F2 back panel assembly.

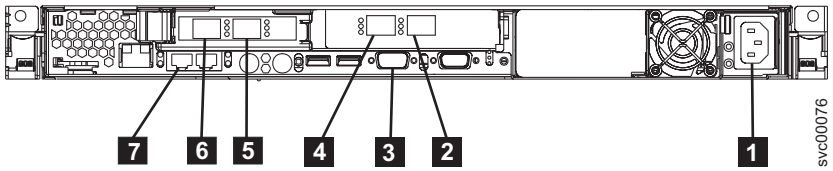


Figure 19. SAN Volume Controller 2145-8F2 external connectors

1. Power supply
2. Fibre-channel port 4
3. Serial connection
4. Fibre-channel port 3
5. Fibre-channel port 2
6. Fibre-channel port 1
7. Ethernet port 1

Figure 19 shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller

2145-8F2 to the power source from the uninterruptible power supply.

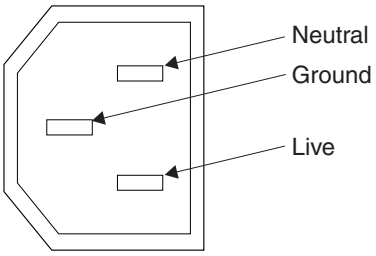


Figure 20. Power connector

Fibre-channel LEDs

The fibre-channel LEDs indicate the status of the fibre-channel ports.

The SAN Volume Controller 2145-8G4 and SAN Volume Controller 2145-8F4 use two fibre-channel LEDs per fibre-channel port, arranged one above the other. The LEDs are arranged in the same order as the ports.

Table 2 describes the status of the link LEDs.

Table 2. Settings for the SAN Volume Controller 2145-8G4 and SAN Volume Controller 2145-8F4 fibre-channel LEDs

Top LED (link speed)	Bottom LED (link activity)	Link Status
Off	Off	Inactive
Off	On/blinking	Active 1 Gbps
Blinking	On/blinking	Active 2 Gbps
On	On/blinking	Active 4 Gbps

Related reference

"Fibre-channel port numbers and worldwide port names" on page 47
Fibre-channel ports are identified by their physical port number and by a worldwide port name (WWPN).

Fibre-channel LEDs on the SAN Volume Controller 2145-8G4:

The fibre-channel LEDs on the SAN Volume Controller 2145-8G4 indicate the status of the fibre-channel ports.

Figure 21 on page 23 shows the fibre-channel LEDs on the SAN Volume Controller 2145-8G4.

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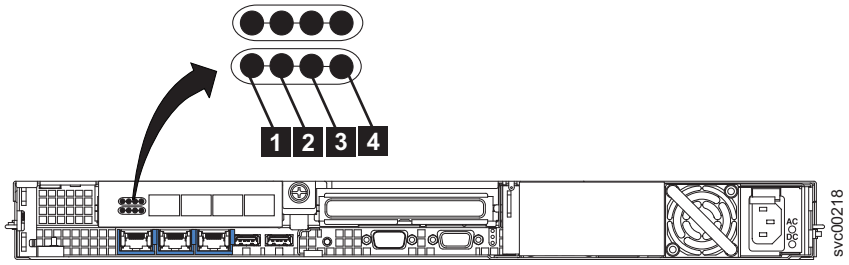


Figure 21. SAN Volume Controller 2145-8G4 fibre-channel LEDs

Fibre-channel LEDs on the SAN Volume Controller 2145-8F4:

The fibre-channel LEDs on the SAN Volume Controller 2145-8F4 indicate the status of the fibre-channel ports.

Figure 22 shows the fibre-channel LEDs on the SAN Volume Controller 2145-8F4.

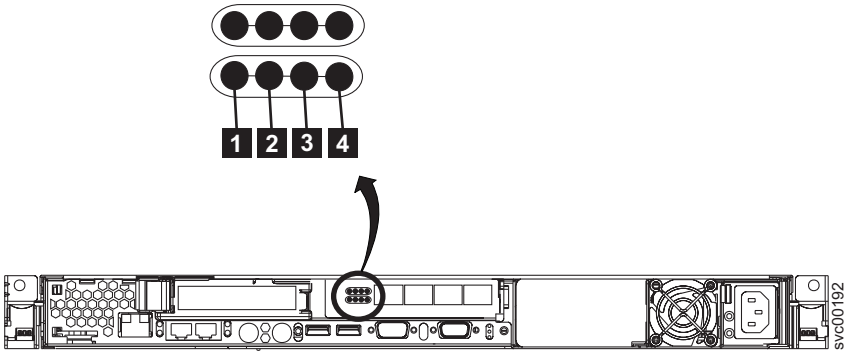


Figure 22. SAN Volume Controller 2145-8F4 fibre-channel LEDs

The fibre-channel LEDs are not used by the SAN Volume Controller 2145-8F2.

Ethernet activity LED

The Ethernet activity LED indicates that the SAN Volume Controller 2145-8G4 is communicating with the Ethernet network that is connected to the Ethernet port.

The Ethernet activity LED is located on each Ethernet port; Ethernet port 2 is used only during Ethernet troubleshooting.

Ethernet link LED

The Ethernet link LED indicates that there is an active connection on the Ethernet port.

The Ethernet link LED is located on each Ethernet port; however, only Ethernet port 1 is used during normal operation.

Power, location, and system error LEDs

The power, location, and system error LEDs are housed together on the rear of the SAN Volume Controller.

The following terms describe the power, location, and system error LEDs:

Power LED

This is the top of the three LEDs and indicates the following states:

Off One or more of the following are true:

- No power is present at the power supply input
- The power supply has failed
- The LED has failed

On The SAN Volume Controller is powered on.

Flashing

The SAN Volume Controller is turned off but is still connected to a power source.

Location LED

This is the middle of the three LEDs and is not used by the SAN Volume Controller.

System-error LED

This is the bottom of the three LEDs that indicates that a system board error has occurred. The light path diagnostics provide more information.

Related tasks

"MAP 5800: Light path" on page 417

MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

Ac and dc LEDs

The ac and dc LEDs indicate whether the node is receiving electrical current.

Ac LED

The upper LED **1** next to the power supply, indicates that ac current is present on the node.

Dc LED

The lower LED **2** next to the power supply, indicates that dc current is present on the node.

Ac and dc LEDs on the SAN Volume Controller 2145-8G4:

The ac LED and dc LED are located on the rear of the SAN Volume Controller 2145-8G4.

Figure 23 on page 25 shows the location of the ac and dc LEDs.

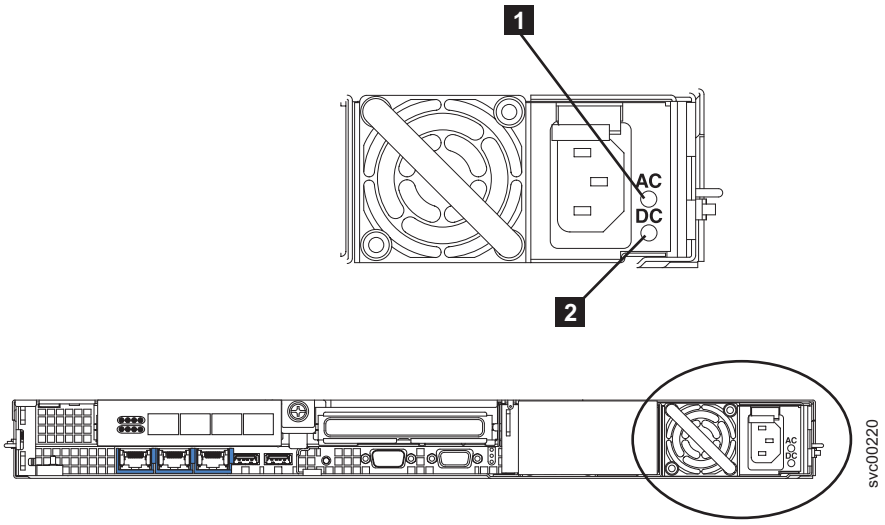


Figure 23. SAN Volume Controller 2145-8G4 ac and dc LEDs

Ac and dc LEDs on the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2:

The ac LED and dc LED are located on the rear of the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2.

Figure 24 shows the location of the ac and dc LEDs.

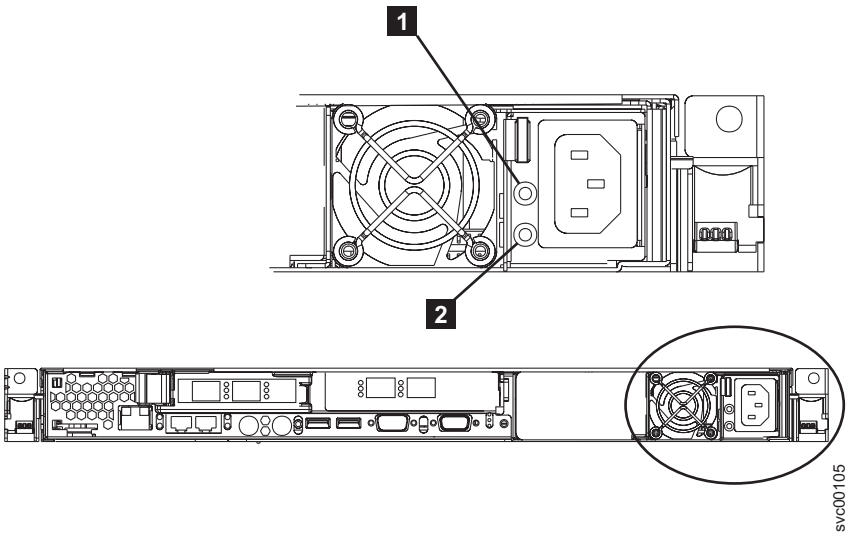


Figure 24. SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 ac and dc LEDs

SAN Volume Controller 2145-4F2 rear panel indicators

The rear panel indicators consist of LEDs that indicate the status of the power supply and Ethernet operation. They can also indicate system board errors.

Figure 25 on page 26 shows the rear panel indicators on the SAN Volume Controller 2145-4F2 back panel assembly.

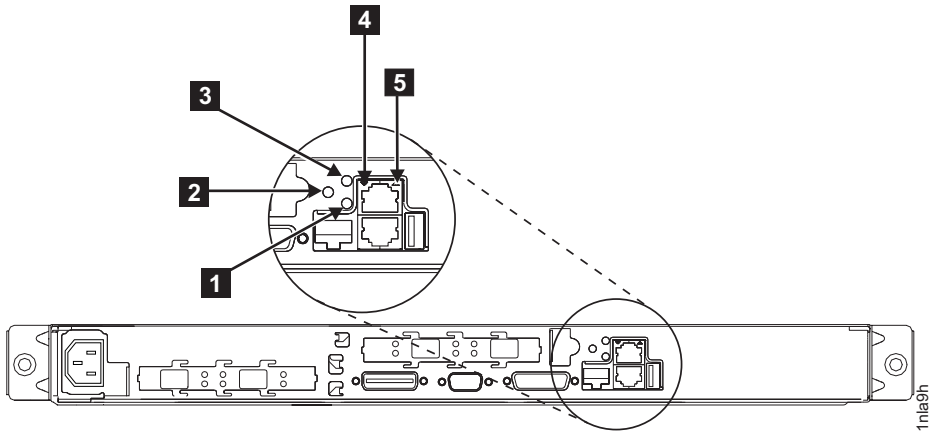


Figure 25. SAN Volume Controller 2145-4F2 rear panel indicators

1. System board power LED
2. System board fault LED
3. Monitor LED (not used)
4. Lower Ethernet link LED
5. Upper Ethernet link LED

System board power LED:

The system board power LED indicates the power supply status that is detected by the system board.

System board fault LED:

The amber system board fault LED indicates that the system board has detected a critical failure.

You can view the system board fault LED in the documentation on the rear panel indicators.

Monitor LED:

The green monitor LED is not used on the SAN Volume Controller.

You can view the monitor LED in the documentation concerning the rear panel indicators.

Lower Ethernet link LED:

The lower Ethernet link LED indicates the operational status of Ethernet port 1. This LED is illuminated when a good Ethernet connection exists between the SAN Volume Controller 2145-4F2 and the Ethernet network.

Upper Ethernet link LED:

The upper Ethernet link LED indicates the operational status of Ethernet port 2. This LED is illuminated when a good Ethernet connection exists between the SAN Volume Controller 2145-4F2 and the Ethernet network.

Ethernet port 2 is not used on the SAN Volume Controller.

SAN Volume Controller 2145-4F2 connectors

The external connectors consist of the power supply and the fibre-channel, Ethernet, and serial ports.

Figure 26 shows the external connectors on the SAN Volume Controller 2145-4F2 back panel assembly.

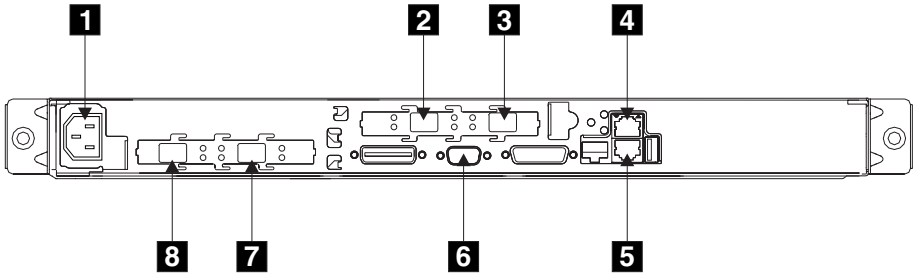


Figure 26. SAN Volume Controller 2145-4F2 external connectors

1. Power connector
2. fibre-channel port 3
3. fibre-channel port 4
4. Ethernet port 2 ***(not used on the SAN Volume Controller 2145-4F2)***
5. Ethernet port 1
6. Serial connector
7. fibre-channel port 2
8. fibre-channel port 1

Figure 27 the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-4F2 to the power source from the uninterruptible power supply.

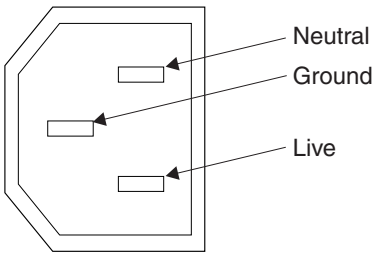


Figure 27. Power connector

External connectors on the SAN Volume Controller node

The external connectors consist of Ethernet, fibre-channel, keyboard, monitor, mouse, serial, system management, and USB ports and the power supply.

SAN Volume Controller 2145-8G4 connectors

The external connectors consist of fibre-channel, serial, and Ethernet ports, and the power supply.

Figure 9 on page 17 shows the external connectors on the SAN Volume Controller 2145-8G4 back panel assembly.

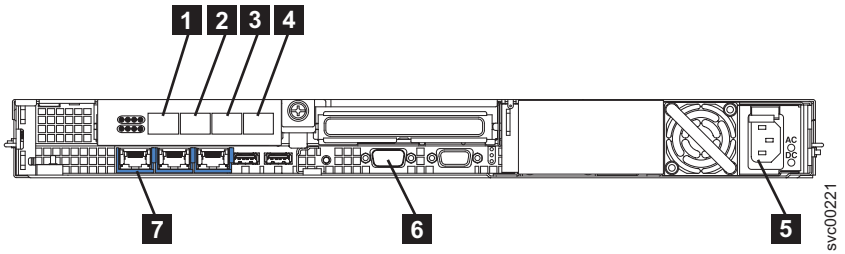


Figure 28. SAN Volume Controller 2145-8G4 external connectors

1. Fibre-channel port 1
2. Fibre-channel port 2
3. Fibre-channel port 3
4. Fibre-channel port 4
5. Power supply
6. Serial connection
7. Ethernet port 1

Figure 10 on page 17 shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8G4 to the power source from the uninterruptible power supply.

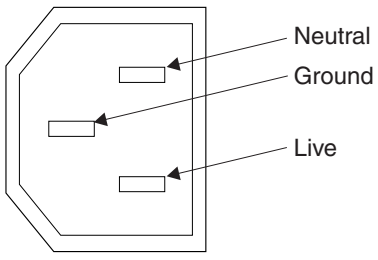


Figure 29. Power connector

SAN Volume Controller 2145-8G4 ports used during service procedures

The SAN Volume Controller 2145-8G4 contains a number of ports that are only used during service procedures. These ports are shown in Figure 11 on page 18.

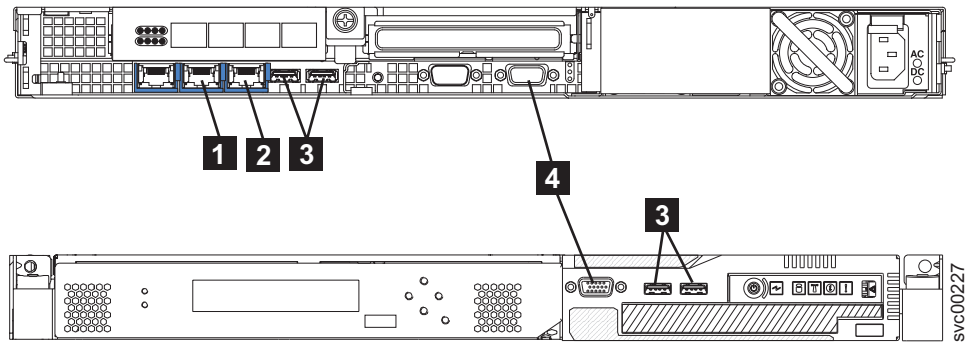


Figure 30. Service ports of the SAN Volume Controller 2145-8G4

1. Ethernet port 2
2. System management port
3. Four USB ports, two on the front and two on the rear
4. Two monitor ports, one on the front and one on the rear

During normal operation, none of these ports are used. Connect a device to any of these ports only when you are directed to do so by a service procedure or by your IBM service representative.

SAN Volume Controller 2145-8G4 ports not used

The SAN Volume Controller 2145-8G4 has no unused ports.

SAN Volume Controller 2145-8F4 connectors

The external connectors consist of Ethernet, serial, and fibre-channel ports, and the power supply.

Figure 13 on page 19 shows the external connectors on the SAN Volume Controller 2145-8F4 back panel assembly.

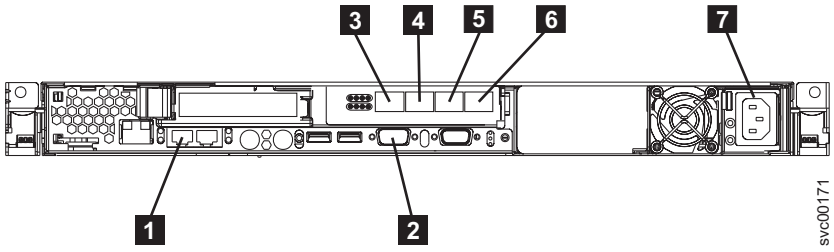


Figure 31. SAN Volume Controller 2145-8F4 external connectors

1. Ethernet port 1
2. Serial connection
3. Fibre-channel port 1
4. Fibre-channel port 2
5. Fibre-channel port 3
6. Fibre-channel port 4

7 Power supply

Figure 14 on page 19 shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8F4 to the power source from the uninterruptible power supply.

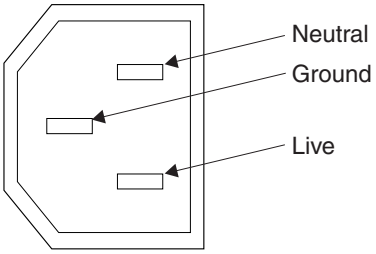


Figure 32. Power connector

SAN Volume Controller 2145-8F4 ports used during service procedures

The SAN Volume Controller 2145-8F4 contains three service ports: Ethernet port 2, the keyboard port, and the monitor port. These ports are currently not in use. Figure 15 on page 20 provides the locations of the service ports.

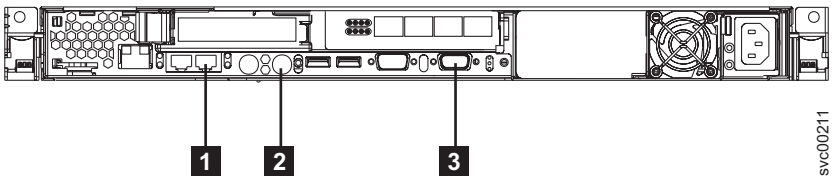


Figure 33. Service ports of the SAN Volume Controller 2145-8F4

1 Ethernet port 2

2 Keyboard port

3 Monitor port

SAN Volume Controller 2145-8F4 ports not used during normal operation

The SAN Volume Controller 2145-8F4 is equipped with several ports that are not used by the SAN Volume Controller during normal operation and that have not been tested. Use of these ports in conjunction with the SAN Volume Controller 2145-8F4, or any other application that might be run on this hardware, is not supported. Figure 16 on page 20 and Figure 16 on page 20 show the ports that are not used by the SAN Volume Controller.

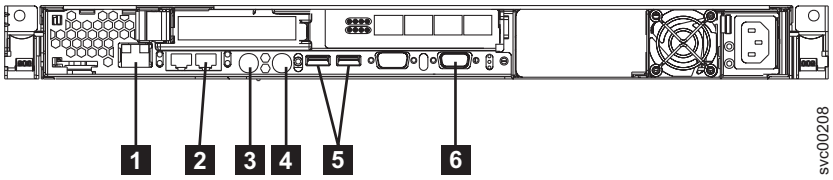


Figure 34. Ports not used by the SAN Volume Controller 2145-8F4

1. System management port
2. Ethernet port 2
3. Mouse port
4. Keyboard port
5. USB ports
6. Monitor port

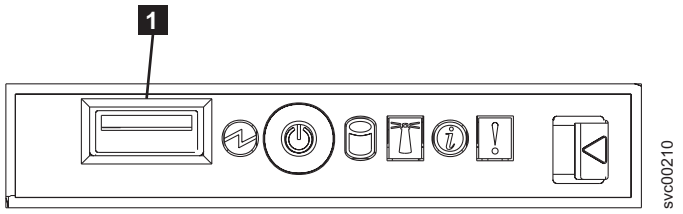


Figure 35. Ports not used on the front panel of the SAN Volume Controller 2145-8F4

1. USB port

SAN Volume Controller 2145-8F2 connectors

The external connectors consist of the power supply and Ethernet, fibre-channel, and serial ports.

Figure 19 on page 21 shows the external connectors on the SAN Volume Controller 2145-8F2 back panel assembly.

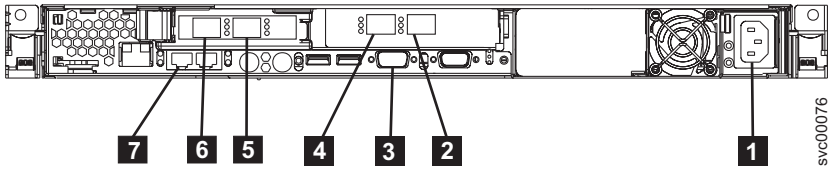


Figure 36. SAN Volume Controller 2145-8F2 external connectors

1. Power supply
2. Fibre-channel port 4
3. Serial connection
4. Fibre-channel port 3
5. Fibre-channel port 2
6. Fibre-channel port 1

7 Ethernet port 1

Figure 19 on page 21 shows the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-8F2 to the power source from the uninterruptible power supply.

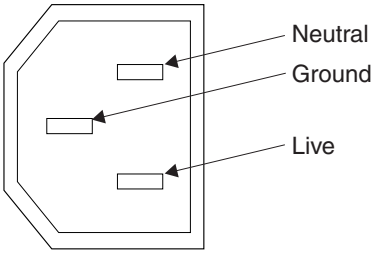


Figure 37. Power connector

SAN Volume Controller 2145-4F2 connectors

The external connectors consist of the power supply and the fibre-channel, Ethernet, and serial ports.

Figure 26 on page 27 shows the external connectors on the SAN Volume Controller 2145-4F2 back panel assembly.

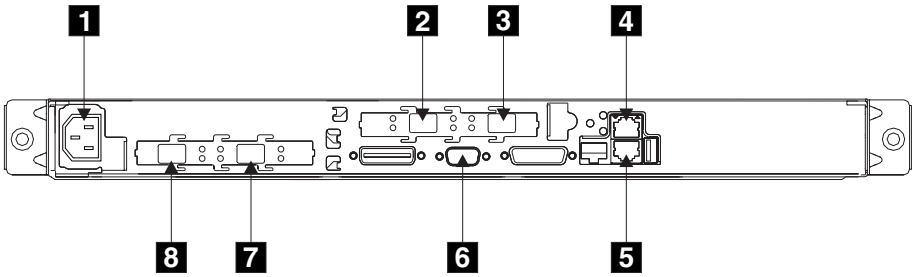


Figure 38. SAN Volume Controller 2145-4F2 external connectors

1 Power connector

2 fibre-channel port 3

3 fibre-channel port 4

4 Ethernet port 2 ***(not used on the SAN Volume Controller 2145-4F2)***

5 Ethernet port 1

6 Serial connector

7 fibre-channel port 2

8 fibre-channel port 1

Figure 27 on page 27 the type of connector that is located on the power supply assembly. The connector enables you to connect the SAN Volume Controller 2145-4F2 to the power source from the uninterruptible power supply.

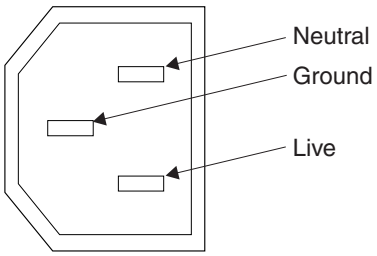


Figure 39. Power connector

SAN Volume Controller exploded views

The exploded view of the parts for each SAN Volume Controller model can help you locate and identify each field replaceable unit (FRU) that is mentioned in an event code, error message, or service procedure.

SAN Volume Controller 2145-8G4 hardware

It is good to familiarize yourself with the SAN Volume Controller 2145-8G4 hardware.

Figure 40 on page 34 provides a breakout view of the parts to the SAN Volume Controller 2145-8G4. Use the reference keys after the figure to identify each hardware component.

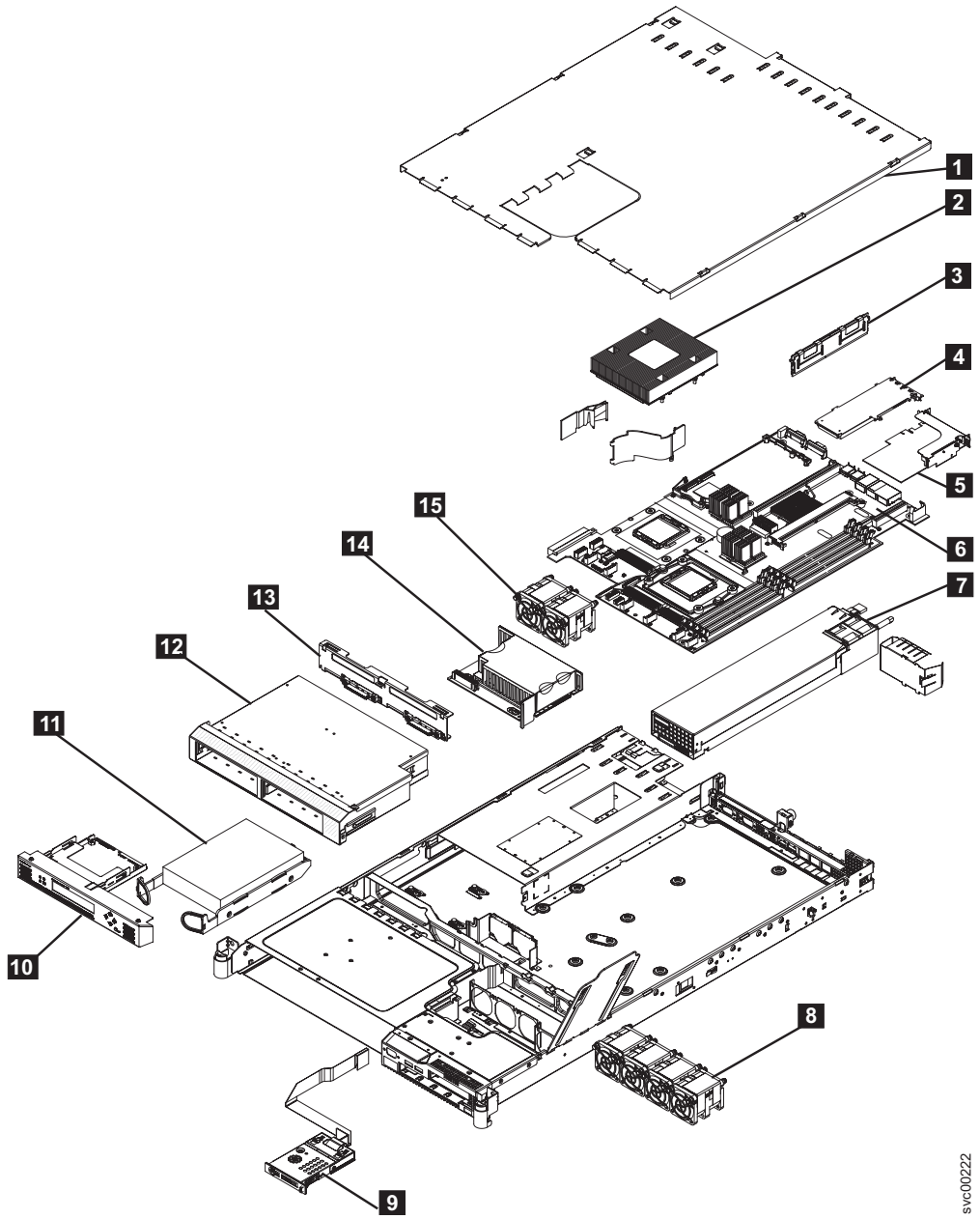


Figure 40. Exploded view of the hardware for the SAN Volume Controller 2145-8G4

1. Top cover
2. Microprocessor with heat sink
3. Memory
4. 4-port fibre-channel host bus adapter
5. PCI Express riser card
6. Power supply
7. System board
8. Fan assembly (3 - 6)
9. Operator information panel

10 Service controller

11 3.5-inch SATA disk drive

12 3.5-inch SATA disk drive cage

13 SATA cable assembly, with backplate

14 Power backplane

15 Fan assembly (1, 2)

SAN Volume Controller 2145-8F4 hardware

It is good to familiarize yourself with the SAN Volume Controller 2145-8F4 hardware.

Figure 41 provides a breakout view of the parts to the SAN Volume Controller 2145-8F4. Use the reference keys after the figure to identify each hardware component.

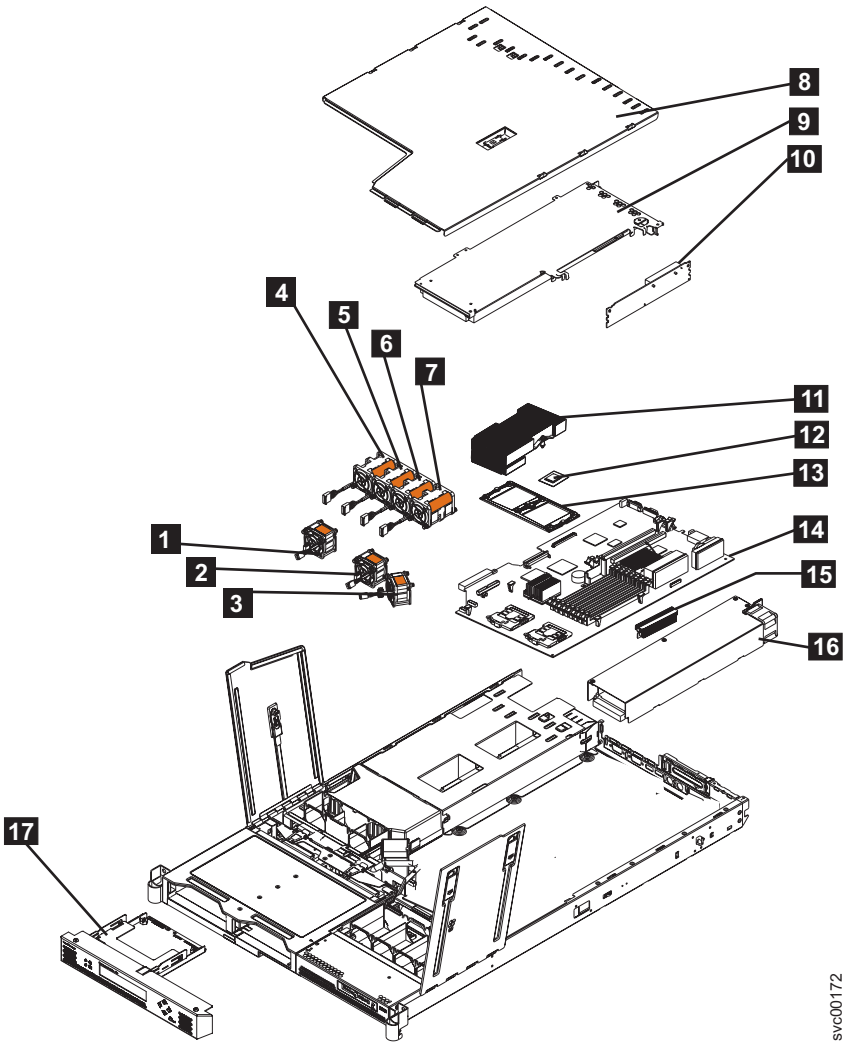


Figure 41. Exploded view of the hardware for the SAN Volume Controller 2145-8F4

1 Fan 1

2 Fan 2

3 Fan 3

4 Fan 4

5 Fan 5

6 Fan 6

7 Fan 7

8 Top cover

9 4-port fibre-channel host bus adapter

10 PCI Express riser card

11 Microprocessor heat sink

12 Microprocessor

13 Heat sink retainer

14 System board

15 Voltage regulator module

16 Power supply

17 Service controller

Related reference

"Hardware for the 2145-1U uninterruptible power supply" on page 57
The hardware for the 2145-1U uninterruptible power supply consists of connectors and switches, ports and receptacles, and the power supply.

SAN Volume Controller 2145-8F2 hardware

It is good to familiarize yourself with the SAN Volume Controller 2145-8F2 hardware.

Figure 42 on page 37 provides a breakout view of the parts to the SAN Volume Controller 2145-8F2. Use the reference keys after the figure to identify each hardware component.

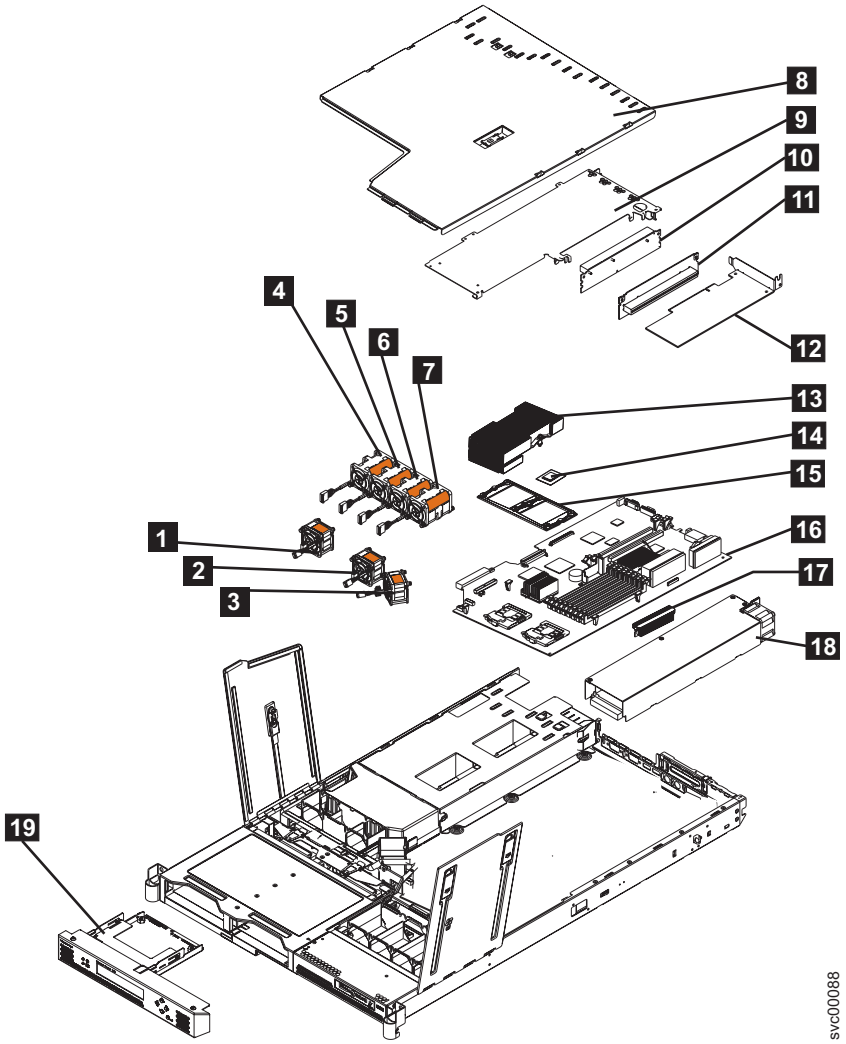


Figure 42. Exploded view of the hardware for the SAN Volume Controller 2145-8F2

1. Fan 1
2. Fan 2
3. Fan 3
4. Fan 4
5. Fan 5
6. Fan 6
7. Fan 7
8. Top cover
9. Dual port fibre-channel host bus adapter (full height)
10. Full height riser card
11. Low profile riser card
12. Dual port fibre-channel host bus adapter (low profile)
13. Microprocessor heat sink
14. Microprocessor

15 Heat sink retainer

16 System board

17 Voltage regulator module (VRM)

18 Power supply

19 Service controller

SAN Volume Controller 2145-4F2 hardware

It is good to familiarize yourself with the SAN Volume Controller 2145-4F2 hardware.

Figure 43 on page 39 provides a breakout view of the parts to the SAN Volume Controller. Use the reference keys after the figure to identify each hardware component.

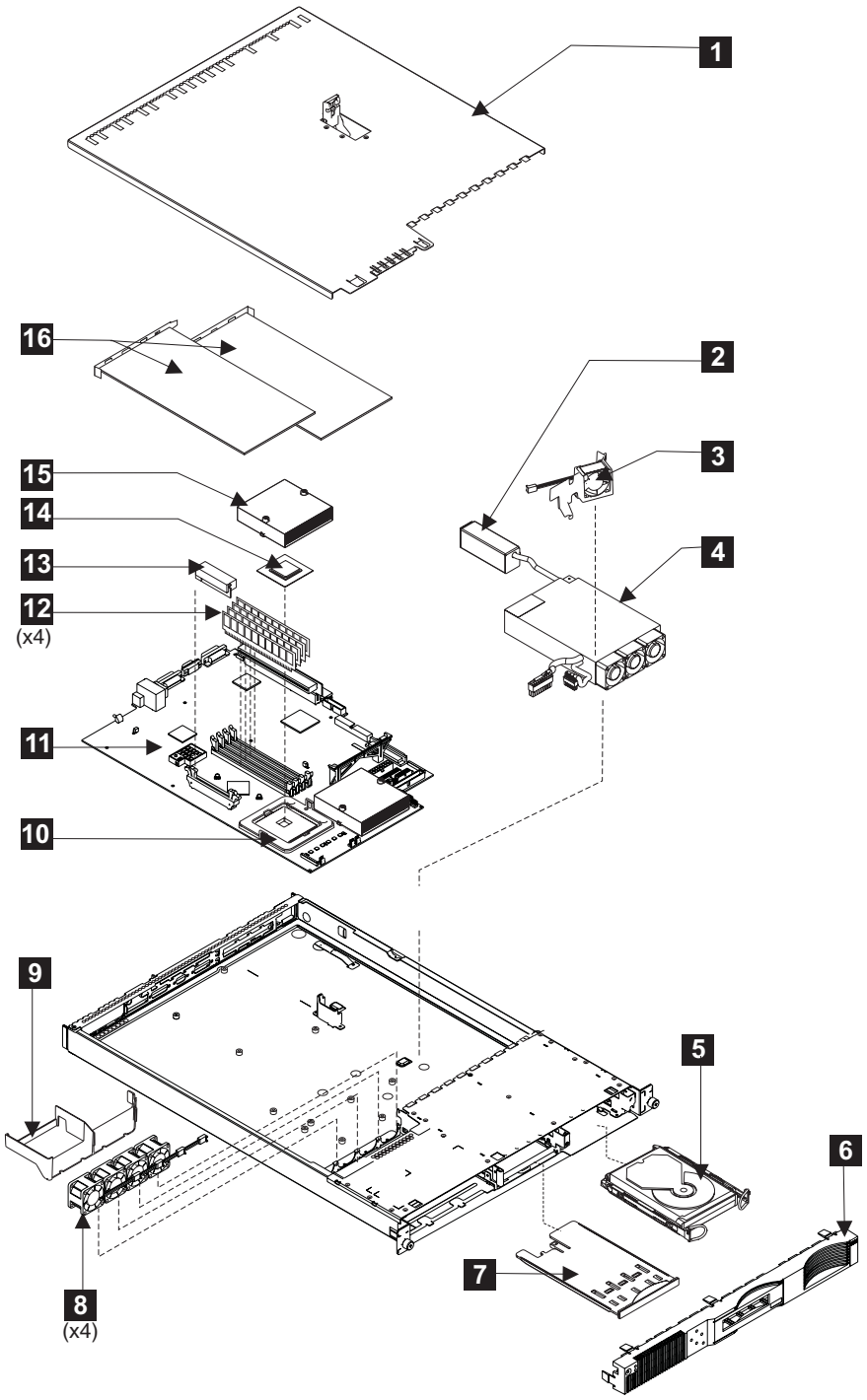


Figure 43. Exploded view of the hardware for the SAN Volume Controller 2145-4F2

1. Top cover
2. Power supply connector
3. Fan with baffle
4. Power supply assembly
5. Hard disk drive
6. Front panel

7 Service controller card

8 Fan assembly (4)

9 Air baffle

10 Microprocessor heat sink retention module

11 System board

12 DIMM modules (4)

13 Microprocessor Voltage Regulator

14 Microprocessor

15 Microprocessor heat sink

16 Fibre-channel adapters (2)

Requirements for the SAN Volume Controller environment

Certain specifications for the physical site of the SAN Volume Controller must be met before the IBM representative can set up your SAN Volume Controller environment.

SAN Volume Controller 2145-8G4 environment requirements

Before the SAN Volume Controller 2145-8G4 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Input-voltage requirements

Ensure that your environment meets the following voltage requirements.

Voltage	Frequency
200 to 240 V single phase ac	50 or 60 Hz

Power requirements for each node

Ensure that your environment meets the following power requirements.

The power that is required depends on the node type, the uninterruptible power supply type, and whether the redundant ac power feature is used.

Components	Power requirements
SAN Volume Controller 2145-8G4 + 2145-1U uninterruptible power supply	470 W

For each redundant ac power switch, add 20 W to the power requirements.

Circuit breaker requirements

The 2145-1U uninterruptible power supply has an integrated circuit breaker and does not require additional protection.

Environment requirements without redundant ac power

Ensure that your environment falls within the following ranges if you are not using redundant ac power.

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	10°C to 35°C (50°F to 95°F)	0 to 914 m (0 to 2998 ft)	8% to 80% noncondensing	23°C (73°F)
Operating in higher altitudes	10°C to 32°C (50°F to 90°F)	914 to 2133 m (2998 to 6988 ft)	8% to 80% noncondensing	23°C (73°F)
Powered off	10°C to 43°C (50°F to 110°F)	0 to 2133 m (2998 to 6988 ft)	8% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133 m (0 to 6988 ft)	5% to 80% noncondensing	29°C (84°F)
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft)	5% to 100% condensing, but no precipitation	29°C (84°F)

Environment requirements with redundant ac power

Ensure that your environment falls within the following ranges if you are using redundant ac power.

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	15°C to 32°C (59°F to 90°F)	0 to 914 m (0 to 2998 ft)	20% to 80% noncondensing	23°C (73°F)
Operating in higher altitudes	15°C to 32°C (59°F to 90°F)	914 to 2133 m (2998 to 6988 ft)	20% to 80% noncondensing	23°C (73°F)
Powered off	10°C to 43°C (50°F to 110°F)	0 to 2133m (0 to 6988 ft)	20% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133 m (0 to 6988 ft)	5% to 80% noncondensing	29°C (84°F)
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft)	5% to 100% condensing, but no precipitation	29°C (84°F)

Preparing your environment

The following tables list the physical characteristics of the SAN Volume Controller 2145-8G4 node.

Dimensions and weight

Ensure that space is available in a rack that is capable of supporting the node.

Height	Width	Depth	Maximum weight
43 mm (1.69 in.)	440 mm (17.32 in.)	686 mm (27 in.)	12.7 kg (28 lb)

Additional space requirements

Ensure that space is also available in the rack for the following additional space requirements around the node.

Location	Additional space requirements	Reason
Left and right sides	50 mm (2 in.)	Cooling air flow
Back	Minimum: 100 mm (4 in.)	Cable exit

Heat output of each SAN Volume Controller 2145-8G4 node

The node dissipates the following maximum heat output.

Model	Heat output per node
SAN Volume Controller 2145-8G4	400 W (1350 Btu per hour)

Related reference

"Requirements for the uninterruptible power supply environment" on page 65
An uninterruptible power supply environment requires that certain specifications for the physical site of the SAN Volume Controller must be met.

"SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 environment requirements"
Before the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

"SAN Volume Controller 2145-4F2 environment requirements" on page 44
Before the SAN Volume Controller 2145-4F2 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 environment requirements

Before the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Input-voltage requirements

Ensure that your environment meets the following voltage requirements.

Voltage	Frequency
200 to 240 V single phase ac	50 or 60 Hz

Power requirements for each node

Ensure that your environment meets the following power requirements.

The power that is required depends on the node type, the uninterruptible power supply type, and whether the redundant ac power feature is used.

Components	Power requirements
SAN Volume Controller 2145-8F4 + 2145-1U uninterruptible power supply	520 W
SAN Volume Controller 2145-8F2 + 2145-1U uninterruptible power supply	520 W

For each redundant ac power switch, add 20 W to the power requirements.

Circuit breaker requirements

The 2145-1U uninterruptible power supply has an integrated circuit breaker and does not require additional protection.

Environment requirements without redundant ac power

Ensure that your environment falls within the following ranges if you are not using redundant ac power.

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	10°C to 35°C (50°F to 95°F)	0 to 914 m (0 to 2998 ft)	8% to 80% noncondensing	23°C (74°F)
Operating in higher altitudes	10°C to 32°C (50°F to 88°F)	914 to 2133 m (2998 to 6988 ft)	8% to 80% noncondensing	23°C (74°F)
Powered off	10°C to 43°C (50°F to 110°F)	0 to 2133 m (2998 to 6988 ft)	8% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133 m (0 to 6988 ft)	5% to 80% noncondensing	29°C (84°F)
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft)	5% to 100% condensing, but no precipitation	29°C (84°F)

Environment requirements with redundant ac power

Ensure that your environment falls within the following ranges if you are using redundant ac power.

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	15°C to 32°C (59°F to 89°F)	0 to 914 m (0 to 2998 ft)	20% to 80% noncondensing	23°C (74°F)
Operating in higher altitudes	15°C to 32°C (50°F to 88°F)	914 to 2133 m (2998 to 6988 ft)	20% to 80% noncondensing	23°C (74°F)
Powered off	10°C to 43°C (50°F to 110°F)	0 to 2133m (0 to 6988 ft)	20% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133 m (0 to 6988 ft)	5% to 80% noncondensing	29°C (84°F)

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft)	5% to 100% condensing, but no precipitation	29°C (84°F)

Preparing your environment

The following tables list the physical characteristics of the SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 nodes.

Dimensions and weight

Ensure that space is available in a rack that is capable of supporting the node.

Height	Width	Depth	Maximum weight
43 mm (1.69 in.)	440 mm (17.32 in.)	686 mm (27 in.)	12.7 kg (28 lb)

Additional space requirements

Ensure that space is also available in the rack for the following additional space requirements around the node.

Location	Additional space requirements	Reason
Left and right sides	50 mm (2 in.)	Cooling air flow
Back	Minimum: 100 mm (4 in.)	Cable exit

Heat output of each SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 node

The nodes dissipate the following maximum heat output.

Model	Heat output per node
SAN Volume Controller 2145-8F4	450 W (1540 Btu per hour)
SAN Volume Controller 2145-8F2	450 W (1540 Btu per hour)

SAN Volume Controller 2145-4F2 environment requirements

Before the SAN Volume Controller 2145-4F2 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Input-voltage requirements

Ensure that your environment meets the following voltage requirements.

Voltage	Frequency
200 to 240 V single phase ac	50 or 60 Hz

Power requirements for each node

Ensure that your environment meets the following power requirements.

The power that is required depends on the node type, the uninterruptible power supply type, and whether the redundant ac power feature is used.

Components	Power requirements
SAN Volume Controller 2145-4F2 + 2145-1U uninterruptible power supply	420 W
One SAN Volume Controller 2145-4F2 + one 2145 uninterruptible power supply	760 W
Two SAN Volume Controller 2145-4F2 nodes + one 2145 uninterruptible power supply	1120 W

For each redundant ac power switch, add 20 W to the power requirements.

Circuit breaker requirements

Ensure that the following circuit breaker requirements are met:

- The 2145-1U uninterruptible power supply has an integrated circuit breaker and does not require additional protection.
- Each 2145 uninterruptible power supply is connected to a separate branch circuit, which includes a UL-listed 15 A circuit breaker.

Environment requirements without redundant ac power

Ensure that your environment falls within the following ranges if you are not using redundant ac power.

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	10°C to 35°C (50°F to 95°F)	0 to 914 m (0 to 2998 ft)	8% to 80% noncondensing	23°C (74°F)
Operating in higher altitudes	10°C to 32°C (50°F to 88°F)	914 to 2133 m (2998 to 6988 ft)	8% to 80% noncondensing	23°C (74°F)
Powered off	10°C to 43°C (50°F to 110°F)	0 to 2133 m (2998 to 6988 ft)	8% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133 m (0 to 6988 ft)	5% to 80% noncondensing	29°C (84°F)
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft)	5% to 100% condensing, but no precipitation	29°C (84°F)

Environment requirements with redundant ac power

Ensure that your environment falls within the following ranges if you are using redundant ac power.

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating in lower altitudes	15°C to 32°C (59°F to 89°F)	0 to 914 m (0 to 2998 ft)	20% to 80% noncondensing	23°C (74°F)
Operating in higher altitudes	15°C to 32°C (50°F to 88°F)	914 to 2133 m (2998 to 6988 ft)	20% to 80% noncondensing	23°C (74°F)
Powered off	10°C to 43°C (50°F to 110°F)	0 to 2133m (0 to 6988 ft)	20% to 80% noncondensing	27°C (81°F)
Storing	1°C to 60°C (34°F to 140°F)	0 to 2133 m (0 to 6988 ft)	5% to 80% noncondensing	29°C (84°F)
Shipping	-20°C to 60°C (-4°F to 140°F)	0 to 10668 m (0 to 34991 ft)	5% to 100% condensing, but no precipitation	29°C (84°F)

Preparing your environment

The following tables list the physical characteristics of the SAN Volume Controller 2145-4F2 node.

Dimensions and weight

Ensure that space is available in a rack that is capable of supporting the node.

Height	Width	Depth	Maximum weight
43 mm (1.69 in.)	440 mm (17.32 in.)	686 mm (27 in.)	12.7 kg (28 lb)

Additional space requirements

Ensure that space is also available in the rack for the following additional space requirements around the node.

Location	Additional space requirements	Reason
Left and right sides	50 mm (2 in.)	Cooling air flow
Back	Minimum: 100 mm (4 in.)	Cable exit

Heat output of each SAN Volume Controller 2145-4F2 node

The node dissipates the following maximum heat output.

Model	Heat output per node
SAN Volume Controller 2145-4F2	350 W (1200 Btu per hour)

Fibre-channel port numbers and worldwide port names

Fibre-channel ports are identified by their physical port number and by a worldwide port name (WWPN).

Related reference

"Fibre-channel LEDs" on page 22
The fibre-channel LEDs indicate the status of the fibre-channel ports.

SAN Volume Controller 2145-8G4 fibre-channel port numbers and worldwide port names

The SAN Volume Controller 2145-8G4 fibre-channel ports are identified by their physical port number and by a worldwide port name (WWPN).

Figure 44 provides a view of the rear of the SAN Volume Controller 2145-8G4.

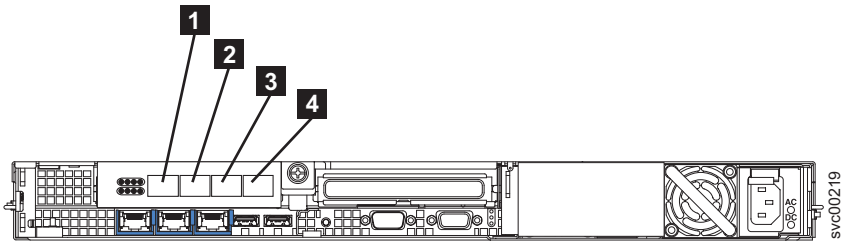


Figure 44. The physical port numbers for the SAN Volume Controller 2145-8G4

The physical port numbers identify fibre-channel cards and cable connections when you perform service tasks. The WWPNs are used for tasks such as fibre-channel switch configuration and to uniquely identify the devices on the SAN.

The physical port numbers are 1 - 4, counting from left to right when you view the rear panel of the SAN Volume Controller. The WWPNs are derived from the worldwide node name (WWNN) of the SAN Volume Controller in which the card is installed.

The WWNN is in the form 50050768010*XXXXX*, where *XXXXX* is initially derived from the unit and is specific to a SAN Volume Controller. You can change the *XXXXX* value by using the front panel to facilitate service controller concurrent replacement and to enable some concurrent upgrade operations.

The WWPNs are in the form 5005076801*QXXXXX*, where *XXXXX* is as previously stated and *Q* is related to the port number as follows:

Port	Value of Q
1	4
2	3
3	1
4	2

SAN Volume Controller 2145-8F4 fibre-channel port numbers and worldwide port names

The SAN Volume Controller 2145-8F4 fibre-channel ports are identified by their physical port number and by a worldwide port name (WWPN).

Figure 45 provides a view of the rear of the SAN Volume Controller 2145-8F4.

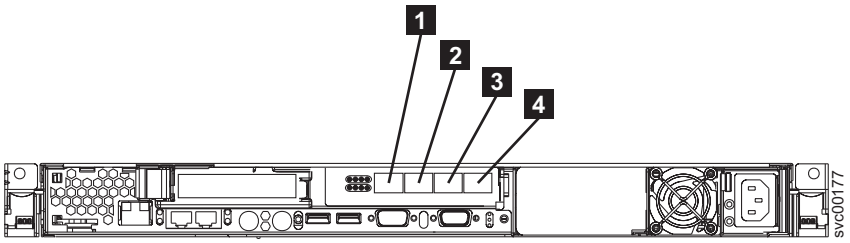


Figure 45. The physical port numbers for the SAN Volume Controller 2145-8F4

SAN Volume Controller 2145-8F2 fibre-channel port numbers and worldwide port names

The SAN Volume Controller 2145-8F2 fibre-channel ports are identified by their physical port number and by a worldwide port name (WWPN).

Figure 46 provides a view of the rear of the SAN Volume Controller 2145-8F2.

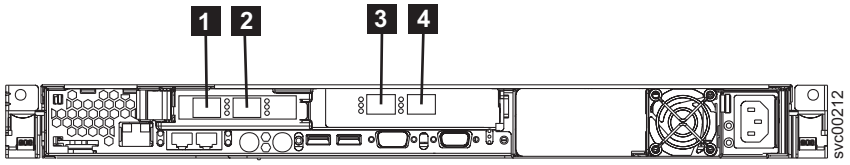


Figure 46. The physical port numbers for the SAN Volume Controller 2145-8F2

Redundant ac power switch

The redundant ac power switch is an optional feature that makes the SAN Volume Controller nodes more resilient to power failure. The redundant ac power switch is not a replacement for an uninterruptible power supply. You must still use a 2145-1U uninterruptible power supply for each node.

You must connect the redundant ac power switch to two independent power circuits. One power circuit connects to the main power input port and the other power circuit connects to the backup power input port. If the main power to the SAN Volume Controller node fails for any reason, the redundant ac power switch automatically uses the backup power source. When power is restored, the redundant ac power switch automatically changes back to using the main power source.

Place the redundant ac power switch in the same rack as the SAN Volume Controller node. The redundant ac power switch logically sits between the rack power distribution unit and the 2145-1U uninterruptible power supply.

You can use a single redundant ac power switch to power one or two SAN Volume Controller nodes. If you use the redundant ac power switch to power two nodes, the nodes must be in different I/O groups. In the event that the redundant ac power switch fails or requires maintenance, both nodes power off. Because the nodes are in two different I/O groups, the hosts do not lose access to the backend disk data.

For maximum resilience to failure, use one redundant ac power switch to power each SAN Volume Controller node.

The following graphic shows a redundant ac power switch.

Preparing your redundant ac power environment

Ensure that your physical site meets the installation requirements for the redundant ac power switch.

The redundant ac power switch requires two independent power sources that are provided through two rack-mounted power distribution units (PDUs). The PDUs must have IEC320-C13 outlets.

The redundant ac power switch comes with two IEC 320-C19 to C14 power cables to connect to rack PDUs. There are no country-specific cables for the redundant ac power switch.

The power cable between the redundant ac power switch and the 2145-1U uninterruptible power supply is rated at 10 A.

Redundant ac power switch specifications

The following tables list the physical characteristics of the redundant ac power switch.

Dimensions and weight

Ensure that space is available in a rack that is capable of supporting the redundant ac power switch.

Height	Width	Depth	Maximum weight
43 mm (1.69 in.)	192 mm (7.56 in.)	240 mm	2.6 kg (5.72 lb)

Additional space requirements

Ensure that space is also available in the rack for the side mounting plates on either side of the redundant ac power switch.

Location	Width	Reason
Left side	124 mm (4.89 in.)	Side mounting plate
Right side	124 mm (4.89 in.)	Side mounting plate

Heat output (maximum)

The maximum heat output that is dissipated inside the redundant ac power switch is approximately 20 watts (70 Btu per hour).

Cabling of redundant ac power switch (example)

You must properly cable the redundant ac power switch units in your environment.

Note: While this topic provides an example of the cable connections, it does not indicate a preferred physical location for the components.

Figure 47 on page 51 shows an example of the main wiring for a SAN Volume Controller cluster with the redundant ac power switch feature. The four-node cluster consists of two I/O groups:

- I/O group 0 contains nodes A and B
- I/O group 1 contains nodes C and D

Figure 47. A four-node SAN Volume Controller cluster with the redundant ac power switch feature

1. I/O group 0
2. SAN Volume Controller node A
3. 2145-1U uninterruptible power supply A
4. SAN Volume Controller node B
5. 2145-1U uninterruptible power supply B
6. I/O group 1
7. SAN Volume Controller node C
8. 2145-1U uninterruptible power supply C
9. SAN Volume Controller node D
10. 2145-1U uninterruptible power supply D
11. Redundant ac power switch 1
12. Redundant ac power switch 2

13 Site PDU X (C13 outlets)

14 Site PDU Y (C13 outlets)

The site PDUs X and Y (13 and 14) are powered from two independent power sources.

In this example, only two redundant ac power switch units are used, and each power switch powers one node in each I/O group. However, for maximum redundancy, use one redundant ac power switch to power each node in the cluster.

Uninterruptible power supply

The uninterruptible power supply protects a SAN Volume Controller node against blackouts, brownouts, and power surges. The uninterruptible power supply contains a power sensor to monitor the supply and a battery to provide power until an orderly shutdown of the system can be performed.

2145-1U uninterruptible power supply

A 2145-1U uninterruptible power supply is used exclusively to maintain data that is held in the SAN Volume Controller dynamic random access memory (DRAM) in the event of an unexpected loss of external power. This use differs from the traditional uninterruptible power supply that enables continued operation of the device that it supplies when power is lost.

With a 2145-1U uninterruptible power supply, data is saved to the internal disk of the SAN Volume Controller node. The uninterruptible power supply units are required to power the SAN Volume Controller nodes even when the input power source is considered uninterruptible.

The SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 nodes can operate only with the 2145-1U uninterruptible power supply. The SAN Volume Controller 2145-4F2 node can operate with either the 2145 uninterruptible power supply or the 2145-1U uninterruptible power supply.

Note: The uninterruptible power supply maintains continuous SAN Volume Controller-specific communications with its attached SAN Volume Controller nodes. A SAN Volume Controller node cannot operate without the uninterruptible power supply. The uninterruptible power supply must be used in accordance with documented guidelines and procedures and must not power any equipment other than a SAN Volume Controller node.

Related reference

"Connecting the 2145-1U uninterruptible power supply to the SAN Volume Controller"
To provide redundancy and concurrent maintenance, you can install the SAN Volume Controllers in pairs.

Connecting the 2145-1U uninterruptible power supply to the SAN Volume Controller

To provide redundancy and concurrent maintenance, you can install the SAN Volume Controllers in pairs.

For connection to the 2145-1U uninterruptible power supply, each SAN Volume Controller of a pair must be connected to only one 2145-1U uninterruptible power supply.

Note: A cluster can contain no more than eight SAN Volume Controller nodes. The 2145-1U uninterruptible power supply must be attached to a source that is both single phase and 200-240 V. The 2145-1U uninterruptible power supply has an integrated circuit breaker and does not need external protection.

The SAN Volume Controller software determines whether the input voltage to the uninterruptible power supply is within range and sets an appropriate voltage alarm range on the uninterruptible power supply. The software continues to recheck the input voltage every few minutes. If it changes substantially but remains within the permitted range, the alarm limits are readjusted.

Note: The 2145-1U uninterruptible power supply is equipped with a cable retention bracket that keeps the power cable from disengaging from the rear panel. See the related documentation for more information.

Related reference

"Hardware for the 2145-1U uninterruptible power supply" on page 57
The hardware for the 2145-1U uninterruptible power supply consists of connectors and switches, ports and receptacles, and the power supply.

Controls and indicators for the 2145-1U uninterruptible power supply

All controls and indicators for the 2145-1U uninterruptible power supply are located on the front panel assembly.

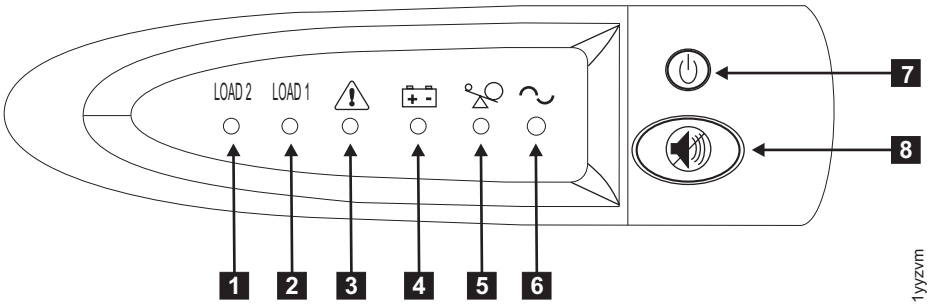


Figure 48. 2145-1U uninterruptible power supply front panel assembly

1. Load segment 2 indicator
2. Load segment 1 indicator
3. Alarm
4. On-battery indicator
5. Overload indicator
6. Power-on indicator
7. On/off button
8. Test and alarm reset button

Table 3 identifies which status and error LEDs that display on the 2145-1U uninterruptible power supply front panel assembly relate to the specified error conditions. It also lists the uninterruptible power supply alert buzzer behavior.

Table 3. Uninterruptible power supply error indicators

[1] Load2	[2] Load1	[3] Alarm	[4] Battery	[5] Overload	[6] ac-on	Buzzer	Error condition
Green (see Note 1)					Green	(see Note 3)	No errors; the uninterruptible power supply was configured by the SAN Volume Controller
Green	Amber (see Note 2)				Green		No errors; the uninterruptible power supply is not yet configured by the SAN Volume Controller
Green	Either on or off		Amber		Green	Beeps for two seconds and then stops	ac over or under limit (on battery)
		Flashing red	Flashing amber	Flashing red	Flashing green	Three beeps every ten seconds	Battery undervoltage
Green	Either on or off	Flashing red			Flashing green	solid on	Battery overvoltage
		Flashing red	Flashing amber		Flashing green	solid on	Output wave is abnormal when the charger is open, on battery mode
		Flashing red	Flashing amber			solid on	ac output wave is under low limit or above high limit on battery mode
Green	Either on or off		Amber			Beeps for four seconds and then stops	On battery (no ac)
Green	Either on or off		Flashing amber			Beeps for two seconds and then stops	Low battery (no ac)
Green	Either on or off			Red	Green	Beeps for one second and then stops	Overload while on line
			Amber	Red		Beeps for one second and then stops	Overload while on battery
Either on or off	Either on or off	Flashing red			Green	solid on	Fan failure

Table 3. Uninterruptible power supply error indicators (continued)

[1] Load2	[2] Load1	[3] Alarm	[4] Battery	[5] Overload	[6] ac-on	Buzzer	Error condition
Either on or off	Either on or off	Flashing red	Amber			solid on	Battery test fail
		Flashing red		Red		solid on	Overload timeout
		Flashing red	Amber		Green	solid on	Over temperature
		Flashing red	Amber	Red	Green		Output short circuit

Notes:

1. The green Load2 LED ([1]) indicates that power is being supplied to the right pair of ac power outlets (viewed from the rear of the uninterruptible power supply).
2. The amber Load1 LED ([2]) indicates that power is being supplied to the left pair of ac power outlets (viewed from the rear of the uninterruptible power supply). These outlets are not used by the SAN Volume Controller.

   This LED might be illuminated during power-on sequences, but it is typically extinguished by the SAN Volume Controller node that is attached to the uninterruptible power supply.
3. A blank cell indicates that the light or buzzer is off.

Load segment 2 indicator:

The load segment 2 indicator on the 2145-1U uninterruptible power supply is lit (green) when power is available to load segment 2.

When the load segment 2 indicator is green, the 2145-1U uninterruptible power supply is running normally and power is available to this segment.

Related reference

"Hardware for the 2145-1U uninterruptible power supply" on page 57
The hardware for the 2145-1U uninterruptible power supply consists of connectors and switches, ports and receptacles, and the power supply.

Load segment 1 indicator:

The load segment 1 indicator on the 2145-1U uninterruptible power supply is not currently used by the SAN Volume Controller.

Note: When the 2145-1U uninterruptible power supply is configured by the SAN Volume Controller, this load segment is disabled. During normal operation, the load segment 1 indicator is off. A "Do not use" label.covers the receptacles.

Related reference

"Hardware for the 2145-1U uninterruptible power supply" on page 57
The hardware for the 2145-1U uninterruptible power supply consists of connectors and switches, ports and receptacles, and the power supply.

Alarm:

If the alarm on the 2145-1U uninterruptible power supply is flashing red, maintenance is required.

If the service indicator is on, go to the 2145-1U uninterruptible power supply MAP to resolve the problem.

Related tasks

"MAP 5150: 2145-1U uninterruptible power supply" on page 379
MAP 5150: 2145-1U uninterruptible power supply helps you solve problems that have occurred in the 2145-1U uninterruptible power supply systems that are used on a SAN Volume Controller.

On-battery indicator:

The on-battery indicator glows yellow when the 2145-1U uninterruptible power supply is powered by the battery. This indicates that the main power source has failed.

If the on-battery indicator is on, go to the 2145-1U uninterruptible power supply MAP to resolve the problem.

Related tasks

"MAP 5150: 2145-1U uninterruptible power supply" on page 379
MAP 5150: 2145-1U uninterruptible power supply helps you solve problems that have occurred in the 2145-1U uninterruptible power supply systems that are used on a SAN Volume Controller.

Overload indicator:

The overload indicator lights up when the capacity of the 2145-1U uninterruptible power supply is exceeded.

If the overload indicator is on, go to MAP 5250: 2145-1U uninterruptible power supply repair verification to resolve the problem.

Related tasks

"MAP 5150: 2145-1U uninterruptible power supply" on page 379
MAP 5150: 2145-1U uninterruptible power supply helps you solve problems that have occurred in the 2145-1U uninterruptible power supply systems that are used on a SAN Volume Controller.

Power-on indicator:

The power-on indicator is displayed when the 2145-1U uninterruptible power supply is functioning.

When the power-on indicator is a steady green, the 2145-1U uninterruptible power supply is active.

On/off button:

The on/off button turns the power on or turns the power off to the 2145-1U uninterruptible power supply.

Turning on the 2145-1U uninterruptible power supply

After you connect the 2145-1U uninterruptible power supply to the outlet, it remains in *standby* mode until you turn it on. Press and hold the on/off button until the power-on indicator is illuminated (approximately 5 seconds). On some versions of the 2145-1U uninterruptible power supply, you might need a pointed device, such as a screwdriver, to press the on/off button. A self-test is initiated that

takes approximately 10 seconds, during which time the indicators are turned on and off several times. The 2145-1U uninterruptible power supply then enters *normal* mode.

Turning off the 2145-1U uninterruptible power supply

Press and hold the on/off button until the power-on light is extinguished (approximately 5 seconds). On some versions of the 2145-1U uninterruptible power supply, you might need a pointed device, such as a screwdriver, to press the on/off button. This places the 2145-1U uninterruptible power supply in *standby* mode. You must then unplug the 2145-1U uninterruptible power supply to power-off the unit.

Warning: Do not power off the uninterruptible power supply before you shut down the SAN Volume Controller node that it is connected to. Always follow the instructions that are provided in this guide to perform an orderly shut down of a SAN Volume Controller node.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

Test and alarm reset button:

Use the test and alarm reset button to start the self-test.

To start the self-test, press and hold the test and alarm reset button for three seconds. This button also resets the alarm.

Note: This button is applicable to both the 2145 uninterruptible power supply and the 2145-1U uninterruptible power supply.

Hardware for the 2145-1U uninterruptible power supply

The hardware for the 2145-1U uninterruptible power supply consists of connectors and switches, ports and receptacles, and the power supply.

Locations for the 2145-1U uninterruptible power supply connectors and switches

Figure 49 shows the location of the connectors and switches on the 2145-1U uninterruptible power supply:

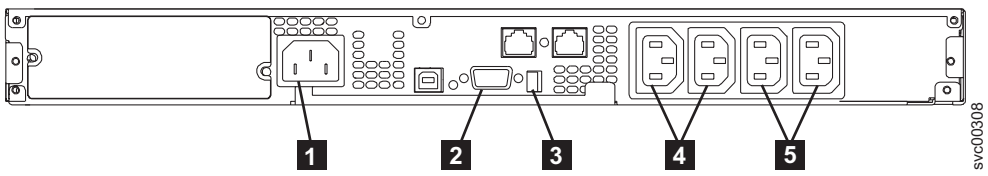


Figure 49. 2145-1U uninterruptible power supply connectors and switches

1. Main power connectors
2. Communication port
3. Dip switches

4 Load segment 1 receptacles

5 Load segment 2 receptacles

2145-1U uninterruptible power supply dip switches

Figure 50 shows the dip switches, which can be used to configure the input and output voltage ranges. Because this function is performed by the SAN Volume Controller software, both switches must be left in the Off position.

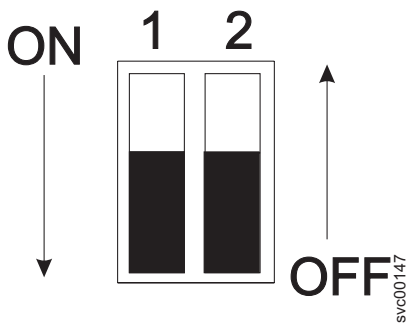


Figure 50. 2145-1U uninterruptible power supply dip switches

2145-1U uninterruptible power supply ports not used

The 2145-1U uninterruptible power supply is equipped with ports that are not used by the SAN Volume Controller and have not been tested. Use of these ports, in conjunction with the SAN Volume Controller or any other application that may be used with the SAN Volume Controller, is not supported. Figure 51 shows the 2145-1U uninterruptible power supply ports that are not used.

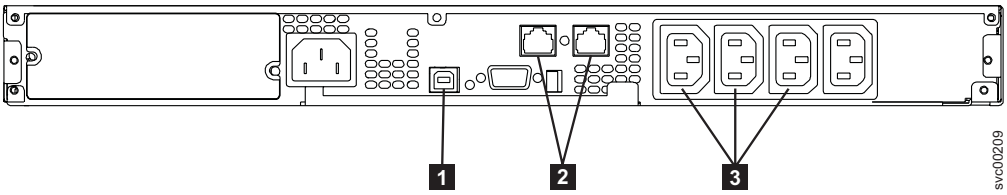


Figure 51. Ports not used by the 2145-1U uninterruptible power supply

1 USB interface port

2 Network ports

3 Load segment receptacles

2145-1U uninterruptible power supply part assembly

Figure 52 on page 59 shows the different parts that make up the 2145-1U uninterruptible power supply.

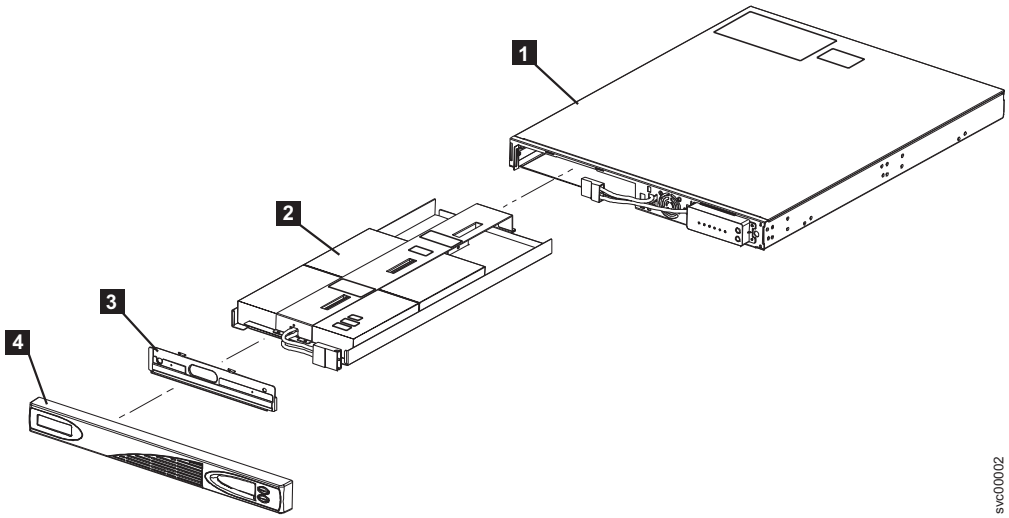


Figure 52. Exploded view of the 2145-1U uninterruptible power supply hardware

1. Frame assembly
2. Battery pack assembly
3. Battery plate
4. Front panel assembly

2145-1U uninterruptible power supply power connector

Figure 53 shows the power connector for the 2145-1U uninterruptible power supply.

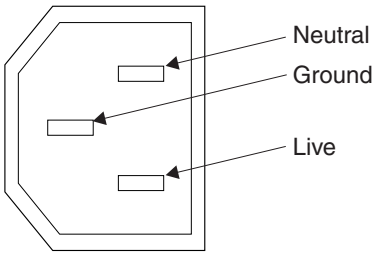


Figure 53. Power connector

Related reference

"SAN Volume Controller 2145-8F4 hardware" on page 35
It is good to familiarize yourself with the SAN Volume Controller 2145-8F4 hardware.

Related information

Appendix A, "Parts catalog," on page 643
Part numbers are available for the different parts and field replaceable units (FRUs) of the SAN Volume Controller and the uninterruptible power supply.

2145 uninterruptible power supply

The 2145 uninterruptible power supply provides a SAN Volume Controller 2145-4F2 node with a secondary power source if you lose power from your primary power source due to power failures, power sags, power surges, or line noise.

The SAN Volume Controller 2145-4F2 node can operate with either the 2145 uninterruptible power supply or the 2145-1U uninterruptible power supply. For information about the 2145-1U uninterruptible power supply, see "2145-1U uninterruptible power supply" on page 52.

Connecting the 2145 uninterruptible power supply to the SAN Volume Controller 2145-4F2

To provide redundancy and concurrent maintenance, you can install the SAN Volume Controller 2145-4F2 nodes in pairs.

For connection to the 2145 uninterruptible power supply, each SAN Volume Controller 2145-4F2 of a pair must be connected to a different uninterruptible power supply (both SAN Volume Controller 2145-4F2 nodes cannot be connected to the same uninterruptible power supply). Each 2145 uninterruptible power supply can support two SAN Volume Controller 2145-4F2 nodes.

Note: You must have two 2145 uninterruptible power supply units per cluster. A cluster can contain no more than eight SAN Volume Controller 2145-4F2 nodes and each uninterruptible power supply of a pair must be connected to a separate electrical input power source (if possible) to reduce the chance of input power failure at both uninterruptible power supply unis.

The 2145 uninterruptible power supply requires a dedicated branch circuit that meets the following specifications:

- A 15 A circuit breaker must be installed in each branch circuit that supplies the power to an uninterruptible power supply
- Single-phase
- 200 - 240 V

The SAN Volume Controller 2145-4F2 software determines whether the input voltage to the uninterruptible power supply is within range and sets an appropriate voltage alarm range on the uninterruptible power supply. The software continues to recheck the input voltage every few minutes. If it changes substantially but remains within the permitted range, the alarm limits are readjusted.

Controls and indicators for the 2145 uninterruptible power supply

All controls and indicators for the 2145 uninterruptible power supply are located on the front panel assembly.

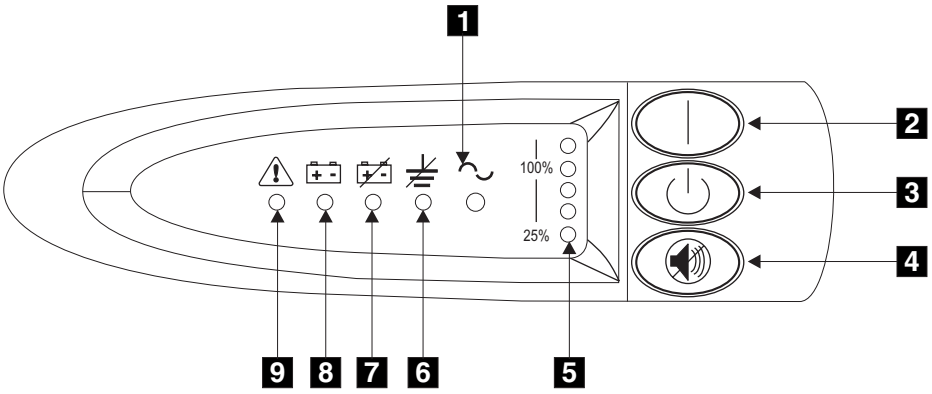


Figure 54. 2145 uninterruptible power supply front panel assembly

1. Mode indicator
2. On button
3. Off button
4. Test and alarm reset button
5. Load-level indicators
6. Site wiring fault indicators
7. Battery service indicator
8. Battery mode indicator
9. General alarm indicator

Related reference

"Mode indicator" on page 62
The mode indicator provides status information on the 2145 uninterruptible power supply and is located on the front panel.

"On button" on page 62
The on button turns on the main power to the 2145 uninterruptible power supply.

"Off button" on page 62
The off button turns off the main power to the 2145 uninterruptible power supply.

"Test and alarm reset button" on page 57
Use the test and alarm reset button to start the self-test.

"Load-level indicators" on page 63
The load-level indicators show the percentage of the 2145 uninterruptible power supply capacity that the SAN Volume Controller 2145-4F2 is using.

"Site wiring fault indicator" on page 63
The site wiring fault indicator on the 2145 uninterruptible power supply shows that either a ground wire connection does not exist or the live and neutral wires are reversed in the input power connection.

"Battery service indicator" on page 63
The battery service indicator is located on the front panel of the 2145 uninterruptible power supply and shows that the charge in the battery has become low while the 2145 uninterruptible power supply is in battery mode.

"Battery mode indicator" on page 63
The battery mode indicator shows that the 2145 uninterruptible power supply is operating on batteries.

"General alarm indicator" on page 63
The general alarm indicator on the 2145 uninterruptible power supply turns on when a power or temperature problem occurs.

Mode indicator:

The mode indicator provides status information on the 2145 uninterruptible power supply and is located on the front panel.

When the mode indicator is a steady green, the 2145 uninterruptible power supply is in normal mode. The 2145 uninterruptible power supply checks and charges its battery as necessary.

When the mode indicator is flashing green, the 2145 uninterruptible power supply is in standby mode. Standby mode means that the 2145 uninterruptible power supply is turned off but is still connected to the main power source. No power is available from the 2145 uninterruptible power supply output sockets but the 2145 uninterruptible power supply monitors and charges its battery as necessary.

When the mode indicator is steady red, the 2145 uninterruptible power supply is in bypass mode because of one of the following conditions:

- The 2145 uninterruptible power supply has overheated
- The 2145 uninterruptible power supply has an overload condition of 103% through 110% for 30 seconds
- The 2145 uninterruptible power supply detects a fault in the battery or in the 2145 uninterruptible power supply electronics assembly

When the mode indicator is flashing red and the alarm is sounding, the voltage range setting might not be correct. When a SAN Volume Controller 2145-4F2 is connected to the 2145 uninterruptible power supply, the SAN Volume Controller 2145-4F2 automatically adjusts the voltage range setting. Take no action for this alarm condition unless it persists for more than five minutes after a SAN Volume Controller 2145-4F2 has been connected to a 2145 uninterruptible power supply and powered on.

On button:

The on button turns on the main power to the 2145 uninterruptible power supply.

To turn on the power, press and hold the on button until you hear a beep (approximately one second). The mode indicator stops flashing and the load-level indicators display the percentage of load that is being applied to the 2145 uninterruptible power supply.

Off button:

The off button turns off the main power to the 2145 uninterruptible power supply.

Attention: Never use the off button unless you are specifically directed to in the instructions that are provided with the SAN Volume Controller 2145-4F2. If you press it at any other time, you might lose data in the cluster if the other 2145 uninterruptible power supply fails.

To turn off the power, press and hold the off button until the long beep stops (approximately five seconds). The mode indicator starts to flash and the 2145 uninterruptible power supply remains in standby mode until you disconnect the 2145 uninterruptible power supply from the main power outlet.

Test and alarm reset button:

Use the test and alarm reset button to start the self-test.

To start the self-test, press and hold the test and alarm reset button for three seconds. This button also resets the alarm.

Note: This button is applicable to both the 2145 uninterruptible power supply and the 2145-1U uninterruptible power supply.

Load-level indicators:

The load-level indicators show the percentage of the 2145 uninterruptible power supply capacity that the SAN Volume Controller 2145-4F2 is using.

When all the indicators are lit, the power requirements of the SAN Volume Controller 2145-4F2 have exceeded the capacity of the 2145 uninterruptible power supply.

Site wiring fault indicator:

The site wiring fault indicator on the 2145 uninterruptible power supply shows that either a ground wire connection does not exist or the live and neutral wires are reversed in the input power connection.

The site wiring fault indicator is located on the front panel of the 2145 uninterruptible power supply.

Battery service indicator:

The battery service indicator is located on the front panel of the 2145 uninterruptible power supply and shows that the charge in the battery has become low while the 2145 uninterruptible power supply is in battery mode.

The alarm continues to beep once every five seconds. The application programs immediately complete and save the work to prevent loss of data. If the 2145 uninterruptible power supply shuts down, it automatically restarts when the main power returns.

Battery mode indicator:

The battery mode indicator shows that the 2145 uninterruptible power supply is operating on batteries.

The battery mode indicator lights up when the main power source fails and the 2145 uninterruptible power supply is running on battery power. The alarm beeps once every five seconds. When main power returns, the 2145 uninterruptible power supply returns to normal mode and the battery recharges. The battery mode indicator then shuts off and the alarm ceases.

General alarm indicator:

The general alarm indicator on the 2145 uninterruptible power supply turns on when a power or temperature problem occurs.

When the general alarm indicator is accompanied by the audio alarm beeping every five seconds, the battery is low. If the audio alarm is continuous, the internal temperature of the 2145 uninterruptible power supply is too high or there has been a momentary output overload.

Hardware for the 2145 uninterruptible power supply

The hardware for the 2145 uninterruptible power supply consists of connectors, circuit breakers, and the power supply.

Locations for the 2145 uninterruptible power supply connectors and circuit breakers

Figure 55 shows the location of the connectors and switches on the 2145 uninterruptible power supply.

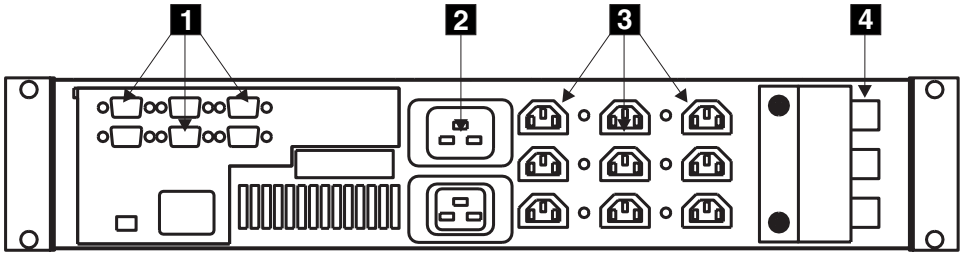


Figure 55. 2145 uninterruptible power supply connectors and circuit breakers

1. Signal cable connectors
2. Main power connector
3. Output connectors
4. Circuit breakers

2145 uninterruptible power supply part assembly

Figure 56 on page 65 shows the different parts that make up the 2145 uninterruptible power supply.

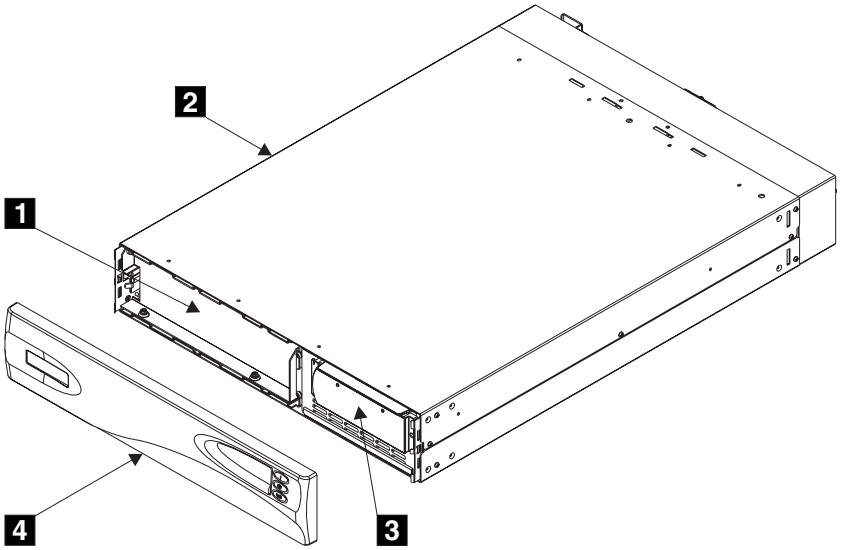


Figure 56. Exploded view of the 2145 uninterruptible power supply hardware

1. Battery assembly
2. Frame assembly
3. Electronics assembly
4. Front panel assembly

2145 uninterruptible power supply connector

Figure 57 shows the power connector for the 2145 uninterruptible power supply.

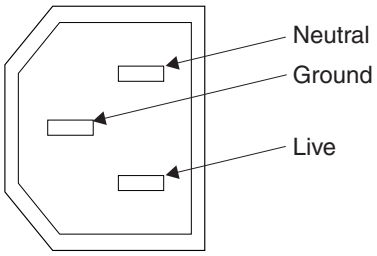


Figure 57. Power connector

Related information

Appendix A, "Parts catalog," on page 643
Part numbers are available for the different parts and field replaceable units (FRUs) of the SAN Volume Controller and the uninterruptible power supply.

Requirements for the uninterruptible power supply environment

An uninterruptible power supply environment requires that certain specifications for the physical site of the SAN Volume Controller must be met.

2145-1U uninterruptible power supply environment

The SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, and SAN Volume Controller 2145-4F2 are supported with the 2145-1U uninterruptible power supply.

2145-1U uninterruptible power supply specifications

The following tables describe the physical characteristics of the 2145-1U uninterruptible power supply.

2145-1U uninterruptible power supply dimensions and weight

Ensure that space is available in a rack that is capable of supporting the 2145-1U uninterruptible power supply.

Height	Width	Depth	Maximum weight
44 mm (1.73 in.)	439 mm (17.3 in.)	579 mm (22.8 in.)	16 kg (35.3 lb)
Note: The 2145-1U uninterruptible power supply package, which includes support rails, weighs 18.8 kg (41.4 lb).			

Heat output

The 2145-1U uninterruptible power supply unit produces the following approximate heat output.

Model	Heat output during normal operation	Heat output during battery operation
2145-1U uninterruptible power supply	40 W (135 Btu per hour)	150 W (510 Btu per hour)

2145 uninterruptible power supply environment

Ensure that your physical site meets the installation requirements of the 2145 uninterruptible power supply.

Uninterruptible power supply specifications

The following tables describe the physical characteristics of the 2145 uninterruptible power supply.

Attention: Ensure that you comply with the following requirements for the 2145 uninterruptible power supply units:

- If the uninterruptible power supply is cascaded from another uninterruptible power supply, the source uninterruptible power supply must have at least three times the capacity per phase and the total harmonic distortion must be less than 5%.
- The uninterruptible power supply must also have input voltage capture that has a slew rate of no more than 3 Hz per second.

2145 uninterruptible power supply dimensions and weight

Ensure that space is available in a rack that is capable of supporting the 2145 uninterruptible power supply.

Height	Width	Depth	Maximum weight
89 mm (3.5 in.)	483 mm (19 in.)	622 mm (24.5 in.)	37 kg (84 lb)

Heat output

The 2145 uninterruptible power supply unit produces the following approximate heat output.

Model	Heat output during normal operation	Heat output during battery operation
2145 uninterruptible power supply powering two SAN Volume Controller 2145-4F2 nodes	140 W (480 Btu per hour)	250 W (850 Btu per hour)

Chapter 3. Using the SAN Volume Controller Console and CLI

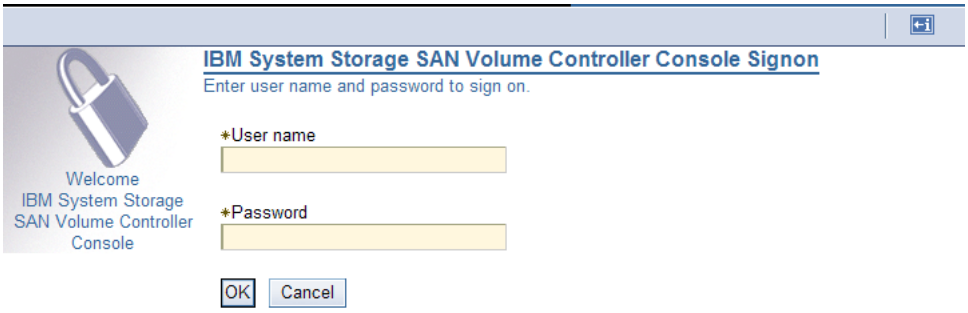
The SAN Volume Controller Console is a Web-browser based GUI and an SMI-S compliant CIM Agent that is based on the Open Pegasus CIM Server. The SAN Volume Controller command-line interface (CLI) is a collection of commands that you can use to manage SAN Volume Controller clusters.

You can use the SAN Volume Controller Console to monitor and maintain the configuration of storage that is associated with SAN Volume Controller clusters. You can also perform service procedures from the SAN Volume Controller Console.

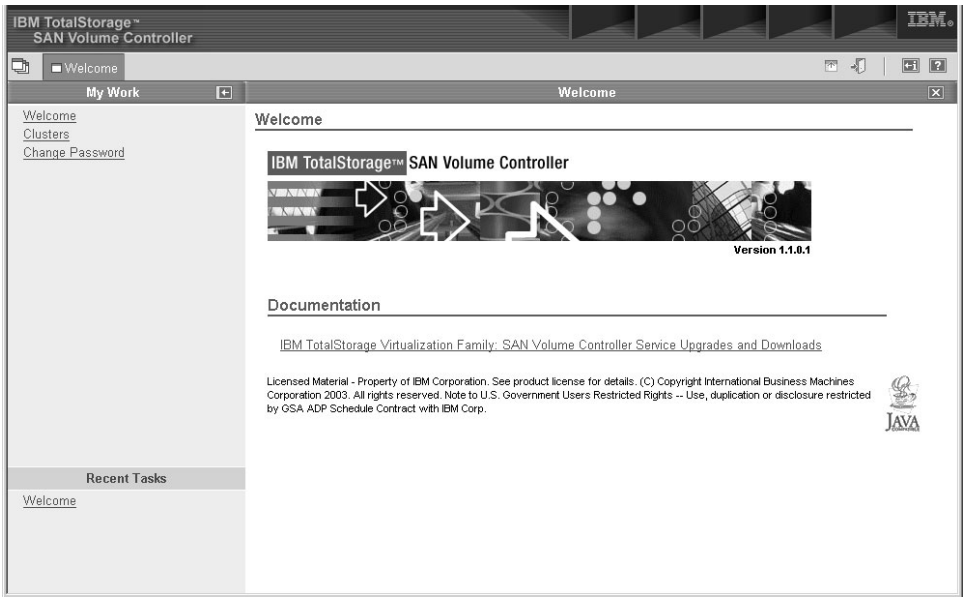
The SAN Volume Controller Console is installed on either an IBM System Storage Productivity Center (SSPC) or, in previous releases, on a master console server. You can access the SAN Volume Controller Console directly from the server where it is installed or remotely by pointing your Web browser to the server where it is installed. Your Web browser must be connected to the same Ethernet that is used by the server where the SAN Volume Controller Console is running.

Perform the following steps to access the SAN Volume Controller Console application from the server where the SAN Volume Controller Console is installed:

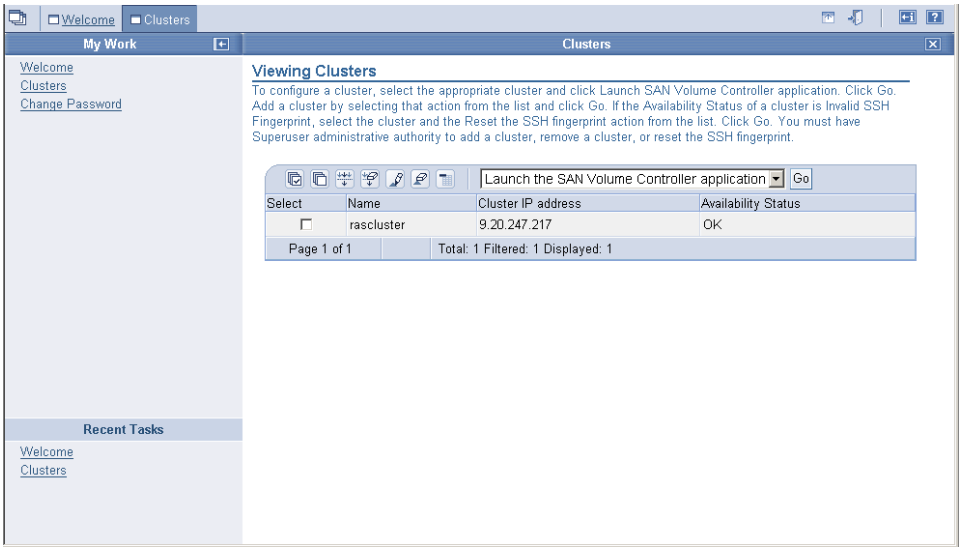
1. Log on to the server where the SAN Volume Controller Console is installed. Use the user name and password that is provided by the customer.
2. Double-click the SAN Volume Controller Console icon to display the SAN Volume Controller Console Signon panel.



3. Sign on with the SAN Volume Controller Console user name and password that is provided by the customer. The user name must be authorized for either the service or administrator role. The following Welcome panel is displayed.



4. Click **Clusters** in the portfolio to access the configuration and service tools. The Viewing Clusters panel is displayed.

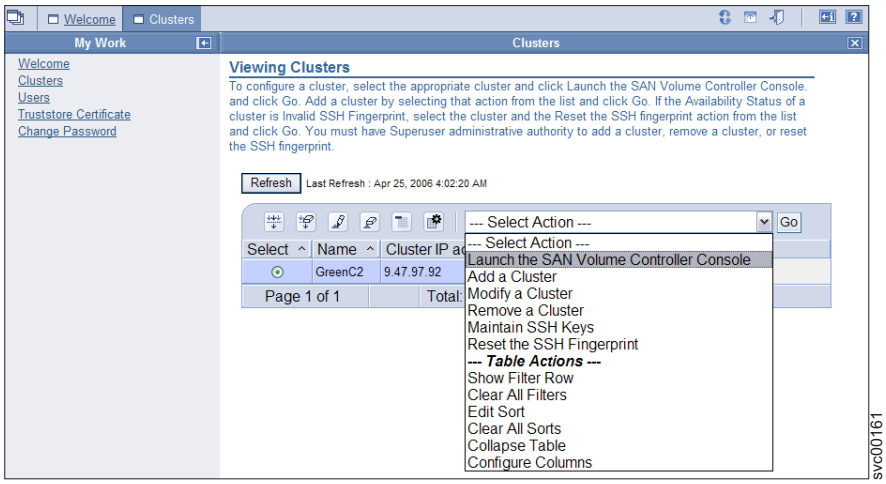


Note: If the cluster status is not OK, see Table 4 on page 71 and use the Availability Status message to determine the corrective action that you must take.

Table 4. Corrective actions when the Availability Status is not OK

Availability Status	Action
Invalid Authorization	Use the Actions drop down menu to authorize the SSH key to the Administrator role on the cluster. Select **Maintain SSH Keys** in the drop down menu and remove the SSH key that is used for the SAN Volume Controller Console. Select either the SAN Volume Controller Console user on the cluster or the Access Level Administrator. Then click the Administrator access key check box to assign the Administrator role.
Invalid Fingerprint	Use the Actions drop down menu to reset the SSH fingerprint for the Service user name in the Window's registry
Invalid SSH Key	Update the SSH private key and ensure that it is authorized for the role of your user name (Administrator or Service).
No Contact	Verify that the SSPC or master console server can connect over SSH to the Cluster. To check, verify that PuTTY is installed and use it to open a CLI session. Verify that the **icat.ppk** file exists in the installed `svcconsole\cimom` directory and is readable.

5. Select the SAN Volume Controller cluster that you want to service and select **Launch the SAN Volume Controller Console** from the task list.



6. Click **Go**. The Welcome panel for the cluster opens in a new window.

   If the following error message is displayed: `The specified cluster is currently unavailable`, and the Availability Status of the selected cluster is shown as `No Contact`, go to "Checking connections to the cluster when the status is No Contact" on page 353.

From this menu, you can perform several tasks, including the following procedures:

- View the status of a node and the node ports
- Delete a node from a cluster

- Add a node to a cluster
- Shut down a node or a cluster
- View the status of a virtual disk (VDisk)
- Verify and repair VDisk copies
- Repair an offline space-efficient VDisk
- View the status of a managed disk (MDisk)
- View the fibre-channel fabric connections
- View the feature log
- View and update license settings
- List and save dump data
- View and analyze the error log
- Start maintenance

Accessing the SAN Volume Controller CLI

If you must enter and run command-line instructions, you can access the SAN Volume Controller command-line interface (CLI) from the server where the SAN Volume Controller Console is installed.

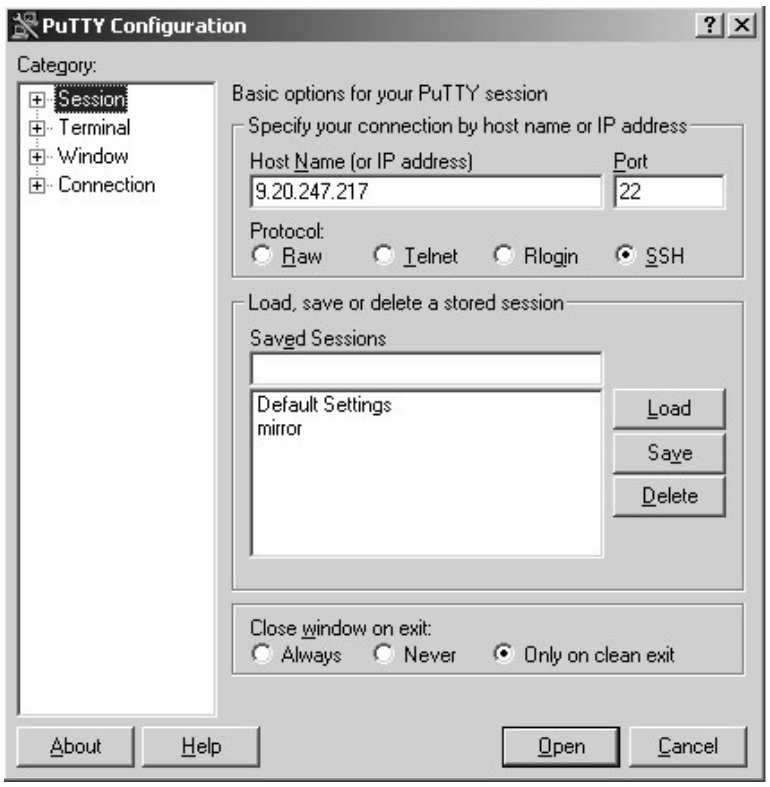
Perform the following steps to access the CLI:

1. Start PuTTY by clicking **Start** → **Programs** → **PuTTY** → **PuTTY** or by going to the directory and double-clicking the putty.exe file. If the server is configured to use PuTTY for command-line access, the session settings might be saved. The SAN Volume Controller Console installation package includes PuTTY. If your SAN Volume Controller cluster has an IPv6 address, you must use PuTTY 0.60 or a higher version.

   If the cluster is not listed under Saved sessions, ask the customer to set up PuTTY for command-line access and then restart this procedure. See the Using the CLI chapter in the *IBM System Storage SAN Volume Controller: Software Installation and Configuration Guide* for information about configuring a PuTTY session.

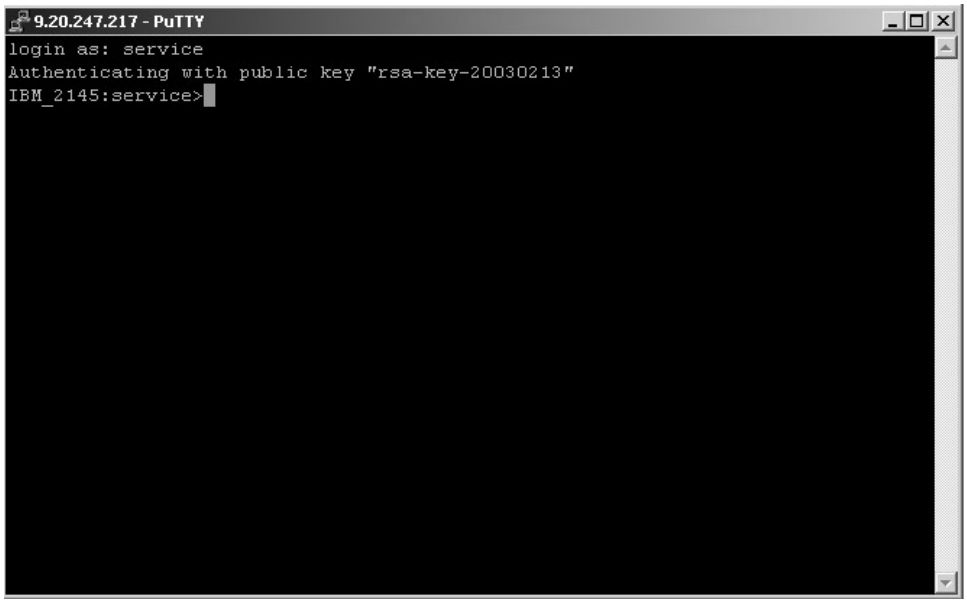
   Perform the following steps if the cluster that you need to access is listed under Saved Sessions:

   a. Select the menu item for the cluster.
   b. Click **Load**.
   c. Click **Open**.
   d. Go to step 2 on page 73.



2. Click **Yes** if the following PuTTY alert panel opens:

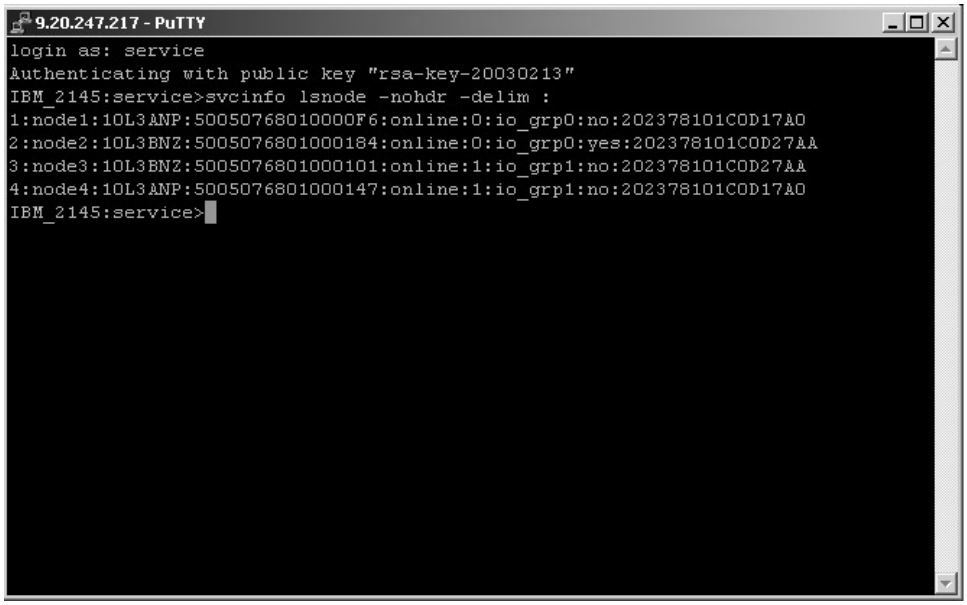
The command-line window for service is displayed.



3. Type the user name `service` at the login prompt. When the service prompt is displayed, you can use the CLI to issue commands.
4. Issue a command following the service prompt to display information about the SAN Volume Controller. For example, issue the following command to view the current status of the nodes that are used by the SAN Volume Controller cluster:

   ```
   svcinfo lsnode -nohdr -delim :
   ```

   The current status of the nodes used by the SAN Volume Controller cluster is displayed.



5. Issue the following command:

   ```
   svcinfo lscluster clustername
   ```

where *clustername* represents the name of the cluster whose details you want to list.

You are set up to use the CLI from the server where the SAN Volume Controller Console is installed.

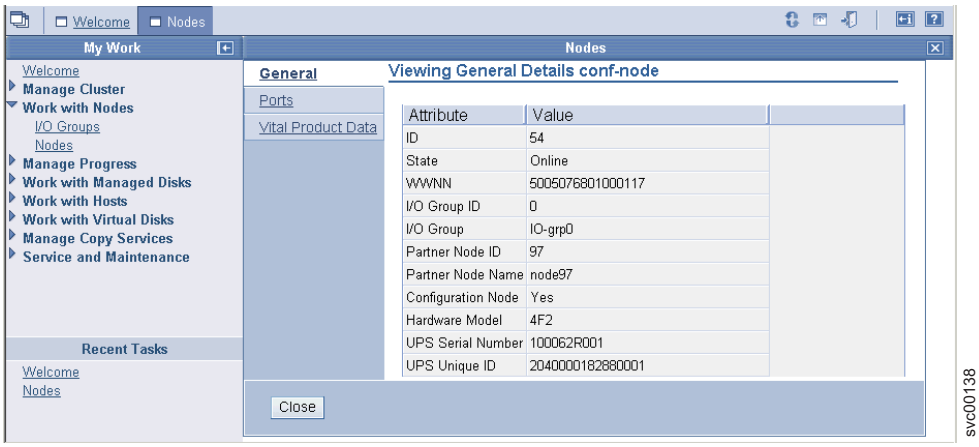
Viewing the node status

You can view the properties for a node from the Viewing General Details panel.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to view the node properties:

1. Click **Work with Nodes** → **Nodes** in the portfolio. The Viewing Nodes panel is displayed.
2. Click the name of the node for which you want to view detailed information. The Viewing General Details panel is displayed.



3. Click **Ports** to view the worldwide port name (WWPN) details. The Viewing Port Details panel is displayed.
4. Click **Vital Product Data** to view the node hardware details. The Viewing Vital Product Data panel is displayed.
5. Click **Close** to close the panel.

Checking the status of the node using the CLI

You can use the command-line interface (CLI) to check the status of the node.

Issue the following CLI command to check the status of the node:

```
svcinfo lsnode -delim : nodename
```

The following output shows what is displayed when you issue the `svcinfo lsnode -delim : node1` command:

```
id:1
name:node1
UPS_serial_number:10L3ANP
WWNN:5005676801000013
status:online
IO group id:0
IO group name:io_grp0
partner node id:2
partner node name:node2
config node:yes
UPS_unique_id:202378101C0D17A0
port id:5005676801100013
port status:active
port id:5005676801200013
port status:active
port id:5005676801300013
port status:active
port id:5005676801400013
port status:active
```

The characteristics for the node are listed in the output, including its status of *online*. You might also see the following status: `offline`, `adding`, or `deleting`.

For more information about what commands you can use, see the *IBM System Storage SAN Volume Controller: Command-Line Interface User's Guide*.

Viewing the status of the node ports

You can view the status of the node ports from the Viewing Port Details for Nodes panel.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to view the status of the node ports:

1. Click **Work with Nodes** → **Nodes** in the portfolio. The Viewing Nodes panel is displayed.
2. Click the name of the node for which you want to view port status. The Viewing General Details panel is displayed.
3. Click **Ports** to view the status of the ports and the worldwide port name (WWPN) details. The Viewing Port Details panel is displayed.
4. Click **Close** to close the panel.

Checking the status of the node ports using the CLI

You can use the command-line interface (CLI) to check the status of the node ports.

Issue the following CLI command to check the status of the node ports:

`svcinfo lsnode -delim : nodename`

where *nodename* is the name of the node whose ports you want to check.

The following output shows what is displayed when you issue the `svcinfo lsnode -delim : nodename` command:

```
id:1
name:node1
UPS_serial_number:10L3ANP
WWNN:5005676801000013
status:online
IO group id:0
IO group name:io_grp0
partner node id:2
partner node name:node2
config node:yes
UPS_unique_id:202378101C0D17A0
port id:5005676801100013
port status:active
port id:5005676801200013
port status:active
port id:5005676801300013
port status:active
port id:5005676801400013
port status:active
```

The previous example shows information for the named node on line two. You can see the port ID and the status of the port in the last eight lines of the example. In this example, the last eight lines show a port status of *active*. You might also see the following statuses: not installed, failed, or inactive.

For more information about using the command-line interface, see *IBM System Storage SAN Volume Controller: Command-Line Interface User's Guide*.

Deleting a node from the cluster

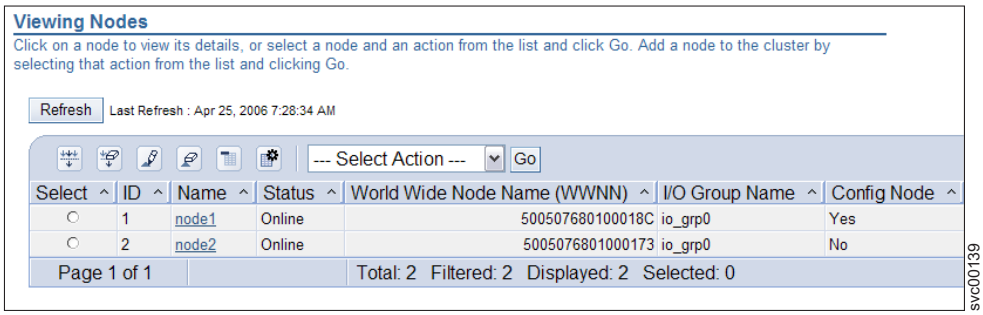
If it is required, you can delete a node from a cluster.

You might want to delete a node from a cluster if the node has failed and is being replaced with a new node, or if the repair that was performed has caused the node to be unrecognizable by the cluster. For example, if the disk drive or the software on the node has been replaced, that node is no longer known by the cluster.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to delete a node from a cluster:

1. Click **Work with Nodes** → **Nodes** in the portfolio. The Viewing Nodes panel is displayed.



2. Record the Name and the I/O Group Name of the offline node. You will use this information when you add the node back into the cluster.

Attention: If more than one node in this or in other clusters on the same SAN is offline, you must take special precautions when you add the node back into the cluster.

3. Select the node that is offline and select **Delete a Node** from the task list.
4. Click **Go**. The Deleting Node from Cluster panel is displayed.
5. Click **Yes** to delete the node.

Deleting a node from the cluster using the CLI

You can use the command-line interface (CLI) to delete a node from the cluster.

1. Issue the following CLI command to list the cluster nodes:

   ```
   svcinfo lsnode
   ```

   The following output is an example of what you might see when you issue the `svcinfo lsnode` command:

```
id name   UPS_serial_number WWNN             status  IO_group_id IO_group_name config_node UPS_unique_id
1  node1  10L3ANP           50050768010000F6 online  0           io_grp0       yes         202378101C0D17A0
2  node2  10L3BNZ           5005076801000184 online  0           io_grp0       no          202378101C0D27AA
3  node3  10L3BNZ           0000000000000000 offline 1           io_grp1       no          202378101C0D27AA
4  node4  10L3ANP           5005076801000147 online  1           io_grp1       no          202378101C0D17A0
5  node5  10L3CNP           50050776020000F8 online  2           io_grp2       no          202278101C0D17AB
6  node6  10L3CNZ           5005076801000197 online  2           io_grp2       no          202378202C0D27AA
7  node7  10L3DNZ           0000000000000000 online  3           io_grp3       no          202379011C0D27AA
8  node8  10L3DNP           5005076801000258 online  3           io_grp3       no          202378101C0D16A0
```

   Make a note of the name and the I/O group name of the offline node. In the example, node3 is offline and is assigned to io_grp1. You will need this information when you add a node back into the cluster.

   Attention: If more than one node in this or in other clusters on the same storage area network (SAN) is offline, make a note of that now because you must take special precautions when you add the node back into the cluster.

2. Issue the following CLI command to remove the offline node from the cluster:

   ```
   svcservicetask rmnode node
   ```

   where *node* is the name of the offline node that you noted in step 1.

Related tasks

"Adding a node to the cluster using the CLI" on page 79
You can use the command-line interface (CLI) to add a node that has either been removed or rejected by a cluster, into the cluster.

Adding a node to a cluster

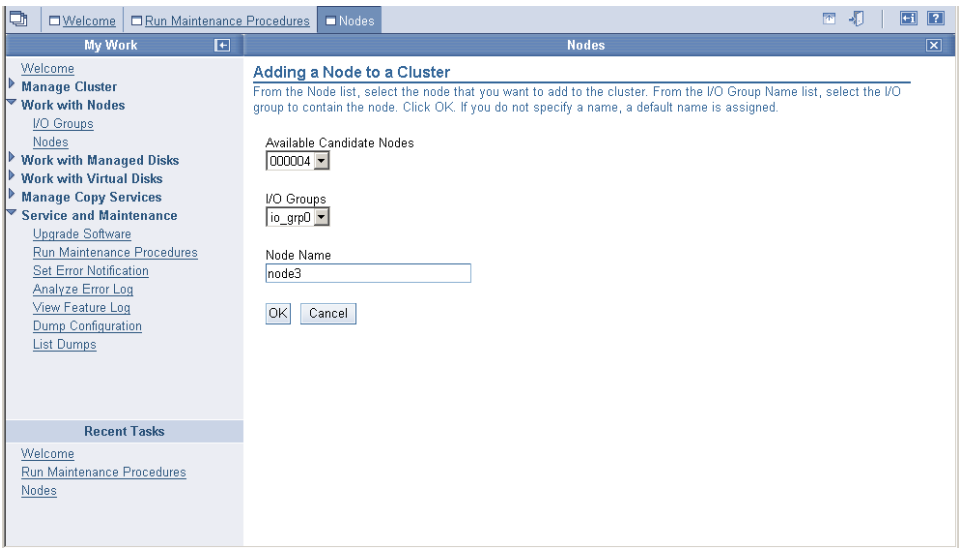
You might have to add a node into the cluster if it has been removed or rejected by a cluster.

Attention: Before you add a new node to a cluster, make sure that you configure the switch zoning so that the node you are adding is in the same zone as all other nodes in the cluster. If you are replacing a node and the switch is zoned by worldwide port name (WWPN) rather than by switch port, you must follow the service instructions carefully to continue to use the same WWPNs.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to add a node into a cluster:

1. Click **Work with Nodes** → **Nodes** in the portfolio. The Viewing Nodes panel is displayed.
2. Select **Add a node** from the task list and click **Go**. The Adding a Node to a Cluster panel is displayed.



3. Select the node that you want to add to the cluster from the **Available Candidate Nodes** list.
4. Select the I/O group that you noted when the previous node was deleted.

   Attention: If more than one candidate node exists, you must ensure that the node that you add into an I/O group is the same node that was deleted from that I/O group. Failure to add the correct node can result in data corruption. If you are uncertain which candidate node belongs to the I/O group, shut down all host systems that access this cluster before you proceed. Add all the nodes back into the cluster, and then reboot each system.

   For further details, see the *IBM System Storage SAN Volume Controller: Command-Line Interface User's Guide*.

Adding a node to the cluster using the CLI

You can use the command-line interface (CLI) to add a node that has either been removed or rejected by a cluster, into the cluster.

Attention: Before you add a new node to a cluster, make sure that you configure the switch zoning so that the node you are adding is in the same zone as all other nodes in the cluster. If you are replacing a node and the switch is zoned by worldwide port name (WWPN) rather than by switch port, you must follow the service instructions carefully to continue to use the same WWPNs.

Perform the following steps to add a node to a cluster:

1. Issue the following CLI command to list the node candidates:

   ```
   svcinfo lsnodecandidate
   ```

   The following output is an example of what you might see after you issue the `svcinfo lsnodecandidate` command:

```
id               panel_name        UPS_serial_number     UPS_unique_id
5005076801000101 000279            10L3BNZ               202378101C0D27AA
```

2. Issue the following CLI command to add the node:

   ```
   svcservicetask addnode -panelname panel_name -name new_name_arg -iogrp
   iogroup_name
   ```

   where *panel_name* is the name that is noted in step 1 on page 79 (in this example the panel name is 000279). This is the number that is printed on the front panel of the node that you are adding back into the cluster; *new_name_arg* is the name of the node that is noted when the previous node was deleted from the cluster; *iogroup_name* is the I/O group that was noted when the previous node was deleted from the cluster.

   The following example shows the command that you might issue:

   ```
   svcservicetask addnode -panelname 000279 -name node3 -iogrp io_grp1
   ```

   The following output is an example of what you might see:

```
Node, id [5005076801000101], successfully added
```

   Attention: If more than one candidate node exists, ensure that the node that you add into an I/O group is the same node that was deleted from that I/O group. Failure to do so might result in data corruption. If you are uncertain about which candidate node belongs to the I/O group, shut down all host systems that access this cluster before you proceed. Reboot each system when you have added all the nodes back into the cluster.

3. Issue the following CLI command to ensure that the node was added successfully:

   ```
   svcinfo lsnode
   ```

   The following output is an example of what you might see when you issue the `svcinfo lsnode` command:

```
id name   UPS_serial_number WWNN             status  IO_group_id IO_group_name config_node UPS_unique_id
1  node1  10L3ANP           50050768010000F6 online  0           io_grp0       yes         202378101C0D17A0
2  node2  10L3BNZ           5005076801000184 online  0           io_grp0       no          202378101C0D27AA
5  node3  10L3BNZ           5005076801000101 online  1           io_grp1       no          202378101C0D27AA
4  node4  10L3ANP           5005076801000147 online  1           io_grp1       no          202378101C0D17A0
5  node5  10L3CNP           50050776020000F8 online  2           io_grp2       no          202278101C0D17AB
6  node6  10L3CNZ           5005076801000197 online  2           io_grp2       no          202378202C0D27AA
7  node7  10L3DNZ           5005076801000458 online  3           io_grp3       no          202379011C0D27AA
8  node8  10L3DNP           5005076801000258 online  3           io_grp3       no          202378101C0D16A0
```

All nodes are now online.

Related tasks

"Deleting a node from the cluster using the CLI" on page 78
You can use the command-line interface (CLI) to delete a node from the cluster.

Shutting down a node

You can shut down a SAN Volume Controller node from the Shutting Down Node panel.

If you are shutting down the last SAN Volume Controller node in an I/O group, quiesce all I/O operations that are destined for this SAN Volume Controller node. Failure to do so can result in failed I/O operations being reported to your host operating systems.

This task assumes that you have already launched the SAN Volume Controller Console.

When input power is restored, you must press the power button on the uninterruptible power supply units before you press the power button on the SAN Volume Controller node.

Perform the following steps to use the shutdown command to shut down a SAN Volume Controller node:

1. Click **Work with Nodes** → **Nodes** in the portfolio. The Viewing Nodes panel is displayed.
2. Select the node to shut down.
3. Select **Shut Down a Node** from the task list and click **Go**. The Shutting Down Node panel is displayed.
4. Click **Yes**.

Shutting down the cluster

If all input power to a SAN Volume Controller cluster must be removed, you must shut down the cluster before the power is removed. If you do not shut down the cluster before turning off input power to the uninterruptible power supply, the SAN Volume Controller detects the loss of power and continues to run on battery power until all data held in memory is saved to the internal disk drive. This increases the time that is required to make the cluster operational when input power is restored and severely increases the time that is required to recover from an unexpected loss of power that might occur before the uninterruptible power supply batteries can fully recharge.

Shut down a cluster by using either the SAN Volume Controller Console or the CLI.

When input power is restored, you must press the power button on the uninterruptible power supply units before you press the power buttons on the SAN Volume Controller.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

Shutting down a cluster

You can shut down a SAN Volume Controller cluster from the Shutting Down cluster panel.

If you want to remove all input power to a cluster (for example, the machine room power must be shutdown for maintenance), you must shut down the cluster before the power is removed. If you do not shut down the cluster before turning off input power to the uninterruptible power supply units, the SAN Volume Controller nodes detect the loss of power and continue to run on battery power until all data

that is held in memory is saved to the internal disk drive. This increases the time that is required to make the cluster operational when input power is restored and severely increases the time that is required to recover from an unexpected loss of power that might occur before the uninterruptible power supply batteries have fully recharged.

When input power is restored to the uninterruptible power supply units, they start to recharge. However, the SAN Volume Controller nodes do not permit any I/O activity to be performed to the virtual disks (VDisks) until the uninterruptible power supply is charged enough to enable all the data on the SAN Volume Controller nodes to be saved in the event of an unexpected power loss. This might take as long as two hours. Shutting down the cluster prior to removing input power to the uninterruptible power supply units prevents the battery power from being drained and makes it possible for I/O activity to resume as soon as input power is restored.

Before shutting down a cluster, quiesce all I/O operations that are destined for this cluster. Failure to do so can result in failed I/O operations being reported to your host operating systems.

Attention: If you are shutting down the entire cluster, you lose access to all VDisks that are provided by this cluster. Shutting down the cluster also shuts down all SAN Volume Controller nodes. This shutdown causes the hardened data to be dumped to the internal hard drive.

Begin the following process of quiescing all I/O to the cluster by stopping the applications on your hosts that are using the VDisks that are provided by the cluster.

1. Determine which hosts are using the VDisks that are provided by the cluster.
2. Repeat the previous step for all VDisks.

When input power is restored, you must press the power button on the uninterruptible power supply units before you press the power buttons on the SAN Volume Controller nodes.

Perform the following steps to shut down a cluster:

1. Click **Manage Clusters** → **Shut down Cluster** in the portfolio. The Shutting Down cluster panel is displayed.
2. Click **Yes**.

Shutting down a cluster using the CLI

You can use the command-line interface (CLI) to shut down a cluster.

If you want to remove all input power to a cluster (for example, the machine room power must be shutdown for maintenance), you must shut down the cluster before the power is removed. If you do not shut down the cluster before turning off input power to the uninterruptible power supply, the SAN Volume Controller nodes detect the loss of power and continue to run on battery power until all data that is held in memory is saved to the internal disk drive. This increases the time that is required to make the cluster operational when input power is restored and severely increases the time that is required to recover from an unexpected loss of power that might occur before the uninterruptible power supply batteries have fully recharged.

When input power is restored to the uninterruptible power supply units, they start to recharge. However, the SAN Volume Controller nodes do not permit any I/O activity to be performed to the virtual disks (VDisks) until the uninterruptible power supply is charged enough to enable all the data on the SAN Volume Controller nodes to be saved in the event of an unexpected power loss. This might take as long as two hours. Shutting down the cluster prior to removing input power to the uninterruptible power supply units prevents the battery power from being drained and makes it possible for I/O activity to resume as soon as input power is restored.

Before shutting down a cluster, quiesce all I/O operations that are destined for this cluster. Failure to do so can result in failed I/O operations being reported to your host operating systems.

Attention:

- If you are shutting down the entire cluster, you lose access to all VDisks that are provided by this cluster. Shutting down the cluster also shuts down all SAN Volume Controller nodes. This shutdown causes the hardened data to be dumped to the internal hard drive.
- Ensure that you have stopped all FlashCopy, Metro Mirror, Global Mirror, and data migration operations before you attempt a cluster shutdown. Also ensure that all asynchronous deletion operations have completed prior to a shutdown operation.

Begin the following process of quiescing all I/O to the cluster by stopping the applications on your hosts that are using the VDisks that are provided by the cluster.

1. Determine which hosts are using the VDisks that are provided by the cluster.
2. Repeat the previous step for all VDisks.

When input power is restored, you must press the power button on the uninterruptible power supply units before you press the power buttons on the SAN Volume Controller nodes.

Perform the following steps to shut down a cluster:

1. Issue the following command to shut down a cluster:

   ```
   svctask stopcluster
   ```

   The following output is displayed:

   ```
   Are you sure that you want to continue with the shut down?
   ```

2. Type `y` to shut down the entire cluster.

Viewing the VDisk status

You must view the status of virtual disks (VDisks) as part of the repair verification procedures.

When all SAN Volume Controller repairs are complete, all VDisks are shown as online. Any VDisks that remain offline, degraded, or excluded might contain errors or are not recognized because of a problem with the SAN environment. If problems still exist on VDisks after the repair actions on the SAN Volume

Controller are complete, resolve the disk drive or SAN problems and then perform repair verification for the SAN Volume Controller to verify that no other problems exist.

Perform the following steps to view the status of VDisks:

1. Click **Work with Virtual Disks** → **Virtual Disks**. The Viewing Virtual Disks panel is displayed.
2. Ensure that all VDisks are online.

Notes:

1. To repair offline VDisks, see the *IBM System Storage SAN Volume Controller: Software Installation and Configuration Guide*.
2. If you have a degraded VDisk and all of the associated nodes and MDisks are online, call the IBM Support Center for assistance.

Verifying and repairing mirrored VDisk copies

The virtual disk (VDisk) copy verification process checks if data on mirrored VDisk copies match. You can choose repair options if differences are found during the verification process.

Use the Verifying VDisk Copies panel to start the VDisk copy verification process for a selected VDisk. If differences are found during verification, you can choose one of the following actions:

- Stop the process when the first difference is found. Select this option if you only want to verify that the mirrored VDisk copies are identical. You can run this option, starting at a different logical block address (LBA) each time to count the number of differences on a VDisk.
- Automatically repair the copy by overwriting sectors with data from the primary VDisk copy. Select the resync option if you are sure that either the primary VDisk copy data is correct or that your host applications can handle incorrect data.
- Create a virtual medium error at the VDisk level. Select this option if you are unsure what the correct data is and you do not want an incorrect version of the data to be used.

When differences are not found, the verification process automatically repairs the VDisk copy if a medium error is encountered on one of the copies.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to verify mirrored VDisk copies:

1. Click **Work with Virtual Disks** → **Virtual Disks** in the portfolio. The Viewing Virtual Disks panel is displayed.
2. Select the VDisk to verify and then select **Verify VDisk Copies** from the task list. Click **Go**. The Verifying VDisk Copies panel is displayed.
3. Select the repair action if errors are found and click **OK**. You can also specify an LBA from which to start the verification. Start at different LBAs to count the number of differences on a VDisk.

Viewing the progress of mirror copy verification

You can view the progress of verification of one or more mirror copies for a virtual disk (VDisk) from the Viewing Mirror Copy Verification Progress panel.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to view the progress of mirror copy verification:

1. Click **Manage Progress** → **View Progress**. The View Progress panel is displayed.
2. Click the **VDisk Copy Verification** link. The Viewing Mirror Copy Verification Progress panel is displayed.
3. Click **Close** to close the panel.

Validating and repairing mirrored VDisk copies using the CLI

You can use the repairvdiskcopy command from the command-line interface (CLI) to validate and, if necessary, repair mirrored VDisk copies.

When you issue the repairvdiskcopy command, you must use one, but only one, of the **-validate**, **-medium**, or **-resync** parameters. You must also specify the name or ID of the VDisk to be validated and repaired as the last entry on the command line. After you issue the command, no output is displayed.

-validate
Use this parameter if you only want to verify that the mirrored VDisk copies are identical. If any difference is found, the command stops and logs an error that includes the logical block address (LBA) and the length of the first difference. You can use this parameter, starting at a different LBA each time to count the number of differences on a VDisk.

-medium
Use this parameter to convert sectors on all VDisk copies that contain different contents into virtual medium errors. Upon completion, the command logs an event, which indicates the number of differences that were found, the number that were converted into medium errors, and the number that were not converted. Use this option if you are unsure what the correct data is, and you do not want an incorrect version of the data to be used.

-resync
Use this parameter to overwrite contents from the specified primary VDisk copy to the other VDisk copy. The command corrects any differing sectors by copying the sectors from the primary copy to the copies being compared. Upon completion, the command process logs an event, which indicates the number of differences that were corrected. Use this action if you are sure that either the primary VDisk copy data is correct or that your host applications can handle incorrect data.

-startlba *lba*
Optionally, use this parameter to specify the starting Logical Block Address (LBA) from which to start the validation and repair. If you previously used the **validate** parameter, an error was logged with the LBA where the first difference, if any, was found. Reissue repairvdiskcopy with that LBA to avoid reprocessing the initial sectors that compared identically. Continue to reissue repairvdiskcopy using this parameter to list all the differences.

Issue the following command to validate and, if necessary, automatically repair mirrored copies of the specified VDisk:

```
svctask repairvdiskcopy -resync -startlba 20 vdisk8
```

Notes:

1. Only one **repairvdiskcopy** command can run on a VDisk at a time.
2. Once you start the **repairvdiskcopy** command, you cannot use the command to stop processing.
3. The primary copy of a mirrored VDisk cannot be changed while the **repairvdiskcopy -resync** command is running.
4. If there is only one mirrored copy, the command returns immediately with an error.
5. If a copy being compared goes offline, the command is halted with an error. The command is not automatically resumed when the copy is brought back online.
6. In the case where one copy is readable but the other copy has a medium error, the command process automatically attempts to fix the medium error by writing the read data from the other copy.
7. If no differing sectors are found during **repairvdiskcopy** processing, an informational error is logged at the end of the process.

Checking the progress of validation and repair of VDisk copies using the CLI

Use the lsrepairvdiskcopyprogress command to display the progress of mirrored VDisk validation and repairs. You can specify a VDisk copy using the **-copy** *id* parameter. To display the VDisks that have two or more copies with an active task, specify the command with no parameters; it is not possible to have only one VDisk copy with an active task.

To check the progress of validation and repair of mirrored VDisks, issue the following command:

```
svcinfo lsrepairvdiskcopyprogress –delim :
```

The following example shows how the command output is displayed:

```
vdisk_id:vdisk_name:copy id:task:progress:estimated_completion_time
0:vdisk0:0:medium:50:070301120000
0:vdisk0:1:medium:50:070301120000
```

Repairing offline space-efficient VDisks

When a space-efficient virtual disk (VDisk) is taken offline because its metadata is corrupted, you can use the Repairing Space-Efficient VDisk panel to repair the metadata. The repair operation automatically detects corrupted metadata and performs any necessary repair actions.

This task assumes that you have already launched the SAN Volume Controller Console.

Use the Repairing Space-Efficient VDisk panel when directed through maintenance procedures. When the repair operation completes successfully, the error is automatically marked as fixed and the volume is brought back online. If the repair operation fails, an error is logged (error ID 060003) and the volume remains offline.

Once started, the VDisk remains offline for the duration of the repair, but you can move the VDisk to another I/O group.

Attention: You can only use this panel to repair a space-efficient VDisk that has reported corrupt metadata.

Perform the following steps to repair the offline space-efficient VDisk:

1. Click **Work with Virtual Disks** → **Virtual Disks** in the portfolio. The Viewing Virtual Disks panel is displayed.
2. Select the VDisk to repair and then select **Repair Space-efficient VDisk** from the task list. Click **Go**. The Repairing Space-Efficient VDisks panel is displayed.
3. Select the VDisk copy to repair and click **OK**.

Viewing the progress of space-efficient VDisk copy repair

You can view the progress of space-efficient virtual disk (VDisk) copy repair from the Viewing Space-Efficient Copy Repair Progress panel.

The time that is needed to complete a space-efficient VDisk copy repair depends on the amount of data that is currently on the copy. The repair process might complete very quickly.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to view the progress of space-efficient VDisk copy repair:

1. Click **Manage Progress** → **View Progress**. The View Progress panel is displayed.
2. Click the **Space-Efficient Copy Repair** link. The Viewing Space-Efficient Copy Repair Progress panel is displayed.
3. Click **Close** to close the panel.

Repairing a space-efficient VDisk using the CLI

You can use the **repairsevdiskcopy** command from the command-line interface to repair the metadata on a space-efficient virtual disk (VDisk).

The **repairsevdiskcopy** command automatically detects and repairs corrupted metadata. The command holds the VDisk offline during the repair, but does not prevent the disk from being moved between I/O groups.

If a repair operation completes successfully and the volume was previously offline because of corrupted metadata, the command brings the volume back online. The only limit on the number of concurrent repair operations is the number of virtual disk copies in the configuration.

When you issue the **repairsevdiskcopy** command, you must specify the name or ID of the VDisk to be repaired as the last entry on the command line. Once started, a repair operation cannot be paused or cancelled; the repair can only be terminated by deleting the copy.

Attention: Use this command only to repair a space-efficient VDisk that has reported corrupt metadata.

Issue the following command to repair the metadata on a space-efficient VDisk:

```
svctask repairsevdiskcopy vdisk8
```

After you issue the command, no output is displayed.

Notes:

1. Because the volume is offline to the host, any I/O that is submitted to the volume while it is being repaired fails.
2. When the repair operation completes successfully, the corrupted metadata error is marked as fixed.
3. If the repair operation fails, the volume is held offline and an error is logged.

Checking the progress of the repair of a space-efficient VDisk using the CLI

Issue the lsrepairsevdiskcopyprogress command to list the repair progress for space-efficient VDisk copies of the specified VDisk. If you do not specify a VDisk, the command lists the repair progress for all space-efficient copies in the cluster.

Note: Only run this command after you run the svctask repairsevdiskcopy command, which you must only run as required by the Directed Maintenance Procedures or by IBM support.

Creating MDisk groups

You can create a new managed disk (MDisk) group using the Create a Managed Disk Group wizard.

If you intend to keep the virtual disk (VDisk) allocation within one disk controller system, ensure that the MDisk group that corresponds with a single disk controller system is presented by that disk controller system. This also enables nondisruptive migration of data from one disk controller system to another disk controller system and simplifies the decommissioning process if you want to decommission a disk controller system at a later time.

Ensure all MDisks that are allocated to a single MDisk group are of the same RAID-type. Using the same RAID-type ensures that a single failure of a physical disk in the disk controller system does not take the entire group offline. For example, if you have three RAID-5 arrays in one group and add a non-RAID disk to this group, you lose access to all the data that is striped across the group if the non-RAID disk fails. Similarly, for performance reasons, you should not mix RAID types.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to create a new MDisk group:

1. Click **Work with Managed Disks** → **Managed Disk Groups** in the portfolio. The Viewing Managed Disk Groups panel is displayed.
2. Select **Create an MDisk Group** from the task list and click **Go**. The Create a Managed Disk Group wizard begins.
3. Complete the Create a Managed Disk Group wizard.

Adding MDisks to MDisk groups

You can add managed disks (MDisks) to an MDisk group from the Adding Managed Disks to Managed Disk Group panel.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to add MDisks to an MDisk group:

1. Click **Work with Managed Disks** → **Managed Disk Groups** in the portfolio. The Viewing Managed Disk Groups panel is displayed.
2. Select the MDisk group to add MDisks to and select **Add MDisks** from the list. Click **Go**. The Adding Managed Disks to Managed Disk Group panel is displayed.
3. Select the MDisks to add and click **OK**.

Viewing the MDisk status

You must view the status of managed disks (MDisks) as part of the repair verification procedures.

When all SAN Volume Controller repairs are complete, all MDisks are shown as online. Any MDisks that remain offline, degraded, or excluded might contain errors or are not recognized because of a problem with the SAN environment. If problems still exist on MDisks after the repair actions on the SAN Volume Controller are complete, resolve the disk drive or SAN problems and then perform repair verification for the SAN Volume Controller to verify that no other problems exist.

Perform the following steps to view the status of MDisks:

1. Click **Work with Managed Disks** → **Managed Disks** from the portfolio. The Viewing Managed Disks panel is displayed.
2. Ensure that all MDisks are online.

Discovering MDisks

You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to discover MDisks:

1. Click **Work with Managed Disks** → **Managed Disks** in the portfolio. The Viewing Managed Disks panel is displayed.
2. Select **Discover MDisks** from the task list and click **Go**. The Discovering Managed Disks panel is displayed. The newly discovered MDisks are displayed in a table on the Discovering Managed Disks panel.
3. Click **Close** to return to the Viewing Managed Disks panel.

Related tasks

"Discovering MDisks using the CLI" on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

Viewing discovery status

You can view the status of a managed disk (MDisk) discovery from the Viewing Discovery Status panel.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to view status of an MDisk discovery:

1. Click **Work with Managed Disks** → **Discovery Status**. The Viewing Discovery Status panel is displayed.
2. Click **Close** to close this panel.

Creating MDisk groups using the CLI

You can use the command-line interface (CLI) to create a managed disk (MDisk) group.

Attention: If you add an MDisk to an MDisk group as an MDisk, any data on the MDisk is lost. If you want to keep the data on an MDisk (for example because you want to import storage that was previously not managed by a SAN Volume Controller), you must create image mode virtual disks (VDisks) instead.

Assume that the cluster has been set up and that a back-end controller has been configured to present new storage to the SAN Volume Controller.

Consider the following factors as you decide how many MDisk groups to create:

- A VDisk can only be created using the storage from one MDisk group. Therefore, if you create small MDisk groups, you might lose the benefits that are provided by virtualization, namely more efficient management of free space and a more evenly distributed workload for better performance.
- If any MDisk in an MDisk group goes offline, all the VDisks in the MDisk group go offline. Therefore you might want to consider using different MDisk groups for different back-end controllers or for different applications.
- If you anticipate regularly adding and removing back-end controllers or storage, this task is made simpler by grouping all the MDisks that are presented by a back-end controller into one MDisk group.
- All the MDisks in an MDisk group should have similar levels of performance or reliability, or both. If an MDisk group contains MDisks with different levels of performance, the performance of the VDisks in this group is limited by the performance of the slowest MDisk. If an MDisk group contains MDisks with different levels of reliability, the reliability of the VDisks in this group is that of the least reliable MDisk in the group.

Even with the best planning, circumstances can change and you must reconfigure your MDisk groups after they have been created. The data migration facilities that are provided by the SAN Volume Controller enable you to move data without disrupting I/O.

Choosing a managed disk group extent size

You must specify the extent size when you create a new MDisk group. You cannot change the extent size later; it must remain constant throughout the lifetime of the MDisk group. MDisk groups can have different extent sizes; however, this places restrictions on the use of data migration. The choice of extent size affects the total amount of storage that a SAN Volume Controller cluster can manage. Table 5 on page 91

page 91 shows the maximum amount of storage that can be managed by a cluster for each extent size. Because the SAN Volume Controller allocates a whole number of extents to each VDisk that is created, using a larger extent size might increase the amount of storage that is wasted at the end of each VDisk. Larger extent sizes also reduces the ability of the SAN Volume Controller to distribute sequential I/O workloads across many MDisks and therefore can reduce the performance benefits of virtualization.

Table 5. Extent size

Extent Size	Maximum storage capacity of cluster
16 MB	64 TB
32 MB	128 TB
64 MB	256 TB
128 MB	512 TB
256 MB	1 PB
512 MB	2 PB
1024 MB	4 PB
2048 MB	8 PB

Important: You can specify different extent sizes for different MDisk groups; however, you cannot migrate VDisks between MDisk groups with different extent sizes. If possible, create all your MDisk groups with the same extent size.

Perform the following steps to create an MDisk group:

Issue the **svctask mkmdiskgrp** CLI command to create an MDisk group.

The following is an example of the CLI command you can issue to create an MDisk group:

```
svctask mkmdiskgrp -name maindiskgroup -ext 32
 -mdisk mdsk0:mdsk1:mdsk2:mdsk3
```

Where *maindiskgroup* is the name of the MDisk group that you want to create, *32* MB is the size of the extent you want to use, and *mdsk0*, *mdsk1*, *mdsk2*, *mdsk3* are the names of the four MDisks that you want to add to the group.

You created and added MDisks to an MDisk group.

The following example provides a scenario where you want to create an MDisk group, but you do not have any MDisks available to add to the group. You plan to add the MDisks at a later time.

1. Issue `svctask mkmdiskgrp -name bkpmdiskgroup -ext 32`.

   Where *bkpmdiskgroup* is the name of the MDisk group that you want to create and *32* MB is the size of the extent you want to use.
2. You find four MDisks that you want to add to the MDisk group.
3. Issue `svctask addmdisk -mdisk mdsk4:mdsk5:mdsk6:mdsk7 bkpdiskgroup`.

   Where *mdsk4*, *mdsk5*, *mdsk6*, *mdsk7* are the names of the MDisks that you want to add to the MDisk group and *bkpdiskgroup* is the name of the MDisk group for which you want to add MDisks.

You used the **svctask mkmdiskgrp** CLI command to create the MDisk group *bkpmdiskgroup* and later used the **svctask addmdisk** CLI command to add *mdsk4*, *mdsk5*, *mdsk6*, *mdsk7* to the MDisk group.

Adding MDisks to MDisk groups using the CLI

You can use the command-line interface (CLI) to add managed disks (MDisks) to MDisk groups.

The MDisks must be in unmanaged mode. Disks that already belong to an MDisk group cannot be added to another MDisk group until they have been deleted from their current MDisk group. You can delete an MDisk from an MDisk group under the following circumstances:

- If the MDisk does not contain any extents in use by a virtual disk (VDisk)
- If you can first migrate the extents in use onto other free extents within the group

Important: Do not add the MDisk using this procedure if you want to make an image mode VDisk with it.

Note: When you are adding MDisks to an MDisk group using the **svctask addmdisk** command or when you are creating an MDisk group using the **svctask mkmdiskgrp -mdisk** command, the SAN Volume Controller performs tests on the MDisks in the list before the MDisks are allowed to become part of an MDisk group. These tests include checks of the MDisk identity, capacity, status, and the ability to perform both read and write operations. If these tests fail or exceed the time allowed, the MDisks are not added to the group. However, with the **svctask mkmdiskgrp -mdisk** command, the MDisk group is still created even if the tests fail, but it does not contain any MDisks. If tests fail, confirm that the MDisks are in the correct state and that they have been correctly discovered.

The following reasons contribute to a typical MDisk test failure:

- The MDisk is not visible to all SAN Volume Controller nodes in the cluster.
- The MDisk identity has changed from a previous discovery operation.
- The MDisk cannot perform read or write operations.
- The status of the MDisk is degraded, excluded, or offline.
- The MDisk does not exist.

The following reasons contribute to a typical MDisk test timeout:

- The disk controller subsystem on which the MDisk resides is failing.
- A SAN fabric or cable fault condition exists that is preventing reliable communication with the MDisk.

Perform the following steps to add MDisks to MDisk groups:

1. Issue the **svcinfo lsmdiskgrp** CLI command to list the existing MDisk groups.

   The following is an example of the CLI command you can issue to list the existing MDisk groups:

   ```
   svcinfo lsmdiskgrp -delim :
   ```

   The following is an example of the output that is displayed:

```
id:name:status:mdisk_count:vdisk_count:
capacity:extent_size:free_capacity:virtual_capacity:
used_capacity:real_capacity:overallocation:warning
0:mdiskgrp0:online:3:4:33.3GB:16:32.8GB:64.00MB:64.00MB:64.00MB:0:0
1:mdiskgrp1:online:2:1:26.5GB:16:26.2GB:16.00MB:16.00MB:16.00MB:0:0
2:mdiskgrp2:online:2:0:33.4GB:16:33.4GB:0.00MB:0.00MB:0.00MB:0:0
```

2. Issue the **svctask addmdisk** CLI command to add MDisks to the MDisk group.

   The following is an example of the CLI command you can issue to add MDisks to an MDisk group:

   ```
   svctask addmdisk -mdisk mdisk4:mdisk5:mdisk6:mdisk7 bkpmdiskgroup
   ```

   Where *mdisk4:mdisk5:mdisk6:mdisk7* are the names of the MDisks that you want to add to the MDisk group and *bkpmdiskgroup* is the name of the MDisk group for which you want to add the MDisks.

Listing MDisks using the CLI

You can use the command-line interface (CLI) to list the managed disks (MDisks).

Perform the following steps to list the name, status, and mode of an MDisk:

1. Issue the following CLI command:

   ```
   svcinfo lsmdisk –delim :
   ```

   The following output is an example of what you might see when you issue the `svcinfo lsmdisk –delim :` command:

```
id: name:    status:  mode:          mdisk_grp_id:   mdisk_grp_name       capacity:ctrl_LUN_#:   controller_name:UID
0:  mdisk0:  online:  unmanaged:::   68.4GB:         0000000000000000:    controller0                    *
1:  mdisk1:  online:  unmanaged:::   68.4GB:         0000000000000000:    controller1                    +
2:  mdisk2:  online:  unmanaged:::   68.4GB:         0000000000000000:    controller2                    ++
3:  mdisk3:  online:  unmanaged:::   68.4GB:         0000000000000000:    controller3                    §
4:  mdisk4:  online:  unmanaged:::   68.4GB:         0000000000000000:    controller4                    #
5:  mdisk5:  online:  unmanaged:::   68.4GB:         0000000000000000:    controller5                    **

*600a0b80000f4c920000000b3ef6c3d000000000000000000000000000000000 (This number represents the controller_name:UID)
+0080e52122fa800000000000000000000000000000000000000000000000000 (This number represents the controller_name:UID)
++600a0b80000c5ae4000000093eca105c000000000000000000000000000000000 (This number represents the controller_name:UID)
§0080a0b80000f6432000000043ef6b4ff000000000000000000000000000000000 (This number represents the controller_name:UID)
#600a0b80000f4c920000000b3ef6c3d000000000000000000000000000000000 (This number represents the controller_name:UID)
**600a0b80000f6c920000000d3er1a7d000000000000000000000000000000000 (This number represents the controller_name:UID)
```

2. View the `status` column to determine the status of the MDisk. In this example, all the MDisks have a status of online. The following list shows the possible status of an MDisk:
   - Online
   - Offline
   - Excluded
   - Degraded
3. View the `mode` column to determine the mode of the disk. In this example, the mode is unmanaged. The following list shows possible modes for an MDisk:
   - Managed
   - Unmanaged
   - Image

4. You can also list more detailed information about an MDisk. For example, issue the `svcinfo lsmdisk –delim : 3` command to see detailed information about the MDisk with an ID of 3. The following output is an example of what you might see:

```
id:3
name:mdisk3
status:online
mode:managed mdisk_grp_id:0
mdisk_grp_name:mdiskgrp0
capacity:68.4GB
quorum_index:
block_size:512
controller_name:controller3
ctrl_type:4
ctrl_WWNN:20000004CF1FD7A0
controller_id:3
path_count:1 max_path_count:1
ctrl_LUN_#:0000000000000000
UID:600a0b80000f6432000000043ef6b4ff00000000000000000000000000000000
```

Discovering MDisks using the CLI

You can use the command-line interface (CLI) to discover managed disks (MDisks).

When back-end controllers are added to the fibre-channel SAN and are included in the same switch zone as a SAN Volume Controller cluster, the cluster automatically discovers the back-end controller and integrates the controller to determine the storage that is presented to the SAN Volume Controller nodes. The SCSI logical units (LUs) that are presented by the back-end controller are displayed as unmanaged MDisks. However, if the configuration of the back-end controller is modified after this has occurred, the SAN Volume Controller cluster might be unaware of these configuration changes. You can request that the SAN Volume Controller cluster rescans the fibre-channel SAN to update the list of unmanaged MDisks.

Note: The automatic discovery that is performed by SAN Volume Controller cluster does not write anything to an unmanaged MDisk. You must instruct the SAN Volume Controller cluster to add an MDisk to an MDisk group or use an MDisk to create an image mode virtual disk (VDisk).

Perform the following steps to discover and then view a list of MDisks:

1. Issue the **svctask detectmdisk** CLI command to manually scan the fibre-channel network. The scan discovers any new MDisks that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

   Notes:

   a. Only issue the **svctask detectmdisk** command when you are sure that all of the disk controller ports are working and correctly configured in the controller and the SAN zoning. Failure to do this can result in errors that are not reported.
   b. Although it might appear that the **detectmdisk** command has completed, extra time might be required for it to run. The **detectmdisk** is asynchronous and returns a prompt while the command continues to run in the background. You can use the **lsdiscoverystatus** command to list the discovery status.

2. When the detection is complete, issue the **svcinfo lsmdiskcandidate** CLI command to show the unmanaged MDisks. These MDisks have not been assigned to an MDisk group.
3. Issue the **svcinfo lsmdisk** CLI command to view all of the MDisks.

You have now seen that the back-end controllers and switches have been set up correctly and that the SAN Volume Controller cluster recognizes the storage that is presented by the back-end controller.

The following example describes a scenario where a single back-end controller is presenting eight SCSI LUs to the SAN Volume Controller cluster:

1. Issue `svctask detectmdisk`.
2. Issue `svcinfo lsmdiskcandidate`.

   The following output is displayed:

```
id
0
1
2
3
4
5
6
7
```

3. Issue `svcinfo lsmdisk -delim : -filtervalue mode=unmanaged`

   The following output is displayed:

```
id:name:status:mode:mdisk_grp_id:mdisk_grp_name:
 capacity:ctrl_LUN_#:controller_name
0:mdisk0:online:unmanaged:::273.3GB:0000000000000000:controller0
1:mdisk1:online:unmanaged:::273.3GB:0000000000000001:controller0
2:mdisk2:online:unmanaged:::273.3GB:0000000000000002:controller0
3:mdisk3:online:unmanaged:::273.3GB:0000000000000003:controller0
4:mdisk4:online:unmanaged:::136.7GB:0000000000000004:controller0
5:mdisk5:online:unmanaged:::136.7GB:0000000000000005:controller0
6:mdisk6:online:unmanaged:::136.7GB:0000000000000006:controller0
7:mdisk7:online:unmanaged:::136.7GB:0000000000000007:controller0
```

Related tasks

"Discovering MDisks" on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

"Accessing the SAN Volume Controller CLI" on page 72
If you must enter and run command-line instructions, you can access the SAN Volume Controller command-line interface (CLI) from the server where the SAN Volume Controller Console is installed.

Including MDisks using the CLI

You can use the command-line interface (CLI) to include an excluded or degraded managed disk (MDisk).

1. Issue the following CLI command to determine which MDisk has been excluded:

   ```
   svcinfo lsmdisk –nohdr –delim :
   ```

   The following output is an example of what you might see:

```
0:mdisk0:online:managed:0:Group0:67.8GB:0000000000000000:controller0*
1:mdisk1:excluded:managed:0:Group0:205.0GB:0000000000000000:controller1+
2:mdisk2:online:managed:0:Group0:273.3GB:0000000000000000:controller1#
3:mdisk3:online:managed:0:Group0:546.6GB:0000000000000000:controller1§

* 0080e52122fa800000000000000000000000000000000000000000000000000000 is appended to this line.
+ 600a0b80000c5ae4000000093eca105c00000000000000000000000000000000000 is appended to this line.
# 600a0b80000f6432000000043ef6b4ff00000000000000000000000000000000000 is appended to this line.
§ 600a0b80000f4c920000000b3ef6c3d00000000000000000000000000000000000 is appended to this line.
```

Line number two shows the number of the excluded disk.

2. Issue the following CLI command to include the excluded or degraded MDisk:

   `svcservicetask includemdisk` *mdisk_number*

   where *mdisk_number* is the number of the MDisk to include.

   Note: If you are using a software version lower than 2.1.0, issue the following command:

   `svctask includemdisk` *mdisk_number*

Checking MDisk group status using the CLI

You can use the command-line interface (CLI) to check the status of a managed disk (MDisk) group.

Issue the following CLI command to display the status of MDisk groups:

```
svcinfo lsmdiskgrp -nohdr -delim :
```

The following output is an example of what you might see:

```
0:Group0:online:4:4:2.1GB:16:1.9GB
```

The characteristics for each MDisk group is listed one line per group. The status of the MDisk group is shown by the third item. In the previous example, Group0 status is online. MDisk group status can be offline, online, or degraded.

Viewing the fibre-channel fabric connections

Failures of the SAN Volume Controller hardware, fibre-channel cables, fibre-channel switches, fibre-channel hardware in host systems, or disk controllers can cause fibre-channel connectivity problems.

Note: The term *fibre-channel fabric* describes all of the interconnections between the ports on a fibre-channel network.

Other SAN Volume Controller procedures isolate the hardware errors that cause storage area network (SAN) connectivity problems. You were sent to this topic because it is suspected that a problem exists elsewhere on the SAN. The resolution of problems on the fibre-channel fabric is outside of the scope of current documentation. The procedures here describe how to use the fibre-channel fabric viewing tool to help you understand the SAN Volume Controller view of the SAN. When you work with support personnel or with the customer to isolate SAN failures, this is valuable information.

Perform the following steps to start the fabric-viewing tool:

1. Log on to the SAN Volume Controller Console.
2. Click **Clusters**. The **Viewing Clusters** panel is displayed.
3. Select the cluster for which you want to view fabric information, and select **Launch the SAN Volume Controller Console** from the task list.
4. Click **Go**.
5. Click **Work with Hosts → Fabrics**. The **Viewing Fabrics** panel is displayed. See the example in Figure 58.

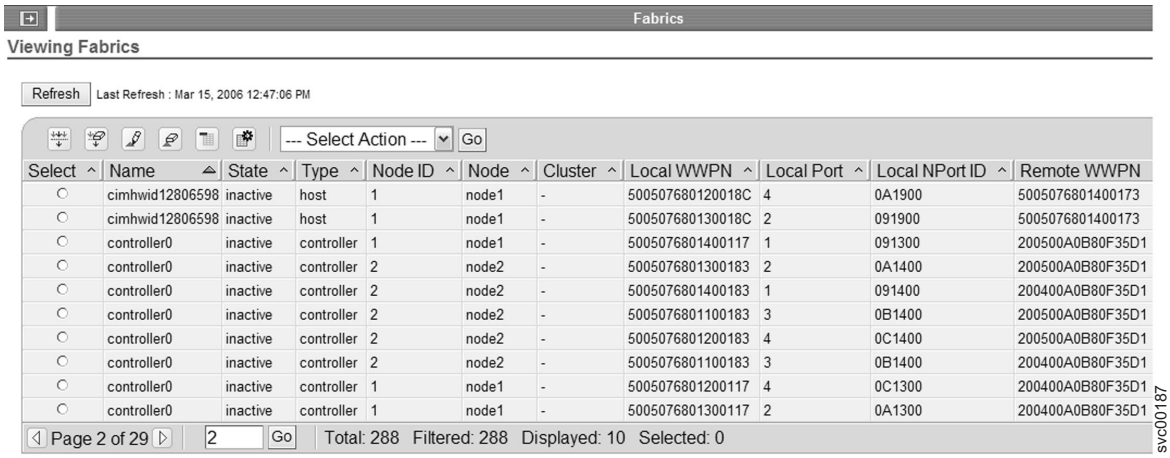


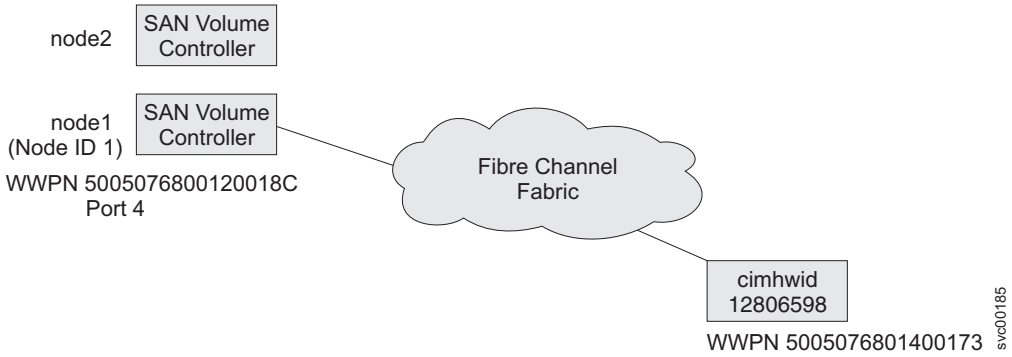
Figure 58. Viewing Fabric panel

The contents of each displayed field is described in Table 6.

Table 6. Fibre-channel viewing definitions

Fields	Description
Name	This is the name of the device whose worldwide port name (WWPN) is listed in the remote WWPN field.
State	Indicates whether the device listed in the Name field is active or inactive.
Type	The type of the device that is listed in the Name field. The expected types are ″controller″ (storage controller), ″node″ (SAN Volume Controller), or ″host″ (system that is using this SAN Volume Controller). If the type of device cannot be determined, ″unknown″ is displayed.
Node ID	The ID of the node that is listed in the Node field.
Node	This is the node name (as displayed on the front panel of the SAN Volume Controller).
Cluster	When the Type field lists a ″node,″ the cluster field displays the name of the cluster to which that node belongs.
Local WWPN	The WWPN of the SAN Volume Controller port that has a connection to the device listed in the Name field, using the WWPN that is listed in the Remote WWPN field.
Local Port	This is the physical port number on the back of the ″node″ listed in the Node field.
Local NPort ID	The NPort number of the Local Port listed in the Local Port field.
Remote WWPN	The WWPN of the device listed in the Name field.
Remote NPort ID	The NPort number of the device listed in the Name field.

The first line of Figure 58 on page 97 shows the following connection:



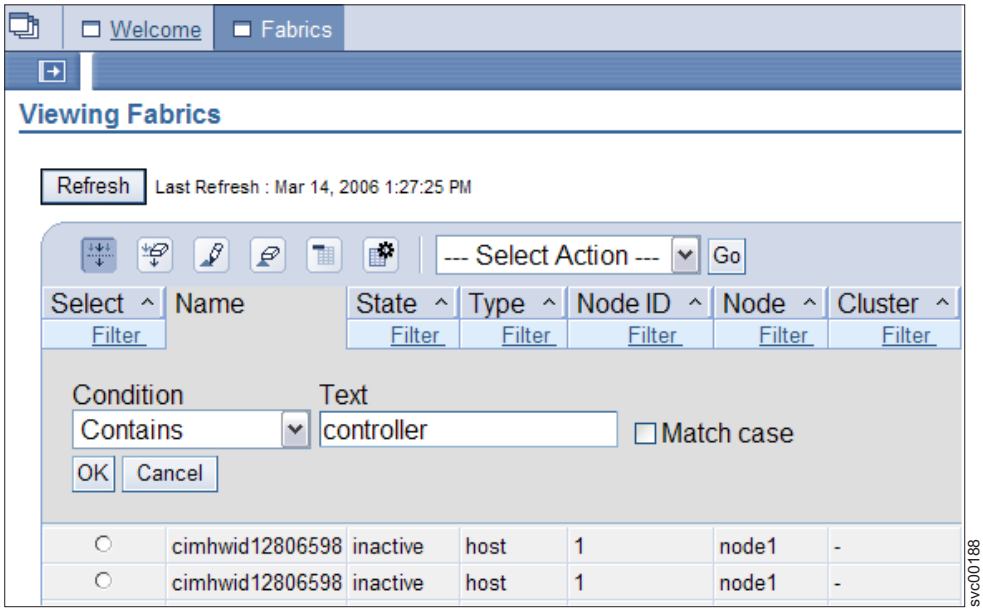
The fabric viewer provides comprehensive tools to let you display only the information that you need, and format the output in the most convenient form.

Note: The following examples show methods of displaying fabric connections. Not all scenarios are represented, and the examples only show two potential methods of finding the information that you seek.

Displaying all controllers logged into a node

Perform the following steps to display all of the controllers that are logged into a node called ″node1″:

1. Under the **Name** heading, click the **Filter** link. In the Text field, type `controller`, and then click **OK**.



2. Under the **Node** heading, click the **Filter** link. In the Text field, type `node1` and then click **OK**.

The example display (in Figure 59) shows all controllers that are logged in to node1.

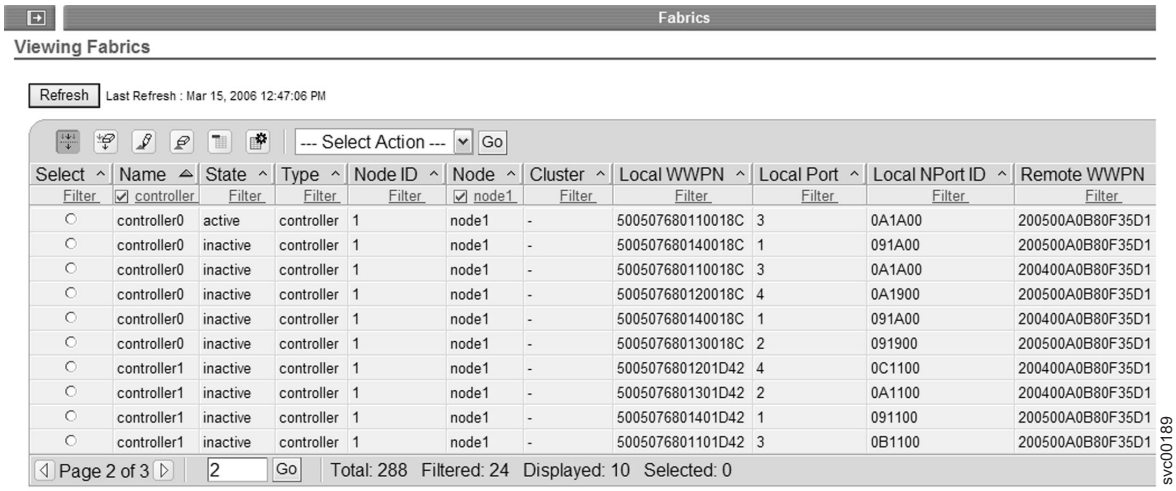


Figure 59. Example display of controllers logged in to node1

3. To restore the original display, select **Clear All Filters** from the **Select Action** drop-down menu and click **Go**.

Displaying all active devices

Perform the following steps to display all active devices that are logged in to port 2 of ″node2″:

1. Under the **State** heading, click the **Filter** link. In the Text field, type `active`.
2. From the **Condition** menu, select **Matches**, as shown in Figure 60, and then click **OK**.

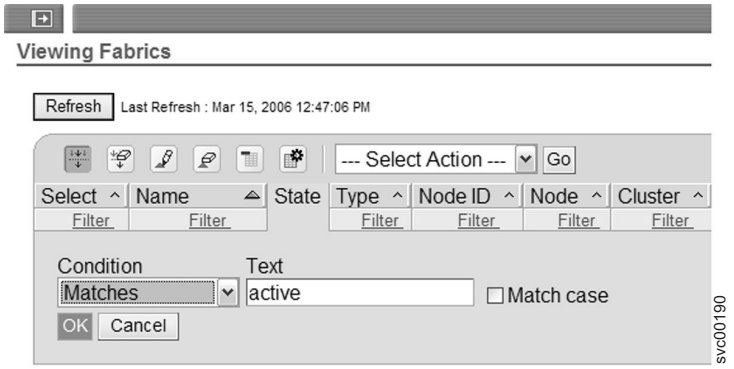


Figure 60. Displaying all active devices

3. Under the **Node** heading, click the **Filter** link. In the Text field, type `node2` and then click **OK**.
4. Under the **Local Port** heading, click the **Filter** link. In the Text field, type `2` in the text box and then click **OK**.

   The example display (in Figure 61 on page 100) shows all devices that are logged in to port 2 on node2.

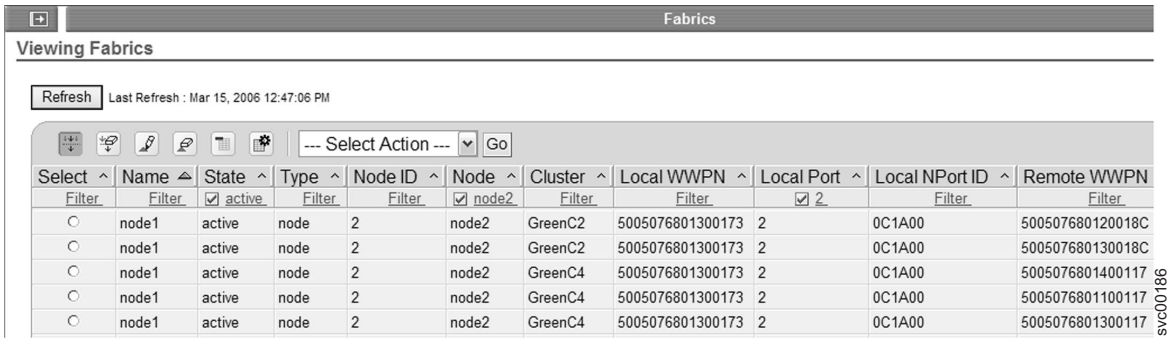


Figure 61. Example display of all active devices logged into port 2 of node2

Changing the fibre-channel network speed

You can change the speed of the fibre-channel ports on a SAN Volume Controller through the front panel on the SAN Volume Controller node or by a command sent to a SAN Volume Controller cluster using the Ethernet interface.

If you use the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8G4, the speed of the fibre-channel ports is governed by the maximum speed of the fibre-channel switch to which the ports are connected, up to a maximum of 4 Gbps. The ports operate at the highest speed at which a reliable connection can be established. Different ports and nodes on the SAN Volume Controller might operate at different speeds.

Note: Although you can change the speed of the fibre-channel ports on a SAN Volume Controller 2145-8G4 or SAN Volume Controller 2145-8F4 through the front panel or by a command, any speed changes that are selected through the front panel or by command have no affect on the SAN Volume Controller 2145-8G4 or SAN Volume Controller 2145-8F4.

All SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-4F2 fibre-channel ports and nodes on a SAN Volume Controller must operate at the same speed. The default for the port speed is 2 Gbps. If the fibre-channel fabric is using fibre-channel switches that are unable to operate at 2 Gbps, set the SAN Volume Controller fibre-channel port speed to 1 Gbps during the installation procedure. If you must replace a 2 Gbps fibre-channel switch with a 1 Gbps fibre-channel switch, you must manually switch the SAN Volume Controller fibre-channel port speed before you can use the SAN Volume Controller at 1 Gbps.

If a new SAN Volume Controller node is added to an existing SAN Volume Controller configuration, you must change the speed setting if the switch is only capable of running at 1 Gbps. If the SAN Volume Controller internal disk drive fails, the fibre-channel speed setting is lost, but the Node Rescue Procedure that you use to restore the SAN Volume Controller software automatically selects the correct speed. If a 1 Gbps fibre-channel switch is being replaced by a 2 Gbps fibre-channel switch, the existing SAN Volume Controller clusters operate at 1 Gbps. You can switch to 2 Gbps any time using the command-line interface.

Determining the fibre-channel port speed

You must determine the fibre-channel port speed for several actions. You can determine the fibre-channel port speed using the SAN Volume Controller Console, the CLI, or from the front panel.

Viewing the fibre-channel port speed from the SAN Volume Controller Console

You can view the fabric speed for the cluster from the View Cluster Properties panel.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to view the fibre-channel port speed:

1. Click **Manage Cluster** → **View Cluster Properties** in the portfolio. The Viewing General Properties panel is displayed.
2. Click the **General** tab to display the general properties, including the port speed.
3. Click **Close** to close the panel.

Determining the fibre-channel port speed from the CLI

If the node is in a cluster that is operational, you can determine the fibre-channel port speed from the cluster vital product data.

To view the fibre-channel port speed of a cluster, issue the following command:

```
svcinfo lscluster -delim : cluster1
```

The following output is an example of what you might see. The fibre-channel port speed is shown in bold.

```
id:cluster1
name:rc-cluster-20
location:local partnership:
bandwidth:
cluster_IP_address:9.71.50.32
cluster_service_IP_address:9.71.50.183
total_mdisk_capacity:2976.9GB
space_in_mdisk_grps::2976.9GB
space_allocated to vdisks:147.2GB
total_free_space:2828.7GB
statistics_status:on
statistics_frequency:15
required_memory:8192
cluster_locale:en_US
SNMP_setting:none
SNMP_community:
SNMP_server_IP_address:[0.0.0.0]:23
subnet_mask:255.255.254.0
default_gateway:9.71.50.1
time_zone:522
UTC email_setting:none
email_id:
code_level:4.1.0.12 (build 5.13.0610240000)
FC_port_speed:2Gb
console_IP:9.71.49.176:9080
id_alias:cluster1
gm_link_tolerance:300
gm_inter_cluster_delay_simulation:0
gm_intra_cluster_delay_simulation:0
email_server:8.53.26.131
email_server_port:25
email_reply:manager@mycompany.com
email_contact:manager
email_contact_primary:01202 123456
email_contact_alternate:44-212-786543-4455
email_contact_location:city
email_state:running
email_user_count:2
inventory_mail_interval:0
cluster_IP_address_6:
cluster_service_IP_address_6:
prefix_6:
default_gateway_6:
total_vdiskcopy_capacity:40.00GB
total_used_capacity:22.50GB
total_overallocation:1.25GB
total_vdisk_capacity:30.00GB
```

Determining the fibre-channel port speed from the front panel

Perform the following steps from the front panel to determine the fibre-channel port speed:

1. Select any fibre-channel port from the front panel.
2. Press and hold **Down**.
3. Press and release **Select**.
4. Release **Down**.
5. Press **Select** again to cancel the text display or wait 60 seconds and the text display cancels itself.

Changing the fibre-channel port speed for a node not in a cluster

You must occasionally change the fibre-channel port speed for a node that is not in a cluster.

Perform the following steps to change the fibre-channel port speed for a node that is not in a cluster:

1. From the front panel, select any fibre channel port.
2. Press and hold **Down**.
3. Press and release **Select**.
4. Release **Down**.
5. Press **Up** or **Down** until the required speed is displayed.
6. Press **Select** to activate the new speed.

Changing the fibre-channel port speed for a node in a cluster

The fibre channel port speed of all SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-4F2 nodes in the cluster can be changed by issuing the `svctask chcluster` command.

This is a customer task that is only available to users who are logged on using the admin ID and password.

Note: Changing the fibre-channel port speed causes all nodes in the cluster to simultaneously perform a warmstart. This causes any I/O activity through the cluster to fail and consequently might cause applications running on hosts to fail. The SAN Volume Controller Console processing also stops until the cluster connection is re-established.

Checking disk controller status using the CLI

You can use the command-line interface (CLI) to check the status of the disk controllers.

Issue the `svcinfo lscontroller -delim :` command to display the example output:

```
id:controller_name:ctrl_s/n:vendor_id:product_id_low:product_id_high
7:controller7:3EK0J5Y8:SEAGATE :ST373405:FC
8:controller8:3EK0J6CR:SEAGATE :ST373405:FC
9:controller9:3EK0J4YN:SEAGATE :ST373405:FC
10:controller10:3EK0GKGH:SEAGATE :ST373405:FC
11:controller11:3EK0J85C:SEAGATE :ST373405:FC
12:controller12:3EK0JBR2:SEAGATE :ST373405:FC
13:controller13:3EKYNJF8:SEAGATE :ST373405:FC
14:controller14:3EK0HVTM:SEAGATE :ST373405:FC
```

You can also check the status of a specific disk controller. Issue the following command to check the status of a specific disk controller:

`svcinfo lscontroller -delim = controller_id`

where *controller_id* is the ID of the controller whose status you want to check.

```
id=7
controller_name=controller7
WWNN=20000004CF2412AC
mdisk_link_count=1
max_mdisk_link_count=1
degraded=no
vendor_id=SEAGATE
product_id_low=ST373405
product_id_high=FC
product_revision=0003
ctrl_s/n=3EK0J5Y8
WWPN=22000004CF2412AC
path_count=1
max_path_count=1
WWPN=21000004CF2412AC
path_count=0
max_path_count=0
```

You can see the status of a specific disk controller (id=7) in the sixth line of the previous example. The value of `degraded` is defined below:

no Specifies that the status is good

yes Specifies that the status is undesirable

Determining the failing enclosure or disk controller using the CLI

You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

Issue the following command to list all the managed disks (MDisks):

```
svcinfo lsmdisk –nohdr –delim :
```

The following output is an example of what you might see after you issue the `svcinfo lsmdisk –nohdr –delim :` command:

```
0:mdisk0:online:managed:0:mdiskgrp0:273.3GB:0000000000000001:controller0:*
1:mdisk1:excluded:managed:0:mdiskgrp0:546.6GB:0000000000000002:controller0:+

* 600a0b80000c5ae4000000093eca105c00000000000000000000000000000000 is appended to this line.
+ 600a0b80000f6432000000043ef6b4ff00000000000000000000000000000000 is appended to this line.
```

The MDisks are listed in the object ID order. The first item is the object ID, the third item is the status, and the ninth item is the disk or controller name. In the previous example, mdisk1 has an object ID of 1, is failing with the status excluded, and is part of a disk controller named controller0.

Issue the following command to obtain the detailed data for the named enclosure or disk controller:

```
svcinfo lscontroller –delim : name
```

where *name* is the enclosure disk controller name.

The following output is an example of what you might see after you issue the `svcinfo lscontroller –delim : name` command:

```
id:0
controller_name:controller0
WWNN:200200A0B80F5E2C
mdisk_link_count:30
max_mdisk_link_count:30
degraded:no
vendor_id:IBM
product_id_low:1722-600
product_id_high:
product_revision:0520
ctrl_s/n:
WWPN:200200A0B80F5E2D
path_count:30
max_path_count:30
WWPN:200300A0B80F5E2D
path_count:30
max_path_count:30
```

Replacing a faulty node with a spare node

You can use the SAN Volume Controller Console and the SAN Volume Controller front panel to replace a faulty node in a cluster.

Before you attempt to replace a faulty node with a spare node you must ensure that you meet the following requirements:

- SAN Volume Controller version 3.1.0 or higher is installed on the cluster and on the spare node.
- You know the name of the cluster that contains the faulty node.
- A spare node is installed in the same rack as the cluster that contains the faulty node.
- You make a record of the last five characters of the original worldwide node name (WWNN) of the spare node. You will need this information, if and when, you want to stop using this node as a spare node.

If a node fails, the cluster continues to operate with degraded performance, until the faulty node is repaired. If the repair operation takes an unacceptable amount of time, it is useful to replace the faulty node with a spare node. However, the appropriate procedures must be followed and precautions must be taken so you do *not* interrupt I/O operations and compromise the integrity of your data.

The following table describes the changes that are made to your configuration when you replace a faulty node in the cluster:

Node attributes	Description
Front panel ID	This is the number that is printed on the front of the node and is used to select the node that is added to a cluster.
Node ID	This is the ID that is assigned to the node. A new node ID is assigned each time a node is added to a cluster; the node name remains the same following service activity on the cluster. You can use the node ID or the node name to perform management tasks on the cluster. However, if you are using scripts to perform those tasks, use the node name rather than the node ID. This ID will change during this procedure.

Node attributes	Description
Node name	This is the name that is assigned to the node. If you do not specify a name, the SAN Volume Controller assigns a default name. The SAN Volume Controller creates a new default name each time a node is added to a cluster. If you choose to assign your own names, you must type the node name on the Adding a node to a cluster panel. You cannot manually assign a name that matches the naming convention used for names assigned automatically by SAN Volume Controller. If you are using scripts to perform management tasks on the cluster and those scripts use the node name, you can avoid the need to make changes to the scripts by assigning the original name of the node to a spare node. This name might change during this procedure.
Worldwide node name	This is the WWNN that is assigned to the node. The WWNN is used to uniquely identify the node and the fibre-channel ports. During this procedure, the WWNN of the spare node is changed to that of the faulty node. The node replacement procedures must be followed exactly to avoid any duplication of WWNNs. This name does not change during this procedure.
Worldwide port names	These are the WWPNs that are assigned to the node. WWPNs are derived from the WWNN that is written to the spare node as part of this procedure. For example, if the WWNN for a node is 50050768010000F6, the four WWPNs for this node are derived as follows: WWNN 50050768010000F6 WWNN displayed on front panel 000F6 WWPN Port 1 50050768014000F6 WWPN Port 2 50050768013000F6 WWPN Port 3 50050768011000F6 WWPN Port 4 50050768012000F6 These names do not change during this procedure.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to replace a faulty node in the cluster:

1. Verify the name and ID of the node that you want to replace.

   Perform the following steps to verify the name and ID:

   a. Make sure that the SAN Volume Controller Console application is running on the cluster that contains the faulty node.
   b. Click **Work with Nodes** → **Nodes** in the portfolio. The Viewing Nodes panel is displayed. If the node is faulty, it is shown as offline.
   c. Ensure the partner node in the I/O group is online.

   - If the other node in the I/O group is offline, start the Directed Maintenance Procedures (DMPs) to determine the fault.
   - If you have been directed here by the DMPs, and subsequently the partner node in the I/O group has failed, recover the offline VDisks.
   - If you are replacing the node for other reasons, determine the node that you want to replace and ensure that the partner node in the I/O group is online.
   - If the partner node is offline, you will lose access to the VDisks that belong to this I/O group. Start the DMPs and fix the other node before proceeding to the next step.

2. Click the name of the faulty (offline) node. The Viewing General Details panel is displayed.
3. Click the **General, Ports** and **Vital Product Data** tabs and record the following information:
   - Node serial number
   - Worldwide node name
   - All of the worldwide port names
   - Name or ID of the I/O group that contains the node
   - Front panel ID
   - Uninterruptible power supply serial number
4. Disconnect all four fibre-channel cables from the node.

   Important: Do not plug the fibre-channel cables into the spare node until the spare node is configured with the WWNN of the faulty node.
5. Connect the power and signal cables from the spare node to the uninterruptible power supply that has the serial number you recorded in step 3.

   Note: For 2145 uninterruptible power supply units, you can plug the signal cable into any vacant position on the top row of serial connectors on the 2145 uninterruptible power supply. If no spare serial connectors are available on the 2145 uninterruptible power supply, disconnect the cables from the faulty node. For 2145-1U uninterruptible power supply units, you must disconnect the cables from the faulty node.
6. Power on the spare node.
7. You must change the WWNN of the spare node to that of the faulty node. The procedure for doing this depends on the SAN Volume Controller version that is installed on the spare node. Press and release the down button until the Node: panel displays. Then press and release the right button until the WWNN: panel displays. If repeated pressing of the right button returns you to the Node: panel, without displaying a WWNN: panel, go to step 9; otherwise, continue with step 8.
8. Change the WWNN of the spare node (with SAN Volume Controller V4.3 and above installed) to match the WWNN of the faulty node by performing the following steps:
   a. With the Node WWNN: panel displayed, press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display contains the last five numbers of the WWNN.
   b. Change the WWNN that is displayed to match the last five numbers of the WWNN that you recorded in step 3. To edit the highlighted number, use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
   c. When the five numbers match the last five numbers of the WWNN that you recorded in step 3, press the select button to accept the numbers.
9. Change the WWNN of the spare node (with SAN Volume Controller versions prior to V4.3 installed) to match the WWNN of the faulty node by performing the following steps:
   a. Press and release the right button until the Status: panel is displayed.

b. With the node status displayed on the front panel, press and hold the down button; press and release the select button; release the down button. WWNN is displayed on line 1 of the display. Line 2 of the display contains the last five numbers of the WWNN.

c. With the WWNN displayed on the front panel; press and hold the down button; press and release the select button; release the down button. The display switches into edit mode.

d. Change the WWNN that is displayed to match the last five numbers of the WWNN that you recorded in step 3 on page 107. To edit the highlighted number, use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.

e. When the five numbers match the last five numbers of the WWNN that you recorded in step 3 on page 107, press the select button to accept the numbers.

f. Press the select button to retain the numbers that you have updated and return to the WWNN panel.

10. Connect the four fibre-channel cables that you disconnected from the faulty node and connect them to the spare node.

    If an Ethernet cable has not been connected to the spare node, disconnect the Ethernet cable from the faulty node and connect it to the spare node.

11. Use the SAN Volume Controller Console to delete the faulty node from the cluster.

    Remember: You must record the following information to avoid data corruption when this node is re-added to the cluster:

    - Node serial number
    - WWNN
    - All WWPNs
    - I/O group that contains the node

12. Use the SAN Volume Controller Console to add the spare node to the cluster. If possible, use the same node name that was used for the faulty node. If necessary, the spare node is updated to the same SAN Volume Controller version as the cluster. This update can take up to 20 minutes.

13. Use the tools that are provided with your multipathing device driver on the host systems to verify that all paths are now online. See the documentation that is provided with your multipathing device driver for more information. For example, if you are using the subsystem device driver (SDD), see the *IBM System Storage Multipath Subsystem Device Driver: User's Guide* for instructions on how to use the SDD management tool on host systems. It might take up to 30 minutes for the paths to come online.

14. Repair the faulty node.

    Attention: When the faulty node is repaired, do not connect the fibre-channel cables to it. Connecting the cables might cause data corruption because the spare node is using the same WWNN as the faulty node.

    If you want to use the repaired node as a spare node, perform the following steps.

    For SAN Volume Controller V4.3 and above:

    a. With the Node WWNN: panel displayed, press and hold the down button, press and release the select button, and then release the down button. The

display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display contains the last five numbers of the WWNN.

b. Change the displayed number to `00000`. To edit the highlighted number, use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.

c. Press the select button to accept the numbers.

This node can now be used as a spare node.

For SAN Volume Controller versions prior to V4.3:

a. Press and release the right button until the Status: panel is displayed. See the *IBM System Storage SAN Volume Controller: Service Guide* for more information.

b. With the node status displayed on the front panel, press and hold the down button; press and release the select button; release the down button. `WWNN` is displayed on line 1 of the display. Line 2 of the display contains the last five numbers of the WWNN.

c. With the WWNN displayed on the front panel; press and hold the down button; press and release the select button; release the down button. The display switches into edit mode.

d. Change the displayed number to `00000`. To edit the highlighted number, use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.

e. Press the select button to accept the numbers.

f. Press the select button to retain the numbers that you have updated and return to the WWNN panel.

This node can now be used as a spare node.

Attention: Never connect a node with a WWNN of `00000` to the cluster. If this node is no longer required as a spare and is to be used for normal attachment to a cluster, you must change the WWNN to the number you recorded when a spare was created. Using any other number might cause data corruption.

Replacing a faulty node in the cluster using the CLI

You can use the command-line interface (CLI) to replace a faulty node in the cluster.

Before you attempt to replace a faulty node with a spare node you must ensure that you meet the following requirements:

- SAN Volume Controller version 3.1.0 or higher is installed on the cluster and on the spare node.
- You know the name of the cluster that contains the faulty node.
- A spare node is installed in the same rack as the cluster that contains the faulty node.
- You must make a record of the last five characters of the original worldwide node name (WWNN) of the spare node. You will need this information, if and when, you want to stop using this node as a spare node.

If a node fails, the cluster continues to operate with degraded performance until the faulty node is repaired. If the repair operation takes an unacceptable amount of

time, it is useful to replace the faulty node with a spare node. However, the appropriate procedures must be followed and precautions must be taken so you do *not* interrupt I/O operations and compromise the integrity of your data.

The following table describes the changes that are made to your configuration when you replace a faulty node in the cluster:

Node attributes	Description
Front panel ID	This is the number that is printed on the front of the node and is used to select the node that is added to a cluster.
Node ID	This is the ID that is assigned to the node. A new node ID is assigned each time a node is added to a cluster; the node name remains the same following service activity on the cluster. You can use the node ID or the node name to perform management tasks on the cluster. However, if you are using scripts to perform those tasks, use the node name rather than the node ID. This ID will change during this procedure.
Node name	This is the name that is assigned to the node. If you do not specify a name, the SAN Volume Controller assigns a default name. The SAN Volume Controller creates a new default name each time a node is added to a cluster. If you choose to assign your own names, you must type the node name on the Adding a node to a cluster panel. You cannot manually assign a name that matches the naming convention used for names assigned automatically by SAN Volume Controller. If you are using scripts to perform management tasks on the cluster and those scripts use the node name, you can avoid the need to make changes to the scripts by assigning the original name of the node to a spare node. This name might change during this procedure.
Worldwide node name	This is the WWNN that is assigned to the node. The WWNN is used to uniquely identify the node and the fibre-channel ports. During this procedure, the WWNN of the spare node changes to that of the faulty node. The node replacement procedures must be followed exactly to avoid any duplication of WWNNs. This name does not change during this procedure.
Worldwide port names	These are the WWPNs that are assigned to the node. WWPNs are derived from the WWNN that is written to the spare node as part of this procedure. For example, if the WWNN for a node is 50050768010000F6, the four WWPNs for this node are derived as follows: WWNN 50050768010000F6 WWNN displayed on front panel 000F6 WWPN Port 1 50050768014000F6 WWPN Port 2 50050768013000F6 WWPN Port 3 50050768011000F6 WWPN Port 4 50050768012000F6 These names do not change during this procedure.

Perform the following steps to replace a faulty node in the cluster:

1. Verify the name and ID of the node that you want to replace.

   Perform the following step to verify the name and ID:

   a. Issue the **svcinfo lsnode** CLI command to ensure that the partner node in the I/O group is online.

   - If the other node in the I/O group is offline, start Directed Maintenance Procedures (DMPs) to determine the fault.

- If you have been directed here by the DMPs, and subsequently the partner node in the I/O group has failed, see the procedure for recovering from offline VDisks after a node or an I/O group failed.
- If you are replacing the node for other reasons, determine the node you want to replace and ensure that the partner node in the I/O group is online.
- If the partner node is offline, you will lose access to the VDisks that belong to this I/O group. Start the DMPs and fix the other node before proceeding to the next step.

2. Find and record the following information about the faulty node:
   - Node serial number
   - Worldwide node name
   - All of the worldwide port names
   - Name or ID of the I/O group that contains the node
   - Front panel ID
   - Uninterruptible power supply serial number

   a. Issue the **svcinfo lsnode** CLI command to find and record the node name and I/O group name. The faulty node will be offline.
   b. Record the following information about the faulty node:
      - Node name
      - I/O group name
   c. Issue the following CLI command:

      ```
      svcinfo lsnodevpd nodename
      ```

      Where *nodename* is the name that you recorded in step 1 on page 110.
   d. Find the `WWNN` field in the output.
   e. Record the last five characters of the WWNN.
   f. Find the `front_panel_id` field in the output.
   g. Record the front panel ID.
   h. Find the `UPS_serial_number` field in the output.
   i. Record the uninterruptible power supply serial number.
3. Disconnect all four fibre-channel cables from the node.

   Important: Do not plug the fibre-channel cables into the spare node until the spare node is configured with the WWNN of the faulty node.
4. Connect the power and signal cables from the spare node to the uninterruptible power supply that has the serial number you recorded in step 2i.

   Note: For 2145 uninterruptible power supply units, you can plug the signal cable into any vacant position on the top row of serial connectors on the 2145 uninterruptible power supply. If no spare serial connectors are available on the 2145 uninterruptible power supply, disconnect the cables from the faulty node. For 2145-1U uninterruptible power supply units, you must disconnect the cables from the faulty node.
5. Power on the spare node.
6. Display the node status on the service panel. See the *IBM System Storage SAN Volume Controller: Service Guide* for more information.
7. You must change the WWNN of the spare node (with SAN Volume Controller V4.3 and above installed) to that of the faulty node. The procedure for doing

this depends on the SAN Volume Controller version that is installed on the spare node. Press and release the down button until the Node: panel displays. Then press and release the right button until the WWNN: panel displays. If repeated pressing of the right button returns you to the Node: panel, without displaying a WWNN: panel, go to step 9; otherwise, continue with step 8.

8. Change the WWNN of the spare node (with SAN Volume Controller V4.3 and above installed) to match the WWNN of the faulty node by performing the following steps:
   a. With the Node WWNN: panel displayed, press and hold the down button, press and release the select button, and then release the down button.The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display contains the last five numbers of the WWNN.
   b. Change the WWNN that is displayed to match the last five numbers of the WWNN that you recorded in step 2e on page 111. To edit the highlighted number, use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
   c. When the five numbers match the last five numbers of the WWNN that you recorded in step 2e on page 111, press the select button to accept the numbers.
9. Change the WWNN of the spare node (with SAN Volume Controller versions prior to V4.3 installed) to match the WWNN of the faulty node by performing the following steps:
   a. Press and release the right button until the Status: panel is displayed.
   b. With the node status displayed on the front panel, press and hold the down button; press and release the select button; release the down button. `WWNN` is displayed on line 1 of the display. Line 2 of the display contains the last five numbers of the WWNN.
   c. With the WWNN displayed on the front panel; press and hold the down button; press and release the select button; release the down button. The display switches into edit mode.
   d. Change the WWNN that is displayed to match the last five numbers of the WWNN that you recorded in step 2e on page 111. To edit the highlighted number, use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
   e. When the five numbers match the last five numbers of the WWNN that you recorded in step 2e on page 111, press the select button to retain the numbers that you have updated and return to the WWNN panel.
   f. Press the select button to apply the numbers as the new WWNN for the node.
10. Connect the four fibre-channel cables that you disconnected from the faulty node and connect them to the spare node.

    If an Ethernet cable has not been connected to the spare node, disconnect the Ethernet cable from the faulty node and connect it to the spare node.
11. Issue the following CLI command to remove the faulty node from the cluster:

    `svctask rmnode` *`nodename/id`*

    Where *nodename/id* is the name or ID of the faulty node.

    Remember to record the following information to avoid data corruption when this node is re-added to the cluster:

    - Node serial number

- WWNN
- All WWPNs
- I/O group that contains the node

12. Issue the following command to add the spare node to the cluster:

    ```
    svctask addnode -wwnodename WWNN -iogrp iogroupname/id -name nodename
    ```

    where *WWNN* is the WWNN of the node, *iogroupname/id* is the name or ID of the I/O group and *nodename* is the name of the node. If possible, use the same node name that was used for the faulty node. If necessary, the spare node is updated to the same SAN Volume Controller version as the cluster. This update can take up to 20 minutes.

13. Use the tools that are provided with your multipathing device driver on the host systems to verify that all paths are now online. See the documentation that is provided with your multipathing device driver for more information. For example, if you are using the subsystem device driver (SDD), see the *IBM System Storage Multipath Subsystem Device Driver: User's Guide* for instructions on how to use the SDD management tool on host systems. It might take up to 30 minutes for the paths to come online.

14. Repair the faulty node.

    Attention: When the faulty node is repaired, do not connect the fibre-channel cables to it. Connecting the cables might cause data corruption because the spare node is using the same WWNN as the faulty node.

    If you want to use the repaired node as a spare node, perform the following steps.

    For SAN Volume Controller V4.3 and above:

    a. With the Node WWNN: panel displayed, press and hold the down button, press and release the select button, and then release the down button.
    b. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display contains the last five numbers of the WWNN.
    c. Change the displayed number to `00000`. To edit the highlighted number, use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
    d. Press the select button to accept the numbers.

       This node can now be used as a spare node.

    For SAN Volume Controller versions prior to V4.3:

    a. Press and release the right button until the Status: panel is displayed. See the *IBM System Storage SAN Volume Controller: Service Guide* for more information.
    b. With the node status displayed on the front panel, press and hold the down button; press and release the select button; release the down button. `WWNN` is displayed on line 1 of the display. Line 2 of the display contains the last five numbers of the WWNN.
    c. With the WWNN displayed on the front panel; press and hold the down button; press and release the select button; release the down button. The display switches into edit mode.
    d. Change the displayed number to `00000`. To edit the highlighted number, use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
    e. Press the select button to accept the numbers.

f. Press the select button to retain the numbers that you have updated and return to the WWNN panel.

   This node can now be used as a spare node.

Attention: Never connect a node with a WWNN of `00000` to the cluster. If this node is no longer required as a spare and is to be used for normal attachment to a cluster, you must change the WWNN to the number you recorded when a spare was created. Using any other number might cause data corruption.

Viewing and updating license settings

You can use the SAN Volume Controller Console to view and update your license settings.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to view and update the license settings:

1. Click **Service and Maintenance** → **License Settings** in the portfolio. The License Settings panel is displayed.
2. Set the licensed settings and enter a capacity value.
3. Click **Update License Settings**.

Viewing and updating license settings using the CLI

You can use the command-line interface (CLI) to view and update your license settings.

Perform the following steps to view and update the license settings:

1. Issue the **svcinfo lslicense** CLI command to view the current license settings for the cluster.
2. Issue the **svctask chlicense** CLI command to change the licensed settings of the cluster. Because the settings are entered when the cluster is first created, do not update the settings unless you have changed your license. You can set the following licenses to either on or off. The capacities for these licenses are specified in terabytes.
   - FlashCopy
   - Metro Mirror or Global Mirror
   - Virtualization

   See the *IBM System Storage SAN Volume Controller: Command-Line Interface User's Guide* for more information about this command.

Displaying and saving log and dump files

You can save the log and dump files for nodes.

You can save dump data for any node in the cluster. When you use this procedure to display dump data only, the dump files for the configuration node are displayed. An option on the dumps menu allows you to display data from other nodes. If you choose to display or save data from another node, that data is first copied to the configuration node.

The software dump files contain dumps of the SAN Volume Controller memory. Your IBM service representative might ask for these dumps to debug problems. The software dumps are large files (approximately 300 MB). Consider copying these files to your host using secure copy methods.

The **List dumps** option supports the following file types:

- Error logs
- Configuration logs
- I/O statistic logs
- I/O trace logs
- Feature logs
- Software dumps

Perform the following steps to display log and dump files:

This task assumes that you have already launched the SAN Volume Controller Console.

1. Click **Service and Maintenance** → **List Dumps** in the portfolio. The List Dumps panel is displayed.

   The List dumps (other nodes) continued panel displays the number of log files or dumps of a particular type that are available on the cluster. If there is more than one node in the cluster, the **Check other nodes** button is displayed. If you click this button, the log files and dumps for all nodes that are part of the cluster are displayed. Dumps and logs on all nodes in the cluster can be deleted on or copied to the configuration node.

   If you click on one of the file types, all the files of that type are listed in a table.

   Note: For error logs and software dumps, the file names include the node name and time and date as part of the file name.
2. Copy the files to your local workstation by right-clicking on the filename and using the **Save Link As...** (Netscape) or **Save Target As...** (Internet Explorer) option from the Web browser.

Viewing the feature log

You can view the feature log for the cluster from the Feature Log panel.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following step to view the feature log for the cluster:

Click **Service and Maintenance** → **View Feature Log** in the portfolio. The Feature Log panel is displayed.

Viewing the feature log using the CLI

You can use the command-line interface (CLI) to view the feature log.

Perform the following steps to view the feature log:

1. Issue the **svcinfo lsfeaturedumps** command to return a list of dumps in the /dumps/feature destination directory. The feature log is maintained by the

cluster. The feature log records events that are generated when license parameters are entered or when the current license settings have been breached.

2. Issue the **svcservicemodeinfo lsfeaturedumps** command to return a list of the files that exist of the type specified on the given node.

Analyzing the error log

You can analyze the error log from the Analyze Error Log panel.

This task assumes that you have already launched the SAN Volume Controller Console.

Note: Log files that are copied to the configuration node are *not* automatically deleted by the SAN Volume Controller.

Perform the following steps to analyze the error log:

1. Click **Service and Maintenance** → **Analyze Error Log** in the portfolio. The Error log analysis panel is displayed.

   The Error log analysis panel lets you analyze the cluster error log. You can display the whole log or filter the log so that only errors, events, or unfixed errors are displayed. In addition, you can request that the table is sorted by either error priority or time. For error priority, the most serious errors are the lowest-numbered errors. Therefore, they are displayed first in the table.

   Either the oldest or the latest entry can be displayed first in the table. You can also select how many error log entries are displayed on each page of the table. The default is set to 10 and the maximum number of error logs that can be displayed on each page is 99.

2. After selecting the options, click **Process** to display the filtered error log in the table. The Analyze error log continued panel is displayed.

   Forward and backward scroll buttons are displayed, depending on the existing page number and the total number of pages that are in the table. If the table contains more than two pages of entries, a **Go to** input area is displayed in the table footer. This input area enables you to skip to a particular page number.

   If you click on the sequence number of a table record, more information about that error log entry is displayed. If the record is an error (instead of an event), you can change the fixed or unfixed status of the record; that is, you can mark an unfixed error as fixed or a fixed error as unfixed.

3. Click **Clear log** to erase the entire cluster error log.

   Note: Clicking **Clear log** does *not* fix the existing errors.

Analyzing the error log using the CLI

You can use the command-line interface (CLI) to analyze the error log.

Perform the following steps to analyze the error log:

Issue any of the following CLI commands to list error log files:

- **svcinfo lserrlogbymdisk**
- **svcinfo lserrlogbymdiskgroup**
- **svcinfo lserrlogbyvdisk**
- **svcinfo lserrlogbyhost**

- **svcinfo lserrlogbynode**
- **svcinfo lserrlogbyiogrp**
- **svcinfo lserrlogbyfcconsistgrp**
- **svcinfo lserrlogbyfcmap**
- **svcinfo lserrlogbyrcconsistgrp**
- **svcinfo lserrlogbyrcrelationship**

These CLI commands list the error log by type and return a list of dumps in the appropriate directory. For example, the **svcinfo lserrlogbymdisk** CLI command displays the error log by managed disks (MDisks).

You can display the whole log or filter the log so that only errors, events, or unfixed errors are displayed. You can also request that the output is sorted either by error priority or by time. For error priority, the most serious errors are the lowest-numbered errors. Therefore, the most serious errors are displayed first in the table. For time, either the older or the latest entry can be displayed first in the output.

Marking errors as fixed

You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

This task assumes that you have already launched the SAN Volume Controller Console. Perform the following steps to mark errors as fixed:

1. Select a cluster and launch the SAN Volume Controller Console.
2. Click **Service and Maintenance** → **Analyze Error Log** in the portfolio.
3. Select the analysis option from the list of options:
   - Show all errors and events
   - Show all errors
   - Show all events
   - Show all unfixed errors
   - Show all errors or events matching code
4. Select the display option:
   - Sort by error priority
   - Sort by date with the newest first
   - Sort by date with the oldest first
   - Number of entries to display (per page)
5. Click **Process**
6. Click on the sequence number of the error that you have just fixed to display the error log in more detail.
7. Click **Mark Error As Fixed**.

   The error log entry for this error is now marked as fixed and it will not be used as part of future error log analysis.

Running the cluster maintenance procedure

You can use the SAN Volume Controller Console to run the cluster maintenance procedure.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to run the cluster maintenance procedure:

1. Click **Service and Maintenance** → **Run Maintenance Procedures** in the portfolio. The Maintenance Procedures panel is displayed.
2. Click **Start Analysis** to analyze the cluster error log. The Maintenance panel is displayed.

   If you click the error code of a error log entry, you are guided through a series of actions that help you estimate the state of the cluster and determine if the error was an isolated event or a component failure. If a component has failed, it might be necessary to exchange that component. Where necessary, images of the failing component are displayed. If a repair is performed successfully, the state of an error record in the error log changes from an unfixed error to a fixed error.

Using directed maintenance procedures

You can use directed maintenance procedures (DMP) to diagnose and resolve problems with the SAN Volume Controller.

For example, to repair a SAN Volume Controller cluster, you might perform the following tasks:

- Analyze the error log
- Replace failed components
- Verify the status of a repaired device
- Restore a device to an operational state in the cluster
- Mark the error as fixed in the error log

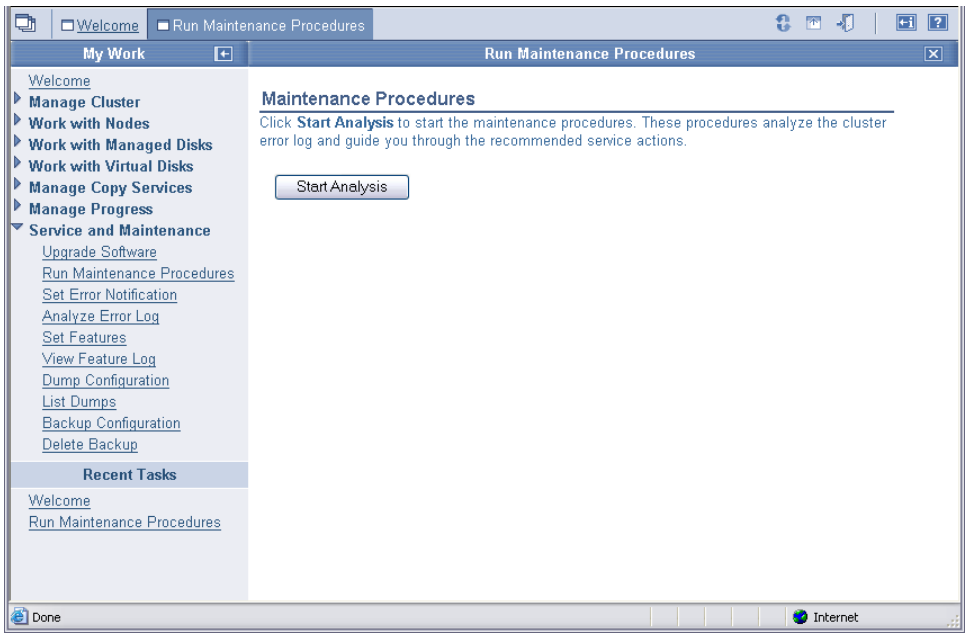
Directed maintenance simplifies these procedures by automating as many of the tasks as possible.

The following procedures and panels show examples of what you might see when you use the DMPs. The specific DMPs and panels that you see depend on the procedure that you select.

Note: The following procedures and graphics are examples of what you might see when you use the DMPs. The DMPs and graphics that you see depend on the procedure that you select. This task assumes that you have already launched the SAN Volume Controller Console.

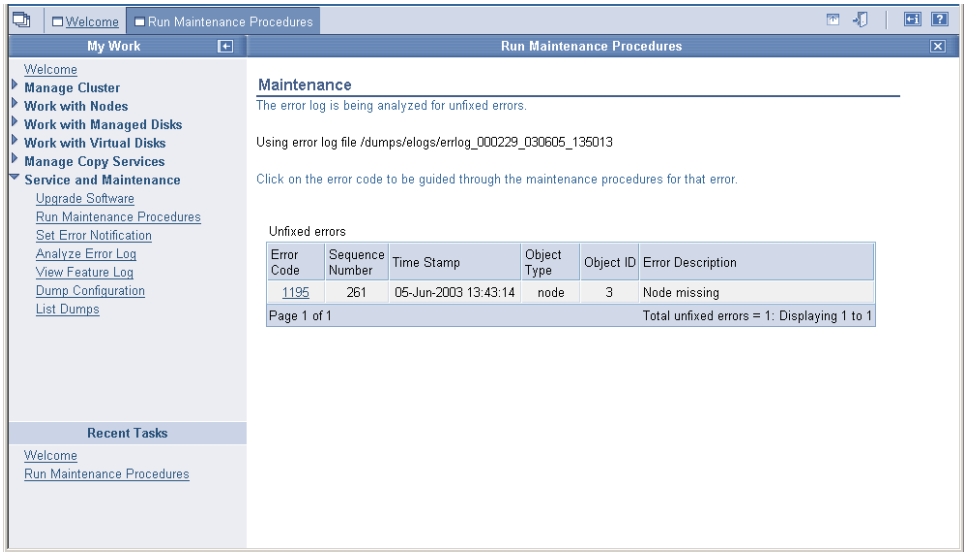
Our example uses the SAN Volume Controller Console to repair a SAN Volume Controller cluster. Perform the following steps to start the DMP:

1. Click **Start Analysis** from the Run Maintenance Procedures panel.



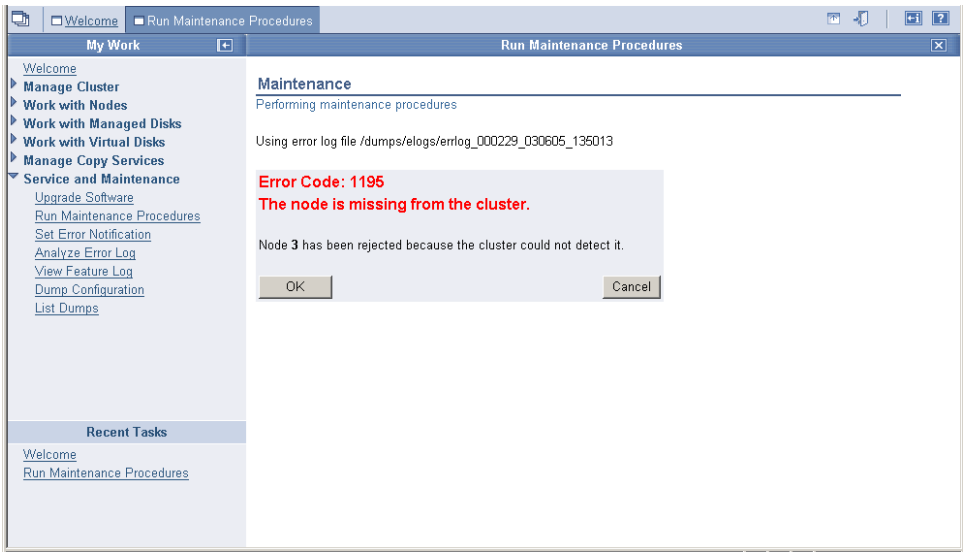
The list might contain any number of errors that must be repaired. If there is more than one error on the list, the error at the top of the list has the highest priority and must always be fixed first. If you do not fix the higher priority errors first, you might not be able to fix the lower priority errors.

2. Click on the number for the error code.

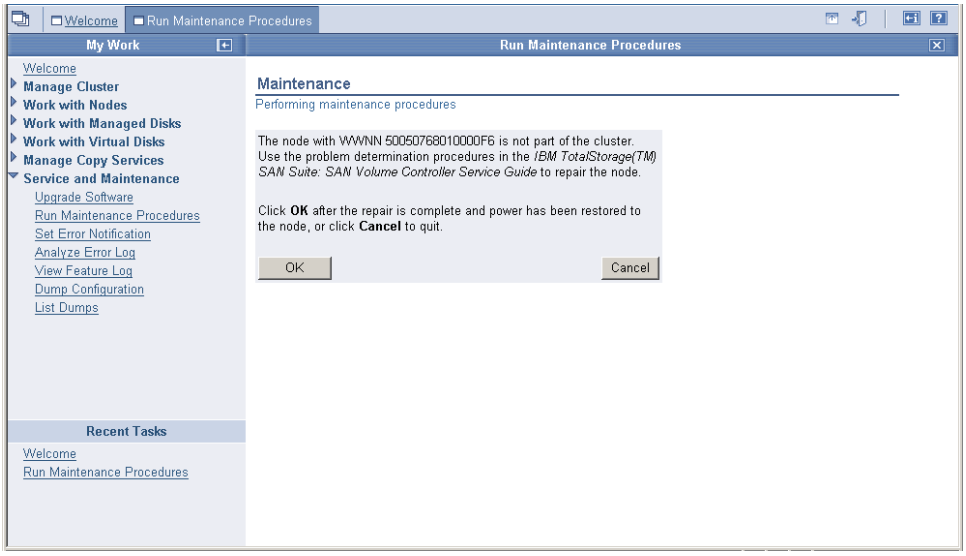


The panel displays the error code and provides a description of the error condition.

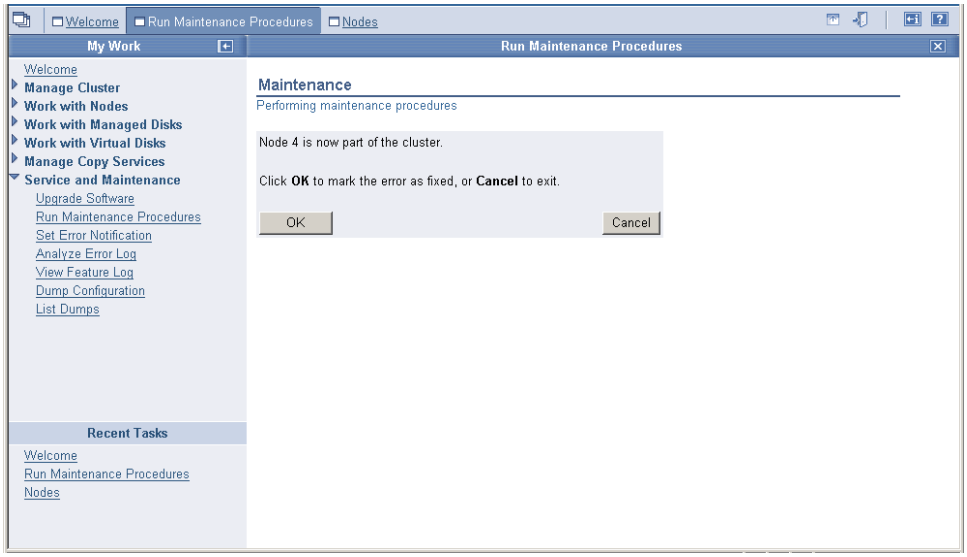
3. Click **OK**.



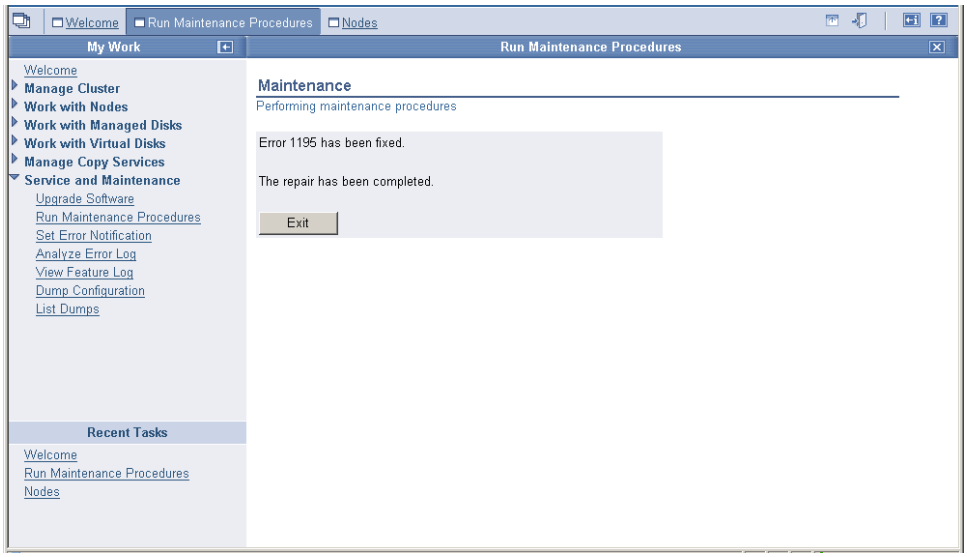
4. One or more panels might be displayed with instructions for you to replace parts or perform other repair activity. If you are not able to complete the actions at this time, click **Cancel**. When you return to the DMPs, the repair can be restarted from step 1 on page 118. When the actions that you are instructed to perform are complete, click **OK**. When the last repair action is completed, the DMPs might attempt to restore failed devices to the cluster.



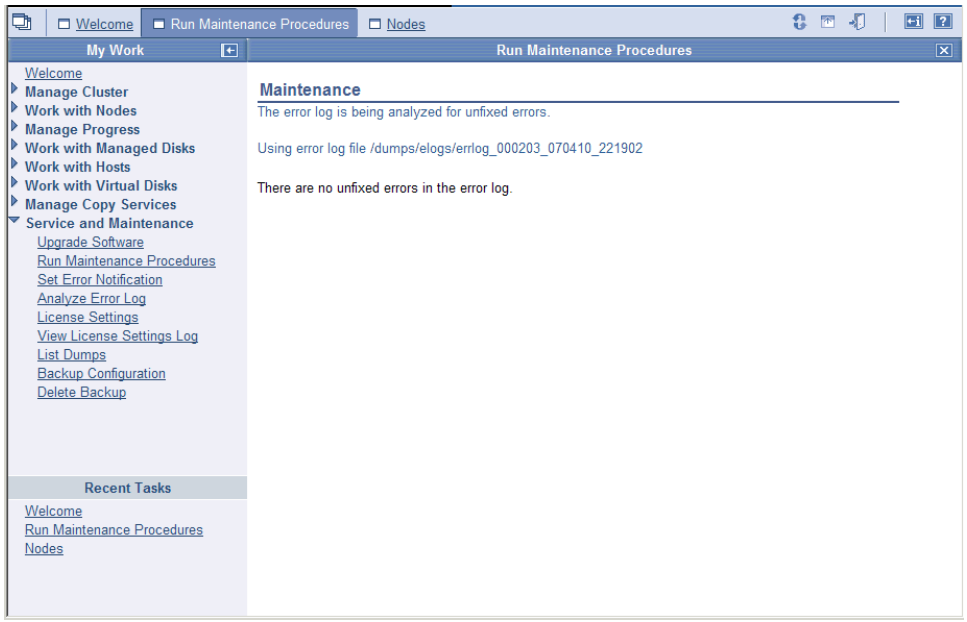
5. Click **OK** to mark the error as fixed in the error log, to prevent this instance of the error from being listed again.



6. Click **Exit**. If other errors need to be fixed, those errors are displayed and the DMPs continue.



If no errors remain, the following panel is displayed:



This panel indicates that no further repair procedures are necessary. Verify the repair using the repair verification MAP.

Related tasks

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Chapter 4. Upgrading the SAN Volume Controller software

The SAN Volume Controller software can be upgraded while you run day-to-day operations.

However, performance is degraded during the software upgrade process. Only the following commands can be issued during the software upgrade:

- All svcinfo commands
- svctask rmnode

Note: Applying a software upgrade takes a varying length of time. Plan for at least one hour because there is a 30 minute delay that allows the multipathing software to recover.

Software and microcode for the SAN Volume Controller and its attached adapters is tested and released as a single package. The package number increases each time a new release is made. The package includes Linux®, Apache and the SAN Volume Controller software.

If you upgrade to more than one level above your current level, you might be required to install the intermediate level. For example, if you are upgrading from level 1 to level 3, you might have to install level 2 before you can install level 3. Details for any prerequisite levels are provided with the source files.

Attention:

- If you apply the software upgrade while a node is in service mode, the node is deleted from the cluster. All status information that is stored on the node is deleted and data loss can occur if the cluster depends solely on this node.
- Ensure that you have no unfixed errors in the log and that the cluster date and time are correctly set. Start the Directed Maintenance Procedures (DMPs) and ensure that you fix any outstanding errors before you attempt to concurrently upgrade the software.

Metro Mirror and Global Mirror

When you upgrade software where the cluster participates in one or more intercluster relationships, update the clusters one at a time. Do not upgrade the clusters concurrently because you can lose synchronization and availability.

You can create new Metro Mirror or Global Mirror partnerships between two clusters with different software levels.

Installing or upgrading the SAN Volume Controller software

The SAN Volume Controller software can be installed or upgraded after you download the software package from the SAN Volume Controller Web site.

Software package

The software installation or upgrade procedure copies the new software level to the cluster and starts an automatic installation process. During the installation process, each node is restarted. While each node restarts, there might be some

degradation in the maximum I/O rate that can be sustained by the cluster. The amount of time that is needed to install or upgrade the software is dependent on the size of the cluster and the size of the software update package. The size of the software update package is determined by the number of components that are being replaced. After all the nodes in the cluster are successfully restarted with the new software level, the new software level is automatically committed.

Installation operation

The installation operation can normally be performed concurrently with normal user I/O operations. If any restrictions apply to the operations that can be performed during the upgrade, these restrictions are documented on the SAN Volume Controller Web site that you use to download the software packages. During the software upgrade procedure, only the following SAN Volume Controller commands are operational from the time the install process starts to the time that the new software level is committed, or until the process has been backed-out. All other commands fail with a message that indicates a software upgrade is in progress.

- All `svcinfo` commands
- `svctask rmnode`

To determine when your software upgrade process has completed, you will be notified through the SAN Volume Controller Console or, if you are using the command-line interface, examine the error log.

Because of the operational limitations that occur during the software upgrade process, the software installation is a user task.

Copying the SAN Volume Controller software upgrade files using PuTTY scp

PuTTY scp (pscp) provides a file transfer application for secure shell (SSH) to copy files either between two directories on the configuration node or between the configuration node and another host.

To use the pscp application, you must have the appropriate permissions on the source and destination directories on your respective hosts.

The pscp application is available when you install an SSH client on your host system. You can access the pscp application through a command prompt.

Perform the following steps to use the pscp application:

1. Start a PuTTY session.
2. Configure your PuTTY session to access your SAN Volume Controller cluster.
3. Save your PuTTY configuration session. For example, you can name your saved session SVCPUTTY.
4. Open a command prompt.
5. Issue the following command to set the path environment variable to include the PuTTY directory:

   ```
   set path=C:\Program Files\putty;%path%
   ```

   Where *Program Files* is the directory where PuTTY is installed.
6. Issue the following command to copy the package onto the node where the CLI runs:

```
directory_software_upgrade_files pscp -load saved_putty_configuration
 software_upgrade_file_name admin@cluster_ip_address:/home/admin/upgrade
```

where *directory_software_upgrade_files* is the directory that contains the software upgrade files, *saved_putty_configuration* is the name of the PuTTY configuration session, *software_upgrade_file_name* is the name of the software upgrade file, and *cluster_ip_address* is the IP address of your cluster.

If there is insufficient space to store the software upgrade file on the cluster, the copy process fails. Perform one of the following steps to provide sufficient space:

- Issue the **svctask cleardumps** CLI command to free space on the cluster and repeat step 6 on page 124.
- Issue the following command from the cluster to transfer the error logs to the IBM System Storage Productivity Center or the master console:

```
pscp -unsafe -load saved_putty_configuration
 admin@cluster_ip_address:/dump/elogs/* your_desired_directory
```

where *saved_putty_configuration* is the name of the PuTTY configuration session, *cluster_ip_address* is the IP address of your cluster, and *your_desired_directory* is the directory where you want to transfer the error logs.

After you have transferred the error logs to the IBM System Storage Productivity Center or the master console, repeat step 6 on page 124.

Upgrading the SAN Volume Controller software automatically

When new nodes are added to the cluster, the software upgrade file is automatically downloaded to the new nodes from the SAN Volume Controller cluster.

If you add a new node that has or requires a software level that is higher than the software level available on the cluster, the new node is *not* configured into the cluster. The new node must be downgraded to the software level of the cluster before it can join the cluster. If a node is added to the cluster that does not have software installed or has an old software level that cannot be recognized by the cluster, a node rescue must be performed to force a reinstallation of the software.

If the new node requires a level of software that is higher than the software level that is available on the cluster, the entire cluster must be upgraded before the new node can be added to the cluster.

Error counts

During the software upgrade if you are using IBM Subsystem device driver (SDD) as the multipathing software on the host, increased I/O error counts are displayed by the **datapath query device** or **datapath query adapter** commands if active I/O operations exist between the hosts and the SANs during a software upgrade. See the *IBM System Storage Multipath Subsystem Device Driver: User's Guide* for more information about the **datapath query** commands.

During the software upgrade, each node of a working pair is upgraded sequentially. The node that is being upgraded is temporarily unavailable and all I/O operations to that node fails. As a result, the I/O error counts increase and the failed I/O operations are directed to the partner node of the working pair. Applications should not see any I/O failures.

Upgrading the SAN Volume Controller software using the SAN Volume Controller Console

You can upgrade the cluster software using the SAN Volume Controller Console.

Attention: Before you start a software upgrade, you must check for offline or degraded VDisks. An offline VDisk can cause write data that has been modified to be pinned in the SAN Volume Controller cache. This prevents VDisk failover and causes a loss of I/O access during the software upgrade. If the fast_write_state is empty, a VDisk can be offline and not cause errors during the software upgrade.

Perform the following steps if you are using Internet Explorer:

1. Click **Tools** in the menu bar.
2. Select the **Internet Options** → **Connections** tab.
3. Click on **LAN Settings...** and ensure that the box marked **Use a proxy server for your LAN (These settings will not apply to dial-up or VPN connections)** is unchecked.
4. Click **OK** twice to accept the settings.

Perform the following steps if you are using Netscape:

1. Click **Edit** in the menu bar.
2. Click on **Preferences...**. Expand the Advanced section and select **Proxies**.
3. Select the **Direct connection to the Internet** button and click **OK** to accept the settings.

Tip: The software upgrade files can be quite large. If you experience problems while uploading the software upgrade files to the cluster, you should disable proxies on the Web browser from where you will upload the file. This shortens the file upload time. If you disable proxies, you might not be able to connect to external Web sites. Therefore, you must make a record of your existing settings before you disable proxies in case you have to restore access to other Web sites.

Perform the following steps to upgrade the software:

1. Download the SAN Volume Controller code from the following Web site:

   http://www.ibm.com/storage/support/2145

   - If you want to write the SAN Volume Controller code to a CD, you must download the CD image.
   - If you do not want to write the SAN Volume Controller code to a CD, you must download the install image.
2. Start a SAN Volume Controller Console session.
3. Launch the SAN Volume Controller application.
4. Click **Service and Maintenance** in the portfolio.
5. Click **Upgrade Software** to check the installed software level or to install a new level of software on the cluster. The Software Upgrade panel is displayed.
6. Click **Upload**. The Software upgrade - file upload panel is displayed.
7. Click **Browse** and select the SAN Volume Controller software file that you downloaded in step 1.
8. Click **Upload** to copy the SAN Volume Controller software file to the cluster.

   Before you begin the software upgrade, you must be aware of the following:

- The install process fails under the following conditions:
  - All the nodes that are configured in the cluster are not present. You cannot use the force flag to force the install process. If any node that is configured to be a member of the cluster is not present, the node must either be deleted from the cluster or be brought online before you can upgrade the software. Furthermore, if a node has been deleted from the cluster such that any I/O group has only one member, the software upgrade also fails. This is because the upgrade process causes a loss of access to data. The force flag can be used to override this restriction if you are prepared to loose access to data during the upgrade.
  - If the software that is installed on the remote cluster is not compatible with the new software or if there is an intercluster communication error that does not allow the software to check that the software is compatible.
- The software upgrade is distributed to all the nodes in the cluster using fibre-channel connections between the nodes.
- Nodes are updated one at a time.
- Nodes will run the new software, concurrently with normal cluster activity.
- While the node is updated, it does not participate in I/O activity in the I/O group. As a result, all I/O activity for the VDisks in the I/O group is directed to the other node in the I/O group by the host multipathing software.
- While the node is updated, the other node in the I/O group notices that its partner node is not participating in the cluster and attempts to flush the writeback cache and set it into write-through mode. This flush is not guaranteed to be successful or to complete and as a result concurrent software update creates a single point of data loss. If the remaining node in an I/O group experiences a failure during a software update of its partner, the only valid copy of dirty data in the writeback cache can be lost.
- There is a 30 minute delay between node updates. The delay allows time for the host multipathing software to rediscover paths to the nodes which have been upgraded, so that there is no loss of access when another node in the I/O group is updated.
- The software update is not committed until all nodes in the cluster have been successfully updated to the new software level. If all nodes successfully restart with the new software level, the new level is committed. When the new level is committed, the cluster vital product data (VPD) is updated to reflect the new software level.
- You cannot invoke the new functions of the upgraded software until all member nodes are upgraded and the update has been committed.
- Because the software upgrade process takes some time, the install command completes as soon as the software level is verified by the cluster. To determine when the upgrade has completed, you must either display the software level in the cluster VPD or look for the Software upgrade complete event in the error/event log. If any node fails to restart with the new software level or fails at any other time during the process, the software level is backed-off.
- During a software upgrade the version number of each node is updated when the software has been installed and the node has been restarted. The cluster software version number is updated when the new software level is committed.
- When the software upgrade starts an entry is made in the error or event log and another entry is made when the upgrade completes or fails.

9. Click **Apply upgrade**. The Applying Software Upgrade panel is displayed. The Applying Software Upgrade panel enables you to select the upgrade and apply it to the cluster. A list of the software levels that you can apply to the cluster is displayed.

When a new software level is applied, it is automatically installed on all the nodes that are in the cluster.

Note: The software upgrade can take up to 30 minutes per node.

Upgrading the SAN Volume Controller software using the CLI

You can use the command-line interface (CLI) to install software upgrades.

Attention: Before you start a software upgrade, you must check for offline or degraded VDisks. An offline VDisk can cause write data that has been modified to be pinned in the SAN Volume Controller cache. This prevents VDisk failover and causes a loss of I/O access during the software upgrade. If the fast_write_state is empty, a VDisk can be offline and not cause errors during the software upgrade.

Perform the following steps to upgrade the software:

1. Download the SAN Volume Controller code from the following Web site:

   http://www.ibm.com/storage/support/2145

   - If you want to write the SAN Volume Controller code to a CD, you must download the CD image.
   - If you do not want to write the SAN Volume Controller code to a CD, you must download the install image.
2. Use PuTTY scp (pscp) to copy the software upgrade files to the node.
3. Ensure that the software upgrade file has been successfully copied.

   Before you begin the software upgrade, you must be aware of the following:

   - The install process fails under the following conditions:
     - All the nodes that are configured in the cluster are not present. You cannot use the force flag to force the install process. If any node that is configured to be a member of the cluster is not present, the node must either be deleted from the cluster or be brought online before you can upgrade the software. Furthermore, if a node has been deleted from the cluster such that any I/O group has only one member, the software upgrade also fails. This is because the upgrade process causes a loss of access to data. The force flag can be used to override this restriction if you are prepared to loose access to data during the upgrade.
     - If the software that is installed on the remote cluster is not compatible with the new software or if there is an intercluster communication error that does not allow the software to check that the software is compatible.
   - The software upgrade is distributed to all the nodes in the cluster using fibre-channel connections between the nodes.
   - Nodes are updated one at a time.
   - Nodes will run the new software, concurrently with normal cluster activity.
   - While the node is updated, it does not participate in I/O activity in the I/O group. As a result, all I/O activity for the VDisks in the I/O group is directed to the other node in the I/O group by the host multipathing software.

- While the node is updated, the other node in the I/O group notices that its partner node is not participating in the cluster and attempts to flush the writeback cache and set it into write-through mode. This flush is not guaranteed to be successful or to complete and as a result concurrent software update creates a single point of data loss. If the remaining node in an I/O group experiences a failure during a software update of its partner, the only valid copy of dirty data in the writeback cache can be lost.
- There is a 30 minute delay between node updates. The delay allows time for the host multipathing software to rediscover paths to the nodes which have been upgraded, so that there is no loss of access when another node in the I/O group is updated.
- The software update is not committed until all nodes in the cluster have been successfully updated to the new software level. If all nodes successfully restart with the new software level, the new level is committed. When the new level is committed, the cluster vital product data (VPD) is updated to reflect the new software level.
- You cannot invoke the new functions of the upgraded software until all member nodes are upgraded and the update has been committed.
- Because the software upgrade process takes some time, the install command completes as soon as the software level is verified by the cluster. To determine when the upgrade has completed, you must either display the software level in the cluster VPD or look for the Software upgrade complete event in the error/event log. If any node fails to restart with the new software level or fails at any other time during the process, the software level is backed-off.
- During a software upgrade the version number of each node is updated when the software has been installed and the node has been restarted. The cluster software version number is updated when the new software level is committed.
- When the software upgrade starts an entry is made in the error or event log and another entry is made when the upgrade completes or fails.

4. Issue the following CLI command to start the software upgrade process:

   ```
   svcservicetask applysoftware -file software_upgrade_file
   ```

   where *software_upgrade_file* is the name of the software upgrade file.

5. Issue the following CLI command to check the status of the software upgrade process:

   ```
   svcinfo lssoftwareupgradestatus
   ```

6. Perform the following steps to verify that the software upgrade successfully completed:
   a. Issue the **svctask dumperrlog** CLI command to send the contents of the error log to a text file.

      The following output is displayed in the text file if the software is successfully upgraded:

      ```
      Upgrade completed successfully
      ```

   b. Issue the **svcinfo lsnodevpd** CLI command for each node that is in the cluster. The software version field displays the new software level.

When a new software level is applied, it is automatically installed on all the nodes that are in the cluster.

Note: The software upgrade can take up to 30 minutes per node.

Performing a disruptive software upgrade using the CLI

You can use the command-line interface (CLI) to perform a disruptive software upgrade.

The SAN Volume Controller only supports concurrent software upgrades. To ensure that a software upgrade is coordinated across all nodes in the cluster, the nodes must be able to communicate with each other across the fibre-channel SAN. However, if this is not possible, you can perform a disruptive software upgrade.

Perform the following steps to complete the disruptive software upgrade process:

1. Stop any host applications and unmount the file systems that use storage that is managed by the SAN Volume Controller. If you are shutting down your hosts, this occurs as the host is shutdown. If you are not shutting down your hosts, you must manually stop host applications and unmount the file systems on each host. This step ensures that the hosts stop issuing I/O operations and that any data in the file system caches is flushed.
2. Issue the **svctask stopcluster** CLI command to shutdown the cluster. This CLI command stops the SAN Volume Controller from issuing I/O to backend controllers and flushes data from the SAN Volume Controller nodes cache.
3. Rezone the switch so that the SAN Volume Controller nodes are in one zone. Ensure that this zone does not include a host HBA or a backend controller (keep the old switch configuration so it can be restored during step 6). This step isolates the SAN Volume Controller from the rest of the SAN.
4. Power on all the SAN Volume Controller nodes and wait for them to reform a cluster.

   Note: Because the SAN Volume Controller has been isolated from the backend storage, errors that indicate the backend storage is unavailable are logged.
5. Perform the software upgrade in the same manner as for a concurrent software upgrade.
6. Restore the original switch configuration.
7. Clear any error logs that were produced in step 4 indicating that backend storage is unavailable. Check that all backend storage is now online and accessible to the SAN Volume Controller nodes.
8. Remount file systems and start host applications.

Performing the node rescue

If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

Similarly, if you have replaced the service controller, you should use the node rescue procedure to ensure that the service controller has the correct software.

Attention: If you recently replaced both the service controller and the disk drive as part of the same repair operation, node rescue fails.

To provide an alternate boot device, a minimal operating system is also available in nonvolatile memory on the service controller. If it is necessary to replace the hard disk drive or the software on the hard disk drive has become corrupted, the node cannot boot and the hardware boot indicator remains on the front panel

display or the boot operation does not progress. If this occurs, use the node rescue procedure to reinstall the SAN Volume Controller software.

Node rescue works by booting the operating system from the service controller and running a program that copies all the SAN Volume Controller software from any other node that can be found on the fibre-channel fabric.

Attention: When running node rescue operations, only run one node rescue operation on the same SAN, at any one time. Wait for one node rescue operation to complete before starting another.

Perform the following steps to complete the node rescue:

1. Ensure that the fibre-channel cables are connected.
2. Ensure that at least one other node is connected to the fibre-channel fabric.
3. Ensure that the SAN zoning allows a connection between at least one port of this node and one port of another node. It is better if multiple ports can connect. This is particularly important if the zoning is by worldwide port name (WWPN) and you are using a new service controller. In this case, you might need to use SAN monitoring tools to determine the WWPNs of the node. If you need to change the zoning, remember to set it back when the service procedure is complete.
4. Turn off the node.
5. Press and hold the left and right buttons on the front panel.
6. Press the power button.
7. Continue to hold the left and right buttons until the node-rescue-request symbol is displayed on the front panel (Figure 62).

Figure 62. Node rescue display

The node rescue request symbol displays on the front panel display until the node starts to boot from the service controller. If the node rescue request symbol displays for more than two minutes, go to the hardware boot MAP to resolve the problem. When the node rescue starts, the service display shows the progress or failure of the node rescue operation.

Note: If the recovered node was part of a cluster, the node is now offline. Delete the offline node from the cluster and then add the node back into the cluster. If node recovery was used to recover a node that failed during a software upgrade process, the automatic software downgrade process starts but might not continue until the failed node is deleted from the cluster. After the failed node is deleted, it is not possible to add the node back into the cluster until the downgrade process has completed. This can take up to four hours for an eight-node cluster.

Related tasks

"Deleting a node from the cluster" on page 77
If it is required, you can delete a node from a cluster.

"Adding a node to a cluster" on page 78
You might have to add a node into the cluster if it has been removed or rejected by a cluster.

Related reference

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

Recovering from software upgrade problems automatically

The cluster automatically stops the software upgrade process if any of the nodes fail to upgrade to the new software level.

In this case, any nodes that have already upgraded to the new software level are downgraded to the original software level. If a node fails to restart during this downgrade process, the process is suspended. The following scenarios can cause the downgrade process to suspend:

- A node (other than the node that is currently upgrading) is offline, restarted or asserted
- A node fails to update to the new software level
- A node is deleted while it is in the process of updating

You must check the error log to determine the reason for the failure before you attempt to upgrade the cluster again.

Recovering from software upgrade problems manually

When a new software level is committed, you might not be able to return to a previous software level because some data structures might have been changed such that they cannot be used with the previous software level. Therefore, if you have any problems, you must install the newest level of the software.

Attention: This procedure causes a loss of *all* data that is currently configured in the cluster. This procedure must only be used as a last resort and should only be done if you have recently backed-up your data.

In extreme conditions where you cannot wait for a software update and you need to return to the previous software level, you can use the following procedure.

Attention: This procedure causes the total loss of the SAN Volume Controller cluster. This procedure must only be used as a last resort.

Perform the following steps to reset from software upgrade problems:

1. Power off all but one of the nodes that are in the cluster.
2. Set the powered-on node to service access mode.
3. Use the service access mode functions to force the download of the older software level.
4. Repeat the action for each of the failed nodes.
5. Use a node with a new software level to create a new cluster.

Chapter 5. Introducing the vital product data

Vital product data (VPD) is information that uniquely defines each element in the SAN Volume Controller.

Prerequisites

The VPD for the SAN Volume Controller is maintained at the cluster level. For each SAN Volume Controller node, the VPD includes the following items:

- Installed software version
- Details of the hardware configuration
- Levels of the hardware
- FRU part numbers
- FRU microcode levels
- Firmware and software component levels
- VPD for the uninterruptible power supply that is powering the node
- Committed software level
- Details of the cluster configuration

You can view the VPD through the SAN Volume Controller graphical user interface or command-line interface. VPD is updated when a cluster is initialized (powered on), a new node is added to the cluster, or a missing node is reconfigured into the cluster.

Related reference

"Understanding the fields for the node VPD" on page 136
The node vital product data (VPD) provides information about the system board, processor, processor cache, fans, memory module, fibre-channel adapter card, SCSI and IDE devices, software, front panel assembly, and the uninterruptible power supply.

"Understanding the fields for the cluster VPD" on page 139
The cluster vital product data (VPD) provides various information about the cluster, including its ID, name, location, IP address, email contact, code level, total free space, and required memory.

Viewing the vital product data

You can view the vital product data for a node from the Viewing Vital Product Data panel.

Perform the following steps to view the vital product data for a node:

1. Click **Work With Nodes** in the portfolio.
2. Click **Nodes** in the portfolio. The Nodes panel is displayed.
3. Click on the node whose details you want to view.
4. Click **Vital Product Data** to view the data.
5. Click **Close** to return to the Viewing Vital Product Data panel.

Viewing cluster properties

You can use the SAN Volume Controller Console to view the properties for a cluster.

This task assumes that you have already launched the SAN Volume Controller Console.

Perform the following steps to view the properties of a cluster:

1. Click **Manage Cluster** → **View Cluster Properties** in the portfolio. The Viewing General Properties panel is displayed.
2. Click the following tabs:
   a. **General** to display the general properties.
   b. **IP Addresses** to view the IP addresses that are used by the cluster.
   c. **Space** to view the space and capacity for managed disks (MDisks), MDisk groups and virtual disks (VDisks).
   d. **SNMP** to view the SNMP details.
   e. **Statistics** to view the cluster statistics details.
   f. **Metro Mirror and Global Mirror** to view the Metro Mirror or Global Mirror properties of the cluster.
3. Click **Close** to close the panel.

Displaying the vital product data using the CLI

You can use the command-line interface (CLI) to display the SAN Volume Controller cluster or node vital product data (VPD).

Issue the following CLI commands to display the VPD:

```
svcinfo lsnodevpd nodename
svcinfo lscluster clustername
```

Note: If you use the SAN Volume Controller 2145-8F4, the output generated from issuing the `svcinfo lsnodevpd nodename` command contains "N/A" for the `device_serial_number` field.

For more information about the commands, see the *IBM System Storage SAN Volume Controller: Command-Line Interface User's Guide*.

Related tasks

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

Displaying node properties using the CLI

You can use the command-line interface (CLI) to display node properties.

Perform the following steps to display the node properties:

1. Issue the **svcinfo lsnode** CLI command to display a concise list of nodes in the cluster.

   The following is an example of the CLI command you can issue to list the nodes in the cluster:

   ```
   svcinfo lsnode -delim :
   ```

   The following is an example of the output that is displayed:

```
id:name:UPS_serial_number:WWNN:status:IO_group_id:
 IO_group_name:config_node:UPS_unique_id:hardware
1:group1node1:10L3ASH:500507680100002C:online:0:io_grp0:yes:202378101C0D18D8:8G4
2:group1node2:10L3ANF:5005076801000009:online:0:io_grp0:no:202378101C0D1796:8G4
3:group2node1:10L3ASH:5005076801000001:online:1:io_grp1:no:202378101C0D18D8:8G4
4:group2node2:10L3ANF:50050768010000F4:online:1:io_grp1:no:202378101C0D1796:8G4
```

2. Issue the **svcinfo lsnode** CLI command and specify the node ID or name of the node that you want to receive detailed output.

   The following is an example of the CLI command you can issue to list detailed output for a node in the cluster:

   ```
   svcinfo lsnode -delim : group1_node1
   ```

   Where *group1_node1* is the name of the node for which you want to view detailed output.

   The following is an example of the output that is displayed:

```
id:1
name:group1node1
UPS_serial_number:10L3ASH
WWNN:500507680100002C
status:online
IO_group_id:0
IO_group_name:io_grp0
partner_node_id:2
partner_node_name:group1node2
config_node:yes
UPS_unique_id:202378101C0D18D8
port_id:500507680110002C
port_status:active
port_speed:2GB
port_id:500507680120002C
port_status:active
port_speed:2GB
port_id:500507680130002C
port_status:active
port_speed:2GB
port_id:500507680140003C
port_status:active
port_speed:2GB
hardware:8G4
```

Displaying cluster properties using the CLI

You can use the command-line interface (CLI) to display the properties for a cluster.

Perform the following step to display cluster properties:

Issue the **svcinfo lscluster** command to display the properties for a cluster.

The following is an example of the command you can issue:

```
svcinfo lscluster -delim : ITSOSVC42A
```

where *ITSOSVC42A* is the name of the cluster.

```
IBM_2145:ITSOSVC42A:admin>svcinfo lscluster -delim : ITSOSVC42A
id:0000020060806FB8
name:ITSOSVC42A
location:local
partnership:
bandwidth:
cluster_IP_address:9.71.50.32
cluster_service_IP_address:9.71.50.183
total_mdisk_capacity:2976.9GB
space_in_mdisk_grps::2976.9GB
space_allocated to vdisks:147.2GB
total_free_space:2828.7GB
statistics_status:on
statistics_frequency:15
required_memory:8192
cluster_locale:en_US
SNMP_setting:none
SNMP_community:
SNMP_server_IP_address:[0.0.0.0]:23
subnet_mask:255.255.254.0
default_gateway:9.71.50.1
time_zone:522 UTC
email_setting:none
email_id:
code_level:4.1.0.12 (build 5.13.0610240000)
FC_port_speed:2Gb
console_IP:9.71.49.176:9080
id_alias:0000020064C05308
gm_link_tolerance:300
gm_inter_cluster_delay_simulation:0
gm_intra_cluster_delay_simulation:0
email_server:8.53.26.131
email_server_port:25
email_reply:manager@mycompany.com
email_contact:manager
email_contact_primary:01202 123456
email_contact_alternate:44-212-786543-4455
email_contact_location:city
email_state:running
email_user_count:2
inventory_mail_interval:0
cluster_IP_address_6:
cluster_service_IP_address_6:
prefix_6:
default_gateway_6:
total_vdiskcopy_capacity:40.00GB
total_used_capacity:22.50GB
total_overallocation:1.25GB
total_vdisk_capacity:30.00GB
```

Understanding the fields for the node VPD

The node vital product data (VPD) provides information about the system board, processor, processor cache, fans, memory module, fibre-channel adapter card, SCSI and IDE devices, software, front panel assembly, and the uninterruptible power supply.

Table 7 shows the fields you see for the system board.

Table 7. Fields for the system board

Item	Field name
System board	Part number
	System serial number
	Number of processors
	Number of memory slots
	Number of fans
	Number of fibre-channel cards
	Number of SCSI or IDE devices **Note:** The service controller is a device.
	BIOS manufacturer
	BIOS version
	BIOS release date
	System manufacturer
	System product
	Planar manufacturer
	Power supply part number
	CMOS battery part number
	Power cable assembly part number
	Service processor FW

Table 8 shows the fields you see for each processor that is installed.

Table 8. Fields for the processors

Item	Field name
Processor	Part number
	Processor location
	Number of caches
	Manufacturer
	Version
	Speed
	Status

Table 9 shows the fields that are repeated for each cache installed on each processor.

Table 9. Fields that are repeated for cache installed on each processor

Item	Field name
Processor cache	Type of cache
	Size of cache (KB)

Table 10 shows the fields that you see for each fan that is installed.

Table 10. Fields for the fans

Item	Field name
Fan	Part number
	Location

Table 11 shows the fields that are repeated for each installed memory module.

Table 11. Fields that are repeated for each installed memory module

Item	Field name
Memory module	Part number
	Device location
	Bank location
	Size (MB)

Table 12 shows the fields that are repeated for each installed fibre-channel adapter card.

Table 12. Fields that are repeated for each fibre-channel adapter card that is installed

Item	Field name
Fibre-adapter card	Part number
	Port numbers
	Device serial number
	Manufacturer
	Device

Table 13 shows the fields that are repeated for each SCSI and IDE device that is installed.

Table 13. Fields that are repeated for each SCSI and IDE device that is installed

Item	Field name
Device	Part number
	Bus
	Device
	Device vendor **Note:** Not provided for the service controller.
	Model
	Revision
	Serial number
	Approximate capacity

Table 14 shows the fields that are specific to the node software.

Table 14. Fields that are specific to the node software

Item	Field name
Software	Code level
	Node name
	Ethernet status
	Worldwide Node Name
	ID
	MAC address

Table 15 shows the fields that are provided for the front panel.

Table 15. Fields that are provided for the front panel

Item	Field name
Front panel	Part number
	Front panel ID
	Front panel locale

Table 16 shows the fields that are provided for the uninterruptible power supply assembly that is powering the node.

Table 16. Fields that are provided for the uninterruptible power supply assembly that is powering the node

Item	Field name
Uninterruptible power supply	Electronics assembly part number
	Battery part number
	UPS assembly part number
	Input power cable part number
	UPS serial number
	UPS type
	UPS internal part number
	UPS unique ID
	UPS main firmware
	UPS communications firmware

Related reference

"Understanding the fields for the cluster VPD"
The cluster vital product data (VPD) provides various information about the cluster, including its ID, name, location, IP address, email contact, code level, total free space, and required memory.

Understanding the fields for the cluster VPD

The cluster vital product data (VPD) provides various information about the cluster, including its ID, name, location, IP address, email contact, code level, total free space, and required memory.

Table 17 shows the fields that are provided for the cluster.

Table 17. Fields that are provided for the cluster

Item	Field name
Cluster	ID **Note:** This is the unique identifier for the cluster.
	Name
	Location
	Partnership
	Bandwidth
	Cluster IP address
	Cluster service IP address
	Total mdisk capacity
	Space in mdisk_grps
	Space allocated to VDisks
	Total free space
	Statistics status
	Statistics frequency
	Required memory
	Cluster locale
	SNMP setting
	SNMP community
	SNMP service IP address
	Subnet mask
	Default gateway
	Time zone
	Email Setting **Note:** This field is no longer used and will always be blank.
	Email ID **Note:** This field is no longer used and will always be blank.
	Code level
	Fibre-channel port speed **Note:** This field represents the speed at which nodes in the cluster that are not capable of speed negotiation will run. A SAN Volume Controller 2145-8G4 or SAN Volume Controller 2145-8F4 node that is capable of speed negotiation will not necessarily run at the speed value that is indicated in this field.
	Console IP
	ID Alias
	Global Mirror link tolerance
	Global Mirror intercluster delay simulation
	Global Mirror intracluster delay simulation
	Email server

Table 17. Fields that are provided for the cluster (continued)

Item	Field name
	Email server port
	Email reply
	Email contact
	Email contact primary
	Email contact alternate
	Email contact location
	Email state
	Email user count
	Inventory mail interval
	Cluster IP address 6
	Cluster service IP address 6
	Prefix 6
	Default gateway 6

Related reference

"Understanding the fields for the node VPD" on page 136
The node vital product data (VPD) provides information about the system board, processor, processor cache, fans, memory module, fibre-channel adapter card, SCSI and IDE devices, software, front panel assembly, and the uninterruptible power supply.

Chapter 6. Using the front panel of the SAN Volume Controller

The front panel of the SAN Volume Controller has a display, various LEDs, navigation buttons, and a select button that are used when servicing your SAN Volume Controller node.

Figure 63 shows where the front panel display is located on the SAN Volume Controller 2145-8G4 node.

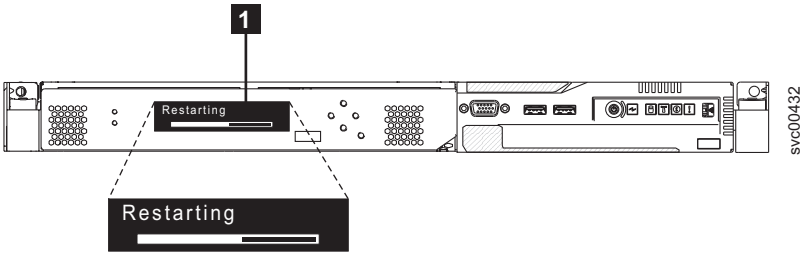


Figure 63. SAN Volume Controller 2145-8G4 front panel display

Related reference

"SAN Volume Controller front panel controls and indicators" on page 7
The controls and indicators are used for power and navigation and to indicate information, such as system activity, service and configuration options, service controller failures, and node identification.

"Front panel display" on page 9
The front panel display shows service, configuration, and navigation information.

Boot progress indicator

Boot progress is displayed on the front panel of the SAN Volume Controller.

The Boot progress display on the front panel shows that the node is starting.

During the boot operation, boot progress codes are displayed and the progress bar moves to the right while the boot operation proceeds.

Boot failed

If the boot operation fails, a boot code is displayed.

See the topic that contains the boot codes in the *IBM System Storage SAN Volume Controller: Service Guide* where you can find a description of the failure and the appropriate steps that you must perform to correct the failure.

Related information

"Understanding the boot codes" on page 202
The boot codes are displayed on the screen when a node is booting.

Charging

The front panel indicates that the uninterruptible power supply battery is charging.

A node will not start and join a cluster if there is insufficient power in the uninterruptible power supply battery to manage with a power failure. `Charging` is displayed until it is safe to start the node. This might take up to two hours.

Error codes

Error codes are displayed on the front panel display.

Figure 64 and Figure 65 show how error codes are displayed on the front panel.

Figure 64. Cluster error display

Figure 65. Node error display

For descriptions of the error codes that are displayed on the front panel display, see the various error code topics for a full description of the failure and the actions that you must perform to correct the failure.

Related reference

"Understanding the cluster recovery codes" on page 248
Cluster recovery codes indicate that a critical software error has occurred that might corrupt your cluster.

Related information

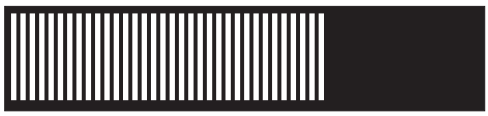
"Understanding the node error codes" on page 232
Node error codes are displayed on the display screen by node software.

"Understanding the create cluster error codes" on page 247
Cluster Create error codes are displayed on the menu screen when you are using the front panel to create a new cluster, but the create operation fails.

"Understanding cluster error codes" on page 248
Every cluster error code includes an error code number, a description, action, and possible field replaceable units (FRUs).

Hardware boot

The hardware boot display shows system data when power is first applied to the node as the node searches for a disk drive to boot.



If this display remains active for longer than 3 minutes, there might be a problem. The cause might be a hardware failure or the software on the hard disk drive might be missing or damaged.

Related tasks

"Determining a hardware boot failure" on page 202
If you see that the hardware boot display stays on the front panel for more than three minutes, the node cannot boot. The cause might be a hardware failure or the software on the hard disk drive is missing or damaged.

Node rescue request

If software is lost, you can use the node rescue process to copy all software from another node.

The node-rescue-request display, which is shown in Figure 66, indicates that a request has been made to replace the software on this node. The SAN Volume Controller software is preinstalled on all SAN Volume Controller nodes. This software includes the operating system, the application software, and the SAN Volume Controller publications. It is normally not necessary to replace the software on a node, but if the software is lost for some reason (for example, the hard disk drive in the node fails), it is possible to copy all the software from another node that is connected to the same fibre-channel fabric. This process is known as *node rescue*.

Figure 66. Node rescue display

Power failure

The SAN Volume Controller node uses battery power from the uninterruptible power supply to shut itself down.

The Power failure display shows that the SAN Volume Controller is running on battery power because main power has been lost. All I/O operations have stopped. The node is saving cluster metadata and node cache data to the internal disk drive. When the progress bar reaches zero, the node powers off.

Note: When input power is restored to the uninterruptible power supply, the SAN Volume Controller turns on without the front panel power button being pressed.

Powering off

The progress bar on the display shows the progress of the power-off operation.

`Powering Off` is displayed after the power button has been pressed and while the node is powering off. Powering off might take several minutes.

The progress bar moves to the left when the power is removed.

Recovering

The front panel indicates that the uninterruptible power supply battery is not fully charged.

When a node is active in a cluster but the uninterruptible power supply battery is not fully charged, `Recovering` is displayed. If the power fails while this message is displayed, the node does not restart until the uninterruptible power supply has charged to a level where it can sustain a second power failure.

Restarting

The front panel indicates when the software on a node is restarting.

The software is restarting for one of the following reasons:

- An internal error was detected.
- The power button was pressed again while the node was powering off.

If you press the power button while powering off, the panel display changes to indicate that the button press was detected; however, the power off continues until the node finishes saving its data. After the data is saved, the node powers off and then automatically restarts. The progress bar moves to the right while the node is restarting.

Shutting down

The front panel indicator tracks shutdown operations.

The Shutting down display is shown when you issue a shutdown command to a SAN Volume Controller cluster or a SAN Volume Controller node. The progress bar continues to move to the left until it is safe to be powered off.

When the shutdown operation is complete, all power is removed from the node. When power is removed from the last node that is connected to a 2145 uninterruptible power supply, the 2145 uninterruptible power supply also shuts down. When a node that is connected to a 2145-1U uninterruptible power supply is shut down, the 2145-1U uninterruptible power supply remains in the normal mode.

Validate WWNN?

The front panel prompts you to validate the WWNN when the worldwide node name (WWNN) that is stored in the service controller (the panel WWNN) does not match the WWNN that is backed up on the SAN Volume Controller disk (the disk WWNN).

Typically, this panel is displayed when the service controller has been replaced. The SAN Volume Controller uses the WWNN that is stored on the service controller. Usually, when the service controller is replaced, you modify the WWNN that is stored on it to match the WWNN on the service controller that it replaced. By doing this, the node maintains its WWNN address, and you do not need to modify the SAN zoning or host configurations. The WWNN that is stored on disk is the same that was stored on the old service controller.

After it is in this mode, the front panel display will not revert to its normal displays, such as node or cluster options or operational status, until the WWNN is validated. Navigate the Validate WWNN option (shown in Figure 67 on page 148) to choose which WWNN that you want to use.

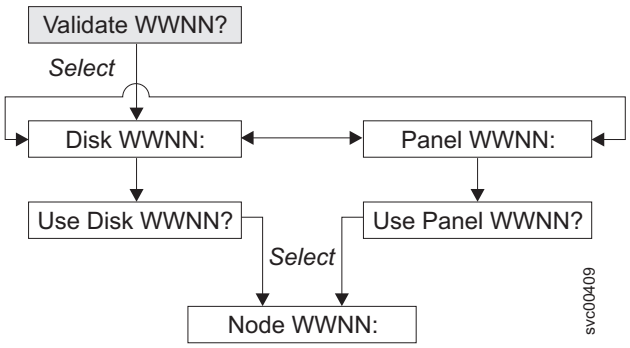


Figure 67. Validate WWNN? navigation

To choose which stored WWNN that you want this node to use, perform the following steps:

1. From the Validate WWNN? panel, press and release the select button. The Disk WWNN: panel is displayed and shows the last five digits of the WWNN that is stored on the disk.
2. To view the WWNN that is stored on the service controller, press and release the right button. The Panel WWNN: panel is displayed and shows the last five numbers of the WWNN that is stored on the service controller.
3. Determine which WWNN that you want to use.
   a. To use the WWNN that is stored on the disk, perform the following steps:
      1) From the Disk WWNN: panel, press and release the down button. The Use Disk WWNN? panel is displayed.
      2) Press and release the select button.
   b. To use the WWNN that is stored on the service controller, perform the following steps:
      1) From the Panel WWNN: panel, press and release the down button. The Use Panel WWNN? panel is displayed.
      2) Press and release the select button.

The node is now using the selected WWNN. The Node WWNN: panel is displayed and shows the last five numbers of the WWNN that you selected.

If neither WWNN that is stored on the service controller panel or on the disk is suitable, select either WWNN choice and then use the edit WWNN option that is available from the Node WWNN: panel to change the WWNN to the correct value.

SAN Volume Controller menu options

During normal operations, menu options are available on the front panel display of the SAN Volume Controller node.

Menu options enable you to review the operational status of the cluster, node, and external interfaces. They also provide access to the tools that you need to install and to service the node.

Figure 68 on page 149 shows the sequence of the menu options. Only one option at a time is displayed on the front panel display. For some options, additional data is displayed on line 2. The first option that is displayed is the cluster option.

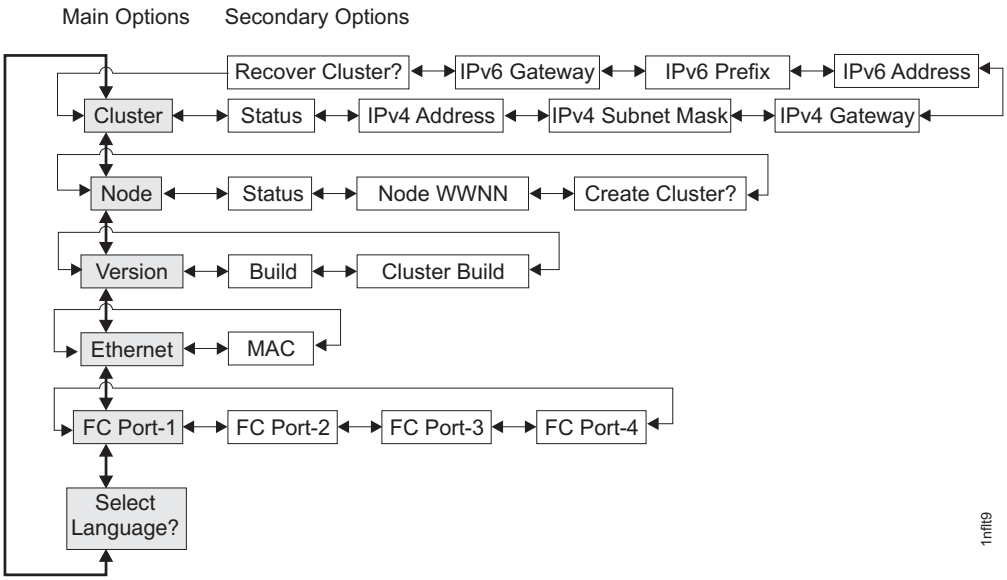


Figure 68. SAN Volume Controller options on the front panel display

Use the left and right buttons to navigate through the secondary fields that are associated with some of the main fields.

Note: Messages might not display fully on the screen. You might see a right angle bracket (>) on the right-hand side of the display screen. If you see a right angle bracket, press the right button to scroll through the display. When there is no more text to display, you can move to the next item in the menu by pressing the right button.

Similarly, you might see a left angle bracket (<) on the left-hand side of the display screen. If you see a left angle bracket, press the left button to scroll through the display. When there is no more text to display, you can move to the previous item in the menu by pressing the left button.

The following main options are available:

- Cluster
- Node
- Version
- Ethernet
- FC port: 1 - 4
- Select language?

Related concepts

"Cluster options" on page 150
The main cluster option from the menu can display the cluster name or can be blank.

"Node options" on page 154
The node option displays the identification number or name of the SAN Volume Controller node.

"Ethernet option" on page 162
The Ethernet option displays the operational states of the Ethernet port and its media access control (MAC) address.

“Fibre-channel port-1 through 4 option” on page 162
The fibre-channel port-1 through 4 options display the operational status of the fibre-channel ports.

Related tasks

“Select language? option” on page 162
You can change the language that displays on the front panel.

Related reference

“Create Cluster?” on page 155
You can create a cluster from the Create Cluster? menu. You also have the option to delete the node from the cluster if the node that is selected is in a cluster.

Cluster options

The main cluster option from the menu can display the cluster name or can be blank.

The main cluster option displays the cluster name that the user has assigned. If a cluster is in the process of being created on the node, and no cluster name has been assigned, a temporary name that is based on the IP address of the cluster is displayed. If this SAN Volume Controller node is not assigned to a cluster, the field is blank.

Related concepts

“Displaying and editing an IPv6 address” on page 152
After you have set the IPv6 address, you can display the IPv6 address and the IPv6 gateway address. You can also set the IPv6 address for a cluster that you are going to create.

Related reference

“Recover cluster navigation” on page 153
The Recover cluster? option is useful if the administrator password has been lost or forgotten.

Status

Status is indicated on the front panel.

This field is blank if this SAN Volume Controller node is not a member of a cluster. If this SAN Volume Controller node is a member of a cluster, the field indicates the operational status of the cluster, as follows:

Active
Indicates that this SAN Volume Controller node is an active member of the cluster.

Inactive
Indicates that the SAN Volume Controller node is a member of a cluster, but is not now operational. It is not operational because the other SAN Volume Controller nodes that are in the cluster cannot be accessed or because this SAN Volume Controller node was excluded from the cluster.

Degraded
Indicates that the cluster is operational, but one or more of the member SAN Volume Controller nodes are missing or have failed.

IPv4 Address

A cluster must have either an IPv4 or an IPv6 address that is assigned, or it can have both. If it is assigned, you can use the IPv4 address to access the cluster from the command-line tools or the SAN Volume Controller Console.

This field contains the existing IPv4 address of the cluster. If this SAN Volume Controller node is not a member of a cluster or an IPv4 address has not been assigned, this field is blank.

IPv4 Subnet

The IPv4 subnet mask address is set when an IPv4 address is assigned to the cluster.

The IPv4 subnet option displays the subnet mask address when the cluster has an IPv4 address. If this SAN Volume Controller node is not a member of a cluster or if an IPv4 addresss has not been assigned, this field is blank.

Related concepts

"IPv4 Gateway"
The IPv4 gateway address is set when the cluster is created.

IPv4 Gateway

The IPv4 gateway address is set when the cluster is created.

The IPv4 gateway option displays the gateway address for the cluster. If this SAN Volume Controller node is not a member of a cluster, or if an IPv4 address has not been assigned, this field is blank.

Related concepts

"IPv4 Subnet"
The IPv4 subnet mask address is set when an IPv4 address is assigned to the cluster.

IPv6 Address

You can use the IPv6 address to access the cluster from the command line tools or the SAN Volume Controller Console.

This option displays the existing IPv6 address of the cluster. If this SAN Volume Controller node is not a member of a cluster, or if an IPv6 address has not been assigned, this field is blank.

Related concepts

"Displaying and editing an IPv6 address" on page 152
After you have set the IPv6 address, you can display the IPv6 address and the IPv6 gateway address. You can also set the IPv6 address for a cluster that you are going to create.

IPv6 Prefix

The IPv6 prefix is set when a cluster is created.

The IPv6 prefix option displays the network prefix of the cluster and the service IPv6 addresses. The prefix has a value of 0 - 127. If this SAN Volume Controller node is not a member of a cluster, or if an IPv6 address has not been assigned, a blank line displays.

IPv6 Gateway

The IPv6 gateway address is set when the cluster is created.

This option displays the IPv6 gateway address for the cluster. If this SAN Volume Controller node is not a member of a cluster, or if an IPv6 address has not been assigned, a blank line displays.

Related concepts

"Displaying and editing an IPv6 address"
After you have set the IPv6 address, you can display the IPv6 address and the IPv6 gateway address. You can also set the IPv6 address for a cluster that you are going to create.

Displaying and editing an IPv6 address

After you have set the IPv6 address, you can display the IPv6 address and the IPv6 gateway address. You can also set the IPv6 address for a cluster that you are going to create.

The IPv6 address and the IPv6 gateway address each consist of eight (4-digit) hexadecimal values that are shown across four panels, as shown in Figure 69. Each panel displays two 4-digit values that are separated by a colon, the address field position (such as 2/4) within the total address, and scroll indicators. Move between the address panels by using the left or right button.

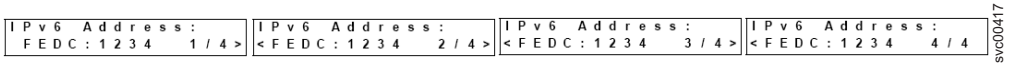


Figure 69. Viewing the IPv6 Address on the front panel display

You can display or edit the IPv6 Address or IPv6 Gateway address when you are creating a cluster from the Create Cluster? menu. You can also edit an IPv6 address within service mode.

Perform the following steps to edit an IPv6 address:

1. When the panel is in edit mode, the full address is still shown across four panels as eight (4-digit) hexadecimal values. You edit each digit of the hexadecimal values independently. The current digit is highlighted.
2. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value.
3. Press the right or left buttons to move to the number field that you want to set.
4. Repeat steps 3 and 4 for each number field that you want to set.
5. Press the select button to complete the change or press the right button to display the next secondary option or press the left button to display the previous options.

Related concepts

"IPv6 Address" on page 151
You can use the IPv6 address to access the cluster from the command line tools or the SAN Volume Controller Console.

"IPv6 Gateway" on page 151
The IPv6 gateway address is set when the cluster is created.

Related reference

"Create Cluster?" on page 155
You can create a cluster from the Create Cluster? menu. You also have the option to delete the node from the cluster if the node that is selected is in a cluster.

Recover cluster navigation

The Recover cluster? option is useful if the administrator password has been lost or forgotten.

Use the recover cluster option (shown in Figure 70) if the user has lost the administrator password or if the user is unable to access the cluster. If it is permitted by the user's password security policy, use this selection to reset the administrator password. Alternatively, use this selection to enter the node into service mode. This makes the node available through the service IP address.

Select **SERVICE MODE** by pressing the select button after you access the Recover Cluster? menu.

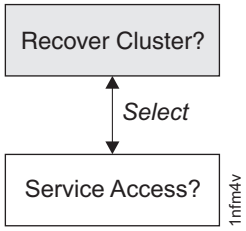


Figure 70. Recover Cluster? navigation

Resetting the password

To reset the administrator password on the cluster, complete the following steps from the Service Access? menu:

1. Press and hold the up button.
2. Press and release the select button.
3. Release the up button.

If your password security policy permits password recovery and if the node is currently a member of a cluster, the administrator password is reset and a new password is displayed for 60 seconds. If your password security policy does not permit password recovery or the node is not a member of a cluster, completing these steps has no effect.

Entering service mode

Enter service mode only if directed to do so by the IBM Support Center.

This function is capable of degrading the operation of a working cluster. Use it only to recover from a problem that is making the cluster inaccessible.

All SAN Volume Controller nodes in the cluster share the same Service IP address. Set only one SAN Volume Controller at a time on the LAN in service mode. Setting more than one SAN Volume Controller in service mode might result in a LAN failure.

Important: Your cluster can use a fixed address for its service mode IP address. If you do use a fixed address for your service mode IP address, only one node at a time can be in service mode.

To enter service mode, complete the following steps from the Service Access? menu:

1. Press and hold the down button.
2. Press and release the select button.
3. Release the down button.

The node restarts and service mode is enabled. SERVICE MODE is displayed on screen. The left or right buttons can be used to display the current service IP address. The node can be accessed using this address. The SERVICE MODE menu continues to be displayed on the front panel until service mode is reset by a command sent to the service IP address, or until the power to the node is turned off and on.

Note: If you are using the service mode, you need only do this on one node at a time. Be sure to disable service mode before continuing on to other nodes.

Related tasks

Chapter 3, "Using the SAN Volume Controller Console and CLI," on page 69
The SAN Volume Controller Console is a Web-browser based GUI and an SMI-S compliant CIM Agent that is based on the Open Pegasus CIM Server. The SAN Volume Controller command-line interface (CLI) is a collection of commands that you can use to manage SAN Volume Controller clusters.

Related reference

"Service mode" on page 163
While in service mode, you can use the front panel to view or change a service IPv4 or an IPv6 address. You can also view the version and build level of the SAN Volume Controller software that is installed and active on the node.

Node options

The node option displays the identification number or name of the SAN Volume Controller node.

The main node option displays the identification number of the SAN Volume Controller or the name of the SAN Volume Controller node if the user has assigned a name.

Related concepts

"Hardware boot" on page 145
The hardware boot display shows system data when power is first applied to the node as the node searches for a disk drive to boot.

Related reference

"Node identification label" on page 14
The node identification label on the front panel displays a six-digit node identification number. Sometimes this number is called panel name or front panel id.

"Cluster addressing" on page 2
Each SAN Volume Controller cluster has an IP address. You can use this address to access the cluster either through the SAN Volume Controller graphical user interface or the command-line interface.

Status

The node status is indicated on the front panel. The status can be one of the following states:

Active The SAN Volume Controller node is operational and assigned to a cluster. It has access to the fibre-channel fabric.

Inactive
The SAN Volume Controller node is operational and assigned to a cluster. It has no access to the fibre-channel fabric.

Free The SAN Volume Controller node is operational, but has not been assigned to any cluster. It has access to the fibre-channel fabric.

Disconnected
The SAN Volume Controller node is operational, but has not been assigned to any cluster. It has no access to the fibre-channel fabric.

Failed The SAN Volume Controller node is not operational. A hardware fault is preventing the SAN Volume Controller from being part of a cluster.

Node WWNN

The node WWNN (worldwide node name) option displays the last five hexadecimal digits of the WWNN that is being used by the SAN Volume Controller node. Only the last five digits of a WWNN vary on a SAN Volume Controller node. The first 11 digits are always `50050768010`.

To edit the WWNN, complete the following steps:

Important: Only change the WWNN when you are instructed to do so by a service procedure. Nodes must always have a unique WWNN. If you change the WWNN, you might have to reconfigure hosts and the SAN zoning.

1. Press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display shows the last five numbers of the WWNN that is currently set. The first number is highlighted.
2. Edit the highlighted number to match the number that is required. Use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
3. When the highlighted value matches the required number, press and release the select button to activate the change. The Node WWNN: panel displays and the second line shows the last five characters of the changed WWNN.

Create Cluster?

You can create a cluster from the Create Cluster? menu. You also have the option to delete the node from the cluster if the node that is selected is in a cluster.

The Create Cluster? option allows you to create a new SAN Volume Controller cluster. Press the select button on the Create cluster? menu to start creating a cluster. Figure 71 on page 156 shows the sequence of the create cluster menu options.

You can set either the IPv4 or the IPv6 address from the front panel when you create the cluster, but you can only set one. If required, you can set the other address from the SAN Volume Controller Console or the CLI.

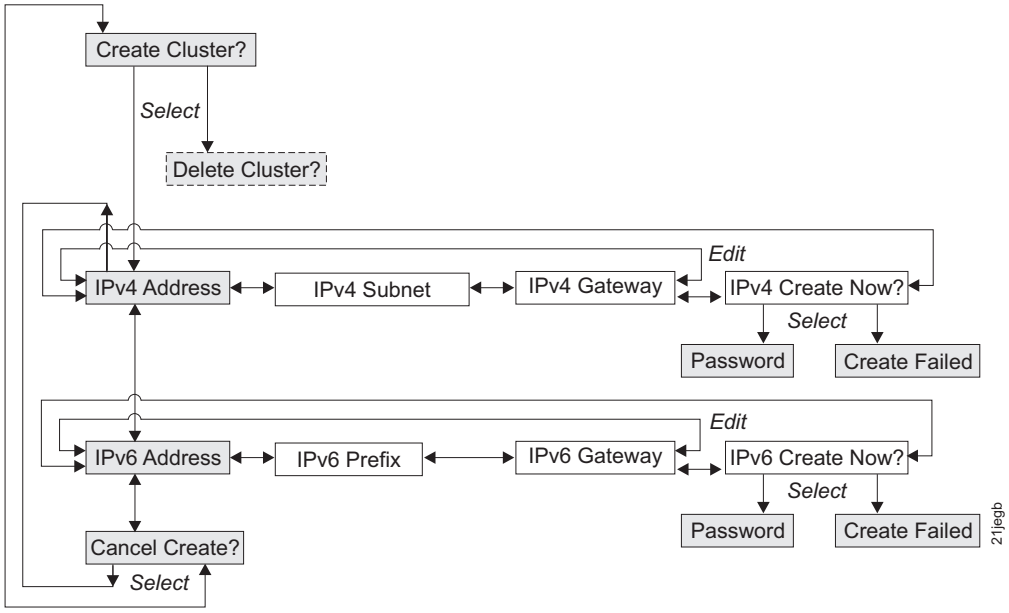


Figure 71. Create Cluster? navigation

Press the up and down buttons to navigate through the secondary options that are associated with the Create Cluster? option. When you have navigated to the desired option, press the select button.

The secondary options that are available include:

- IPv4 Address
- IPv6 Address
- Cancel Create?

If you are creating the cluster with an IPv4 address, complete the following steps:

1. Press and release the up or down button until `Node:` is displayed
2. Press and release the left or right button until `Create Cluster?` is displayed.
3. Press and release the select button. The IPv4 Address panel is displayed.
4. Put the panel into edit mode by pressing and releasing the select button.
5. Edit the IPv4 address, the IPv4 subnet, and the IPv4 gateway.
6. Press and release the select button to put the data in view rather than edit mode.
7. Use the right button to navigate to the IPv4 Create Now? panel.
8. Press and release the select button to confirm.

If you are creating the cluster with an IPv6 address, complete the following steps:

1. Press and release the up or down button until `Node:` is displayed
2. Press and release the left or right button until `Create Cluster?` is displayed.
3. Press and release the select button and then press the down button. The IPv6 Address panel is displayed.
4. Put the panel into edit mode by pressing and releasing the select button.
5. Edit the IPv6 address, the IPv6 prefix, and the IPv6 gateway.
6. Press and release the select button to put the data in view rather than edit mode.

7. Use the right button to navigate to the IPv6 Create Now? panel.
8. Press and release the select button to confirm.

IPv4 Address

The IPv4 address lets you set the IP address for the cluster that you are going to create. The cluster can have either an IPv4 or an IPv6 address, or both at the same time. You can set either the IPv4 or IPv6 address from the front panel when you are creating the cluster. If required, you can set the other IP address (IPv4 or IPv6) from the command line interface. Be sure to verify the correct IP address with the customer before you create a cluster.

Attention: If you set the IPv4 address, ensure that you type the correct address. Otherwise, you cannot access the cluster using the command-line tools or a Web browser.

Perform the following steps to set the IPv4 address:

1. Navigate to the IPv4 Address panel.
2. Press the select button. The first IP address number is highlighted.
3. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value. If you want to quickly increase the highlighted value, hold the up button. If you want to quickly decrease the highlighted value, hold the down button.

   Note: If you want to disable the fast increase/decrease function, press and hold the down button, press and release the select button, and then release the down button. The disabling of the fast increase/decrease function lasts until cluster creation is completed or until the feature is again enabled. If the up or down buttons are pressed and held while the function is disabled, the value increases or decreases once every two seconds. To again enable the fast increase/decrease function, press and hold the up button, press and release the select button, and then release the up button.
4. Press the right or left buttons to move to the number field that you want to set.
5. Repeat steps 3 and 4 for each number field that you want to set.
6. Press the select button to confirm the settings. Otherwise, press the right button to display the next secondary option or press the left button to display the previous options.

Press the right button to display the next secondary option or press the left button to display the previous options.

IPv4 Subnet

This option lets you set the IPv4 subnet mask.

Attention: If you set the IPv4 subnet mask address, ensure that you type the correct address. Otherwise, you cannot access the cluster using the command line tools or a Web browser.

Perform the following steps to set the subnet mask:

1. Navigate to the IPv4 Subnet panel.
2. Press the select button. The first subnet mask number is highlighted.

3. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value. If you want to quickly increase the highlighted value, hold the up button. If you want to quickly decrease the highlighted value, hold the down button.

   Note: If you want to disable the fast increase/decrease function, press and hold the down button, press and release the select button, and then release the down button. The disabling of the fast increase/decrease function lasts until cluster creation is completed or until the feature is again enabled. If the up or down buttons are pressed and held while the function is disabled, the value increases or decreases once every two seconds. To again enable the fast increase/decrease function, press and hold the up button, press and release the select button, and then release the up button.
4. Press the right or left buttons to move to the number field that you want to set.
5. Repeat steps 3 and 4 for each number field that you want to set.
6. Press the select button to confirm the settings. Otherwise, press the right button to display the next secondary option or press the left button to display the previous options.

IPv4 Gateway

This option lets you set the IPv4 gateway address.

Attention: If you set the IPv4 gateway address, ensure that you type the correct address. Otherwise, you cannot access the cluster from the Web interface or from a command line.

Perform the following steps to set the IPv4 gateway address:

1. Navigate to the IPv4 Gateway panel.
2. Press the select button. The first gateway address number field is highlighted.
3. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value. If you want to quickly increase the highlighted value, hold the up button. If you want to quickly decrease the highlighted value, hold the down button.

   Note: If you want to disable the fast increase/decrease function, press and hold the down button, press and release the select button, and then release the down button. The disabling of the fast increase/decrease function lasts until cluster creation is completed or until the feature is again enabled. If the up or down buttons are pressed and held while the function is disabled, the value increases or decreases once every two seconds. To again enable the fast increase/decrease function, press and hold the up button, press and release the select button, and then release the up button.
4. Press the right or left buttons to move to the number field that you want to set.
5. Repeat steps 3 and 4 for each number field that you want to set.
6. Press the select button to confirm the settings. Otherwise, press the right button to display the next secondary option or press the left button to display the previous options.

IPv4 Create Now?

This option lets you start an operation to create a cluster with an IPv4 address.

1. Navigate to the IPv4Create Now? panel.
2. Press the select button to start the operation.

   If the create operation is successful, `Password` is displayed on line 1. The password that you can use to access the cluster is displayed on line 2. Be sure to immediately record the password; it is required on the first attempt to manage the cluster from the SAN Volume Controller Console.

   Attention: The password displays for only 60 seconds, or until a front panel button is pressed. The cluster is created only after the password display is cleared.

   If the create operation fails, `Create Failed:` is displayed on line 1 of the service display screen. Line 2 displays one of two possible error codes that you can use to isolate the cause of the failure.

IPv6 Address

This option lets you set the IPv6 address for the cluster that you are going to create. The cluster can have either an IPv4 or an IPv6 address, or both at the same time. You can set either the IPv4 or IPv6 address from the front panel when you are creating the cluster. If required, you can set the other IP address (IPv4 or IPv6) from the command line interface. Be sure to verify the correct IPv6 address with the customer before you create a cluster.

Attention: If you set the IPv6 address, ensure that you type the correct address. Otherwise, you cannot access the cluster using the command-line tools or the SAN Volume Controller Console.

Perform the following steps to set the IPv6 address:

1. From the Create Cluster? option, press the select button, and then press the down button. The IPv6 Address option is displayed.
2. Press the select button again. The first IPv6 address number is highlighted. .
3. Move between the address panels by using the left or right button. The IPv6 address and the IPv6 gateway address each consist of eight (4-digit) hexadecimal values that are shown across four panels
4. You can change each number in the address independently. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value.
5. Press the right or left buttons to move to the number field that you want to set.
6. Repeat steps 3 and 4 for each number field that you want to set.
7. Press the select button to confirm the settings. Otherwise, press the right button to display the next secondary option or press the left button to display the previous options.

IPv6 Prefix

This option lets you set the IPv6 prefix.

Attention: If you set the IPv6 prefix, ensure that you type the correct network prefix. Otherwise, you cannot access the cluster from the Web interface or from a command line.

Perform the following steps to set the IPv6 prefix:

Note: This option is restricted to a value between 0 and 127.

1. Navigate to the IPv6 Prefix panel.
2. Press the select button. The first prefix number field is highlighted.
3. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value. If you want to quickly increase the highlighted value, hold the up button. If you want to quickly decrease the highlighted value, hold the down button.

   Note: If you want to disable the fast increase/decrease function, press and hold the down button, press and release the select button, and then release the down button. The disabling of the fast increase/decrease function lasts until cluster creation is completed or until the feature is again enabled. If the up or down buttons are pressed and held while the function is disabled, the value increases or decreases once every two seconds. To again enable the fast increase/decrease function, press and hold the up button, press and release the select button, and then release the up button.
4. Press the select button to confirm the settings. Otherwise, press the right button to display the next secondary option or press the left button to display the previous options.

IPv6 Gateway

This option lets you set the IPv6 gateway.

Attention: If you set the IPv6 gateway address, ensure that you type the correct address. Otherwise, you cannot access the cluster from the Web interface or from a command line.

Perform the following steps to set the IPv6 gateway address:

1. Navigate to the IPv6 Gateway panel.
2. Press the select button. The first gateway address number is highlighted. The IPv6 address and the IPv6 gateway address each consist of eight (4-digit) hexadecimal values that are shown across four panels.
3. You can change each number in the address independently. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value.
4. Press the right or left buttons to move to the number field that you want to set.
5. Repeat steps 3 and 4 for each number field that you want to set.
6. Press the select button to confirm the settings. Otherwise, press the right button to display the next secondary option or press the left button to display the previous options.

IPv6 Create Now?

This option lets you start an operation to create a cluster with an IPv6 address.

1. Navigate to the IPv6 Create Now? panel.
2. Press the select button to start the operation.

   If the create operation is successful, `Password` is displayed on line 1. The password that you can use to access the cluster is displayed on line 2. Be sure

to immediately record the password; it is required on the first attempt to manage the cluster from the SAN Volume Controller Console.

Attention: The password displays for only 60 seconds, or until a front panel button is pressed. The cluster is created only after the password display is cleared.

If the create operation fails, `Create Failed:` is displayed on line 1 of the service display screen. Line 2 displays one of two possible error codes that you can use to isolate the cause of the failure.

Delete Cluster?

The Delete Cluster? option lets you delete the node from the cluster. This option is displayed only if you select the Create Cluster? option on a SAN Volume Controller node that is already a member of a cluster.

Usually, you can use the command-line interface (CLI) or the graphical user interface (GUI) to remove a node from a cluster. However, if you cannot use the CLI or GUI, you can use the Delete Cluster? option to force the deletion of a node from a cluster.

From the Delete Cluster? panel, perform the following steps to delete a node from the cluster:

1. Press and hold the up button.
2. Press and release the select button.
3. Release the up button.

The SAN Volume Controller node is deleted from the cluster and the node is restarted. The display then returns to the default menu.

Use the up button to return to the Create Cluster? option.

Related concepts

"Displaying and editing an IPv6 address" on page 152
After you have set the IPv6 address, you can display the IPv6 address and the IPv6 gateway address. You can also set the IPv6 address for a cluster that you are going to create.

Related information

"Understanding the create cluster error codes" on page 247
Cluster Create error codes are displayed on the menu screen when you are using the front panel to create a new cluster, but the create operation fails.

Version option

The version option displays the version of the SAN Volume Controller software that is active on the node. The version consists of four fields that are separated by full stops. The fields are the version, release, modification, and fix level; for example, 4.3.2.1.

Build

The Build: panel displays the build level of the SAN Volume Controller software that is currently active on the node.

Cluster Build

The Cluster Build: panel displays the build level of the SAN Volume Controller cluster software that is currently active on this node.

Ethernet option

The Ethernet option displays the operational states of the Ethernet port and its media access control (MAC) address.

When a cluster is created, only the Ethernet port of one node becomes active for cluster configuration. If the node that has the active port fails, another node in the cluster opens its Ethernet port and gains configuration access to that cluster.

Active The cluster is accessible through this port.

Inactive
The port is operational, but it cannot be used to access the cluster. This port can be used to access the cluster if the cluster's active port fails.

Failed The port is not operational.

Press the right button to display the MAC address of the Ethernet port.

Fibre-channel port-1 through 4 option

The fibre-channel port-1 through 4 options display the operational status of the fibre-channel ports.

Active The port is operational and can access the fibre-channel fabric.

Inactive
The port is operational but cannot access the fibre-channel fabric. One of the following conditions caused this result:
- The fibre-channel cable has failed
- The fibre-channel cable is not installed
- The device that is at the other end of the cable has failed

Failed The port is not operational because of a hardware failure.

Not installed
This port is not installed.

To display the current fibre-channel port speed, press and hold the down button, press and release the select button, and release the down button. For the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-4F2, this action also allows you to change the fibre-channel port speed of a node that is not participating in a cluster, by pressing the up or down buttons.

Select language? option

You can change the language that displays on the front panel.

The Select language? option allows you to change the language that is displayed on the menu. Figure 72 on page 163 shows the Select language? option sequence.

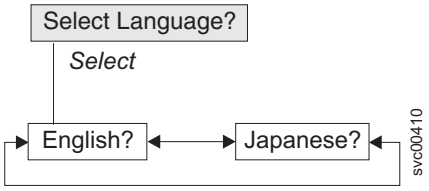


Figure 72. Select Language? navigation

The following languages are available:
- English
- Japanese

To select the language that you want to be used on the front panel, perform the following steps:

1. Navigate to the Select language? panel.
2. Press and release the select button.
3. Use the left and right buttons to move to the desired language. The translated language names are displayed in their own character set. If you do not understand the language that is displayed, wait for at least 60 seconds for the menu to reset to the default option.
4. Press and release the select button to select the language that is displayed.

If the selected language uses the Latin alphabet, the front panel display shows two lines. The panel text is displayed on the first line and additional data is displayed on the second line.

If the selected language does not use the Latin alphabet, the display shows only one line at a time to clearly display the character font. For those languages, you can switch between the panel text and the additional data by pressing and releasing the select button.

Additional data is not available when the front panel displays a menu option, which ends with a question mark (?). In this case, press and release the select button to choose the menu option.

Note: You cannot select another language when the node is displaying a boot error.

Service mode

While in service mode, you can use the front panel to view or change a service IPv4 or an IPv6 address. You can also view the version and build level of the SAN Volume Controller software that is installed and active on the node.

Enter service mode only if directed to do so by the IBM Support Center.

By default, all nodes in a cluster are configured to use the same service address. This means that you can place only one node in service mode at a time. However, you can either change the fixed IP address of a node or configure the nodes for DHCP; thus, making it possible to have more than one node in service mode at any one time.

To access a node that is in service mode, point your Web browser to the following Web address, where *serviceipaddress* is the IPv4 or IPv6 address that is shown on the front panel display:

`https://serviceipaddress`

The service mode panel is displayed when you enter service mode. You can navigate to the IPv4 Address, IPv6 Address, or the Version panels, as shown in Figure 73.

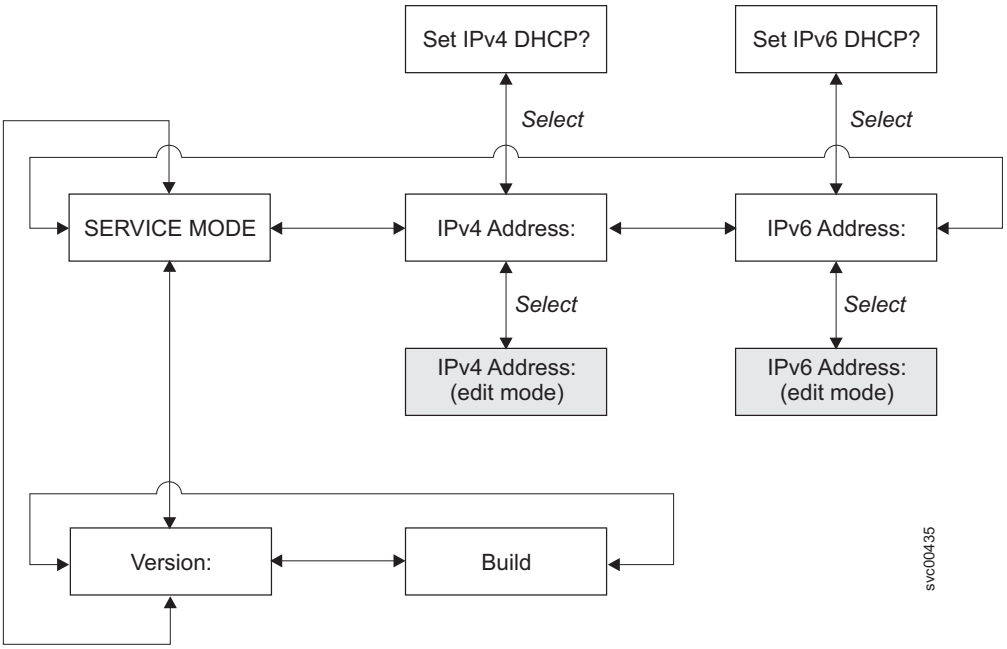


Figure 73. Service mode navigation

You can exit service mode through the Web browser or by turning the node off and then on.

IPv4 Address

The IPv4 Address panel shows one of the following:

- The active service mode address if the cluster has an IPv4 address. This can be either a configured or fixed address, or it can be an address obtained through DHCP.
- `DHCP Failed` if the IPv4 service address is configured for DHCP but the node was unable to obtain an IP address.
- `DHCP Configuring` if the IPv4 service address is configured for DHCP while the node attempts to obtain an IP address. This will change to the IPv4 address automatically if a DHCP address is allocated and activated.
- A blank line if the cluster does not have an IPv4 address.

If the service IPv4 address was not set correctly or a DHCP address was not allocated, you have the option of correcting the IPv4 address from this panel. Note that the service IP address must be in the same subnet as the cluster IP address.

To set a fixed service IPv4 address from the IPv4 Address: panel, perform the following steps:

1. Press and release the select button to put the panel in edit mode.
2. Press the right or left buttons to move to the number field that you want to set.
3. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value. If you want to quickly increase the highlighted value, hold the up button. If you want to quickly decrease the highlighted value, hold the down button.

   Note: If you want to disable the fast increase/decrease function, press and hold the down button, press and release the select button, and then release the down button. The disabling of the fast increase/decrease function lasts until cluster creation is completed or until the feature is again enabled. If the up or down buttons are pressed and held while the function is disabled, the value increases or decreases once every two seconds. To again enable the fast increase/decrease function, press and hold the up button, press and release the select button, and then release the up button.
4. When all the fields are set as required, press and release the select button to activate the new IPv4 address.

   The IPv4 Address: panel is displayed. The new service IPv4 address is not displayed until it has become active. If the new address has not been displayed after two minutes, check that the selected address is valid on the subnetwork and that the Ethernet switch is working correctly.

To set the service IPv4 address to use DHCP, perform the following steps:

1. Navigate to the IPv4 Address: panel.
2. Press and release the down button. `Set IPv4 DHCP?` is displayed on the front panel.
3. Press and release the select button to activate DHCP, or you can press and release the up button to keep the existing address.
4. If you activate DHCP, `DHCP Configuring` is displayed while the node attempts to obtain a DHCP address. It changes automatically to show the allocated address if a DHCP address is allocated and activated, or it changes to `DHCP Failed` if a DHCP address is not allocated.

You can exit service mode through the CLI, or by turning the node off and then on.

IPv6 Address

The IPv6 Address panel shows one of the following:

- The active service mode address if the cluster has an IPv6 address. This can be either a configured or fixed address, or it can be an address obtained through DHCP.
- `DHCP Failed` if the IPv6 service address is configured for DHCP but the node was unable to obtain an IP address.
- `DHCP Configuring` if the IPv6 service address is configured for DHCP while the node attempts to obtain an IP address. This changes to the IPv6 address automatically if a DHCP address is allocated and activated.
- A blank line if the cluster does not have an IPv6 address.

If the service IPv6 address was not set correctly or a DHCP address was not allocated, you have the option of correcting the IPv6 address from this panel. Note that the service IP address must be in the same subnet as the cluster IP address.

To set a fixed service IPv6 address from the IPv6 Address: panel, perform the following steps:

1. Press and release the select button to put the panel in edit mode. When the panel is in edit mode, the full address is still shown across four panels as eight (4-digit) hexadecimal values. You edit each digit of the hexadecimal values independently. The current digit is highlighted.
2. Press the right or left buttons to move to the number field that you want to set.
3. Press the up button if you want to increase the value that is highlighted; press the down button if you want to decrease that value.
4. When all the fields are set as required, press and release the select button to activate the new IPv6 address.

   The `IPv6 Address:` panel is displayed. The new service IPv6 address is not displayed until it has become active. If the new address has not been displayed after two minutes, check that the selected address is valid on the subnetwork and that the Ethernet switch is working correctly.

To set the service IPv6 address to use DHCP, perform the following steps:

1. Navigate to the IPv6 Address: panel.
2. Press and release the down button. `Set IPv6 DHCP?` is displayed on the front panel.
3. Press and release the select button to activate DHCP, or you can press and release the up button to keep the existing address.
4. If you activate DHCP, `DHCP Configuring` is displayed while the node attempts to obtain a DHCP address. It changes automatically to show the allocated address if a DHCP address is allocated and activated, or it changes to `DHCP Failed` if a DHCP address is not allocated.

   Note: If an IPv6 router is present on the local network, SAN Volume Controller does not differentiate between an autoconfigured address and a DHCP address. Therefore, SAN Volume Controller uses the first address that is detected.

Version

The version option displays the version of the SAN Volume Controller software that is active on the node. The version consists of four fields that are separated by full stops. The fields are the version, release, modification, and fix level; for example, 4.3.2.1.

Build

The Build: panel displays the build level of the SAN Volume Controller software that is currently active on the node.

Related concepts

"Displaying and editing an IPv6 address" on page 152
After you have set the IPv6 address, you can display the IPv6 address and the IPv6 gateway address. You can also set the IPv6 address for a cluster that you are going to create.

Related reference

"Service mode overview" on page 6
The service mode allows you to access vital product data (VPD), logs, and dump data on the node. It also provides you with a method of forcing the installation of a different version of software.

Using the power control for the SAN Volume Controller node

SAN Volume Controller nodes are powered by an uninterruptible power supply that is located in the same rack as the SAN Volume Controller nodes.

The power state of the SAN Volume Controller is displayed by a power indicator on the front panel. If the uninterruptible power supply battery is not sufficiently charged to enable the SAN Volume Controller to become fully operational, its charge state is displayed on the front panel display of the SAN Volume Controller node.

The power to a SAN Volume Controller is controlled by the power button on the front panel of the SAN Volume Controller node or by commands sent by the Ethernet interface. *Never* turn off the SAN Volume Controller node by removing the power cable. You might lose data. For more information about how to power off the SAN Volume Controller node, see "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

If the SAN Volume Controller software is running and you request it to power off from the SAN Volume Controller Console, CLI, or power button, the SAN Volume Controller node starts its power off processing. During this time, the SAN Volume Controller node indicates the progress of the power-off operation on the front panel display. After the power-off processing is complete, the front panel becomes blank and the front panel power light flashes. It is safe for you to remove the power cable from the rear of the SAN Volume Controller node. If the power button on the front panel is pressed during power-off processing, the front panel display changes to indicate that the SAN Volume Controller node is being restarted, but the power-off process completes before the restart is performed.

If the SAN Volume Controller software is not running when the front panel power button is pressed, the SAN Volume Controller node immediately powers off.

If the SAN Volume Controller 2145-4F2 node is powered off and it is the only SAN Volume Controller 2145-4F2 node that is connected to the 2145 uninterruptible power supply, the 2145 uninterruptible power supply powers off within five minutes. You must press the power-on button on the 2145 uninterruptible power supply before the SAN Volume Controller 2145-4F2 node can be powered on.

Note: The 2145-1U uninterruptible power supply does not power off when the SAN Volume Controller node is shut down from the power button.

If you turn off a SAN Volume Controller node using the power button or by a command, the SAN Volume Controller node is put into a power-off state. The SAN Volume Controller remains in this state until the power cable is connected to the rear of the SAN Volume Controller node and the power button is pressed.

During the SAN Volume Controller startup sequence, the SAN Volume Controller tries to detect the status of the uninterruptible power supply through the uninterruptible power supply signal cable. If an uninterruptible power supply is not detected, the SAN Volume Controller node pauses and an error is shown on the front panel display. If the uninterruptible power supply is detected, the software monitors the operational state of the uninterruptible power supply. If no uninterruptible power supply errors are reported and the uninterruptible power supply battery is sufficiently charged, the SAN Volume Controller becomes operational. If the uninterruptible power supply battery is not sufficiently charged, the charge state is indicated by a progress bar on the front panel display. When an

uninterruptible power supply is first turned on, it might take up to two hours before the battery is sufficiently charged for the SAN Volume Controller node to become operational.

If input power to the uninterruptible power supply is lost, the SAN Volume Controller node immediately stops all I/O operations and saves the contents of its dynamic random access memory (DRAM) to the internal disk drive. While data is being saved to the disk drive, a `Power Failure` message is shown on the front panel and is accompanied by a descending progress bar that indicates the quantity of data that remains to be saved. After all the data is saved, the SAN Volume Controller node is turned off and the power light on the front panel turns off.

Note: The SAN Volume Controller node is now in standby state. If the input power to the uninterruptible power supply unit is restored, the SAN Volume Controller node restarts. If the uninterruptible power supply battery was fully discharged, `Charging` is displayed and the boot process waits for the battery to charge. When the battery is sufficiently charged, `Booting` is displayed, the node is tested, and the software is loaded. When the boot process is complete, `Recovering` is displayed while the uninterruptible power supply finalizes its charge. While `Recovering` is displayed, the cluster can function normally. However, when the power is restored after a second power failure, there is a delay (with `Charging` displayed) before the node can complete its boot process.

Related concepts

"Powering off" on page 146
The progress bar on the display shows the progress of the power-off operation.

Chapter 7. Diagnosing problems

You can diagnose problems with SAN Volume Controller, the uninterruptible power supply, the IBM System Storage Productivity Center, or the master console server using either the command-line interface (CLI) or the SAN Volume Controller Console. For the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 users, you can also use the light path diagnostics to help find the cause of errors.

Error logs

By understanding the error log, you can do the following:

- Manage the error log
- View the error log
- Describe the fields in the error log

Error codes

The following topics provide information to help you understand and process the error codes:

- Error reporting
- Understanding the error log
- Understanding the error codes
- Understanding the cluster error codes
- Determining a hardware boot failure
- Understanding the boot error codes
- Performing the node rescue
- Understanding the node rescue error codes
- Understanding the create cluster error codes
- Marking errors as fixed
- Checking the status of a node

If you determine that a problem was caused by a software or firmware failure, you can restart the SAN Volume Controller node to see if that might resolve the problem. Perform the following steps to properly shut down and restart the node:

1. Follow the instructions in "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Restart only one node at a time.
3. Do not shut down the second node in an I/O group for at least 30 minutes after you shut down and restart the first node.

Related tasks

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

Related information

Appendix B, "Websphere and CIM Logging," on page 661
You can obtain log files for the Websphere Application Server and the Common Information Model (CIM). Instructions are supplied in the following topics.

Error reporting

Errors detected by the SAN Volume Controller are saved in an error log. As soon as an entry is made in this error log, the error condition is analyzed. If any service activity is required, the user is notified of the error.

Error reporting process

The following methods are used to notify the user and the IBM Support Center of a new error:

- The most serious cluster code is displayed on the front panel of each node in the cluster.
- If you enabled simple network management protocol (SNMP), a SNMP trap is sent to an SNMP manager that is configured by the customer.

  The SNMP manager might be IBM Director, if it is installed, or another SNMP manager.
- If enabled, errors and other event notifications can be sent to the user through Call Home e-mail.
- If you enabled Call Home, critical faults are reported directly to the IBM Support Center by e-mail..

Related tasks

"Using directed maintenance procedures" on page 118
You can use directed maintenance procedures (DMP) to diagnose and resolve problems with the SAN Volume Controller.

Related information

"Understanding cluster error codes" on page 248
Every cluster error code includes an error code number, a description, action, and possible field replaceable units (FRUs).

Power-on self-test

When you turn on the SAN Volume Controller, the system board performs self-tests. During the initial tests, the hardware boot symbol is displayed.

SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or SAN Volume Controller 2145-8F2

The SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 performs a series of tests to check the operation of components and some of the options that have been installed when the units are first turned on. This series of tests is called the power-on self-test (POST).

If a critical failure is detected during the POST, the SAN Volume Controller software is not loaded and the system error LED on the operator information panel is illuminated. If this occurs, use "MAP 5000: Start" on page 362 to help isolate the cause of the failure.

When the SAN Volume Controller software is loaded, additional testing takes place, which ensures that all of the required hardware and software components are installed and functioning correctly. During the additional testing, the word `Booting` is displayed on the front panel along with a boot progress code and a progress bar.

If a test failure occurs, the word `Failed` is displayed on the front panel along with a boot progress code. Some parts of the boot process take several minutes to complete. If the progress bar fails to move and the boot code number does not change for several minutes, see the boot progress code section to understand the situation.

The service controller performs internal checks and is vital to the operation of the SAN Volume Controller. If the error (check) LED is illuminated on the service controller front panel, the front panel display might not be functioning correctly and you can ignore any message displayed.

The uninterruptible power supply also performs internal tests. If the uninterruptible power supply is capable of reporting the failure condition, the SAN Volume Controller displays critical failure information on the front panel display or sends noncritical failure information to the cluster error log. If the SAN Volume Controller cannot communicate with the uninterruptible power supply, it displays a boot failure error message on the front panel display. Further problem determination information might also be displayed on the front panel of the uninterruptible power supply.

SAN Volume Controller 2145-4F2

If a critical failure is detected during the tests, the SAN Volume Controller 2145-4F2 software is not loaded and no additional fault information is provided. When the SAN Volume Controller 2145-4F2 software is loaded, additional testing is performed. This testing ensures that all the required hardware and software components are installed and functioning correctly. During this portion of the testing, the word `Booting` displays on the front panel along with a boot progress code and a progress bar.

If a test fails, the word `Failed` displays on the front panel. You can use the progress code to isolate the cause of the problem. If the booting progress bar fails to move to the right for two minutes, the test process is hung. Use the boot progress code to isolate the failure.

The service controller performs internal checks and is vital to the operation of the SAN Volume Controller 2145-4F2. When an internal check fails, the SAN Volume Controller 2145-4F2 does not operate. Ignore other front panel indicators when you see that the check LED is illuminated.

The uninterruptible power supply also performs internal tests. If the uninterruptible power supply is capable of reporting the failure condition, the SAN Volume Controller 2145-4F2 displays critical failure information on the front panel display or sends noncritical failure information to the SAN Volume Controller 2145-4F2 cluster error log. If the SAN Volume Controller 2145-4F2 cannot communicate with the uninterruptible power supply, it displays a boot failure error message on the front panel display. Additional problem determination information might also be displayed on the front panel of the uninterruptible power supply.

Data and event notifications

The SAN Volume Controller can use SNMP traps, Call Home e-mail, and Inventory Information e-mail to provide necessary data and event notifications to you and to the IBM Support Center.

The following types of information are sent from the SAN Volume Controller:

- Simple Network Management Protocol (SNMP) traps
- Call Home e-mail
- Inventory information

Simple Network Management Protocol traps

Simple network management protocol (SNMP) is the standard protocol for managing networks and exchanging messages. SNMP enables the SAN Volume Controller to send external messages that notify personnel about an event. An SNMP manager allows you to view the messages that the SNMP agent sends. You can use the SAN Volume Controller Console or the SAN Volume Controller command-line interface to configure and modify your SNMP settings. SNMP traps and Call Home e-mail can be sent simultaneously.

Call Home e-mail

The Call Home feature allows the transmission of operational and error-related data to you and IBM through a Simple Mail Transfer Protocol (SMTP) server connection in the form of an event notification e-mail. When configured, this function alerts IBM service personnel about hardware failures and potentially serious configuration or environmental issues.

You must configure an SMTP server to be able to send e-mail outside of your local area network. The SMTP server must allow the relaying of e-mail from the SAN Volume Controller cluster IP address. You can then use the SAN Volume Controller Console or the SAN Volume Controller command-line interface to configure the e-mail settings, including contact information and e-mail recipients. For compatibility with other SMTP servers, ensure that you set the reply address to a valid e-mail address. Send a test e-mail to check that all connections and infrastructure are set up correctly. You can disable the Call Home function at any time using the SAN Volume Controller Console or the SAN Volume Controller command-line interface.

Inventory information e-mail

Inventory information e-mail is a type of Call Home notification. Inventory information can be sent to IBM to assist IBM service personnel in evaluating your SAN Volume Controller system. Because inventory information is sent using the Call Home e-mail function, you must meet the Call Home function requirements and enable the Call Home e-mail function before you can attempt to send inventory information e-mail. You can adjust the contact information, adjust the frequency of inventory e-mail, or manually send an inventory e-mail using the SAN Volume Controller Console or the SAN Volume Controller command-line interface. Inventory information is automatically reported to IBM when you activate error reporting.

Call Home and inventory e-mail information

The SAN Volume Controller can use Call Home e-mail and Inventory Information e-mail to provide necessary data and event notifications to you and to the IBM Support Center.

Call Home e-mail

Call Home support is initiated for the following reasons or types of data:

- Problem or event notification: Data is sent when there is a problem or an informational event.
- Communication tests: You can test for the successful installation and communication infrastructure.
- Inventory information: A notification is sent to provide the necessary status and hardware information to IBM service personnel.

To send data and notifications to IBM service personnel, use one of the following e-mail addresses:

- For SAN Volume Controller nodes located in North America, Latin America, South America or the Caribbean Islands, use `callhome1@de.ibm.com`
- For SAN Volume Controller nodes located anywhere else in the world, use `callhome0@de.ibm.com`

Call Home e-mail can contain any combination of the following types of information:

- Contact name
- Contact phone number
- Offshift phone number
- Machine location
- Record type
- Machine type
- Machine serial number
- Error ID
- Error code
- Software version
- FRU part number
- Cluster name
- Node ID
- Error sequence number
- Time stamp
- Object type
- Object ID
- Problem data

Inventory information e-mail

Inventory information e-mail is a type of Call Home notification. Inventory information can be sent to IBM to assist IBM service personnel in evaluating your SAN Volume Controller system. Because inventory information is sent using the Call Home e-mail function, you must meet the Call Home function requirements and enable the Call Home e-mail function before you can attempt to send inventory information e-mail. You can adjust the contact information, adjust the frequency of inventory e-mail, or manually send an inventory e-mail using the SAN Volume Controller Console or the SAN Volume Controller command-line interface. Inventory information is automatically reported to IBM when you activate error reporting.

Inventory information that is sent to IBM can include the following information about the cluster on which the Call Home function is enabled:

- Time stamp
- Contact information, including name and phone number. This is initially set to the contact information that was set for the Call Home e-mail function. However, you can change the contact information specifically for inventory e-mail using the SAN Volume Controller Console or the **mkemailuser** or **chemailuser** CLI commands.
- Machine location. This is the machine location that is set for the Call Home e-mail function.
- Software level
- License information. This is the same information that it output from the **svcinfo lslicense** command.
- Cluster vital product data (VPD). The cluster VPD is the same information that is output from the **svcinfo lscluster** command, including the following items:
  - Cluster name and IDs
  - Cluster location
  - Bandwidth
  - IP addresses
  - Memory capacities
  - SNMP settings
  - Time zone setting
  - E-mail settings
  - Microcode level
  - Fibre-channel port speed
- Node VPD for each node in the cluster. The node VPD is the same information that is output from the **svcinfo lsnodevpd** command, including the following items:
  - System part number
  - Number of various hardware parts, such as fans, processors, memory slots, fibre-channel cards, and SCSI/IDE devices
  - Part numbers of the various hardware parts
  - BIOS information
  - System manufacturing information, such as system product and manufacturer
  - Firmware level for the service processor
- Software VPD, including the following items:
  - Code level
  - Node name
  - Ethernet status
  - Worldwide node name (WWNN)
  - MAC address
- Processor information, including the following items for each processor:
  - Location of processor
  - Type of cache
  - Size of cache
  - Manufacturer
  - Version
  - Speed
  - Status (enabled or disabled)

- Memory information, including the following items:
  - Part number
  - Device location
  - Bank location
  - Size
- Fibre-channel card information, including the following items:
  - Part number
  - Port number
  - Device serial number
  - Manufacturer
- SCSI/IDE device information, including the following items:
  - Part number
  - Bus ID
  - Device ID
  - Model
  - Revision level
  - Serial number
  - Approximate capacity
- Front panel assembly information, including the following items:
  - Part number
  - ID
  - Location
- Uninterruptible power supply information, including the following items:
  - Electronics part number
  - Battery part number
  - Uninterruptible power supply assembly part number
  - Input power cable part number
  - Uninterruptible power supply serial number
  - Uninterruptible power supply type
  - Uninterruptible power supply internal part number
  - ID
  - Firmware levels

Understanding the error log

The SAN Volume Controller error log contains both error and event data.

Error data

Error data is logged when a failure condition is detected. When error data is logged, an error log analysis is performed to determine if the user should be notified of the condition.

Event data

Event data is logged when a configuration event has occurred.

Managing the error log

The error log has a limited size. After it is full, newer entries replace the oldest entries. If the old entry has not been fixed, it is not replaced by newer entries.

To avoid the possibility of an error condition causing the log to be flooded by a single error, some errors of the same type are recorded in the same space in the error log. When error log entries are coalesced in this way, the time stamp of the first occurrence and the last occurrence of the problem is saved in the log entry. A count of the number of times the error condition has occurred is also saved in the log entry. If a new entry is the same as one that you made more than 25 hours after the first entry, a new error record is opened.

Related tasks

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

Viewing the error log

You can view the error log by using the SAN Volume Controller command-line interface (CLI) or the SAN Volume Controller Console.

Perform the following steps to view the full contents of each error log entry using the CLI:

1. Issue the `svctask dumperrlog` command to create a dump file that contains the current error log data.
2. Issue the `svcinfo lserrlogdumps` command to determine the name of the dump file that you have just created.
3. Issue the `secure copy` command to copy the dump file to the IBM System Storage Productivity Center or master console server.

You can then view the file with a text viewer.

Figure 74 on page 177 shows an example of an error log entry that might be displayed:

```
Error Log Entry 21
  Node Identifier       : node3
  Object Type           : adaptor
  Object ID             : 1
  Sequence Number       : 174
  Root Sequence Number  : 174
  First Error Timestamp : Tue Aug 23 16:02:18 2005
                        : Epoch + 1051027338
  Last Error Timestamp  : Tue Aug 23 16:02:18 2005
                        : Epoch + 1051027338
  Error Count           : 1
  Error ID              : 73003 : More/Less fibre channel ports operational
  Error Code            : 1060 : Fibre Channel ports not operational
  Status Flag           : UNFIXED
  Type Flag             : ERROR CAT 1

02 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Figure 74. Example of an error log entry when you use the command-line interface

You can also view the error log using the SAN Volume Controller Console. The error log contains a large number of entries, but by using this method of viewing the log you can select only the type of information that you need. For example, if you are repairing a fault, you might only want to select **Show unfixed errors**.

Figure 75 on page 178 shows an example of an error log summary that is displayed when you select the type of information that you want.

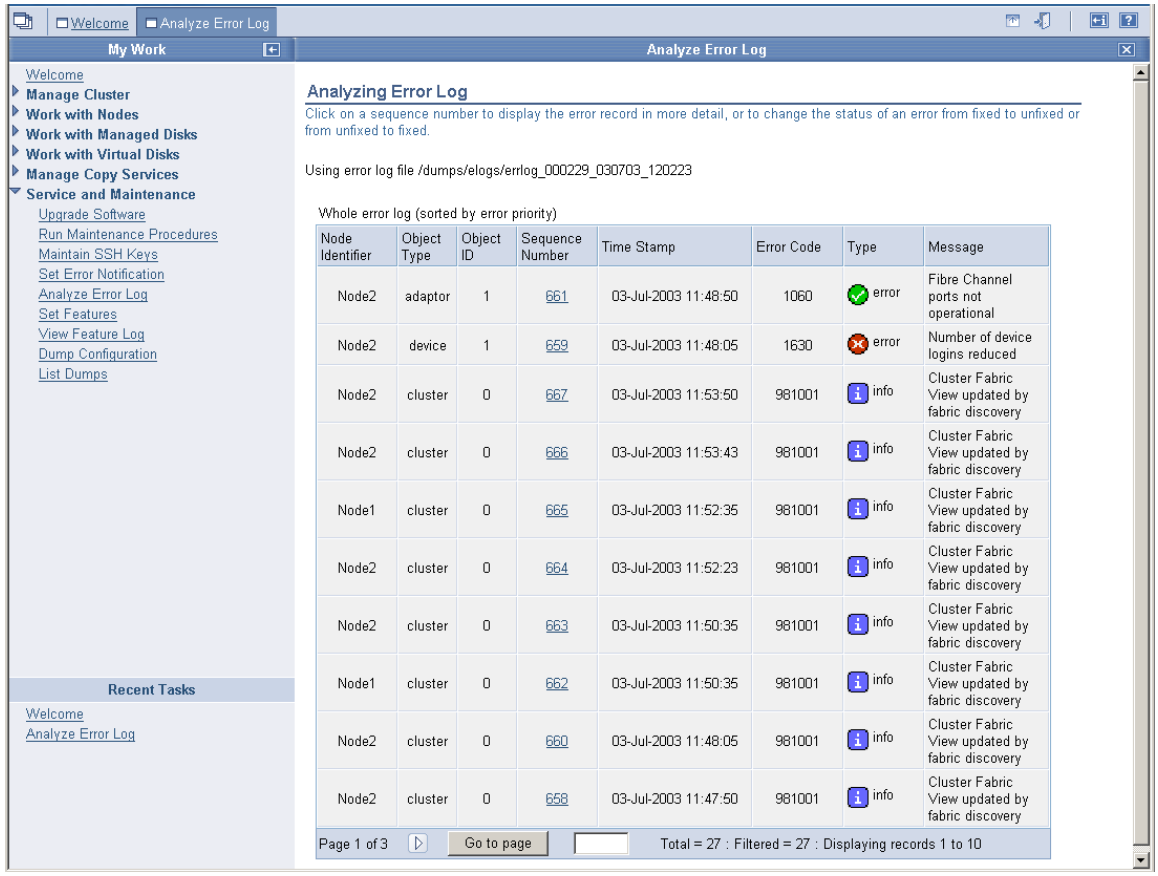


Figure 75. Example of an Error Log Summary

Details of each listed error can be displayed by clicking on the sequence number of any record. The Type field contains an icon and a text message to indicate the cause of the log entry. Table 18 describes the meaning of the information in the type field.

Table 18. Descriptions of Log Entry Icons

Icon	Description
	The Error icon indicates that this log entry requires service activity. Select Run Maintenance Procedures from the Service and Maintenance menu to start the repair activity.
	The Fixed icon indicates that a problem existed but has now been resolved. It might have been resolved as a result of service activity or it might have been resolved as a result of some other action, for example powering on a missing node.

Table 18. Descriptions of Log Entry Icons (continued)

Icon	Description
	The Warn icon indicates that some condition has occurred that might have been caused by a temporary problem or by a problem that is external to the SAN Volume Controller, such as an error in a RAID controller. If a specified number of these events occurs in 25 hours, the warning converts to an error. No service action is required on the SAN Volume Controller for this log entry.
	The Info icon indicates that the log entry provides information about a configuration change or the state of a command. In some cases, the SAN Volume Controller user might need to take some action based on this information.

Describing the fields in the error log

The error log includes fields with information you can use to diagnose problems.

Table 19 describes the fields you see when you use the command-line interface to produce an error log.

Table 19. Description of data fields for the error log

Data field	Description
Node identifier	The name of the node that created the error report.
Object type	The object type to which the error log relates. See Table 20 on page 180.
Object ID	A number that uniquely identifies the object on this node.
Sequence number	A sequentially assigned number that can be used to provide a cross reference to sense data returned to host systems.
Root sequence number	The sequence number of another log entry that enables all errors that have a single source to be marked as fixed by a single action.
First error timestamp	The time when the first instance of this error code was reported by this object type in the last 25 hours.
Last error timestamp	The time when the last instance of this error code was reported by this object type in the last 25 hours.
Error count	The number of times that this error code has been reported by this object in the last 25 hours.
Error ID	This number is a unique identifier for the error or event.
Error code	This number is used as the starting point for service procedures.
Status flag	For details of the status flag. See Table 21 on page 180.
Type flag	For details of the type flag. See Table 23 on page 181.

Table 19. Description of data fields for the error log (continued)

Data field	Description
Additional sense data	Data specific to this error or event code. This is a binary data record. When the error log is viewed using the command line tools, this data is shown in hex. When the data is viewed using the Web interface, this data is translated to ASCII characters on the right side of the page. You are not normally required to interpret this data as part of the service procedures. However, any procedures that do refer to the data describe the ASCII format.

Table 20 describes the types of error log objects.

Table 20. Description of object types and object IDs for the error log

Object type	Object ID
Node	Node ID
Fcgrp	Flash Copy consistency group number
Rcgrp	Metro Mirror consistency group number
Fcmap	Flash Copy MAP number
Rcmap	Metro Mirror MAP number
Cluster	Cluster name (shown in decimal)
Device	Device number
Mdisk	Managed disk number
Mdiskgrp	Managed disk group number
Vdisk	Virtual disk
Vdisk copy	Space-efficient virtual disk copy

Table 21 shows the types of error log flags.

Note: Configuration Events have nothing in the flag field. Information Events only have the SNMP trap-raised flag on when configured to do so.

Table 21. Description of flags for the error log

Flag	Description
Unfixed	This log entry requires a service action.
Fixed	This entry is marked as fixed. It remains in the error log until it becomes the oldest record in the log, at which point it is overwritten by the next log entry.
Expired	The error log entry is over 25 hours old. Any new log entries of this error/event code for this object type produce a new log entry.
SNMP trap raised	An SNMP trap has been raised. SNMP traps are raised for unfixed errors and for information events.

Table 22 shows the various combinations of flags that might be logged and the resulting status that is reported by the user interfaces.

Note: SNMP_TRAP_RAISED is independent of the other flags.

Table 22. Reported status for combinations of error-log status flags

UNFIXED	ERROR_FIXED	ERROR_EXPIRED	Reported Status
0	0	0	BELOW_THRESHOLD
0	0	1	EXPIRED
0	1	0	FIXED
0	1	1	*not possible*
1	0	0	UNFIXED
1	0	1	*not possible*
1	1	0	FIXED
1	1	1	*not possible*

Table 23 shows the types of error log flags.

Table 23. Description of types of error log flags

Flag	Description
Unknown error	This flag should never be seen. This flag can only result from a software defect.
Error Cat 1	These errors require a service action. A FRU or list of FRUs are included with the trap data sent with the error record.
Error Cat 2	These errors require a service action but more analysis is required before the service action or FRU can be identified.
Related error	These are errors that have a root cause that has been reported in another log entry. Marking the source error as fixed also marks this error as fixed.
Transient error	Errors flagged as transient have been recovered by an error recovery procedure.
Configuration event	This entry is from the Configuration Event log. This flag is useful when displaying both logs in a seamless display as an aid to relating logged error conditions to configuration events.
Information	This entry indicates that the log entry is an Information Event. Information events can be used to warn the user about an unexpected configuration result or prompt a user to initiate further configuration actions. This type of log entry causes an SNMP trap to be raised if requested by the user.

Related tasks

"Viewing the error log" on page 176
You can view the error log by using the SAN Volume Controller command-line interface (CLI) or the SAN Volume Controller Console.

Understanding the error codes

Error codes are generated for the SAN Volume Controller by the system error-log analysis and system configuration code.

Error codes help you to identify the cause of a problem, the failing field-replaceable units (FRUs), and the service actions that might be needed to solve the problem.

Note: If more than one error occurs during an operation, the highest priority error code displays on the front panel. The lower the number for the error code, the higher the priority. For example, cluster error code 1020 has a higher priority than cluster error code 1370.

Using the error code tables

The error code tables list the various error codes and describe the actions that you may take.

Perform the following steps to use the error code tables:

1. Locate the error code in one of the tables. If you cannot find a particular code in any table, call IBM Support Center for assistance.
2. Read about the action you must perform to correct the problem. Do not exchange field replaceable units (FRUs) unless you are instructed to do so.
3. Normally, exchange only one FRU at a time, starting from the top of the FRU list for that error code.

Related tasks

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

Chapter 9, "Removing and replacing parts," on page 431
You can remove and replace field replaceable units (FRUs) from the SAN Volume Controller, redundant ac power switch, and uninterruptible power supply.

Event codes

The system generates information and configuration event codes.

There are two different types of event codes:

- Information event codes
- Configuration event codes

Information event codes provide information on the status of an operation. Information event codes are recorded in the error log and an SNMP trap is raised.

Configuration event codes are generated when configuration parameters are set. Configuration event codes are recorded in a separate log and do not raise SNMP traps. Their error fixed flags are ignored.

Information event codes

The information event codes provide information on the status of an operation.

Information event codes are recorded in the error log and, if configured, an SNMP trap is raised and an e-mail is sent.

Information event codes can be either SNMP trap type I (information) or type W (warning). You can use the SNMP trap type that is included in the e-mail to determine if the information event was caused by an expected or unexpected condition. An information event report of type (W) might require user attention. Table 24 provides a list of information event codes, the SNMP type, and the meaning of the event code.

Table 24. Information event codes

Event code	SNMP Type	Description
980221	I	The error log is cleared.
980310	I	A degraded or offline managed disk group is now online.
980435	W	Failed to obtain directory listing from remote node.
980440	W	Failed to transfer file from remote node.
980446	I	The secure delete is complete.
980501	W	The virtualization amount is close to the limit that is licensed.
980502	W	The FlashCopy feature is close to the limit that is licensed.
980503	W	The Metro Mirror or Global Mirror feature is close to the limit that is licensed.
981001	W	The cluster fabric view has been updated by a multiphase discovery.
981007	W	The managed disk is not on the preferred path.
981014	W	The LUN discovery has failed. The cluster has a connection to a device through this node but this node cannot discover the managed disks that are associated with this LUN.
981015	W	The LUN capacity equals or exceeds the maximum. Only the first 2 TB of the disk can be accessed.
981020	W	The managed disk error count warning threshold has been met.
981022	I	Managed disk view smoothing start
982003	W	Insufficient virtual extents.
982004	W	The migration suspended because of insufficient virtual extents or too many media errors on the source managed disk.
982007	W	Migration has stopped.
982009	I	Migration is complete.
982010	W	Copied disk I/O medium error.
983001	I	The FlashCopy is prepared.
983002	I	The FlashCopy is complete.

Table 24. Information event codes (continued)

Event code	SNMP Type	Description
983003	W	The FlashCopy has stopped.
984001	W	First customer data being pinned in a virtual disk working set.
984002	I	All customer data in a virtual disk working set is now unpinned.
984003	W	The virtual disk working set cache mode is in the process of changing to synchronous destage because the virtual disk working set has too much pinned data.
984004	I	Virtual disk working set cache mode now allows asynchronous destage because enough customer data has now been unpinned for theat virtual disk working set.
985001	I	The Metro Mirror or Global Mirror background copy is complete.
985002	I	The Metro Mirror or Global Mirror is ready to restart.
985003	W	Unable to find path to disk in the remote cluster within the timeout period.
986001	W	The space-efficient virtual disk copy data in a node is pinned.
986002	I	All space-efficient virtual disk copy data in a node is unpinned.
986010	W	The space-efficient virtual disk copy import has failed.
986011	I	The space-efficient virtual disk copy import is successful.
986020	W	A space-efficient virtual disk copy space warning has occurred.
986030	I	A space-efficient virtual disk copy repair has started.
986031	I	A space-efficient virtual disk copy repair is successful.
986032	I	A space-efficient virtual disk copy validation is started.
986033	I	A space-efficient virtual disk copy validation is successful.
986201	I	A medium error has been repaired for the mirrored copy.
986203	W	A mirror copy repair, using the validate option cannot complete.
986204	I	A mirror disk repair is complete and no differences are found.
986205	I	A mirror disk repair is complete and the differences are resolved.
986206	W	A mirror disk repair is complete and the differences are set to medium errors.
986207	I	The mirror disk repair has been started.
986208	W	A mirror copy repair, using the set medium error option, cannot complete.
986209	W	A mirror copy repair, using the resync option, cannot complete.
987102	W	A node power-off has been requested from the power switch.

Table 24. Information event codes (continued)

Event code	SNMP Type	Description
987103	W	Coldstart.
987301	W	The connection to a configured remote cluster has been lost.
987400	W	The node unexpectedly lost power but has now been restored to the cluster.
988100	W	An overnight maintenance procedure has failed to complete. Resolve any hardware and configuration problems that you are experiencing on the SAN Volume Controller cluster. If the problem persists, contact your IBM service representative for assistance.
989001	W	A managed disk group space warning has occurred.

Configuration event codes

Configuration event codes are generated when configuration parameters are set.

Configuration event codes are recorded in a separate log. They do not raise SNMP traps or send e-mails. Their error fixed flags are ignored. Table 25 provides a list of the configuration event codes and their meanings.

Table 25. Configuration event codes

Event code	Description
990101	Modify cluster (attributes in the **svctask chcluster** command)
990102	The e-mail test completed successfully
990103	The e-mail test failed
990105	Delete node from cluster (attributes in the **svctask rmnode** command)
990106	Create host (attributes in the **svctask mkhost** command)
990112	Cluster configuration dumped to file (attributes from the **svcluster -x dumpconfig** command)
990117	Create cluster (attributes in the **svctask mkcluster** command)
990118	Modify node (attributes in the **svctask chnode** command)
990119	Configure set controller name
990120	Shut down node (attributes in the **svctask stopcluster** command)
990128	Modify host (attributes in the **svctask chhost** command)
990129	Delete node (attributes in the **svctask rmnode** command)
990138	Virtual disk modify (attributes in the **svctask chvdisk** command)
990140	Virtual disk delete (attributes in the **svctask rmvdisk** command)
990144	Modify managed disk group (attributes in the **svctask chmdiskgrp** command)
990145	Delete managed disk group (attributes in the **svctask rmdiskgrp** command)
990148	Create managed disk group (attributes in the **svctask mkmdiskgrp** command)
990149	Modify managed disk (attributes in the **svctask chmdisk** command)

Table 25. Configuration event codes (continued)

Event code	Description
990150	Modify managed disk
990158	VLUN included
990159	Quorum created
990160	Quorum destroy
990168	Modify the HWS a virtual disk is assigned to
990169	Create a new virtual disk (attributes in the **svctask mkvdisk** command)
990173	Add a managed disk to managed disk group (attributes in the **svctask addmdisk** command)
990174	Delete a managed disk from managed disk group (attributes in the **svctask rmmdisk** command)
990178	Add a port to a Host (attributes in the **svctask addhostport** command)
990179	Delete a port from a Host (attributes in the **svctask rmhostport** command)
990182	Create a virtual disk to Host SCSI mapping (attributes in the **svctask mkvdiskhostmap** command)
990183	Delete an virtual disk to Host SCSI mapping (attributes in the **svctask rmdiskhostmap** command)
990184	Create a FlashCopy mapping (attributes in the **svctask mkfcmap** command)
990185	Modify a FlashCopy mapping (attributes in the **svctask chfcmap** command)
990186	Delete a FlashCopy mapping (attributes in the **svctask rmfcmap** command)
990187	Prepare a FlashCopy mapping (attributes in the **svctask prestartfcmap** command)
990188	Prepare a FlashCopy consistency group (attributes in the **svctask prestartfcconsistgrp** command)
990189	Trigger a FlashCopy mapping (attributes in the **svctask startfcmap** command)
990190	Trigger a FlashCopy consistency group (attributes in the **svctask startfcconsistgrp** command)
990191	Stop a FlashCopy mapping (attributes in the **svctask stopfcmap** command)
990192	Stop a FlashCopy consistency group (attributes in the **svctask stopfcconsistgrp** command)
990193	FlashCopy set name
990194	Delete a list of ports from a Host (attributes in the **svctask rmhostport** command)
990196	Shrink a virtual disk.
990197	Expand a virtual disk (attributes in the **svctask expandvdisksize** command)
990198	Expand single extent a virtual disk
990199	Modify govern a virtual disk

Table 25. Configuration event codes (continued)

Event code	Description
990203	Initiate manual managed disk discovery (attributes in the **svctask detectmdisk** command)
990204	Create FlashCopy consistency group (attributes in the **svctask mkfcconsistgrp** command)
990205	Modify FlashCopy consistency group (attributes in the **svctask chfcconsistgrp** command)
990206	Delete FlashCopy consistency group (attributes in the **svctask rmfcconsistgrp** command)
990207	Delete a list of Hosts (attributes in the **svctask rmhost** command)
990213	Change the HWS a node belongs to (attributes in the **svctask chiogrp** command)
990216	Apply software upgrade (attributes in the **svcservicetask applysoftware** command)
990219	Analyze error log (attributes in the **svctask finderr** command)
990220	Dump error log (attributes in the **svctask dumperrlog** command)
990222	Fix error log entry (attributes in the **svctask cherrstate** command)
990223	Migrate a single extent (attributes in the **svctask migrateexts** command)
990224	Migrate a number of extents
990225	Create a Metro Mirror or Global Mirror or Global Mirror relationship (attributes in the **svctask mkrcrelationship** command)
990226	Modify a Metro Mirror or Global Mirror relationship (attributes in the **svctask chrcrelationship** command)
990227	Delete a Metro Mirror or Global Mirror relationship (attributes in the **svctask rmrcrelationship** command)
990229	Start a Metro Mirror or Global Mirror relationship (attributes in the **svctask startrcrelationship** command)
990230	Stop a Metro Mirror or Global Mirror relationship (attributes in the **svctask stoprcrelationship** command)
990231	Switch a Metro Mirror or Global Mirror relationship (attributes in the **svctask switchrcrelationship** command)
990232	Start a Metro Mirror or Global Mirror consistency group (attributes in the **svctask startrcconsistgrp** command)
990233	Stop a Metro Mirror or Global Mirror consistency group (attributes in the **svctask stoprcconsistgrp** command)
990234	Switch a Metro Mirror or Global Mirror consistency group (attributes in the **svctask switchrcconsistgrp** command)
990235	Managed disk migrated to a managed disk group
990236	Virtual disk migrated to a new managed disk
990237	Create partnership with remote cluster (attributes in the **svctask mkpartnership** command)
990238	Modify partnership with remote cluster (attributes in the **svctask chpartnership** command)
990239	Delete partnership with remote cluster (attributes in the **svctask rmpartnership** command)

Table 25. Configuration event codes (continued)

Event code	Description
990240	Create a Metro Mirror or Global Mirror consistency group (attributes in the **svctask mkrcconsistgrp** command)
990241	Modify a Metro Mirror or Global Mirror consistency group (attributes in svctask chrcconsistgrp)
990242	Delete a Metro Mirror or Global Mirror consistency group (attributes in the **svctask rmrcconsistgrp** command)
990245	Node pend
990246	Node remove
990247	Node unpend
990380	Time zone changed (attributes in the **svctask settimezone** command)
990383	Change cluster time (attributes in the **svctask setclustertime** command)
990385	System time changed
990386	SSH key added (attributes in the **svctask addsshkey** command)
990387	SSH key removed (attributes in the **svctask rmsshkey** command)
990388	All SSH keys removed (attributes in the **svctask rmallsshkeys** command)
990390	Add node to the cluster
990395	Shutdown or reset node
990410	The software installation has started.
990415	The software installation has completed.
990420	The software installation has failed.
990423	The software installation has stalled.
990425	The software installation has stopped.
990430	The Planar Serial Number has changed.
990501	The featurization has changed. See the feature log for details.
990510	The configuration limits have been changed.
991024	I/O tracing has finished and the managed disk has been triggered.
991025	The autoexpand setting of the VDisk has been modified.
991026	The primary copy of the VDisk has been modified.
991027	The VDisk synchronization rate has been modified.
991028	The space-efficient VDisk warning capacity has been modified.
991029	A mirrored copy has been added to a VDisk.
991030	A repair of mirrored VDisk copies has started.
991031	A VDisk copy has been split from a mirrored VDisk.
991032	A VDisk copy has been removed from a mirrored VDisk.

Error Codes

Error codes provide a unique entry to service procedures. Each error code has an error ID that uniquely identifies the condition that caused the error.

Error IDs are recorded in the error log. When the number of error IDs of a specific type for a specific resource exceeds a predetermined threshold, an SNMP trap is raised and an e-mail is sent. When the SNMP traps are received, the SNMP type is used by the management tools to control how the trap is processed. The SNMP type is used by the Call Home e-mail service to decide the recipients, the title, and the contents of the e-mail. The following SNMP types are possible:

Error This type identifies unexpected conditions that might be the result of a system failure. If configured, this type causes an SNMP trap to be sent to the monitoring application. An e-mail can also be sent to the IBM Support Center and the system administrator.

Warning
This type identifies unexpected conditions that might be experienced during user operations. These conditions can result from device errors or incorrect user actions. If configured, this type causes an SNMP trap to be sent to the monitoring application. An e-mail can also be sent to the system administrator.

Information
This type identifies conditions where a user might want to be notified of the completion of an operation. If configured, this type causes an SNMP trap to be sent to the monitoring application. An e-mail can also be sent to the system administrator.

Table 26 lists the error codes and corresponding error IDs.

Table 26. Error codes

Error ID	SNMP Type	Condition	Error Code
009020	E	An automatic cluster recovery has started. All configuration commands are blocked.	1001
009040	E	The error log is full.	1002
009052	E	The following causes are possible: • The node is missing • The node is no longer a functional member of the cluster • One or more nodes are not available	1195
009100	W	The software install process has failed.	2010
009101	W	The software upgrade package delivery has failed.	2010
009150	W	Unable to connect to the SMTP (e-mail) server	2600
009151	W	Unable to send mail through the SMTP (e-mail) server	2601
009170	W	The Metro Mirror or Global Mirror feature capacity is not set.	3030
009171	W	The FlashCopy feature capacity is not set.	3031
009172	W	The Virtualization feature has exceeded the amount that is licensed.	3032
009173	W	The FlashCopy feature has exceeded the amount that is licensed.	3032
009174	W	The Metro Mirror or Global Mirror feature has exceeded the amount that is licensed.	3032
009176	W	The value set for the virtualization feature capacity is not valid.	3029
010002	E	The node ran out of base event sources. As a result, the node has stopped and exited the cluster.	2030

Table 26. Error codes (continued)

Error ID	SNMP Type	Condition	Error Code
010003	W	The number of device logins has reduced.	1630
010006	E	A software error has occurred.	2030
010008	E	The block size is invalid, the capacity or LUN identity has changed during the managed disk initialization.	1660
010010	E	The managed disk is excluded because of excessive errors.	1310
010011	E	The remote port is excluded for a managed disk and node.	1220
010012	E	The local port is excluded.	1210
010013	E	The login is excluded.	1230
010017	E	A timeout has occurred as a result of excessive processing time.	1340
010018	E	An error recovery procedure has occurred.	1370
010019	E	A managed disk I/O error has occurred.	1310
010020	E	The managed disk error count threshold has exceeded.	1310
010021	E	There are too many devices presented to the cluster.	1200
010022	E	There are too many managed disks presented to the cluster.	1200
010023	E	The are too many LUNs presented to a node.	1200
010025	W	A disk I/O medium error has occurred.	1320
010026	E	There are no managed disks that can be used as a quorum disk.	1330
010027	E	The quorum disk is not available.	1335
010028	W	A controller configuration is not supported.	1625
010029	E	A login transport fault has occurred.	1360
010030	E	A managed disk error recovery procedure (ERP) has occurred. The node or controller reported the following: • Sense • Key • Code • Qualifier	1370
010031	E	One or more MDisks on a controller are degraded.	1623
010032	W	The controller configuration limits failover.	1625
010033	E	The controller configuration uses the RDAC mode; this is not supported.	1624
010034	E	Persistent unsupported controller configuration.	1695
010040	E	The controller subsystem device is only connected to the node through a single initiator port.	1627
010041	E	The controller subsystem device is only connected to the node through a single target port.	1627
010042	E	The controller subsystem device is only connected to the cluster nodes through a single target port.	1627
010043	E	The controller subsystem device is only connected to the cluster nodes through half of the expected target ports.	1627
010044	E	The controller subsystem device has disconnected all target ports to the cluster nodes.	1627

Table 26. Error codes (continued)

Error ID	SNMP Type	Condition	Error Code
020001	E	There are too many medium errors on the managed disk.	1610
020002	E	A managed disk group is offline.	1620
020003	W	There are insufficient virtual extents.	2030
030000	W	The trigger prepare command has failed because of a cache flush failure.	1900
030010	W	The mapping is stopped because of the error that is indicated in the data.	1910
050010	W	A Metro Mirror or Global Mirror relationship has stopped because of a persistent I/O error.	1920
050020	W	A Metro Mirror or Global Mirror relationship has stopped because of an error that is not a persistent I/O error.	1720
060001	W	The space-efficient virtual disk copy is offline because there is insufficient space.	1865
060002	W	The space-efficient virtual disk copy is offline because the metadata is corrupt.	1862
060003	W	The space-efficient virtual disk copy is offline because the repair has failed.	1860
060004	W	The space-efficient virtual disk copy import has failed.	2200
062001	W	Unable to mirror medium error during VDisk copy synchronization	1950
062002	W	The mirrored VDisk is offline because the data cannot be synchronized.	1870
062003	W	The repair process for the mirrored disk has stopped because there is a difference between the copies.	1600
072001	E	A system board hardware failure has occurred. This error applies to only the SAN Volume Controller 2145-4F2 model.	1020
072004	E	A CMOS battery failure has occurred. This error applies to the SAN Volume Controller 2145-4F2, the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1670
072005	E	A CMOS battery failure has occurred. This error applies to only the SAN Volume Controller 2145-8G4 model.	1670
072101	E	The processor is missing. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1025
072102	E	The processor is missing. This error applies to only the SAN Volume Controller 2145-8G4 model.	1025
073001	E	The fibre-channel adapter card has detected an incorrect number of fibre-channel adapters. This error applies to only the SAN Volume Controller 2145-4F2 model.	1010
073002	E	The fibre-channel adapter has failed. This error applies to only the SAN Volume Controller 2145-4F2 model.	1050
073003	E	The fibre-channel ports are not operational.	1060
073004	E	The fibre-channel adapter has detected a PCI bus error. This error applies to only the SAN Volume Controller 2145-4F2 model.	1012

Table 26. Error codes (continued)

Error ID	SNMP Type	Condition	Error Code
073005	E	A cluster path failure has occurred.	1550
073006	W	The SAN is not correctly zoned. As a result, more than 512 ports on the SAN have logged into one SAN Volume Controller port.	1800
073101	E	The 2-port fibre-channel adapter card in slot 1 is missing. This error applies to only the SAN Volume Controller 2145-8F2 model.	1014
073102	E	The 2-port fibre-channel adapter in slot 1 has failed. This error applies to only the SAN Volume Controller 2145-8F2 model.	1054
073104	E	The 2-port fibre-channel adapter in slot 1 has detected a PCI bus error. This error applies to only the SAN Volume Controller 2145-8F2 model.	1017
073201	E	The 2-port fibre-channel adapter in slot 2 is missing. This error applies to only the SAN Volume Controller 2145-8F2 model.	1015
073202	E	The 2-port fibre-channel adapter in slot 2 has failed. This error applies to only the SAN Volume Controller 2145-8F2 model.	1056
073204	E	The 2-port fibre-channel adapter in slot 2 has detected a PCI bus error. This error applies to only the SAN Volume Controller 2145-8F2 model.	1018
073251	E	The 4-port fibre-channel adapter in slot 1 is missing. This error applies to only the SAN Volume Controller 2145-8G4 model.	1011
073252	E	The 4-port fibre-channel adapter in slot 1 has failed. This error applies to only the SAN Volume Controller 2145-8G4 model.	1055
073258	E	The 4-port fibre-channel adapter in slot 1 has detected a PCI bus error. This error applies to only the SAN Volume Controller 2145-8G4 model.	1013
073301	E	The 4-port fibre-channel adapter in slot 2 is missing. This error applies to only the SAN Volume Controller 2145-8F4 model.	1016
073302	E	The 4-port fibre-channel adapter in slot 2 has failed. This error applies to only the SAN Volume Controller 2145-8F4 model.	1057
073304	E	The 4-port fibre-channel adapter in slot 2 has detected a PCI bus error. This error applies to only the SAN Volume Controller 2145-8F4 model.	1019
073305	E	One or more fibre-channel ports are running at a speed that is lower than the last saved speed. This error applies to both the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8G4 models.	1065
073310	E	A duplicate fibre-channel frame has been detected, which indicates that there is an issue with the fibre-channel fabric. Other fibre-channel errors might also be generated.	1203

Table 26. Error codes (continued)

Error ID	SNMP Type	Condition	Error Code
074001	W	Unable to determine the vital product data (VPD) for an FRU. This is probably because a new FRU has been installed and the software does not recognize that FRU. The cluster continues to operate; however, you must upgrade the software to fix this warning.	2040
074002	E	The node warm started after a software error.	2030
075001	E	The flash boot device has failed. This error applies to the SAN Volume Controller 2145-4F2, the SAN Volume Controller 2145-8F2, and the SAN Volume Controller 2145-8F4 models.	1040
075002	E	The flash boot device has recovered. This error applies to the SAN Volume Controller 2145-4F2, the SAN Volume Controller 2145-8F2, and the SAN Volume Controller 2145-8F4 models.	1040
075005	E	A service controller read failure has occurred. This error applies to the SAN Volume Controller 2145-4F2, the SAN Volume Controller 2145-8F2, and the SAN Volume Controller 2145-8F4 models.	1044
075011	E	The flash boot device has failed. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1040
075012	E	The flash boot device has recovered. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1040
075015	E	A service controller read failure has occurred. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1044
076001	E	The internal disk for a node has failed.	1030
076002	E	The hard disk is full and cannot capture any more output.	2030
077001	E	The system board service processor shows that fan 1 has failed. This error applies to only the SAN Volume Controller 2145-4F2 model.	1070
077002	E	The system board service processor shows that fan 2 has failed. This error applies to only the SAN Volume Controller 2145-4F2 model.	1070
077003	E	The system board service processor shows that fan 3 has failed. This error applies to only the SAN Volume Controller 2145-4F2 model.	1070
077004	E	The system board service processor shows that fan 4 has failed. This error applies to only the SAN Volume Controller 2145-4F2 model.	1070
077005	E	The system board service processor shows that fan 5 has failed. This error applies to only the SAN Volume Controller 2145-4F2 model.	1071
077011	E	The system board service processor shows that the ambient temperature threshold has exceeded. This error applies to only the SAN Volume Controller 2145-4F2 model.	1075
077012	E	The system board service processor shows that temperature warning threshold has exceeded. This error applies to only the SAN Volume Controller 2145-4F2 model.	1076

Table 26. Error codes (continued)

Error ID	SNMP Type	Condition	Error Code
077013	E	The system board service processor shows that the soft or hard shutdown temperature threshold has exceeded. This error applies to only the SAN Volume Controller 2145-4F2 model.	1077
077021	E	The system board service processor shows that Voltage 1, (12 volt) is outside the set thresholds. This error applies to only the SAN Volume Controller 2145-4F2 model.	1080
077022	E	The system board service processor shows that Voltage 2, (5 volt) is outside the set thresholds. This error applies to only the SAN Volume Controller 2145-4F2 model.	1080
077023	E	The system board service processor shows that Voltage 3, (3.3 volt) is outside the set thresholds. This error applies to only the SAN Volume Controller 2145-4F2 model.	1080
077024	E	The system board service processor shows that Voltage 4, (2.5 volt) is outside the set thresholds. This error applies to only the SAN Volume Controller 2145-4F2 model.	1081
077025	E	The system board service processor shows that Voltage 5, (1.5 volt) is outside the set thresholds. This error applies to only the SAN Volume Controller 2145-4F2 model.	1081
077026	E	The system board service processor shows that Voltage 6, (1.25 volt) is outside the set thresholds. This error applies to only the SAN Volume Controller 2145-4F2 model.	1081
077027	E	The system board service processor shows that Voltage 7, (CPU volts) is outside the set thresholds. This error applies to only the SAN Volume Controller 2145-4F2 model.	1081
077101	E	The service processor shows a fan 40×40×28 failure. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1090
077102	E	The service processor shows a fan 40×40×56 failure. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1091
077105	E	The service processor shows a fan failure. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1089
077111	E	The node ambient temperature threshold has exceeded. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1094
077112	E	The node processor warning temperature threshold has exceeded. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1093
077113	E	The node processor or ambient critical threshold has exceeded. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1092
077121	E	System board - any voltage high. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1100
077124	E	System board - any voltage low. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1105

Table 26. Error codes (continued)

Error ID	SNMP Type	Condition	Error Code
077128	E	A power management board voltage failure has occurred. This error applies to both the SAN Volume Controller 2145-8F2 and the SAN Volume Controller 2145-8F4 models.	1110
077161	E	The node ambient temperature threshold has exceeded. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1094
077162	E	The node processor warning temperature threshold has exceeded. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1093
077163	E	The node processor or ambient critical threshold has exceeded. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1092
077171	E	System board - any voltage high. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1101
077174	E	System board - any voltage low. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1106
077178	E	A power management board voltage failure has occurred. This errors applies to only the SAN Volume Controller 2145-8G4 model.	1110
078001	E	A power domain error has occurred. Both nodes in a pair are powered by the same uninterruptible power supply.	1155
079000	W	Data has not been recovered on virtual disks (VDisks).	1850
079500	W	The limit on the number of cluster secure shell (SSH) sessions has been reached.	2500
081001	E	An Ethernet port failure has occurred.	1400
082001	E	A server error has occurred.	2100
083001	E	An uninterruptible power supply communications failure has occurred. The RS232 connection between a node and its uninterruptible power supply is faulty. This error applies to only the 2145 uninterruptible power supply model.	1145
083002	E	The uninterruptible power supply output is unexpectedly high. The uninterruptible power supply is probably connected to a non-SAN Volume Controller load. This error applies to only the 2145 uninterruptible power supply model.	1165
083003	E	The uninterruptible power supply battery has reached end of life. This error applies to only the 2145 uninterruptible power supply model.	1190
083004	E	An uninterruptible power supply battery failure has occurred. This error applies to only the 2145 uninterruptible power supply model.	1180
083005	E	An uninterruptible power supply electronics failure has occurred. This error applies to only the 2145 uninterruptible power supply model.	1170
083006	E	Uninterruptible power supply frame fault	1175
083007	E	Uninterruptible power supply frame fault overcurrent. This error applies to only the 2145 uninterruptible power supply model.	1160

Table 26. Error codes (continued)

Error ID	SNMP Type	Condition	Error Code
083008	E	An uninterruptible power supply failure has occurred. This error applies to only the 2145 uninterruptible power supply model.	1185
083009	E	Uninterruptible power supply AC input power fault. This error applies to only the 2145 uninterruptible power supply model.	1140
083010	E	An uninterruptible power supply configuration error has occurred. This error applies to only the 2145 uninterruptible power supply model.	1150
083011	E	Uninterruptible power supply ambient over temperature. This error applies to only the 2145 uninterruptible power supply model.	1135
083012	E	Uninterruptible power supply over temperature warning. This error applies to only the 2145 uninterruptible power supply model.	3000
083013	E	The cross cable test was bypassed because of an internal uninterruptible power supply software error. This error applies to only the 2145 uninterruptible power supply model.	3010
083101	E	An uninterruptible power supply communications failure has occurred. The RS232 connection between a node and its uninterruptible power supply is faulty. This error applies to only the 2145-1U uninterruptible power supply model.	1146
083102	E	The uninterruptible power supply output is unexpectedly high. The uninterruptible power supply is probably connected to a non-SAN Volume Controller load. This error applies to only the 2145-1U uninterruptible power supply model.	1166
083103	E	The uninterruptible power supply battery has reached end of life. This error applies to only the 2145-1U uninterruptible power supply model.	1191
083104	E	An uninterruptible power supply battery failure has occurred. This error applies to only the 2145-1U uninterruptible power supply model.	1181
083105	E	An uninterruptible power supply electronics failure has occurred. This error applies to only the 2145-1U uninterruptible power supply model.	1171
083107	E	Uninterruptible power supply overcurrent. This error applies to only the 2145-1U uninterruptible power supply model.	1161
083108	E	An uninterruptible power supply failure has occurred. This error applies to only the 2145-1U uninterruptible power supply model.	1186
083109	E	Uninterruptible power supply AC input power fault. This error applies to only the 2145-1U uninterruptible power supply model.	1141
083110	E	An uninterruptible power supply configuration error has occurred. This error applies to only the 2145-1U uninterruptible power supply model.	1151
083111	E	Uninterruptible power supply ambient over temperature. This error applies to only the 2145-1U uninterruptible power supply model.	1136

Table 26. Error codes (continued)

Error ID	SNMP Type	Condition	Error Code
083112	E	Uninterruptible power supply over temperature warning. This error applies to only the 2145-1U uninterruptible power supply model.	3001
083113	E	An uninterruptible power supply software error has occurred. This error applies to only the 2145-1U uninterruptible power supply model.	3011

Definitions of the FRU names for the SAN Volume Controller

The glossaries for all SAN Volume Controllers are in this topic to provide you with all applicable field replaceable units (FRUs).

Glossary of FRU names for the SAN Volume Controller 2145-8G4

Name of FRU	Description
Frame assembly	A complete SAN Volume Controller 2145-8G4 with the exception of the fibre-channel cards and the service controller
System board assembly	An assembly that consists of the system board and new thermal grease for the microprocessor.
4-port fibre-channel host bus adapter (HBA)	The SAN Volume Controller 2145-8G4 is connected to the fibre-channel fabric through the fibre-channel HBA, which is located in PCI slot 1.
Fibre-channel small form-factor pluggable (SFP) connector	A compact optical transceiver that provides the optical interface to a fibre-channel cable. It is capable of operating at up to 4 GB/sec.
Riser card, PCI Express	An interconnection card that provides the interface between the system board and the 4-port fibre-channel adapter.
Service controller	The FRU that provides the service functions and the front panel display and buttons.
Disk drive	A SATA (serial advanced technology attachment) disk drive for the SAN Volume Controller 2145-8G4
Disk drive cage assembly	A SATA disk drive cage assembly for the SAN Volume Controller 2145-8G4
SATA cable assembly	A SATA disk drive cable assembly with backplate
Memory module	A 1 GB ECC DRR2 memory module
Microprocessor	The dual core microprocessor with heat sink on the system board
Power supply assembly	An assembly that provides dc power to the SAN Volume Controller 2145-8G4
Power backplane	An assembly that provides a power interface between the system board and the power supply assembly

Name of FRU	Description
CMOS battery	A 3.0V battery on the system board that maintains power to backup the system BIOS settings
Front panel signal cable	A ribbon cable that connects the operator information panel to the system board
Operator information panel	The information panel that includes the power control button and the light path diagnostics LEDs
Fan assembly	A fan assembly containing two fans, which is used in all the fan positions
Input power cable assembly	The cable assembly that provides the power and signal connections between the SAN Volume Controller 2145-8G4 and the 2145-1U uninterruptible power supply assembly

Glossary of FRU names for the SAN Volume Controller 2145-8F4

Name of FRU	Description
Frame assembly	A complete SAN Volume Controller 2145-8F4 with the exception of the fibre-channel cards and the service controller
4-port fibre-channel host bus adapter (HBA)	The SAN Volume Controller 2145-8F4 is connected to the fibre-channel fabric through the fibre-channel HBA. The card assembly is located in PCI slot 2. It is not permitted to install a fibre-channel card in PCI slot 1 when the card is installed.
Fibre-channel small form-factor pluggable (SFP) connector	A compact optical transceiver that provides the optical interface to a fibre-channel cable. It is capable of operating at up to 4 GB/sec.
Riser card, PCI Express	An interconnection card that provides the interface between the system board and the 4-port fibre-channel adapter.
Service controller	The FRU that provides the service functions and the front panel display and buttons.
Disk drive assembly	A SATA (serial advanced technology attachment) disk drive assembly for the SAN Volume Controller 2145-8F4
Memory module	A 1 GB ECC DRR2 memory module
Microprocessor	The microprocessor on the system board
Voltage regulator module (VRM)	The VRM of the microprocessor
Power supply assembly	An assembly that provides dc power to the SAN Volume Controller 2145-8F4
Power backplane	An assembly that provides a power interface between the system board and the power supply assembly
CMOS battery	A 3.0V battery on the system board that maintains power to backup the system BIOS settings

Name of FRU	Description
Fan power cable	A kit that provides the cables for connecting the fan backplanes to the system board
Front panel signal cable	A ribbon cable that connects the operator information panel to the system board
Fan backplane	A kit that provides all fan holder and fan backplane assemblies
Operator information panel	The information panel that includes the power control button and the light path diagnostics LEDs
Fan, 40×40×28	The single fan assemblies located in fan positions 1 - 3
Fan, 40×40×56	The double fan assemblies located in fan positions 4 - 7
Input power cable assembly (SAN Volume Controller 2145-8F4 to 2145-1U uninterruptible power supply)	The cable assembly that provides the power and signal connections between the SAN Volume Controller 2145-8F4 and the 2145-1U uninterruptible power supply assembly

Glossary of FRU names for the SAN Volume Controller 2145-8F2

Name of FRU	Description
Frame assembly	A complete SAN Volume Controller 2145-8F2 with the exception of the fibre-channel cards and the service controller
Fibre-channel host bus adapter (HBA) (full height)	The SAN Volume Controller 2145-8F2 is connected to the fibre-channel fabric through the fibre-channel HBA. The full height card assembly is located in PCI slot 2.
Fibre-channel small form-factor pluggable (SFP) connector	A compact optical transceiver that provides the optical interface to a fibre-channel cable. Its maximum speed is limited to 2 GB/sec by the fibre-channel adapter.
Riser card, PCI (full height)	An interconnection card that provides the interface between the system board and the PCI card in slot 2
Fibre-channel HBA (low profile)	The SAN Volume Controller 2145-8F2 is connected to the fibre-channel fabric through the fibre-channel HBA. The low profile card assembly is located in PCI slot 1.
Riser card, PCI (low profile)	An interconnection card that provides the interface between the system board and the PCI card in slot 1
Service controller	The FRU that provides the service functions and the front panel display and buttons.
Disk drive assembly	A SATA (serial advanced technology attachment) disk drive assembly for the SAN Volume Controller 2145-8F2
Memory module	A 1 GB ECC DRR2 memory module
Microprocessor	The microprocessor on the system board
Voltage regulator module (VRM)	The microprocessor's VRM

Name of FRU	Description
Power supply assembly	An assembly that provides DC power to the SAN Volume Controller 2145-8F2
Power backplane	An assembly that provides a power interface between the system board and the power supply assembly
CMOS battery	A 3.0V battery on the system board that maintains power to backup the system BIOS settings
Fan power cable	A kit that provides the cables for connecting the fan backplanes to the system board
Front panel signal cable	A ribbon cable that connects the operator information panel to the system board
Fan backplane	A kit that provides all fan holder and fan backplane assemblies
Operator information panel	The information panel that includes the power control button and the light path diagnostics LEDs
Fan, 40×40×28	The single fan assemblies located in fan positions 1-3
Fan, 40×40×56	The double fan assemblies located in fan positions 4-7
Input power cable assembly (SAN Volume Controller 2145-8F2 to 2145-1U uninterruptible power supply)	The cable assembly that provides the power and signal connections between the SAN Volume Controller 2145-8F2 and the 2145-1U uninterruptible power supply assembly

Glossary of FRU names for the SAN Volume Controller 2145-4F2

Name of FRU	Description
Frame assembly	The frame of the SAN Volume Controller 2145-4F2 and the cables that it contains
Disk drive assembly	The disk drive of the SAN Volume Controller 2145-4F2
Disk drive cables	The SCSI and power cable, which connect the disk drive to the SAN Volume Controller 2145-4F2 system board
Fibre channel cable	A cable that connects the SAN Volume Controller 2145-4F2 to a fibre-channel network
Ethernet cable	A cable that connects the SAN Volume Controller 2145-4F2 to an Ethernet network
Power supply assembly	An assembly that provides DC power to the SAN Volume Controller 2145-4F2 and also contains three fans
Power cable assembly	The power cable and signal cable that connect the SAN Volume Controller to the uninterruptible power supply. This FRU consists of a power cable and a signal cable.

Name of FRU	Description
Fan assembly	An assembly that contains a dc cooling fan. The SAN Volume Controller 2145-4F2 has two types of fan assemblies, excluding those that are in the power supply assembly.
System board assembly	An assembly that consists of the system board, two processors, VRM, riser card, voltage regulator, and CMOS battery
Fibre channel adapter assembly	The means by which the SAN Volume Controller 2145-4F2 is connected to the fibre-channel fabric
Fibre-channel small form-factor pluggable (SFP) connector	A compact optical transceiver that provides the optical interface to a fibre-channel cable. Its maximum speed is limited to 2 GB/sec by the fibre channel adapter.
Service controller	The FRU that provides the service functions of the SAN Volume Controller 2145-4F2. This FRU consists of an electronics card, the flash module, and three connecting cables.
CMOS battery	The battery that maintains power to back up the system BIOS settings for time and date.
Front panel assembly	The front cover of the SAN Volume Controller 2145-4F2. This FRU includes the front panel, controls, and display.

Related reference

"Definitions of the FRU names for the uninterruptible power supply"
The following glossary provides the field replaceable unit (FRU) names for the uninterruptible power supply:

Definitions of the FRU names for the redundant ac power switch

The following glossary provides the field replaceable unit (FRU) names for the redundant ac power switch:

Name of FRU	Description
Redundant ac power switch assembly	The redundant ac power switch and its input power cables.

Definitions of the FRU names for the uninterruptible power supply

The following glossary provides the field replaceable unit (FRU) names for the uninterruptible power supply:

Name of FRU	Description
Battery assembly	The battery that provides backup power to the SAN Volume Controller if a power failure occurs. This FRU is part of the uninterruptible power supply.
Battery plate	Cover plate for the 2145-1U uninterruptible power supply battery pack assembly

Name of FRU	Description
Input power cable, power distribution unit to the uninterruptible power supply	Power cord for the 2145-1U uninterruptible power supply
Front panel	Removable FRU for the 2145-1U uninterruptible power supply
uninterruptible power supply electronics assembly	The unit that controls the functions of the 2145 uninterruptible power supply. This FRU is part of the 2145 uninterruptible power supply.
uninterruptible power supply	This FRU includes the frame of the uninterruptible power supply and all the FRUs contained within that frame.

Related reference

"Definitions of the FRU names for the SAN Volume Controller" on page 197
The glossaries for all SAN Volume Controllers are in this topic to provide you with all applicable field replaceable units (FRUs).

Determining a hardware boot failure

If you see that the hardware boot display stays on the front panel for more than three minutes, the node cannot boot. The cause might be a hardware failure or the software on the hard disk drive is missing or damaged.

Perform the following steps to determine a hardware boot failure:

1. Attempt to restore the software by using the node rescue procedure.
2. If node rescue fails, perform the actions that are described for any failing node rescue code or procedure.

Related concepts

"Hardware boot" on page 145
The hardware boot display shows system data when power is first applied to the node as the node searches for a disk drive to boot.

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

Understanding the boot codes

The boot codes are displayed on the screen when a node is booting.

The codes indicate the progress of the boot operation or the condition that has caused the node to fail to boot. The codes can isolate failures when the boot hangs or when the boot detects an unrecoverable error. Line 1 of the front panel displays the message `Booting` that is followed by the boot code. Line 2 of the display shows a boot progress indicator. If the boot hangs, the progress bar stops and you can use the code to isolate the fault. If the boot code detects a hardware error, `Failed` is displayed and you can use the error code to isolate the failure. In some cases, the same code that displays with the Booting message is also displayed as the Failed error code. Figure 76 on page 203 provides a view of the boot progress display and Figure 77 on page 203 provides a view of the boot failed display.

Figure 76. Boot progress display

Figure 77. Boot failed display

Related concepts

"Boot progress indicator" on page 143
Boot progress is displayed on the front panel of the SAN Volume Controller.

100 Boot is running.

Explanation

If the progress bar does not advance for two minutes, the boot process is hung.

Action

Go to the hardware boot MAP to resolve the problem.

Possible Cause-FRUs or other:

2145-8G4

- Service controller (95%)
- System board assembly (5%)

2145-8F2 or 2145-8F4

- Service controller (95%)
- Frame assembly (5%)

2145-4F2

- Service controller (95%)
- System board (5%)

Related tasks

"MAP 5900: Hardware boot" on page 425
MAP 5900: Hardware boot helps you solve problems that are preventing the node from starting its boot sequence.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

110 The 2145 is loading kernel code.
Explanation

The progress bar has stopped.

Action

If the progress bar has been stopped for two minutes, power off the node and then power on the node. If the boot process stops again at this point, run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

120 A disk drive hardware error has occurred.
Explanation

A disk drive hardware error has occurred.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

2145-8G4

- Disk drive assembly (95%)
- Disk cable assembly (4%)
- System board assembly (1%)

2145-8F2 or 2145-8F4

- Disk drive assembly (98%)
- Frame assembly (2%)

2145-4F2

- Disk drive assembly (95%)
- Disk drive cables (5%)

Related tasks

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
You might have to remove the SATA backplate for a service action.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the SAN Volume Controller 2145-4F2 disk drive cables" on page 499
The disk drive cables must be replaced if they are removed.

Related reference

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

130 The 2145 is checking the file systems.

Explanation

The progress bar is stopped.

Action

If the progress bar has been stopped for at least five minutes, power off the node and then power on the node. If the boot process stops again at this point, run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

132 The 2145 is updating the node's BIOS CMOS settings.

Explanation

When the update completes, the node reboots.

Action

If the progress bar has stopped for more than ten minutes, or if the display has shown codes 100 and 132 three times or more, go to MAP 5900: Hardware boot to resolve the problem.

Related tasks

"MAP 5900: Hardware boot" on page 425
MAP 5900: Hardware boot helps you solve problems that are preventing the node from starting its boot sequence.

135 The 2145 is verifying the software.

Explanation

The 2145 is verifying the software.

Action

If the progress bar has stopped for at least 90 minutes, power off the node and then power on the node. If the boot process stops again at this point, run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

137 Updating the system board service processor firmware.

Explanation

The process of updating the system board service processor firmware might take up to 90 minutes.

Action

If the progress bar has been stopped for more than 90 minutes, power off and reboot the node. If the boot progress bar stops again on this code, replace the system board assembly.

Possible Cause-FRUs or other:

- Communications problem (95%)
- System board assembly (5%)

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

140 The 2145 software is damaged.

Explanation

The 2145 software is damaged.

Action

Power off the node and then power on the node. If the boot process stops again at this point, run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

145 Unable to detect fibre-channel adapter

Explanation

The 2145 cannot detect any fibre-channel adapter cards.

Action

Ensure that a fibre-channel adapter card has been installed. Ensure that the fibre-channel card is seated correctly in the riser card. Ensure that the riser card is seated correctly on the system board. If the problem persists, exchange FRUs for new FRUs in the order shown.

Possible Cause-FRUs or other:

2145-8G4

- 4-port fibre-channel host bus adapter (80%)
- Riser card (19%)
- System board assembly (1%)

2145-8F4

- 4-port fibre-channel host bus adapter (99%)
- Frame assembly (1%)

2145-8F2

- fibre-channel host bus adapter (full height) (40%)
- fibre-channel host bus adapter (low profile) (40%)
- Riser card, PCI (full height) (9%)
- Riser card, PCI (low profile) (9%)
- Frame assembly (2%)

2145-4F2

- fibre-channel adapter assembly (98%)
- System board (2%)

Related tasks

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

"Removing the SAN Volume Controller 2145-8G4 PCI express riser card assembly" on page 532
Use these instructions when you are prompted to remove the SAN Volume Controller 2145-8G4 PCI express riser card assembly.

"Replacing the SAN Volume Controller 2145-8G4 PCI express riser card assembly" on page 532
Use these instructions when you are prompted to replace the SAN Volume Controller 2145-8G4 PCI express riser card assembly.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

150 The 2145 is loading the cluster code.

Explanation

The 2145 is loading the cluster code.

Action

If the progress bar has been stopped for at least 90 seconds, power off the node and then power on the node. If the boot process stops again at this point, run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

155 The 2145 is loading the cluster data.

Explanation

The 2145 is loading the cluster data.

Action

If the progress bar has been stopped for at least 90 seconds, power off the node and then power on the node. If the boot process stops again at this point, run the node rescue procedure.

Possible Cause-FRUs or other:

- None.

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

160 The 2145 is recovering flash disk.

Explanation

The flash disk recovery operation will take more time when a node rescue is occurring than when a node rescue is not occurring.

Action

When a node rescue is occurring, if the progress bar has been stopped for at least thirty minutes, exchange the FRU for a new FRU. When a node rescue is not occurring, if the progress bar has been stopped for at least fifteen minutes, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ at the end of this section.

Possible Cause-FRUs or other:

- Service Controller (100%)

Related tasks

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

170 A flash module hardware error has occurred.

Explanation

A flash module hardware error has occurred.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:

- Service controller (100%)

Related tasks

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

174 The service processor on the system board has failed.

Explanation

The service processor on the system board has failed.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

2145-8G4

- System board assembly (100%)

2145-8F2 or 2145-8F4

- Frame assembly (100%)

2145-4F2

- System board assembly (100%)

Related tasks

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

175 The service processor has indicated an overheating.

Explanation

The node temperature soft or hard shutdown threshold has been exceeded. The node will power off after 10 seconds.

Action

Clear the vents and remove any heat sources. Ensure that the airflow around the node is not restricted. Ensure that the operating environment meets requirements. Go to the light path diagnostic MAP and perform the light path diagnostic procedures. If these actions do not fix the problem, replace the FRU.

Possible Cause-FRUs or other:

2145-8G4

- Light path diagnostic FRU (25%)
- System board assembly (5%)

2145-8F2 or 2145-8F4

- Light path diagnostic FRU (25%)
- Frame assembly (5%)

2145-4F2

- System board assembly (30%)

Other:

- System environment (70%)

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

"MAP 5900: Hardware boot" on page 425
MAP 5900: Hardware boot helps you solve problems that are preventing the node from starting its boot sequence.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"SAN Volume Controller 2145-8G4 environment requirements" on page 40
Before the SAN Volume Controller 2145-8G4 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

180 There is a fault in the communications cable, the serial interface in the uninterruptible power supply 2145 UPS, or the 2145.

Explanation

There is a fault in the communications cable, the serial interface in the uninterruptible power supply 2145 UPS, or 2145.

Action

Check that the communications cable is correctly plugged in to the 2145 and the 2145 UPS. If the cable is plugged in correctly, replace the FRUs in the order shown.

Possible Cause-FRUs or other:

2145-4F2

- 2145 power cable assembly (40%)
- 2145 UPS electronics assembly (30%)
- 2145 system board assembly (25%)
- 2145 disk drive assembly (5%)

Related tasks

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

"Removing and replacing the SAN Volume Controller 2145-4F2 service controller cables" on page 470
You can remove the SAN Volume Controller 2145-4F2 service controller cables from the SAN Volume Controller 2145-4F2.

"Removing the power cable from the 2145 uninterruptible power supply" on page 624
You can replace the power cable from the 2145 uninterruptible power supply if you are having problems with the power supply and suspect that the power cable is defective.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

181 There is a fault in the communications cable, the serial interface in the uninterruptible power supply 2145 UPS-1U, or the 2145.

Explanation

There is a fault in the communications cable, the serial interface in the uninterruptible power supply 2145 UPS-1U, or 2145.

Action

Check that the communications cable is correctly plugged in to the 2145 and the 2145 UPS-1U. If the cable is plugged in correctly, replace the FRUs in the order shown.

Possible Cause-FRUs or other:

2145-8G4

- 2145 power cable assembly (40%)
- 2145 UPS-1U assembly (30%)
- 2145 system board assembly (30%)

2145-8F2 or 2145-8F4

- 2145 power cable assembly (40%)
- 2145 UPS-1U assembly (30%)
- 2145 frame assembly (30%)

2145-4F2

- 2145 power cable assembly (40%)
- 2145 UPS-1U assembly (30%)
- 2145 system board assembly (25%)
- 2145 disk drive assembly (5%)

Related tasks

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the power supply" on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

"Replacing the power supply" on page 512
You might need to replace the SAN Volume Controller power supply for a service action.

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

"Removing and replacing the SAN Volume Controller 2145-4F2 service controller cables" on page 470
You can remove the SAN Volume Controller 2145-4F2 service controller cables from the SAN Volume Controller 2145-4F2.

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

185 The uninterruptible power supply battery has reached its end of life.

Explanation

The maximum available capacity can no longer support four 2145s.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- 2145 UPS battery assembly (100%)

Related tasks

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

"Replacing the 2145 uninterruptible power supply battery" on page 634
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

186 The uninterruptible power supply battery has reached its end of life.

Explanation

The maximum available capacity can no longer support one 2145.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.") After replacing the battery assembly, if the 2145 UPS-1U service indicator is on, press and hold the 2145 UPS-1U Test button for three seconds to start the self-test and verify the repair.

Possible Cause-FRUs or other:

- 2145 UPS-1U battery assembly (100%)

Related tasks

"Removing the 2145-1U uninterruptible power supply battery" on page 606
Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

"Replacing the 2145-1U uninterruptible power supply battery" on page 611
Follow all safety notices when you are replacing the 2145-1U uninterruptible power supply battery.

190 A problem has occurred with the uninterruptible power supply battery.

Explanation

A problem has occurred with the 2145 UPS battery.

Action

Exchange the FRU for a new FRU. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- 2145 UPS battery assembly (100%)

Related tasks

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

"Replacing the 2145 uninterruptible power supply battery" on page 634
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

191 A problem has occurred with the uninterruptible power supply battery.

Explanation

A problem has occurred with the uninterruptible power supply 2145 UPS-1U battery.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″) After replacing the battery assembly, if the 2145 UPS-1U service indicator is on, press and hold the 2145 UPS-1U Test button for three seconds to start the self-test and verify the repair.

Possible Cause-FRUs or other:

- 2145 UPS-1U battery assembly
- 2145 UPS-1U assembly

Related tasks

“Removing the 2145-1U uninterruptible power supply battery” on page 606
Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

“Replacing the 2145-1U uninterruptible power supply battery” on page 611
Follow all safety notices when you are replacing the 2145-1U uninterruptible power supply battery.

“Removing the 2145-1U uninterruptible power supply” on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

“Replacing the 2145-1U uninterruptible power supply” on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

195 A problem has occurred with the uninterruptible power supply electronics.

Explanation

A problem has occurred with the 2145 UPS electronics.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:

- 2145 UPS electronics assembly (100%)

Related tasks

“Removing the 2145 uninterruptible power supply electronics” on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

“Replacing the 2145 uninterruptible power supply electronics” on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

196 A problem has occurred with the uninterruptible power supply electronics.

Explanation

A problem has occurred with the 2145 UPS-1U electronics.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:

- 2145 UPS-1U assembly

Related tasks

“Removing the 2145-1U uninterruptible power supply” on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

“Replacing the 2145-1U uninterruptible power supply” on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

“Removing the 2145 uninterruptible power supply electronics” on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

“Replacing the 2145 uninterruptible power supply electronics” on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

200 A problem has occurred with the uninterruptible power supply.

Explanation

A problem has occurred with the 2145 UPS.

Action

Exchange the FRU for a new FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:

- 2145 UPS (100%)

Related tasks

“Removing the 2145 uninterruptible power supply” on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

“Replacing the 2145 uninterruptible power supply” on page 617
You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

205 A problem with output overload was reported by the uninterruptible power supply.

Explanation

This is assumed to be a false error, or the 2145 UPS would have powered off and its Load Level Indicator would be red.

Action

Replace the FRU. (See ″Possible Cause-FRUs or other.″)

Possible Cause-FRUs or other:

- 2145 UPS electronics assembly (100%)

  Related tasks

  “Removing the power supply” on page 509
  You must remove the SAN Volume Controller power supply if you intend to replace it.

  “Replacing the power supply” on page 512
  You might need to replace the SAN Volume Controller power supply for a service action.

  “Removing the 2145 uninterruptible power supply” on page 615
  Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

  “Replacing the 2145 uninterruptible power supply” on page 617
  You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

206 A problem with output overload has been reported by the uninterruptible power supply. The Overload Indicator on the 2145 UPS-1U front panel is illuminated red.

Explanation

A problem with output overload has been reported by the uninterruptible power supply 2145 UPS-1U. The Overload Indicator on the 2145 UPS-1U front panel is illuminated red.

Action

Ensure that only one 2145 is receiving power from the 2145 UPS-1U. Also ensure that no other devices are connected to the 2145 UPS-1U.

Disconnect the 2145 from the 2145 UPS-1U. If the Overload Indicator is now off, on the disconnected 2145, in the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.

If the Overload Indicator is still illuminated with all outputs disconnected, replace the 2145 UPS-1U.

Possible Cause-FRUs or other:

- 2145 power cable assembly (45%)
- 2145 power supply assembly (45%)
- 2145 UPS-1U (10%)

  Related tasks

  “Removing the power supply” on page 509
  You must remove the SAN Volume Controller power supply if you intend to replace it.

  “Replacing the power supply” on page 512
  You might need to replace the SAN Volume Controller power supply for a service action.

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

210 A problem has occurred in the uninterruptible power supply.

Explanation

No specific FRU has been identified.

Action

In the sequence shown, exchange the FRUs for new FRUs. See "Possible Cause-FRUs or other."

Possible Cause-FRUs or other:

- 2145 UPS electronics assembly (40%)
- 2145 UPS battery assembly (40%)
- 2145 UPS (20%)

Other:

- None.

Related tasks

"Removing the 2145 uninterruptible power supply" on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

"Replacing the 2145 uninterruptible power supply" on page 617
You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

"Replacing the 2145 uninterruptible power supply battery" on page 634
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

211 A problem has occurred in the uninterruptible power supply.

Explanation

A problem has occurred in the 2145 UPS-1U.

Action

In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other.″

Possible Cause-FRUs or other:

- 2145 UPS-1U assembly (100%)

Other:

- None.

Related tasks

“Removing the 2145-1U uninterruptible power supply” on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

“Replacing the 2145-1U uninterruptible power supply” on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

215 A problem has occurred with the uninterruptible power supply load.

Explanation

The 2145 detected that the current of the 2145 UPS exceeds the current that four 2145s require.

Action

1. Ensure also that only 2145s are receiving power from the 2145 UPS; that is, no switches or disk controllers are connected to the 2145 UPS.
2. If only one 2145 is connected to the 2145 UPS, exchange the FRU for a new FRU. See ″Possible Cause-FRU or other.″ If more than one 2145 is connected to the 2145 UPS, disconnect the 2145s from the 2145 UPS and reconnect them one-at-a-time. While the problem persists, the nodes fail to start with boot error code 215 displayed on the 2145 front panel. When the first failure occurs, exchange the FRU for a new FRU. See ″Possible Cause-FRU or other.″

Possible Cause-FRUs or other:

- 2145 UPS electronics assembly (40%)
- 2145 power supply assembly (10%)
- Other: Configuration error (50%)

Related tasks

“Removing the power supply” on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

“Replacing the power supply” on page 512
You might need to replace the SAN Volume Controller power supply for a service action.

“Removing the 2145 uninterruptible power supply electronics” on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

“Replacing the 2145 uninterruptible power supply electronics” on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

216 A problem has occurred with the uninterruptible power supply load.

Explanation

The 2145 has detected that the 2145 UPS-1U current exceeds the current that one 2145 requires.

Action

Ensure that only one 2145 is receiving power from the 2145 UPS-1U; that is, no other devices are connected to the 2145 UPS-1U.

Possible Cause-FRUs or other:

- None.

220 The uninterruptible power supply is receiving input power that might be unstable or in low voltage conditions.

Explanation

The 2145 UPS is receiving input power that might be unstable or in low voltage conditions.

Action

Ask the customer to check the site power to the 2145 UPS providing power to this 2145. Check the connection, voltage and frequency. If the input power is sufficient, exchange the FRUs for new FRUs. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- 2145 UPS input power cable (10%)
- 2145 UPS electronics assembly (10%)

Other:

- AC input power (80%)

  Related tasks

  "Removing the 2145 uninterruptible power supply electronics" on page 625
  During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

  "Replacing the 2145 uninterruptible power supply electronics" on page 627
  During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

221 The uninterruptible power supply is receiving input power that might be unstable in low or high voltage conditions.

Explanation

The 2145 UPS-1U is receiving input power that might be unstable in low or high voltage conditions.

Action

Ask the customer to check the site power to the 2145 UPS-1U providing power to this 2145. Check the connection, voltage, and frequency. If the input power is sufficient, exchange the FRUs for new FRUs. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- 2145 UPS-1U input power cable (10%)
- 2145 UPS-1U assembly (10%)

Other:

- AC input power (80%)

  Related tasks

  "Removing the 2145-1U uninterruptible power supply" on page 591
  Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

  "Replacing the 2145-1U uninterruptible power supply" on page 596
  You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

225 An incorrect type of uninterruptible power supply was installed.

Explanation

The 2145 UPS installed is not compatible. If it is connected to a 2145 4F2, the incorrect model type is installed. The 2145 UPS cannot be used with other 2145 model types.

Action

Exchange the 2145 UPS for one of the correct type, or replace the 2145 UPS with a 2145 UPS-1U.

Possible Cause-FRUs or other:

- 2145 UPS (100%)

  Related tasks

  "Removing the 2145-1U uninterruptible power supply" on page 591
  Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

  "Replacing the 2145-1U uninterruptible power supply" on page 596
  You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

226 An incorrect type of uninterruptible power supply was installed.

Explanation

An incorrect type of 2145 UPS-1U was installed.

Action

Exchange the 2145 UPS-1U for one of the correct type.

Possible Cause-FRUs or other:

- 2145 UPS-1U (100%)

  Related tasks

  "Removing the 2145-1U uninterruptible power supply" on page 591
  Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

230 An uninterruptible power supply is not configured correctly.

Explanation

The signal cable or the 2145 power cables are probably not connected correctly. The power cable and signal cable might be connected to different 2145 UPS assemblies.

Action

Connect the cables correctly.

Possible Cause-FRUs or other:

- None.

Other:

- Cabling error (100%)

231 An uninterruptible power supply is not configured correctly.

Explanation

The signal cable or the 2145 power cables are probably not connected correctly. The power cable and signal cable might be connected to different 2145 UPS-1U assemblies.

Action

Connect the cables correctly.

Possible Cause-FRUs or other:

- None.

Other:

- Cabling error (100%)

235 A 2145 is powered on, but the uninterruptible power supply has been instructed by another 2145 to power off because a loss of AC input power has occurred.

Explanation

Although the AC input power has now returned, the 2145 still powers off. It then powers on again.

Action

Wait for the 2145 to power off.

Possible Cause-FRUs or other:

- None.

236 A 2145 is powered on, but the uninterruptible power supply has been instructed by the 2145 to power off because a loss of AC input power has occurred.

Explanation

Although the AC input power has now returned, the 2145 still powers off. It then powers on again.

Action

Wait for the 2145 to power off.

Possible Cause-FRUs or other:

- None.

240 The ambient temperature threshold for the uninterruptible power supply has been exceeded.

Explanation

The 2145 UPS shows a red warning light, and an alarm sounds. The 2145 UPS switches to bypass mode to lower the temperature.

Action

1. Turn off the 2145 UPS and unplug it from the power source.
2. Clear the vents and remove any heat sources.
3. Ensure that the air flow around the 2145 UPS is not restricted.
4. Wait at least five minutes, and then restart the 2145 UPS.
5. If the problem remains, exchange, in the sequence shown, the FRUs for new FRUs. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- 2145 UPS electronics assembly (60%)
- 2145 UPS battery assembly (20%)
- 2145 UPS (20%)

Related tasks

"Removing the 2145 uninterruptible power supply" on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

"Replacing the 2145 uninterruptible power supply" on page 617
You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

"Replacing the 2145 uninterruptible power supply battery" on page 634
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

241 The ambient temperature threshold for the uninterruptible power supply has been exceeded.

Explanation

The ambient temperature threshold for the 2145 UPS-1U has been exceeded.

Action

1. Turn off the 2145 UPS-1U and unplug it from the power source.
2. Clear the vents and remove any heat sources.
3. Ensure that the air flow around the 2145 UPS-1U is not restricted.
4. Wait at least five minutes, and then restart the 2145 UPS-1U.
5. If the problem remains, exchange, in the sequence shown, the FRUs for new FRUs. (See "Possible Cause-FRUs or other.")

Possible Cause-FRUs or other:

- 2145 UPS-1U assembly (100%)

Related tasks

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

245 Repetitive node restarts due to uninterruptible power supply errors.

Explanation

Multiple node restarts have occurred due to 2145 UPS errors.

Action

The uninterruptible power supply has been repeatedly restarted because 2145 UPS errors are being detected. Verify that the room temperature is within specified limits and that the input power is stable. Verify that the 2145 UPS signal cable is fastened securely at both ends.

The condition will be reset by powering off the node from the node front panel. If a reset does not fix the problem, replace FRUs in the order shown.

Possible Cause-FRUs or other:

- 2145 UPS electronics assembly (85%)
- 2145 UPS battery assembly (5%)
- 2145 UPS frame assembly (5%)
- Power/signal cable (5%)

Related tasks

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

"Replacing the 2145 uninterruptible power supply battery" on page 634
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

"Removing the 2145 uninterruptible power supply" on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

"Replacing the 2145 uninterruptible power supply" on page 617
You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

246 Repetitive node restarts due to uninterruptible power supply errors.

Explanation

Multiple node restarts have occurred due to 2145 UPS-1U errors.

Action

The uninterruptible power supply has been repeatedly restarted because 2145 UPS-1U errors are being detected. Verify that the room temperature is within specified limits and that the input power is stable. Verify that the 2145 UPS-1U signal cable is fastened securely at both ends.

The condition will be reset by powering off the node from the node front panel.

Possible Cause-FRUs or other:

- 2145 UPS-1U assembly (95%)
- Power/signal cable (5%)

Related tasks

"MAP 5900: Hardware boot" on page 425
MAP 5900: Hardware boot helps you solve problems that are preventing the node from starting its boot sequence.

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

250 The Ethernet ports did not start correctly.

Explanation

The Ethernet ports on the node did not start correctly. This is a transient error that only occurs during node start up. It does not indicate a hardware error.

Action

Perform the following actions in order:

1. Power off the node using the front panel power control button.
2. Wait 30 seconds, then press the front power control button again to restart the node.
3. This error might occur again. If the error recurs, repeat the sequence up to four times. If this error still occurs after four repetitions of the step 1 and step 2 sequence, contact your Service Support Center.

Possible Cause-FRUs or other:

- None.

Performing the node rescue

If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

Similarly, if you have replaced the service controller, you should use the node rescue procedure to ensure that the service controller has the correct software.

Attention: If you recently replaced both the service controller and the disk drive as part of the same repair operation, node rescue fails.

To provide an alternate boot device, a minimal operating system is also available in nonvolatile memory on the service controller. If it is necessary to replace the hard disk drive or the software on the hard disk drive has become corrupted, the node cannot boot and the hardware boot indicator remains on the front panel display or the boot operation does not progress. If this occurs, use the node rescue procedure to reinstall the SAN Volume Controller software.

Node rescue works by booting the operating system from the service controller and running a program that copies all the SAN Volume Controller software from any other node that can be found on the fibre-channel fabric.

Attention: When running node rescue operations, only run one node rescue operation on the same SAN, at any one time. Wait for one node rescue operation to complete before starting another.

Perform the following steps to complete the node rescue:

1. Ensure that the fibre-channel cables are connected.
2. Ensure that at least one other node is connected to the fibre-channel fabric.
3. Ensure that the SAN zoning allows a connection between at least one port of this node and one port of another node. It is better if multiple ports can connect. This is particularly important if the zoning is by worldwide port name (WWPN) and you are using a new service controller. In this case, you might need to use SAN monitoring tools to determine the WWPNs of the node. If you need to change the zoning, remember to set it back when the service procedure is complete.
4. Turn off the node.
5. Press and hold the left and right buttons on the front panel.
6. Press the power button.

7. Continue to hold the left and right buttons until the node-rescue-request symbol is displayed on the front panel (Figure 62 on page 131).

Figure 78. Node rescue display

The node rescue request symbol displays on the front panel display until the node starts to boot from the service controller. If the node rescue request symbol displays for more than two minutes, go to the hardware boot MAP to resolve the problem. When the node rescue starts, the service display shows the progress or failure of the node rescue operation.

Note: If the recovered node was part of a cluster, the node is now offline. Delete the offline node from the cluster and then add the node back into the cluster. If node recovery was used to recover a node that failed during a software upgrade process, the automatic software downgrade process starts but might not continue until the failed node is deleted from the cluster. After the failed node is deleted, it is not possible to add the node back into the cluster until the downgrade process has completed. This can take up to four hours for an eight-node cluster.

Related tasks

"Deleting a node from the cluster" on page 77
If it is required, you can delete a node from a cluster.

"Adding a node to a cluster" on page 78
You might have to add a node into the cluster if it has been removed or rejected by a cluster.

Related reference

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

Understanding the node rescue codes

The node rescue codes are displayed on the menu screen during node rescue.

Start node rescue if the boot image on the hard disk is missing or corrupted. Corrupted code is indicated during the boot process either by the display of an error code or by a hang condition.

To start node rescue, press and hold the **left** and **right** buttons on the front panel during a power-on cycle. The menu screen displays the Node rescue request. See the node rescue request topic. The hard disk is formatted and, if the format completes without error, the software image is downloaded from any available node. During node recovery, Line 1 of the menu screen displays the message `Booting` followed by one of the node rescue codes. Line 2 of the menu screen displays a **boot progress indicator**. Figure 79 on page 228 shows an example of a displayed node rescue code.

Figure 79. Boot failed display

The three-digit code that is shown in Figure 79 represents a node rescue code.

Attention: If the 2145 uninterruptible power supply is only connected to this SAN Volume Controller, the 2145 uninterruptible power supply powers off within five minutes of a node-rescue process failure. For example, if a donor node cannot be found. When the problem that is preventing node rescue has been resolved, the 2145 uninterruptible power supply must be powered on before powering on the SAN Volume Controller.

Note: The 2145-1U uninterruptible power supply will not power off following a node rescue failure.

Related concepts

"Node rescue request" on page 145
If software is lost, you can use the node rescue process to copy all software from another node.

300 The 2145 is running node rescue.
Explanation

The 2145 is running node rescue.

Action

If the progress bar has been stopped for at least two minutes, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″.

Possible Cause-FRUs or other:

- Service controller (100%)

Related tasks

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

310 The 2145 is running a format operation.
Explanation

The 2145 is running a format operation.

Action

If the progress bar has been stopped for two minutes, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″.

Possible Cause-FRUs or other:

2145-8G4

- Disk drive assembly (90%)

- Disk cable assembly (10%)

2145-8F2 or 2145-8F4
- Disk drive assembly (100%)

2145-4F2
- Disk drive assembly (95%)
- Disk drive cables (5%)

Related tasks

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
You might have to remove the SATA backplate for a service action.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

"Replacing the SAN Volume Controller 2145-4F2 disk drive cables" on page 499
The disk drive cables must be replaced if they are removed.

320 A 2145 format operation has failed.

Explanation

A 2145 format operation has failed.

Action

Exchange the FRU for a new FRU. See "Possible Cause-FRUs or other".

Possible Cause-FRUs or other:

2145-8G4
- Disk drive assembly (90%)
- Disk cable assembly (10%)

2145-8F2 or 2145-8F4
- Disk drive assembly (95%)
- Frame assembly (5%)

2145-4F2
- Disk drive assembly (95%)
- Disk drive cables (5%)

Related tasks

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
You might have to remove the SATA backplate for a service action.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

"Replacing the SAN Volume Controller 2145-4F2 disk drive cables" on page 499
The disk drive cables must be replaced if they are removed.

330 The 2145 is partitioning its disk drive.

Explanation

The 2145 is partitioning its disk drive.

Action

If the progress bar has been stopped for two minutes, exchange the FRU for a new FRU.

Possible Cause-FRUs or other:

2145-8G4
- Disk drive assembly (90%)
- Disk cable assembly (10%)

2145-8F2 or 2145-8F4
- Disk drive assembly (95%)
- Frame assembly (5%)

2145-4F2
- Disk drive assembly (95%)
- Disk drive cables (5%)

Other:
- Configuration problem
- Software error

Related tasks

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
You might have to remove the SATA backplate for a service action.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

"Replacing the SAN Volume Controller 2145-4F2 disk drive cables" on page 499
The disk drive cables must be replaced if they are removed.

340 The 2145 is searching for donor node.
Explanation

The 2145 is searching for donor node.

Action

If the progress bar has been stopped for more than two minutes, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″.

Possible Cause-FRUs or other:

- Fibre-channel adapter (100%)

Related tasks

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

345 The 2145 is searching for a donor node from which to copy the software.
Explanation

The node is searching at 1 Gb/s for a donor node.

Action

If the progress bar has stopped for more than two minutes, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″.

Possible Cause-FRUs or other:

- Fibre-channel adapter (100%)

Related tasks

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

350 The 2145 cannot find a donor node.
Explanation

The 2145 cannot find a donor node.

Action

If the progress bar has stopped for more than two minutes, perform the following steps:

1. Ensure that all of the fibre-channel cables are connected correctly and securely to the cluster.
2. Ensure that at least one other node is operational, is connected to the same fibre-channel network, and is a donor node candidate. A node is a donor node candidate if the version of software that is installed on that node supports the model type of the node that is being rescued.
3. Ensure that the fibre-channel zoning allows a connection between the node that is being rescued and the donor node candidate.
4. Perform the problem determination procedures for the network.

Possible Cause-FRUs or other:

- None

Other:

- Fibre-channel network problem

Related tasks

"MAP 5600: Fibre-channel" on page 409
MAP 5600: Fibre-channel helps you to solve problems that have occurred on the SAN Volume Controller fibre-channel ports.

360 The 2145 is loading software from the donor.

Explanation

The 2145 is loading software from the donor.

Action

If the progress bar has been stopped for at least two minutes, restart the node rescue procedure.

Possible Cause-FRUs or other:

- None

370 The 2145 is installing software.

Explanation

The 2145 is installing software.

Action

1. If this code is displayed and the progress bar has been stopped for at least ten minutes, the software install process has failed with an unexpected software error.
2. Power off the 2145 and wait for 60 seconds.
3. Power on the 2145. The software upgrade operation continues.
4. Report this problem immediately to your Software Support Center.

Possible Cause-FRUs or other:

- None

Understanding the node error codes

Node error codes are displayed on the display screen by node software.

Each code indicates that a critical error was detected that prevents the node from becoming a member of a cluster. Line 1 of the menu screen contains the message `Node Error`.

Line 2 contains either the error code or the error code and additional data. Figure 80 provides an example of a node error code. This data might exceed the maximum width of the menu screen. You can press the Right navigation to scroll the display.

Figure 80. Example of a displayed node error code

The additional data is unique for any error code. It provides necessary information that enables you to isolate the problem in an offline environment. Examples of additional data are disk serial numbers and field replaceable unit (FRU) location codes. When these codes are displayed, you can do additional fault isolation by navigating the default menu to determine the node and fibre-channel port status.

510 The detected memory size for this 2145 does not match the expected memory size for the cluster.

Explanation

The detected memory size, in MB, is the first number following the error code. The expected memory size for the cluster is the second number following the error code. This problem might have occurred because a memory module has failed or because failing memory modules were exchanged and the wrong size modules were installed.

Action

Check the memory size of another 2145 that is in the same cluster. For the 2145-4F2, exchange the memory modules in this 2145-4F2 for modules of the correct size. For the 2145-8F2, 2145-8F4 and 2145-8G4, if you have just replaced a memory module, check that the module that you have installed is the correct size, then go to the light path MAP to isolate any possible failed memory modules.

Possible Cause-FRUs or other:

- Memory module (100%)

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

"Removing the memory modules (DIMM)" on page 482
You might need to remove one or more faulty memory modules.

"Replacing the memory modules (DIMM)" on page 485
The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

511 Memory bank 1 of the 2145 is failing.

Explanation

Memory bank 1 of the 2145 is failing.

Action

For the 2145-8F2, 2145-8F4 and 2145-8G4, go to the light path MAP to resolve this problem.

For the 2145-4F2, exchange both memory modules of bank 1 for new modules.

Possible Cause-FRUs or other:

- Memory module (100%)

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

"Removing the memory modules (DIMM)" on page 482
You might need to remove one or more faulty memory modules.

"Replacing the memory modules (DIMM)" on page 485
The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

513 Memory bank 2 of the 2145 is failing.

Explanation

Memory bank 2 of the 2145 is failing.

Action

For the 2145-8F2, 2145-8F4 and 2145-8G4, go to the light path MAP to resolve this problem.

For the 2145-4F2, exchange both memory modules of bank 2 for new modules.

Possible Cause-FRUs or other:

- Memory module (100%)

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

"Removing the memory modules (DIMM)" on page 482
You might need to remove one or more faulty memory modules.

"Replacing the memory modules (DIMM)" on page 485
The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

514 Memory bank 3 of the 2145 is failing.

Explanation

This cannot occur on the 2145-4F2.

Action

For the 2145-8F2, 2145-8F4 and 2145-8G4, go to the light path MAP to resolve this problem.

Possible Cause-FRUs or other:

- Memory module (100%)

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

515 Memory bank 4 of the 2145 is failing.

Explanation

This cannot occur on the 2145-4F2.

Action

For the 2145-8F2, 2145-8F4 and 2145-8G4, go to the light path MAP to resolve this problem.

Possible Cause-FRUs or other:

- Memory module (100%)

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

520 A fibre-channel adapter is failing.

Explanation

A failure has been detected on a fibre-channel adapter.

If the failure has been isolated to one or more fibre-channel ports, the first failing fibre-channel adapter port is shown by the additional data for the displayed error code, for example 520 2.

For the 2145-4F2 and 2145-8F2, port number 1 or 2 indicates adapter one and port number 3 or 4 indicates adapter two. For the 2145-8F4 and 2145-8G4 there is only one adapter.

For the 2145-8F4 and 2145-8G4, if the failure has not been isolated to a port, no port number is shown after the error code.

Action

1. If the node has more than one fibre-channel adapter, determine which adapter is failing.
2. Ensure that the adapter is correctly seated in its socket.
3. Exchange the failing FRU for a new FRU.

Possible Cause-FRUs or other:

- Fibre-channel adapter assembly (100%)

Note: Although this error might be reported on a single port, the fibre-channel Small Form-factor Pluggable (SFP) connector is not a suitable replacement part.

Related tasks

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

540 An Ethernet port has failed on the 2145.

Explanation

An Ethernet port has failed on the 2145.

Action

Go to Ethernet MAP.

Possible Cause-FRUs or other:

2145-8G4

- Ethernet cable
- System board assembly

2145-8F2 or 2145-8F4

- Ethernet cable
- Frame assembly

2145-4F2

- Ethernet cable
- System board assembly

Other:

- The Ethernet cable is disconnected
- Ethernet hub

Related tasks

"MAP 5500: Ethernet" on page 406
MAP 5500: Ethernet helps you solve problems that have occurred on the SAN Volume Controller Ethernet.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

550 Cannot form a cluster due to a lack of cluster resources.

Explanation

Supplemental data displayed with this error code list the missing IDs for the 2145s and the quorum disk controller. Each missing node is listed by its node ID. A missing quorum disk is listed as WWWWWWWWWWWWWWWW/LL, where WWWWWWWWWWWWWWWW is a worldwide port name (WWPN) on the disk controller that contains the missing quorum disk and LL is the Logical Unit Number (LUN) of the missing quorum disk on that controller.

Action

1. Ensure that the other 2145s in the cluster are powered on and operational.
2. From the front panel, display the fibre-channel port status. If any port is not active, perform the fibre-channel port problem determination procedures.
3. Ensure that fibre-channel network zoning changes have not restricted communication between nodes, or between the nodes and the quorum disk.
4. Do the problem determination procedures for the network.
5. The quorum disk failed or cannot be accessed. Perform the problem determination procedures for the disk controller.

Possible Cause-FRUs or other:

- None

555 Power Domain error.

Explanation

Both 2145s in an I/O group are being powered by the same uninterruptible power supply. The other 2145's ID is displayed with the node error code on the front panel.

Action

Ensure that the configuration is correct and that each 2145 is in an I/O group is connected from a separate uninterruptible power supply.

Possible Cause-FRUs or other:

- None

Other:

- Configuration problem.

556 Duplicate WWNN detected.

Explanation

The node has detected another device on the fibre-channel network with the same World Wide Node Name (WWNN) as itself. The last five digits of the node's WWNN are shown as the additional data for the error.

The node is not an active member of a cluster. It has disabled its fibre-channel ports to prevent disrupting the operation of the fibre-channel network.

Either just one node, or both nodes, with the same WWNN will show the error.

Due to the way WWNNs are allocated, the device with a duplicate WWNN should be another SAN Volume Controller node.

Only the last five digits of the WWNN are shown on the front panel displays. A WWNN is 16 hexadecimal digits long. For a SAN Volume Controller the first 11 digits are always 50050768010.

Action

1. Find the SAN Volume Controller node with the same WWNN as the node reporting the error. The WWNN for a SAN Volume Controller node can be found from the node Vital Product Data (VPD) or from the Node menu on the front panel. The node with the duplicate WWNN need not be part of the same cluster as the node reporting the error; it could be remote from the node reporting the error on a part of the fabric connected through an inter-switch link. The node's WWNN is stored with the service controller, so the duplication is most likely caused by a node that has recently had its service controller replaced and/or its WWNN changed.
2. If a SAN Volume Controller node with a duplicate WWNN is found, determine whether it, or the node reporting the error, has the incorrect WWNN. Normally it is the node that has had its service controller replaced, and/or its WWNN changed, that is incorrect. Also consider how the SAN is zoned when making your decision.
3. If both nodes with the same WWNN reported the error, the node with the correct WWNN can be restarted using the front panel power control button.
4. Determine the correct WWNN for the node with the incorrect WWNN. If the complete node or the service controller has been replaced as part of a service action, the WWNN for the node should have been written down. If the correct WWNN cannot be determined contact your support center for assistance.
5. Use the front panel menus to modify the incorrect WWNN. If it is the node showing the error that should be modified, this can safely be done immediately. If it is an active node that should be modified, use caution because the node will restart when the WWNN is changed. If this node is the only operational node in an I/O group, access to the VDisks that it is managing will be lost. You should ensure that the host systems are in the correct state before you change the WWNN.
6. If the node showing the error had the correct WWNN, it can be restarted, using the front panel power control button, after the node with the duplicate WWNN is updated.
7. If you are unable to find a SAN Volume Controller node with the same WWNN as the node showing the error, use the SAN monitoring tools to determine if there is another device on the SAN with the same WWNN. This

device should not be using a WWNN assigned to a SAN Volume Controller, so you should follow the service procedures for the device to change its WWNN.

Possible Cause-FRUs or other:

- None.

Related concepts

"Node WWNN" on page 155
The node WWNN (worldwide node name) option displays the last five hexadecimal digits of the WWNN that is being used by the SAN Volume Controller node. Only the last five digits of a WWNN vary on a SAN Volume Controller node. The first 11 digits are always `50050768010`.

"Validate WWNN?" on page 147
The front panel prompts you to validate the WWNN when the worldwide node name (WWNN) that is stored in the service controller (the panel WWNN) does not match the WWNN that is backed up on the SAN Volume Controller disk (the disk WWNN).

558 The 2145 cannot see the fibre-channel fabric or the fibre-channel card port speed might be set to a different speed than the fibre channel fabric.

Explanation

The 2145 cannot see the fibre-channel fabric or the fibre-channel card port speed might be set to a different speed than the fibre channel fabric.

Action

Ensure that:

1. The fibre-channel network fabric switch is powered-on.
2. At least one fibre-channel cable connects the 2145 to the fibre-channel network fabric.
3. The fibre-channel card port speed is equal to the fibre-channel fabric.
4. At least one fibre-channel adapter is installed in the 2145.
5. Go to the Fibre-channel MAP.

Possible Cause-FRUs or other:

- None

Related tasks

"MAP 5600: Fibre-channel" on page 409
MAP 5600: Fibre-channel helps you to solve problems that have occurred on the SAN Volume Controller fibre-channel ports.

Related reference

"Changing the fibre-channel network speed" on page 100
You can change the speed of the fibre-channel ports on a SAN Volume Controller through the front panel on the SAN Volume Controller node or by a command sent to a SAN Volume Controller cluster using the Ethernet interface.

560 The fibre-channel network fabric is too big.

Explanation

The configuration is not valid.

Action

1. Ensure that all the fibre-channel connections are correct.
2. Restart the 2145.

Possible Cause-FRUs or other:

- None

Other:

- See your product's configuration guide

562 The hardware configuration is not valid.

Explanation

This error has probably been caused by a service action error when replacing FRUs.

Action

1. Ensure that the 2145 hardware is correct.
2. Restart the 2145.

Possible Cause-FRUs or other:

- None

564 This 2145 node is repeatedly crashing because of a software failure.

Explanation

Software dump data is available in the Dumps directory.

If this is the only node with this problem and if you can still access the data on the virtual disks (VDisks), perform the following actions. If more than one node has this problem or if you cannot access the data on the VDisks, call your support center for assistance.

Action

1. Use the front panel controls to delete the node from the cluster. To do this:
   a. Display Node on the front panel menu. See the 2145 menu options.
   b. Press the left or right buttons until ″Create Cluster?″ is displayed.
   c. Press select. ″Delete Cluster?″ is displayed.
   d. Press and hold the up button.
   e. Press and release the select button.
   f. Release the up button. The node is deleted from the cluster and restarts.
2. Delete the node from the cluster.
3. Fully power-off the node.
4. Power on the node.
5. Add the node back into the cluster.
6. Call your software support center for assistance.

Possible Cause-FRUs or other:

- None

Other:

- Software error.

Related tasks

"Deleting a node from the cluster" on page 77
If it is required, you can delete a node from a cluster.

"Adding a node to a cluster" on page 78
You might have to add a node into the cluster if it has been removed or rejected by a cluster.

565 The node's internal disk is failing.

Explanation

An excessive number of errors has been reported by the node's internal disk drive. It is no longer safe to rely on the integrity of the disk drive.

The node has removed itself from the cluster.

Action

Perform the following actions in order:

1. Replace the node's disk drive assembly.
2. Restart the node using the node rescue procedure.
3. Delete the node from the cluster, then add the node back into the cluster.
4. This error will not recur immediately when the node is restarted. If the error has occurred previously on this node and the disk drive has been replaced, replace FRUs in the order shown.

FRU list:

2145-8G4

- Disk drive assembly (95%)
- Disk drive cables (5%)

2145-8F2 or 2145-8F4

- Disk drive assembly (100%)

2145-4F2

- Disk drive assembly (95%)
- SCSI signal cable (5%)

Related tasks

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
You might have to remove the SATA backplate for a service action.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

"Replacing the SAN Volume Controller 2145-4F2 disk drive cables" on page 499
The disk drive cables must be replaced if they are removed.

570 The 2145 data is readable, but damaged.

Explanation

The 2145 has been rejected by the cluster.

Action

If more than one node has this problem or if you cannot access the data on the virtual disks, call your support center for assistance. If this is the only node with this problem and if you can still access the data on the virtual disks (VDisks), perform the following actions.

If you believe that the power off sequence was interrupted, for example, if you pressed the power button on the uninterruptible power supply assembly or if you removed the power cables before a power-off sequence had completed, then delete and re-add the node to the cluster.

If the probable cause of the problem is unknown, delete and re-add the node, then contact your support center for assistance. The support center might want you to recover the dump and trace data records to help analyze the root cause of the problem. If the problem persists, exchange the FRUs for new FRUs in the sequence shown.

Possible Cause-FRUs or other:

2145-8G4
- Disk drive assembly (80%)
- Disk drive cables (10%)
- System board assembly (10%)

2145-8F2 or 2145-8F4
- Disk drive assembly (90%)
- Frame assembly (10%)

2145-4F2
- Disk drive assembly (45%)
- System board assembly (50%)
- Disk drive cables (5%)

Other:
- Software problem.

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
You might have to remove the SATA backplate for a service action.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

572 The 2145 cannot determine the VPD for a FRU.

Explanation

A FRU in the 2145 has been changed, and the VPD is unreadable or unrecognized.

Action

1. Update the 2145 software to the latest level.
2. Exchange the most-recently replaced FRU for a new FRU.

Possible Cause-FRUs or other:

- None

Other:

- Software problem.

574 The 2145 software on this node is damaged.

Explanation

The 2145 software on this node is damaged. Recovery is required.

If this is the only node with this problem and if you can still access the data on the virtual disks (VDisks), perform the following actions. If more than one node has this problem or if you cannot access the data on the virtual disks, call your support center for assistance.

Action

1. Perform the node rescue procedure.

Possible Cause-FRUs or other:

- None

Other:

- Software problem.

  Related tasks

  "Performing the node rescue" on page 130
  If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

576 The 2145 data cannot be read.

Explanation

The 2145 has been rejected from the cluster.

Action

In the sequence shown, exchange the FRUs for new FRUs.

Possible Cause-FRUs or other:

2145-8G4

- Disk drive assembly (80%)
- Disk drive cables (10%)
- System board assembly (10%)

2145-8F2 or 2145-8F4

- Disk drive assembly (90%)
- Frame assembly (10%)

2145-4F2

- Disk drive assembly (45%)
- System board assembly (50%)
- Disk drive cables (5%)

  Related tasks

  "Removing the disk drive" on page 487
  You might have to remove the disk drive for a service action.

  "Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
  You might have to remove the SATA backplate for a service action.

  "Removing the SAN Volume Controller 2145-8G4 system board" on page 564
  You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

  "Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
  The disk drive cables must be removed if they become defective or if you want to replace them.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

578 This node has lost power without saving its current state data to its internal disk.

Explanation

The node has shut down without saving its current state to its internal disk. The node has restarted but it is not able to participate in the cluster.

The usual cause of this error is a user action that has removed power from the node in a manner that does not allow the node to save its state data to its internal disk. Actions that might cause this error include:

- Removing the node power cable from the node or uninterruptible power supply.
- Pressing the power button on the node for more than four seconds. This action causes an immediate power off.
- Powering off the uninterruptible power supply while the node is active or while the node is in the process of shutting down.

A software error or hardware error might also cause the node to power off without saving the state data. If the cause is a hardware error, the hardware problem is intermittent because the node has restarted. In this case, the node message and trace files might indicate the cause of the power off and your support center might request these files for analysis.

Action

1. If the node is offline to the cluster, delete the offline node from the cluster and then add the node back into the cluster to reintroduce the node to the cluster.
2. Determine whether this error has occurred because power was removed from this node in a manner that does not allow the node to save its state data to its internal disk. If the cause of the error has been determined, continue with MAP 5700: Repair verification.
3. If you cannot identify an action or event that has caused a temporary loss of power to the node, ensure that the input power cable is securely connected to both the node and to the uninterruptible power supply.
4. If you still cannot determine the cause of the temporary loss of power to the node, call your support center for assistance.

Possible Cause-FRUs or other:

Your support center might indicate a FRU based on their problem analysis (2%)

Other:

- User action (98%)

Related tasks

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Removing the power supply" on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

"Replacing the power supply" on page 512
You might need to replace the SAN Volume Controller power supply for a service action.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

580 The 2145 cannot read the unique ID from the service controller, so the fibre-channel adapters cannot be started.

Explanation

The 2145 cannot read the unique ID from the service controller, so the fibre-channel adapters cannot be started.

Action

In the sequence shown, exchange the following FRUs for new FRUs. See "Possible Cause-FRUs or other".

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

Service controller (100%)

2145-4F2

- Front panel assembly (50%)
- Service controller (50%)

Other:

- None

Related tasks

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

"Removing the front panel from the SAN Volume Controller 2145-4F2" on page 562
You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

Understanding the create cluster error codes

Cluster Create error codes are displayed on the menu screen when you are using the front panel to create a new cluster, but the create operation fails.

Line 1 of the menu screen contains the message `Create Failed`. Line 2 shows the error code and, where necessary, additional data.

Related reference

"Create Cluster?" on page 155
You can create a cluster from the Create Cluster? menu. You also have the option to delete the node from the cluster if the node that is selected is in a cluster.

700 All the available unique identifications have been used.

Explanation

Each time a node creates a new cluster a unique ID is generated by the node's Service Controller. Once 255 clusters have been created the Service Controller must be replaced.

Action

Use a different node to create the cluster.

Possible Cause-FRUs or other:

- Service controller (100%)

Related tasks

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

710 The service controller cannot increase the cluster ID counter.

Explanation

When a new cluster ID is requested from the service controller, the service controller is told to increase the ID counter. The new ID is read back for verification. If the ID counter has not been increased, this error code is displayed. This error has occurred because the service controller failed.

Action

Exchange the FRU for a new FRU.

Possible Cause-FRUs or other:

- Service controller (100%)

Related tasks

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

Understanding the cluster recovery codes

Cluster recovery codes indicate that a critical software error has occurred that might corrupt your cluster.

You must perform software problem analysis before you can perform further cluster operations to avoid the possibility of corrupting your cluster configuration.

9xx
Explanation

A cluster recovery action is required.

Action

Contact the support center for assistance in performing the software problem analysis.

Possible Cause-FRUs or other:

- None

Understanding cluster error codes

Every cluster error code includes an error code number, a description, action, and possible field replaceable units (FRUs).

1001 Automatic cluster recovery has run.
Explanation

All cluster configuration commands are blocked.

Action

Call your software support center.

Caution:

You can unblock the configuration commands by issuing the svctask enablecli command, but you must first consult with your software support to avoid corrupting your cluster configuration.

Possible Cause-FRUs or other:

- None

1002 Error log full.
Explanation

Error log full.

Action

To fix the errors in the error log, go to the start MAP.

Possible Cause-FRUs or other:

- Unfixed errors in the log.

Related tasks

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

1010 A fibre-channel adapter was reported missing.
Explanation

A fibre-channel adapter was reported missing.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online,″ mark the error that you have just repaired ″fixed.″ If any nodes do not show a status of ″online,″ go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

- Fibre-channel adapter assembly (90%)
- System board assembly (10%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units

(FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1011 Fibre-channel adapter (4 port) in slot 1 is missing.

Explanation

Fibre-channel adapter (4 port) in slot 1 is missing.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- 4-port fibre-channel host bus adapter (90%)
- PCI Express riser card (8%)
- System board assembly (2%)

2145-8F4

N/A

2145-8F2

N/A

2145-4F2

N/A

Related tasks

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

1012 A fibre-channel adapter reported PCI bus errors.

Explanation

A fibre-channel adapter reported PCI bus errors.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

- Fibre-channel adapter assembly (90%)
- System board assembly (10%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1013 Fibre-channel adapter (4-port) in slot 1 PCI fault.

Explanation

Fibre-channel adapter (4-port) in slot 1 PCI fault.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See "Possible Cause-FRUs or other" after the last action in this section.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired as "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- 4-port fibre-channel host bus adapter (80%)
- PCI Express riser card (10%)
- System board assembly (10%)

2145-8F4

N/A

2145-8F2

N/A

2145-4F2

N/A

Related tasks

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

1014 Fibre-channel adapter in slot 1 is missing.

Explanation

Fibre-channel adapter in slot 1 is missing.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See "Possible Cause-FRUs or other" after the last action in this section.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2

- Dual port fibre-channel HBA - low profile (90%)
- PCI riser card - low profile (8%)
- Frame assembly (2%)

2145-8G4

N/A

2145-8F4

N/A

2145-4F2

N/A

Related tasks

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1015 Fibre-channel adapter in slot 2 is missing.

Explanation

Fibre-channel adapter in slot 2 is missing.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2

- Dual port fibre-channel host bus adapter - full height (90%)
- PCI riser card (8%)
- Frame assembly (2%)

2145-8G4

N/A

2145-8F4

N/A

2145-4F2

N/A

Related tasks

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1016 Fibre-channel adapter (4 port) in slot 2 is missing.

Explanation

Fibre-channel adapter (4 port) in slot 2 is missing.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F4

- 4-port fibre-channel host bus adapter (90%)
- PCI Express riser card (8%)
- Frame assembly (2%)

2145-8G4

N/A

2145-8F2

N/A

2145-4F2

N/A

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1017 Fibre-channel adapter in slot 1 PCI bus error.

Explanation

Fibre-channel adapter in slot 1 PCI bus error.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2

- Dual port fibre-channel host bus adapter - low profile (80%)
- PCI riser card (10%)
- Frame assembly (10%)

2145-8G4

N/A

2145-8F4

N/A

2145-4F2

N/A

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1018 Fibre-channel adapter in slot 2 PCI fault.

Explanation

Fibre-channel adapter in slot 2 PCI fault.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2

- Dual port fibre-channel host bus adapter - full height (80%)
- PCI riser card (10%)
- Frame assembly (10%)

2145-8G4

N/A

2145-8F4

N/A

2145-4F2

N/A

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1019 Fibre-channel adapter (4-port) in slot 2 PCI fault.

Explanation

Fibre-channel adapter (4-port) in slot 2 PCI fault.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F4

- 4-port fibre-channel host bus adapter (80%)

- PCI Express riser card (10%)
- Frame assembly (10%)

2145-8G4

N/A

2145-8F2

N/A

2145-4F2

N/A

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1020 The 2145 system board is failing.

Explanation

The 2145 system board is failing.

Action

1. Replace the system board assembly.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

System board assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1025 The 2145 system assembly is failing.

Explanation

The 2145 system assembly is failing.

Action

1. Go to the light path diagnostic MAP and perform the light path diagnostic procedures.
2. If the light path diagnostic procedure isolates the FRU, mark this error as "fixed" and go to the repair verification MAP. If you have just replaced a FRU but it has not corrected the problem, ensure that the FRU is installed correctly and go to the next step.
3. Replace the frame assembly.
4. Check node status. If all nodes show a status of "online", mark the error that you have just repaired as "fixed". If any nodes do not show a status of "online", go to the start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
5. Go to the repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- The FRUs that are indicated by the Light path diagnostics (98%)
- System board assembly (2%)

2145-8F2 or 2145-8F4

- The FRUs that are indicated by the Light path diagnostics (98%)
- Frame assembly (2%)

2145-4F2

N/A

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1030 A node's internal disk has failed.

Explanation

An error has occurred while attempting to read or write data to the internal disk of one of the nodes in the cluster. The disk has failed.

Action

Determine which node's internal disk has failed using the node information in the error. Replace the FRUs in the order shown. Mark the error as fixed.

Possible Cause-FRUs or other:

2145-8G4

- disk drive assembly (90%)
- disk drive cables (10%)

2145-8F4 or 2145-8F2

- disk drive assembly (100%)

2145-4F2

- disk drive assembly (90%)
- disk drive cables (10%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
You might have to remove the SATA backplate for a service action.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Replacing the SAN Volume Controller 2145-4F2 disk drive cables" on page 499
The disk drive cables must be replaced if they are removed.

1040 A flash module error has occurred after a successful start of a 2145.

Explanation

Note: The node containing the flash module has not been rejected by the cluster.

Action

1. Replace the service controller assembly.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

Service controller (100%)

2145-4F2

Service controller (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1044 A service controller read failure occurred.

Explanation

A service controller read failure occurred.

Action

1. Replace the service controller.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

Service controller (100%)

2145-4F2

Service controller (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1050 A 2145 fibre-channel adapter has failed a loop back, or similar, test.

Explanation

A 2145 fibre-channel adapter has failed a loop back, or similar, test.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

- Fibre-channel adapter assembly (90%)

- System board assembly (10%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1054 Fibre-channel adapter in slot 1 adapter present but failed.

Explanation

Fibre-channel adapter in slot 1 adapter present but failed.

Action

1. Replace the fibre-channel adapter.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2

Dual port fibre-channel host bus adapter - low profile (100%)

2145-8G4

N/A

2145-8F4

N/A

2145-4F2

N/A

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1055 Fibre-channel adapter (4 port) in slot 1 adapter present but failed.

Explanation

Fibre-channel adapter (4 port) in slot 1 adapter present but failed.

Action

1. Exchange the FRU for new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- 4-port fibre-channel host bus adapter (100%)

2145-8F4

N/A

2145-8F2

N/A

2145-4F2

N/A

1056 Fibre-channel adapter in slot 2 adapter present but failed.

Explanation

Fibre-channel adapter in slot 2 adapter present but failed.

Action

1. Replace the fibre-channel adapter.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2

Dual port fibre-channel host bus adapter - full height (100%)

2145-8G4

N/A

2145-8F4

N/A

2145-4F2

N/A

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1057 Fibre-channel adapter (4 port) in slot 2 adapter present but failed.

Explanation

Fibre-channel adapter (4 port) in slot 2 adapter present but failed.

Action

1. Exchange the FRU for new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F4

- 4-port fibre-channel host bus adapter (100%)

2145-8G4

N/A

2145-8F2

N/A

2145-4F2

N/A

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the

cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1060 One or more fibre-channel ports on the 2145 are not operational.

Explanation

One or more fibre-channel ports on the 2145 are not operational.

Action

1. Go to MAP 5600: Fibre-channel to isolate and repair the problem.
2. Go to the repair verification MAP.

Possible Cause-FRUs or other:

2145-8F4 or 2145-8G4

- Fibre-channel cable (80%)
- Small Form-factor Pluggable (SFP) connector (5%)
- 4-port fibre-channel host bus adapter (5%)

2145-8F2

- Fibre-channel cable (80%)
- Small Form-factor Pluggable (SFP) connector (5%)
- Dual port fibre-channel host bus adapter (fibre-channel MAP isolates to the correct type) (5%)

2145-4F2

- Fibre-channel cable (80%)
- Small Form-factor Pluggable (SFP) connector (5%)
- Fibre-channel adapter port (5%)

Other:

- Fibre-channel network fabric (10%)

Related tasks

"MAP 5600: Fibre-channel" on page 409
MAP 5600: Fibre-channel helps you to solve problems that have occurred on the SAN Volume Controller fibre-channel ports.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing and replacing the fibre-channel SFP connector on a SAN Volume Controller node" on page 523
When a failure occurs on a single fibre channel link, the SFP connector might need to be replaced.

1065 One or more fibre channel ports are running at lower than the previously saved speed.

Explanation

The fibre channel ports will normally operate at the highest speed permitted by the fibre-channel switch, but this speed might be reduced if the signal quality on the fibre-channel connection is poor. The fibre-channel switch could have been set to operate at a lower speed by the user, or the quality of the fibre-channel signal has deteriorated.

Action

- Go to MAP 5600: Fibre Channel to resolve the problem.

Possible Cause-FRUs or other:

2145-8F4 or 2145-8G4

- Fibre-channel cable (50%)
- Small Form-factor Pluggable (SFP) connector (20%)
- 4-port fibre-channel host bus adapter (5%)

Other:

- Fibre-channel switch, SFP or GBIC (25%)

Related tasks

"MAP 5600: Fibre-channel" on page 409
MAP 5600: Fibre-channel helps you to solve problems that have occurred on the SAN Volume Controller fibre-channel ports.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing and replacing the fibre-channel SFP connector on a SAN Volume Controller node" on page 523
When a failure occurs on a single fibre channel link, the SFP connector might need to be replaced.

1070 One of the four fan assemblies that cool the processors has returned a status of Failed status through the service processor.

Explanation

One of the four fan assemblies that cool the processors has returned a status of Failed status through the service processor.

Action

1. Check the error log and verify which fan failed.
2. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
3. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

- Microprocessor fan (90%)
- System board assembly (10%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing the fibre-channel adapter assembly” on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

“Replacing the fibre-channel adapter assembly” on page 529
Use these instructions when you need to replace the adapter assemblies.

“Removing the fans” on page 544
The SAN Volume Controller fans might have to be replaced due to failure.

“Replacing the fans” on page 548
The SAN Volume Controller fans might have to be replaced due to failure.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1071 The fan assembly that cools the disk drive assembly has returned a Failed status using the service processor.

Explanation

The fan assembly that cools the disk drive assembly has returned a Failed status using the service processor.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

- Disk drive fan (90%)
- System board assembly (10%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Replacing the SAN Volume Controller 2145-4F2 disk drive fan" on page 499
The disk drive fan must be removed if it is defective or if it needs to be replaced.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1075 The ambient temperature threshold of the node was exceeded.

Explanation

The ambient temperature threshold of the node was exceeded.

Action

1. Check that the room temperature is within the limits allowed.
2. Check for obstructions in the air flow.
3. Mark the error that you have just repaired, ″fixed″.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

System environment (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"SAN Volume Controller 2145-8G4 environment requirements" on page 40
Before the SAN Volume Controller 2145-8G4 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

1076 The internal temperature sensor of the 2145 has reported that the temperature warning threshold has been exceeded.

Explanation

The internal temperature sensor of the 2145 has reported that the temperature warning threshold has been exceeded.

Action

1. Check whether the internal airflow of the 2145 has been obstructed. Clear any obstructions. If you cannot find an obstruction, exchange the FRU for a new FRU. See "Possible Cause-FRUs or other" after the last action in this section.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

System board assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1077 The temperature soft or hard shutdown threshold of the 2145 has been exceeded.

Explanation

The 2145 has powered off automatically.

Action

1. In the sequence shown, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

System board assembly (100%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing the SAN Volume Controller 2145-4F2 system board” on page 580
During routine maintenance, you may be required to remove and replace the system board.

“Replacing the SAN Volume Controller 2145-4F2 system board” on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

“Checking the status of the node ports using the CLI” on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1080 One of the voltages that is monitored on the system board, but generated elsewhere, is outside the set thresholds.

Explanation

One of the voltages that is monitored on the system board, but generated elsewhere, is outside the set thresholds.

Action

1. In the sequence shown, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

- Power supply unit (98%)
- System board assembly (2%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing the power supply” on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

“Replacing the power supply” on page 512
You might need to replace the SAN Volume Controller power supply for a service action.

“Removing the SAN Volume Controller 2145-4F2 system board” on page 580
During routine maintenance, you may be required to remove and replace the system board.

“Replacing the SAN Volume Controller 2145-4F2 system board” on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1081 One of the voltages that is generated and monitored on the system board is outside the set thresholds.

Explanation

One of the voltages that is generated and monitored on the system board is outside the set thresholds.

Action

1. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

System board assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.
"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1089 One or more fans are failing.

Explanation

One or more fans are failing.

Action

1. Determine the failing fan(s) from the fan indicator on the system board or from the text of the error data in the log. If you have determined the failing fan number from the error data in the log, use the following table to determine the position of the fan assembly to replace. Each fan assembly contains two fans.
2. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
3. Go to repair verification MAP.

- Fan number:Fan assembly position
- 1 or 2 :1
- 3 or 4 :2
- 5 or 6 :3
- 7 or 8 :4
- 9 or 10:5
- 11 or 12:6

Possible Cause-FRUs or other:

2145-8G4

- Fan assembly (100%)

2145-4F2 or 2145-4F2 or 2145-8F4

N/A

1090 One or more fans (40×40×28) are failing.

Explanation

One or more fans (40×40×28) are failing.

Action

1. Determine the failing fan(s) from the fan indicator on the system board or from the text of the error data in the log.
2. If all fans on the fan backplane are failing or if no fan fault lights are illuminated, verify that the cable between the fan backplane and the system board is connected.
3. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4

- Fan 40×40×28 (98%)
- Fan power cable assembly (2%)

2145-4F2 or 2145-8G4

N/A

Related tasks

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the fans" on page 544
The SAN Volume Controller fans might have to be replaced due to failure.

"Replacing the fans" on page 548
The SAN Volume Controller fans might have to be replaced due to failure.

"Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fan holder and fan backplanes" on page 551
The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

"Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fan holder and fan backplanes" on page 552
The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

1091 One or more fans (40×40×56) are failing.

Explanation

One or more fans (40×40×56) are failing.

Action

1. Determine the failing fan(s) from the fan indicator on the system board or from the text of the error data in the log.
2. If all fans on the fan backplane are failing or if no fan fault lights are illuminated, verify that the cable between the fan backplane and the system board is connected.
3. Exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4

- Fan 40×40×56 (98%)
- Fan power cable assembly (2%)

2145-4F2 or 2145-8G4

N/A

Related tasks

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units

(FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the fans" on page 544
The SAN Volume Controller fans might have to be replaced due to failure.

"Replacing the fans" on page 548
The SAN Volume Controller fans might have to be replaced due to failure.

"Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fan holder and fan backplanes" on page 551
The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

"Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fan holder and fan backplanes" on page 552
The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

1092 The temperature soft or hard shutdown threshold of the 2145 has been exceeded. The 2145 has automatically powered off.

Explanation

The temperature soft or hard shutdown threshold of the 2145 has been exceeded. The 2145 has automatically powered off.

Action

1. Ensure that the operating environment meets specifications.
2. Ensure that the airflow is not obstructed.
3. Ensure that the fans are operational.
4. Go to the light path diagnostic MAP and perform the light path diagnostic procedures.
5. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any nodes do not show a status of ″online″, go to the start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
6. Go to the repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- The FRU that is indicated by the Light path diagnostics (25%)
- System board assembly (5%)

2145-8F2 or 2145-8F4

- The FRU that is indicated by the Light path diagnostics (25%)
- Frame assembly (5%)

2145-4F2

N/A

Other:

System environment or airflow blockage (70%)

Related tasks

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

1093 The internal temperature sensor of the 2145 has reported that the temperature warning threshold has been exceeded.

Explanation

The internal temperature sensor of the 2145 has reported that the temperature warning threshold has been exceeded.

Action

1. Ensure that the internal airflow of the node has not been obstructed.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to the start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- Fan assembly (25%)
- System board assembly (5%)

2145-8F2 or 2145-8F4

- Fan assembly (25%)
- Frame assembly (5%)

2145-4F2

N/A

Other:

Airflow blockage (70%)

Related tasks

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

1094 The ambient temperature threshold has been exceeded.

Explanation

The ambient temperature threshold has been exceeded.

Action

1. Check that the room temperature is within the limits allowed.
2. Check for obstructions in the air flow.
3. Mark the errors as fixed.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

None

Other:

System environment (100%)

Related tasks

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1100 One of the voltages that is monitored on the system board is over the set threshold.

Explanation

One of the voltages that is monitored on the system board is over the set threshold.

Action

1. See the light path diagnostic MAP.

2. If the light path diagnostic MAP does not resolve the issue, exchange the frame assembly.
3. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

N/A

2145-8F2 or 2145-8F4

- Light path diagnostic MAP FRUs (98%)
- Frame assembly (2%)

2145-4F2

N/A

Related tasks

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“MAP 5800: Light path” on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

“Replacing the SAN Volume Controller 2145-8G4 system board” on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

“Replacing the frame assembly” on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

1101 One of the voltages that is monitored on the system board is over the set threshold.

Explanation

One of the voltages that is monitored on the system board is over the set threshold.

Action

1. See the light path diagnostic MAP.
2. If the light path diagnostic MAP does not resolve the issue, exchange the system board assembly.
3. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- Light path diagnostic MAP FRUs (98%)
- System board assembly (2%)

2145-8F2 or 2145-8F4 or 2145-4F2

N/A

Related tasks

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

1105 One of the voltages that is monitored on the system board is under the set threshold.

Explanation

One of the voltages that is monitored on the system board is under the set threshold.

Action

1. Check the cable connections.
2. See the light path diagnostic MAP.
3. If the light path diagnostic MAP does not resolve the issue, exchange the frame assembly.
4. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

N/A

2145-8F2 or 2145-8F4

- Light path diagnostic MAP FRUs (98%)
- Frame assembly (2%)

2145-4F2

N/A

Related tasks

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“MAP 5800: Light path” on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

“Replacing the SAN Volume Controller 2145-8G4 system board” on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

“Replacing the frame assembly” on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

1106 One of the voltages that is monitored on the system board is under the set threshold.

Explanation

One of the voltages that is monitored on the system board is under the set threshold.

Action

1. Check the cable connections.
2. See the light path diagnostic MAP.
3. If the light path diagnostic MAP does not resolve the issue, exchange the system board assembly.
4. Check node status. If all nodes show a status of "online", mark the error that you have just repaired as "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- Light path diagnostic MAP FRUs (98%)
- System board assembly (2%)

2145-8F2 or 2145-8F4 or 2145-4F2

N/A

Related tasks

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

1110 The power management board detected a voltage that is outside of the set thresholds.

Explanation

The power management board detected a voltage that is outside of the set thresholds.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- Power backplane (90%)
- Power supply assembly (5%)
- System board assembly (5%)

2145-8F2 or 2145-8F4

- Power backplane (90%)
- Power supply assembly (5%)
- Frame assembly (5%)

2145-4F2

N/A

Related tasks

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing the power backplane” on page 516
The SAN Volume Controller power backplane might have to be removed.

“Replacing the power backplane” on page 518
The power backplane might have to be replaced for a service action.

“Removing the power supply” on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

“Replacing the power supply” on page 512
You might need to replace the SAN Volume Controller power supply for a service action.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

1135 The 2145 UPS has reported an ambient over temperature.

Explanation

The 2145 UPS has reported an ambient over temperature. The uninterruptible power supply switches to Bypass mode to allow the 2145 UPS to cool.

Action

1. Power off the nodes attached to the 2145 UPS.
2. Turn off the 2145 UPS, and then unplug the 2145 UPS from the main power source.
3. Ensure that the air vents of the 2145 UPS are not obstructed.
4. Ensure that the air flow around the 2145 UPS is not restricted.
5. Wait for at least five minutes, and then restart the 2145 UPS. If the problem remains, check the ambient temperature. Correct the problem. Otherwise, exchange the FRU for a new FRU. See "Possible Cause-FRUs or other" after the last action in this section.
6. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
7. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS electronics unit (50%)

Other:

The system ambient temperature is outside the specification (50%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

"Requirements for the uninterruptible power supply environment" on page 65
An uninterruptible power supply environment requires that certain specifications for the physical site of the SAN Volume Controller must be met.

1136 The 2145 UPS-1U has reported an ambient over temperature.

Explanation

The 2145 UPS-1U has reported an ambient over temperature.

Action

1. Power off the node attached to the 2145 UPS-1U.
2. Turn off the 2145 UPS-1U, and then unplug the 2145 UPS-1U from the main power source.
3. Ensure that the air vents of the 2145 UPS-1U are not obstructed.
4. Ensure that the air flow around the 2145 UPS-1U is not restricted.
5. Wait for at least five minutes, and then restart the 2145 UPS-1U. If the problem remains, check the ambient temperature. Correct the problem. Otherwise, exchange the FRU for a new FRU. See "Possible Cause-FRUs or other" after the last action in this section.
6. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
7. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS-1U assembly (50%)

Other:

The system ambient temperature is outside the specification (50%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

"Removing the power cable from the 2145-1U uninterruptible power supply" on page 605
You can remove the power cable from the 2145-1U uninterruptible power supply if you are having problems with the power supply and suspect that the power cable is defective.

"Removing the 2145-1U uninterruptible power supply battery" on page 606
Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

"Replacing the 2145-1U uninterruptible power supply battery" on page 611
Follow all safety notices when you are replacing the 2145-1U uninterruptible power supply battery.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

Related information

"Removing and replacing 2145-1U uninterruptible power supply parts" on page 588
The remove and replace procedures for the 2145-1U uninterruptible power supply field replaceable units are described in the topics which follow.

1140 The 2145 UPS has reported that it has a problem with the input AC power.

Explanation

The 2145 UPS has reported that it has a problem with the input AC power.

Action

1. Check the input AC power, whether it is missing or out of specification. Correct if necessary. Otherwise, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.

2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- 2145 UPS input power cable (10%)
- Electronics assembly (10%)

Other:

- The input AC power is missing (40%)
- The input AC power is not in specification (40%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1141 The 2145 UPS-1U has reported that it has a problem with the input AC power.

Explanation

The 2145 UPS-1U has reported that it has a problem with the input AC power.

Action

1. Check the input AC power, whether it is missing or out of specification. Correct if necessary. Otherwise, exchange the FRU for a new FRU. See "Possible Cause-FRUs or other" after the last action in this section.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- 2145 UPS-1U input power cable (10%)
- 2145 UPS-1U assembly (10%)

Other:

- The input AC power is missing (40%)
- The input AC power is not in specification (40%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1145 The signal connection between a 2145 and its 2145 UPS is failing.

Explanation

The signal connection between a 2145 and its 2145 UPS is failing.

Action

1. If other 2145s that are using this uninterruptible power supply are reporting this error, exchange the 2145 UPS electronics unit for a new one.
2. If only this 2145 is reporting the problem, check that the signal cable, exchange the FRUs for new FRUs in the sequence shown. See "Possible Cause-FRUs or other" after the last action in this section.
3. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8F2 or 2145-8F4 or 2145-8G4

N/A

2145-4F2

- Power cable assembly (40%)
- 2145 UPS electronics assembly (30%)
- System board assembly (25%)
- 2145 disk drive assembly (5%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Replacing the SAN Volume Controller 2145-4F2 disk drive cables" on page 499
The disk drive cables must be replaced if they are removed.

"Replacing the SAN Volume Controller 2145-4F2 disk drive fan" on page 499
The disk drive fan must be removed if it is defective or if it needs to be replaced.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1146 The signal connection between a 2145 and its 2145 UPS-1U is failing.

Explanation

The signal connection between a 2145 and its 2145 UPS-1U is failing.

Action

1. Exchange the FRUs for new FRUs in the sequence shown. See "Possible Cause-FRU or other" after the last action in this section.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired as "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- Power cable assembly (40%)
- 2145 UPS-1U assembly (30%)
- System board assembly (30%)

2145-8F2 or 2145-8F4

- Power cable assembly (40%)
- 2145 UPS-1U assembly (30%)
- Frame assembly (30%)

2145-4F2

- Power cable assembly (40%)
- 2145 UPS-1U assembly (30%)
- System board assembly (25%)
- 2145 disk drive assembly (5%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-4F2 disk drive cables" on page 493
The disk drive cables must be removed if they become defective or if you want to replace them.

"Replacing the SAN Volume Controller 2145-4F2 disk drive cables" on page 499
The disk drive cables must be replaced if they are removed.

"Replacing the SAN Volume Controller 2145-4F2 disk drive fan" on page 499
The disk drive fan must be removed if it is defective or if it needs to be replaced.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1150 Data that the 2145 has received from the 2145 UPS suggests the 2145 UPS power cable, the signal cable, or both, are not connected correctly.

Explanation

Data that the 2145 has received from the 2145 UPS suggests the 2145 UPS power cable, the signal cable, or both, are not connected correctly.

Action

1. Connect the cables correctly. See your product's installation guide.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Configuration error

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the

cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1151 Data that the 2145 has received from the 2145 UPS-1U suggests the 2145 UPS-1U power cable, the signal cable, or both, are not connected correctly.

Explanation

Data that the 2145 has received from the 2145 UPS-1U suggests the 2145 UPS-1U power cable, the signal cable, or both, are not connected correctly.

Action

1. Connect the cables correctly. See your product's installation guide.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Configuration error

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1155 A power domain error has occurred.

Explanation

Both 2145s of a pair are powered by the same uninterruptible power supply.

Action

1. List the cluster's 2145s and check that 2145s in the same I/O group are connected to a different uninterruptible power supply.
2. Connect one of the 2145s as identified in step 1 to a different uninterruptible power supply.
3. Mark the error that you have just repaired, "fixed".
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Configuration error

Related tasks

"Viewing the vital product data" on page 133
You can view the vital product data for a node from the Viewing Vital Product Data panel.

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

1160 The output load on the 2145 UPS exceeds the specification (reported by 2145 UPS alarm bits).

Explanation

The output load on the 2145 UPS exceeds the specification (reported by 2145 UPS alarm bits).

Action

1. Ensure that only 2145s are receiving power from the uninterruptible power supply. Ensure that there are no switches or disk controllers that are connected to the 2145 UPS.
2. Remove each connected 2145 input power in turn, until the output overload is removed.
3. Exchange the FRUs for new FRUs in the sequence shown, on the overcurrent 2145. See "Possible Cause-FRU or other" after the last action in this section.
4. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145 UPS.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

- Power cable assembly (50%)
- Power supply assembly (40%)
- 2145 UPS electronics assembly (10%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the power supply" on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

"Replacing the power supply" on page 512
You might need to replace the SAN Volume Controller power supply for a service action.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1161 The output load on the 2145 UPS-1U exceeds the specifications (reported by 2145 UPS-1U alarm bits).

Explanation

The output load on the 2145 UPS-1U exceeds the specifications (reported by 2145 UPS-1U alarm bits).

Action

1. Ensure that only 2145s are receiving power from the uninterruptible power supply. Also, ensure that no other devices are connected to the 2145 UPS-1U.
2. Exchange, in the sequence shown, the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section. If the Overload Indicator is still illuminated with all outputs disconnected, replace the 2145 UPS-1U.
3. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145 UPS-1U.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- Power cable assembly (50%)
- Power supply assembly (40%)
- 2145 UPS-1U assembly (10%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing the power supply” on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

“Replacing the power supply” on page 512
You might need to replace the SAN Volume Controller power supply for a service action.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

“Checking the status of the node ports using the CLI” on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1165 The 2145 UPS output load is unexpectedly high. The 2145 UPS output is possibly connected to an extra non-2145 load.

Explanation

The 2145 UPS output load is unexpectedly high. The 2145 UPS output is possibly connected to an extra non-2145 load.

Action

1. Ensure that only 2145s are receiving power from the uninterruptible power supply. Ensure that there are no switches or disk controllers that are connected to the 2145 UPS.
2. Check node status. If all nodes show a status of ″online″, the problem no longer exists. Mark the error that you have just repaired ″fixed″ and go to the repair verification MAP.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

None

Other:

- Configuration error

  Related tasks

  “Marking errors as fixed” on page 117
  You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

  “Viewing the node status” on page 75
  You can view the properties for a node from the Viewing General Details panel.

  “MAP 5000: Start” on page 362
  MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

  “MAP 5700: Repair verification” on page 415
  MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

  Related reference

  “Checking the status of the node using the CLI” on page 75
  You can use the command-line interface (CLI) to check the status of the node.

  “Checking the status of the node ports using the CLI” on page 76
  You can use the command-line interface (CLI) to check the status of the node ports.

1166 The 2145 UPS-1U output load is unexpectedly high.

Explanation

The uninterruptible power supply output is possibly connected to an extra non-2145 load.

Action

1. Ensure that there are no other devices that are connected to the 2145 UPS-1U.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145 UPS-1U.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- 2145 UPS-1U assembly (5%)

Other:

- Configuration error (95%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1170 2145 UPS electronics fault (reported by the 2145 UPS alarm bits).

Explanation

2145 UPS electronics fault (reported by the 2145 UPS alarm bits).

Action

1. Replace the uninterruptible power supply electronics assembly.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the UPS.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS electronics assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply electronics" on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1171 2145 UPS-1U electronics fault (reported by the 2145 UPS-1U alarm bits).

Explanation

2145 UPS-1U electronics fault (reported by the 2145 UPS-1U alarm bits).

Action

1. Replace the uninterruptible power supply assembly.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145 UPS-1U.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS-1U assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1175 A problem has occurred with the uninterruptible power supply frame fault (reported by uninterruptible power supply alarm bits).

Explanation

A problem has occurred with the uninterruptible power supply frame fault (reported by the uninterruptible power supply alarm bits).

Action

1. Replace the uninterruptible power supply assembly.
2. Check node status. If all nodes show a status of "online", mark the error that you have just repaired "fixed". If any nodes do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

Uninterruptible power supply assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

"Removing the 2145 uninterruptible power supply" on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

"Replacing the 2145 uninterruptible power supply" on page 617
You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1180 2145 UPS battery fault (reported by 2145 UPS alarm bits).

Explanation

2145 UPS battery fault (reported by 2145 UPS alarm bits).

Action

1. Replace the 2145 UPS battery assembly.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS battery assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

"Replacing the 2145 uninterruptible power supply battery" on page 634
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1181 2145 UPS-1U battery fault (reported by 2145 UPS-1U alarm bits).

Explanation

2145 UPS-1U battery fault (reported by 2145 UPS-1U alarm bits).

Action

1. Replace the 2145 UPS-1U battery assembly.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS-1U battery assembly (100%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing the 2145-1U uninterruptible power supply battery” on page 606
Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

“Replacing the 2145-1U uninterruptible power supply battery” on page 611
Follow all safety notices when you are replacing the 2145-1U uninterruptible power supply battery.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

“Checking the status of the node ports using the CLI” on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1185 2145 UPS fault, with no specific FRU identified (reported by uninterruptible power supply alarm bits).

Explanation

2145 UPS fault, with no specific FRU identified (reported by 2145 UPS alarm bits).

Action

1. In the sequence shown, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145 UPS.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- 2145 UPS electronics assembly (60%)
- 2145 UPS battery assembly (20%)
- 2145 UPS assembly (20%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing the 2145 uninterruptible power supply” on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

“Replacing the 2145 uninterruptible power supply” on page 617
You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

“Removing the 2145 uninterruptible power supply electronics” on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

“Replacing the 2145 uninterruptible power supply electronics” on page 627
During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

“Removing the 2145 uninterruptible power supply battery” on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

“Replacing the 2145 uninterruptible power supply battery” on page 634
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1186 A problem has occurred in the 2145 UPS-1U, with no specific FRU identified (reported by 2145 UPS-1U alarm bits).

Explanation

A problem has occurred in the 2145 UPS-1U, with no specific FRU identified (reported by 2145 UPS-1U alarm bits).

Action

1. In the sequence shown, exchange the FRU for a new FRU. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS-1U assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

"Removing the 2145-1U uninterruptible power supply battery" on page 606
Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

"Replacing the 2145-1U uninterruptible power supply battery" on page 611
Follow all safety notices when you are replacing the 2145-1U uninterruptible power supply battery.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1190 The 2145 UPS battery has reached its end of life.

Explanation

The 2145 UPS battery has reached its end of life.

Action

1. Replace the 2145 UPS battery assembly.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS battery assembly (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

"Replacing the 2145 uninterruptible power supply battery" on page 634
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1191 The 2145 UPS-1U battery has reached its end of life.

Explanation

The 2145 UPS-1U battery has reached its end of life.

Action

1. Replace the 2145 UPS-1U battery assembly.
2. Check node status. If all nodes show a status of ″online″, mark the error that you have just repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the uninterruptible power supply.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

2145 UPS-1U battery assembly (100%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing the 2145-1U uninterruptible power supply battery” on page 606
Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

“Replacing the 2145-1U uninterruptible power supply battery” on page 611
Follow all safety notices when you are replacing the 2145-1U uninterruptible power supply battery.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

“Checking the status of the node ports using the CLI” on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1195 A 2145 is missing from the cluster.
Explanation

You can resolve this problem by repairing the failure on the missing 2145.

Action

1. If it is not obvious which node in the cluster has failed, check the status of the nodes and find the 2145 with a status of offline.
2. Go to the Start MAP and perform the repair on the failing node.
3. When the repair has been completed, this error is automatically marked as fixed.
4. Check node status. If all nodes show a status of ″online″, but the error in the log has not been marked as fixed, manually mark the error that you have just

repaired ″fixed″. If any nodes do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the 2145.

5. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

“Checking the status of the node ports using the CLI” on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1200 The configuration is not valid. Too many devices have been presented to the cluster or 2145.

Explanation

The configuration is not valid. Too many devices have been presented to the cluster or 2145.

Action

1. Remove unwanted devices from the fibre-channel network fabric.
2. Start a cluster discovery operation to find devices/disks by rescanning the fibre-channel network.
3. List all connected managed disks. Check with the customer that the configuration is as expected. Mark the error that you have just repaired fixed.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Fibre-channel network fabric fault (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Listing MDisks using the CLI" on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

"Discovering MDisks" on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

"Discovering MDisks using the CLI" on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1203 A duplicate fibre channel frame has been received.

Explanation

A duplicate fibre channel frame should never be detected. Receiving a duplicate fibre channel frame indicates that there is a problem with the fibre channel fabric. other errors related to the fibre channel fabric might be generated.

Action

1. Use the transmitting and receiving WWPNs indicated in the error data to determine the section of the fibre channel fabric that has generated the duplicate frame. Search for the cause of the problem by using fabric monitoring tools. The duplicate frame might be caused by a design error in the topology of the fabric, by a configuration error, or by a software or hardware fault in one of the components of the fibre channel fabric.
2. When you are satisfied that the problem has been corrected, mark the error that you have just repaired ″fixed″.
3. Go to MAP 5700: Repair verification.

Possible Cause-FRUs or other:

- Fibre-channel cable assembly (1%)
- Fibre-channel adapter (1%)

Other:

- Fibre-channel network fabric fault (98%)

1210 A local fibre-channel port has been excluded.

Explanation

A local fibre-channel port has been excluded.

Action

1. Repair faults in the order shown.

2. Check the status of the disk controllers. If all disk controllers show a ″good″ status, mark the error that you just repaired as ″fixed″.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- Fibre-channel cable assembly (75%)
- Small Form-factor Pluggable (SFP) connector (10%)
- Fibre-channel adapter (5%)

Other:

- Fibre-channel network fabric fault (10%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“MAP 5600: Fibre-channel” on page 409
MAP 5600: Fibre-channel helps you to solve problems that have occurred on the SAN Volume Controller fibre-channel ports.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

“Removing and replacing the fibre-channel SFP connector on a SAN Volume Controller node” on page 523
When a failure occurs on a single fibre channel link, the SFP connector might need to be replaced.

1220 A remote fibre-channel port has been excluded.

Explanation

A remote fibre-channel port has been excluded.

Action

1. View the error log. Note the MDisk ID associated with the error code.
2. From the MDisk, determine the failing disk controller ID.
3. Refer to the service documentation for the disk controller and the fibre-channel network to resolve the reported problem.
4. After the disk drive is repaired, start a cluster discovery operation to recover the excluded fibre-channel port by rescanning the fibre-channel network.
5. To restore MDisk online status, include the managed disk that you noted in step 1.
6. Check the status of the disk controller. If all disk controllers show a ″good″ status, mark the error that you have just repaired, ″fixed″.
7. If all disk controllers do not show a good status, contact your support center to resolve the problem with the disk controller.
8. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Enclosure/controller fault (50%)
- Fibre-channel network fabric (50%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Listing MDisks using the CLI" on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

"Discovering MDisks" on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

"Discovering MDisks using the CLI" on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

"Viewing the error log" on page 176
You can view the error log by using the SAN Volume Controller command-line interface (CLI) or the SAN Volume Controller Console.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking disk controller status using the CLI" on page 103
You can use the command-line interface (CLI) to check the status of the disk controllers.

"Determining the failing enclosure or disk controller using the CLI" on page 104
You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

1230 Login has been excluded.

Explanation

Login has been excluded.

Action

1. In the sequence shown, exchange the FRUs for new FRUs. See ″Possible Cause-FRUs or other″ after the last action in this section.
2. Start a cluster discovery operation to recover the login by rescanning the fibre-channel network.
3. Check the status of the disk controller. If all disk controllers show a ″good″ status, mark the error that you have just repaired, ″fixed″. If any disk controllers do not show ″good″ status, go to start MAP. If you return to this step, contact the support center to resolve the problem with the disk controller.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- Fibre-channel cable, switch to remote port, (50%)
- Fibre-channel cable, local port to switch (50%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Discovering MDisks" on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

"Discovering MDisks using the CLI" on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking disk controller status using the CLI" on page 103
You can use the command-line interface (CLI) to check the status of the disk controllers.

1310 A managed disk is reporting excessive errors.

Explanation

A managed disk is reporting excessive errors.

Action

1. Repair the enclosure/controller fault.
2. Check the managed disk status. If all managed disks show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any managed disks show a status of ″excluded″, include the excluded managed disks and then mark the error as ″fixed″.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Enclosure/controller fault (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Listing MDisks using the CLI" on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1320 A disk I/O medium error has occurred.

Explanation

A disk I/O medium error has occurred.

Action

1. Ask the customer to rewrite the incorrect data to the block LBA that is reported in the host systems SCSI sense data. If this error has occurred during a migration, the host system does not notice the error until the target device is accessed.
2. Check managed disk status. If all managed disks show a status of "online", mark the error that you have just repaired as "fixed". If any managed disks do not show a status of "online", go to start MAP. If you return to this step, contact your support center to resolve the problem with the disk controller.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Enclosure/controller fault (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Listing MDisks using the CLI" on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1330 No managed disk (MDisk) is suitable for use as a quorum disk.

Explanation

When a cluster is created, three disks are automatically selected as quorum disks. A quorum disk is needed to enable a tie-break when some cluster members are missing. To become a quorum disk:

- The MDisk must be accessible by all nodes in the cluster.
- The MDisk must have free extents

This error code is produced when at least one quorum disk is not accessible by all nodes in the cluster.

A quorum disk might not be available because of a fibre-channel network failure or because of a fibre-channel switch zoning problem.

Action

1. Resolve any known fibre-channel network problems.
2. Ask the customer to confirm that Mdisks have been created and that those MDisks have free extents. If at least one managed disk shows a mode of managed, mark the error that you have just repaired as "fixed".
3. List the MDisks. If at least one MDisk shows a mode of managed, mark the error as "fixed".
4. If the customer is unable to make the appropriate changes, ask your software support center for assistance.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Configuration error (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Listing MDisks using the CLI" on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

"SAN problem determination" on page 348
The procedures to service the SAN Volume Controller that are provided here help you solve problems on the SAN Volume Controller and its connection to the storage area network (SAN).

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1335 Quorum disk not available.

Explanation

Quorum disk not available.

Action

1. View the error log entry to identify the managed disk (MDisk) being used as a quorum disk, that is no longer available.

2. Perform the disk controller problem determination and repair procedures for the MDisk identified in step 1.
3. Include the MDisks into the cluster.
4. Check the managed disk status. If the managed disk identified in step 1 shows a status of ″online″, mark the error that you have just repaired as ″fixed″. If the managed disk does not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the disk controller.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Enclosure/controller fault (100%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Listing MDisks using the CLI” on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

“Determining the failing enclosure or disk controller using the CLI” on page 104
You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

1340 A managed disk has timed out.

Explanation

This error was reported because a large number of disk timeout conditions have been detected. The problem is probably caused by a failure of some other component on the SAN.

Action

1. Repair problems on all enclosures/controllers and switches on the same SAN as this 2145 cluster.
2. If problems are found, mark this error as ″fixed″.
3. If no switch or disk controller failures can be found, take an error log dump and call your hardware support center.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Enclosure/controller fault
- Fibre-channel switch

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1360 A SAN transport error occurred.

Explanation

This error has been reported because the 2145 performed error recovery procedures in response to SAN component associated transport errors. The problem is probably caused by a failure of a component of the SAN.

Action

1. View the error log entry to determine the node that logged the problem. Determine the 2145 node or controller that the problem was logged against.
2. Perform fibre-channel switch problem determination and repair procedures for the switches connected to the 2145 node or controller.
3. Perform fibre-channel cabling problem determination and repair procedures for the cables connected to the 2145 node or controller.
4. If any problems are found and resolved in step 2 and 3, mark this error as "fixed".
5. If no switch or cable failures were found in steps 2 and 3, take an error log dump. Call your hardware support center.
6. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Fibre-channel switch
- Fibre-channel cabling

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units

(FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1370 A managed disk error recovery procedure (ERP) has occurred.

Explanation

This error was reported because a large number of disk error recovery procedures have been performed by the disk controller. The problem is probably caused by a failure of some other component on the SAN.

Action

1. View the error log entry and determine the managed disk that was being accessed when the problem was detected.
2. Perform the disk controller problem determination and repair procedures for the MDisk determined in step 1.
3. Perform problem determination and repair procedures for the fibre channel switches connected to the 2145 and any other fibre-channel network components.
4. If any problems are found and resolved in steps 2 and 3, mark this error as ″fixed″.
5. If no switch or disk controller failures were found in steps 2 and 3, take an error log dump. Call your hardware support center.
6. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Enclosure/controller fault
- Fibre-channel switch

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1400 The 2145 cannot detect the Ethernet connection.

Explanation

The 2145 cannot detect the Ethernet connection.

Action

1. Go to the Ethernet MAP.
2. Go to the repair verification MAP.

Possible Cause-FRUs or other:

2145-8G4

- Ethernet cable (25%)
- System board assembly (25%)

2145-8F2 or 2145-8F4

- Ethernet cable (25%)
- Frame assembly (25%)

2145-4F2

- Ethernet cable (25%)
- System board assembly (25%)

Other:

- Ethernet cable is disconnected or damaged (25%)
- Ethernet hub fault (25%)

Related tasks

"MAP 5500: Ethernet" on page 406
MAP 5500: Ethernet helps you solve problems that have occurred on the SAN Volume Controller Ethernet.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

1550 A cluster path has failed.

Explanation

One of the 2145 fibre-channel ports is unable to communicate with all the other 2145s in the cluster.

Action

1. Check for incorrect switch zoning.
2. Repair the fault in the fibre-channel network fabric.
3. Check the status of the node ports. If the status of the node ports shows as active, mark the error that you have just repaired as "fixed". If any node ports do not show a status of active, go to start MAP. If you return to this step contact your support center to resolve the problem with the 2145.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Fibre-channel network fabric fault (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking the status of the node ports using the CLI" on page 76
You can use the command-line interface (CLI) to check the status of the node ports.

1600 Mirrored disk repair halted because of difference.

Explanation

During the repair of a mirrored VDisk two copy disks were found to contain different data for the same logical block address (LBA). The validate option was used, so the repair process has halted.

Read operations to the LBAs that differ might return either VDisk Copy's data. Therefore it is important not to use the VDisk unless you are sure that the host applications will not read the LBAs that differ or can manage the different data that potentially can be returned.

Action

Perform one of the following actions:

- Continue the repair starting with the next LBA after the difference to see how many differences there are for the whole mirrored VDisk. This can help you decide which of the following actions to take.
- Choose a primary disk and run repair resynchronizing differences.
- Run a repair and create medium errors for differences.
- Restore all or part of the VDisk from a backup.
- Decide which disk has correct data, then delete the copy that is different and recreate it allowing it to be synchronized.

Then mark the error as ″fixed″.

Possible Cause-FRUs or other:

- None

1610 Media errors on back-end managed disk.
Explanation

Media errors on back-end managed disk.

Action

1. Repair fault in the enclosure/controller.
2. To restore MDisk online status, include the managed disk into the cluster.
3. Check managed disk status. If all managed disks show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any managed disks do not show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the disk controller.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Enclosure/controller fault (100%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Listing MDisks using the CLI” on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

“Determining the failing enclosure or disk controller using the CLI” on page 104
You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

1620 An Mdisk group is offline.
Explanation

An Mdisk group is offline.

Action

1. Repair the faults in the order shown.
2. Start a cluster discovery operation by rescanning the fibre-channel network.
3. Check managed disk (MDisk) status. If all MDisks show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any MDisks do not

show a status of ″online″, go to start MAP. If you return to this step, contact your support center to resolve the problem with the disk controller.

4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Fibre-channel network fabric fault (50%)
- Enclosure/controller fault (50%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Listing MDisks using the CLI” on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

“Discovering MDisks” on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

“Discovering MDisks using the CLI” on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

“Determining the failing enclosure or disk controller using the CLI” on page 104
You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

1623 One or more MDisks on a controller are degraded.

Explanation

At least one MDisk on a controller is degraded because the MDisk is not available through one or more nodes. The MDisk is available through at least one node. Access to data might be lost if another failure occurs.

In a correctly configured system, each node accesses all of the MDisks on a controller through all of the controller’s ports.

This error is only logged once per controller. There might be more than one MDisk on this controller that has been configured incorrectly, but the error is only logged for one MDisk.

To prevent this error from being logged because of short-term fabric maintenance activities, this error condition must have existed for one hour before the error is logged.

Action

1. Determine which MDisks are degraded. Look for MDisks with a path count lower than the number of nodes. Do not use only the MDisk status, since other errors can also cause degraded MDisks.
2. Ensure that the controller is zoned correctly with all of the nodes.
3. Ensure that the logical unit is mapped to all of the nodes.
4. Ensure that the logical unit is mapped to all of the nodes using the same LUN.
5. Run the console or CLI command to discover MDisks and ensure that the command completes.
6. Mark the error that you have just repaired as ″fixed″. When you mark the error as ″fixed″, the controller's MDisk availability is tested and the error will be logged again immediately if the error persists for any MDisks. It is possible that the new error will report a different MDisk.
7. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Fibre-channel network fabric fault (50%)
- Enclosure/controller fault (50%)

1624 Controller configuration has unsupported RDAC mode.

Explanation

SAN Volume Controller has detected that an IBM DS4000 series disk controller's configuration is not supported by SAN Volume Controller. The disk controller is operating in RDAC mode. The disk controller might appear to be operating with SAN Volume Controller; however, the configuration is unsupported because it is known to not work with SAN Volume Controller.

Action

1. Using the IBM DS4000 console, ensure that the host type is set to 'IBM TS SAN VCE' and that the AVT option is enabled. (The AVT and RDAC options are mutually exclusive).
2. Mark the error that you have just repaired as ″fixed″. If the problem has not been fixed it will be logged again; this could take a few minutes.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Enclosure/controller fault

1625 Incorrect disk controller configuration.

Explanation

While running an MDisk discovery, the SAN Volume Controller has detected that a disk contoller's configuration is not supported by SAN Volume Controller. The disk controller might appear to be operating with SAN Volume Controller; however, the configuration detected can potentially cause issues and should not be used. The unsupported configuration is shown in the event data.

Action

1. Use the event data to determine changes required on the disk controller and reconfigure the disk controller to use a supported configuration.
2. Mark the error that you have just repaired as "fixed". If the problem has not been fixed it will be logged again by the managed disk discovery that automatically runs at this time; this could take a few minutes.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Enclosure/controller fault

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Discovering MDisks" on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

"Discovering MDisks using the CLI" on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1627 The cluster has insufficient redundancy in its controller connectivity.

Explanation

The cluster has detected that it does not have sufficient redundancy in its connections to the disk controllers. This means that another failure in the SAN could result in loss of access to the application data. The cluster SAN environment should have redundant connections to every disk controller. This redundancy allows for continued operation when there is a failure in one of the SAN components.

To provide recommended redundancy, a cluster should be configured so that:

- each node can access each disk controller through two or more different initiator ports on the node.
- each node can access each disk controller through two or more different controller target ports. Note: Some disk controllers only provide a single target port.
- each node can access each disk controller target port through at least one initiator port on the node.

If there are no higher-priority errors being reported, this error usually indicates a problem with the SAN design, a problem with the SAN zoning or a problem with the disk controller.

If there are unfixed higher-priority errors that relate to the SAN or to disk controllers, those errors should be fixed before resolving this error because they might indicate the reason for the lack of redundancy. Error codes that must be fixed first are:

- 1210 Local FC port excluded
- 1230 Login has been excluded

Note: This error can be reported if the required action, to rescan the fibre-channel network for new MDisks, has not been performed after a deliberate reconfiguration of a disk controller or after SAN rezoning.

The 1627 error code is reported for a number of different error IDs. The error ID indicates the area where there is a lack of redundancy. The data reported in an error log entry indicates where the condition was found.

The meaning of the error IDs is shown below. For each error ID the most likely reason for the condition is given. If the problem is not found in the suggested areas, check the configuration and state of all of the SAN components (switches, controllers, disks, cables and cluster) to determine where there is a single point of failure.

010040 A disk controller is only accessible from a single node port.

- A node has detected that it only has a connection to the disk controller through exactly one initiator port, and more than one initiator port is operational.
- The error data indicates the device WWNN and the WWPN of the connected port.
- A zoning issue or a fibre-channel connection hardware fault might cause this condition.

010041 A disk controller is only accessible from a single port on the controller.

- A node has detected that it is only connected to exactly one target port on a disk controller, and more than one target port connection is expected.
- The error data indicates the WWPN of the disk controller port that is connected.
- A zoning issue or a fibre-channel connection hardware fault might cause this condition.

010042 Only a single port on a disk controller is accessible from every node in the cluster.

- Only a single port on a disk controller is accessible to every node when there are multiple ports on the controller that could be connected.
- The error data indicates the WWPN of the disk controller port that is connected.

- A zoning issue or a fibre-channel connection hardware fault might cause this condition.

010043 A disk controller is accessible through only half, or less, of the previously configured controller ports.

- Although there might still be multiple ports that are accessible on the disk controller, a hardware component of the controller might have failed or one of the SAN fabrics has failed such that the operational system configuration has been reduced to a single point of failure.
- The error data indicates a port on the disk controller that is still connected, and also lists controller ports that are expected but that are not connected.
- A disk controller issue, switch hardware issue, zoning issue or cable fault might cause this condition.

010044 A disk controller is not accessible from a node.

- A node has detected that it has no access to a disk controller. The controller is still accessible from the partner node in the I/O group, so its data is still accessible to the host applications.
- The error data indicates the WWPN of the missing disk controller.
- A zoning issue or a cabling error might cause this condition.

Action

1. Check the error ID and data for a more detailed description of the error.
2. Determine if there has been an intentional change to the SAN zoning or to a disk controller configuration that reduces the cluster's access to the indicated disk controller. If either action has occurred, continue with step 8.
3. Use the GUI or the CLI command svcinfo lsfabric to ensure that all disk controller WWPNs are reported as expected.
4. Ensure that all disk controller WWPNs are zoned appropriately for use by the cluster.
5. Check for any unfixed errors on the disk controllers.
6. Ensure that all of the fibre-channel cables are connected to the correct ports at each end.
7. Check for failures in the fibre-channel cables and connectors.
8. When you have resolved the issues, use the GUI or the CLI command svctask detectmdisk to rescan the fibre-channel network for changes to the MDisks. NOTE: Do not attempt to detect MDisks unless you are sure that all problems have been fixed. Detecting MDisks prematurely might mask an issue.
9. Mark the error that you have just repaired as fixed. The cluster will revalidate the redundancy and will report another error if there is still not sufficient redundancy.
10. Go to MAP 5700: Repair verification.

Possible Cause-FRUs or other:

- None

1630 The number of device logins was reduced.

Explanation

One possible cause is that the user intentionally reconfigured the system.

Action

1. Check the error in the cluster error log to identify the object ID associated with the error.
2. Check the availability of the failing device using the following command line: svcinfo lscontroller object_ID. If the command fails with the message ″CMMVC6014E The command failed because the requested object is either unavailable or does not exist,″ ask the customer if this device was removed from the system.
   - If ″yes″, mark the error as fixed in the cluster error log and continue with the repair verification MAP.
   - If ″no″ or if the command lists details of the failing controller, continue with the next step.
3. Check whether the device has regained connectivity. If it has not, check the cable connection to the remote-device port.
4. If all attempts to log in to a remote-device port have failed and you cannot solve the problem by changing cables, check the condition of the remote-device port and the condition of the remote device.
5. Start a cluster discovery operation by rescanning the fibre-channel network.
6. Check the status of the disk controller. If all disk controllers show a ″good″ status, mark the error that you have just repaired as ″fixed″. If any disk controllers do not show ″good″ status, go to start MAP. If you return to this step, contact the support center to resolve the problem with the disk controller.
7. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Fibre-channel network fabric fault (50%)
- Enclosure/controller fault (50%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Discovering MDisks” on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

“Discovering MDisks using the CLI” on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Checking disk controller status using the CLI" on page 103
You can use the command-line interface (CLI) to check the status of the disk controllers.

1660 The initialization of the managed disk has failed.

Explanation

The initialization of the managed disk has failed.

Action

1. View the error log entry to identify the managed disk (MDisk) that was being accessed when the problem was detected.
2. Perform the disk controller problem determination and repair procedures for the MDisk identified in step 1.
3. Include the MDisk into the cluster.
4. Check the managed disk status. If all managed disks show a status of ″online″, mark the error that you have just repaired as ″fixed″. If any managed disks do not show a status of ″online″, go to the start MAP. If you return to this step, contact your support center to resolve the problem with the disk controller.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Enclosure/controller fault (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Listing MDisks using the CLI" on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

"Discovering MDisks" on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

"Discovering MDisks using the CLI" on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Determining the failing enclosure or disk controller using the CLI" on page 104
You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

1670 The CMOS battery on the 2145 system board failed.

Explanation

The CMOS battery on the 2145 system board failed.

Action

1. Replace the CMOS battery.
2. Mark the error that you have just repaired as "fixed".
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

CMOS battery (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the CMOS battery" on page 500
You must remove the system board complementary metal-oxide semiconductor (CMOS), or system-board, battery to replace it or to perform routine maintenance.

1695 Persistent unsupported disk controller configuration.

Explanation

A disk controller configuration that might prevent failover for SAN Volume Controller has persisted for more than four hours. The problem was originally logged through a 010032 event, service error code 1625.

Action

1. Fix any higher priority error. In particular, follow the service actions to fix the 1625 error indicated by this error's root event. This error will be marked as "fixed" when the root event is marked as "fixed".
2. If the root event cannot be found, or is marked as "fixed", perform an MDisk discovery and mark this error as "fixed".
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Enclosure/controller fault

1720 In a Metro Mirror or Global Mirror operation, the relationship has stopped and lost synchronization, for a reason other than a persistent I/O error.

Explanation

In a Metro Mirror or Global Mirror operation, the relationship has stopped and lost synchronization, for a reason other than a persistent I/O error.

Action

1. Restart the relationship after fixing errors of higher priority.
2. Mark the error that you have just repaired as ″fixed″.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1800 The SAN has been zoned incorrectly.

Explanation

This has resulted in more than 512 other ports on the SAN logging into one port of a 2145 node.

Action

1. Ask the user to reconfigure the SAN.
2. Mark the error as ″fixed″.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

- Fibre-channel switch configuration error
- Fibre-channel switch

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Listing MDisks using the CLI” on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

"Discovering MDisks" on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

"Discovering MDisks using the CLI" on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Determining the failing enclosure or disk controller using the CLI" on page 104
You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

1850 A cluster recovery operation was performed but data on one or more VDisks has not been recovered.

Explanation

A cluster recovery operation was performed but data on one or more VDisks has not been recovered.

Action

1. The support center will direct the user to restore the data on the affected virtual disks (VDisks).
2. When the VDisk data has been restored or the user has chosen not to restore the data, mark the error as ″fixed″.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"Listing MDisks using the CLI" on page 93
You can use the command-line interface (CLI) to list the managed disks (MDisks).

"Discovering MDisks" on page 89
You can have the cluster rescan the fibre-channel network. The rescan discovers any new managed disks (MDisks) that might have been added to the cluster and rebalances MDisk access across the available controller device ports.

"Discovering MDisks using the CLI" on page 94
You can use the command-line interface (CLI) to discover managed disks (MDisks).

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

"Determining the failing enclosure or disk controller using the CLI" on page 104
You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

1860 Space-efficient VDisk Copy offline due to failed repair.

Explanation

The attempt to repair a space-efficient volume's metadata that describes the disk contents has failed due to problems with the automatically maintained backup copy of this data. The error event data describes the problem.

Action

Delete the space-efficient VDisk and reconstruct a new one from a backup or mirror copy. Mark the error as ″fixed″. Also mark the original 1862 error as ″fixed″.

Possible Cause-FRUs or other:

- None

1862 Space-efficient VDisk Copy offline due to corrupt metadata.

Explanation

A space-efficient VDisk has been taken offline because there is an inconsistency in the SAN Volume Controller metadata that describes the disk contents. This might occur because of corruption of data on the physical disk (e.g., medium error or data miscompare), the loss of cached metadata (because of a T3 recovery) or because of a software error. The event data gives information on the reason.

The SAN Volume Controller maintains backup copies of the metadata and it might be possible to repair the space-efficient VDisk using this data.

Action

SAN Volume Controller is able to repair the inconsistency in some circumstances. Run the repair VDisk option to start the repair process. This repair process, however, can take some time. In some situations it might be more appropriate to delete the space-efficient VDisk and reconstruct a new one from a backup or mirror copy.

If you run the repair procedure and it completes, this error is automatically marked as ″fixed″; otherwise, another error event (error code 1860) is logged to indicate that the repair action has failed.

Possible Cause-FRUs or other:

- None

Related tasks

"Repairing offline space-efficient VDisks" on page 86
When a space-efficient virtual disk (VDisk) is taken offline because its metadata is corrupted, you can use the Repairing Space-Efficient VDisk panel to repair the metadata. The repair operation automatically detects corrupted metadata and performs any necessary repair actions.

Related reference

"Repairing a space-efficient VDisk using the CLI" on page 87
You can use the **repairsevdiskcopy** command from the command-line interface to repair the metadata on a space-efficient virtual disk (VDisk).

1865 Space-efficient VDisk Copy offline due to insufficient space.

Explanation

A space-efficient VDisk has been taken offline because there is insufficient allocated real capacity available on the VDisk for the used space to increase further. If the space-efficient VDisk is auto-expand enabled, then the managed disk group it is in also has no free space.

Action

The service action differs depending on whether the space-efficient VDisk Copy is auto-expand enabled or not. Whether the disk is auto-expand enabled or not is indicated in the error event data.

If the VDisk Copy is auto-expand enabled, perform one or more of the following actions. When you have performed all of the actions that you intend to perform, mark the error as "fixed"; the VDisk Copy will then return online.

- Determine why the managed disk group free space has been depleted. Any of the space-efficient VDisk Copies, with auto-expand enabled, in this managed disk group might have expanded at an unexpected rate; this could indicate an application error. New VDisk Copies might have been created in, or migrated to, the managed disk group.
- Increase the capacity of the managed disk group that is associated with the space-efficient VDisk Copy by adding more MDisks to the group.
- Provide some free capacity in the managed disk group by reducing the used space. VDisk Copies that are no longer required can be deleted, the size of VDisk Copies can be reduced or VDisk Copies can be migrated to a different managed disk group.
- Migrate the space-efficient VDisk Copy to a managed disk group that has sufficient unused capacity.
- Consider reducing the value of the managed disk group warning threshold to give more time to allocate extra space.

If the VDisk Copy is not auto-expand enabled, perform one or more of the following actions. In this case the error will automatically be marked as "fixed", and the VDisk Copy will return online when space is available.

- Determine why the space-efficient VDisk Copy used space has grown at the rate that it has. There might be an application error.
- Increase the real capacity of the VDisk Copy.
- Enable auto-expand for the space-efficient VDisk Copy.

- Consider reducing the value of the space-efficient VDisk Copy warning threshold to give more time to allocate more real space.

Possible Cause-FRUs or other:

- None

1870 Mirrored VDisk offline because a hardware read error has occurred.

Explanation

While attempting to maintain the VDisk mirror, a hardware read error occurred on all of the synchronized Virtualized Disk copies.

The Virtual Disk Copies might be inconsistent, so the VDisk is now offline.

Action

- Fix all higher priority errors. In particular, fix any read errors that are listed in the sense data. This error event will automatically be fixed when the root event is marked as ″fixed″.
- If you cannot fix the root error, but the read errors on some of the Virtual Disk Copies have been fixed, mark this error as ″fixed″ to run without the mirror. You can then delete the Virtual Disk Copy that cannot read data and recreate it on different MDisks.

Possible Cause-FRUs or other:

- None

1900 A FlashCopy, Trigger Prepare command has failed because a cache flush has failed.

Explanation

A FlashCopy, Trigger Prepare command has failed because a cache flush has failed.

Action

1. Correct higher priority errors, and then try the Trigger Prepare command again.
2. Mark the error that you have just repaired as ″fixed″.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Cache flush error (100%)

1910 A FlashCopy mapping task was stopped because of the error that is indicated in the sense data.

Explanation

A stopped FlashCopy might affect the status of other VDisks in the same I/O group. Preparing the stopped FlashCopy operations as soon as possible is advised.

Action

1. Correct higher priority errors, and then prepare and start the FlashCopy task again.
2. Mark the error that you have just repaired as ″fixed″.
3. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

Data error (100%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1920 Global and Metro Mirror persistent error.

Explanation

This error might be caused by a problem on the primary cluster, a problem on the secondary cluster, or a problem on the inter-cluster link. The problem might be a failure of a component, a component becoming unavailable or having reduced performance due to a service action or it might be that the performance of a component has dropped to a level where the Metro Mirror or Global Mirror relationship cannot be maintained. Alternatively the error might be caused by a change in the performance requirements of the applications using Metro Mirror or Global Mirror.

This error is reported on the primary cluster when the copy relationship has not progressed sufficiently over a period of time. Therefore, if the relationship is restarted before all of the problems are fixed, the error might be reported again when the time period next expires (the default period is five minutes).

This error might also be reported because the primary cluster has encountered read errors.

You might need to refer to the Copy Services features chapter of the ″IBM System Storage SAN Volume Controller Software Installation and Configuration Guide″ while diagnosing this error.

Action

1. If the 1920 error has occurred previously on Metro Mirror or Global Mirror between the same clusters and all the following actions have been attempted, contact your product support center to resolve the problem.
2. On the primary cluster reporting the error, correct any higher priority errors.
3. On the secondary cluster, review the maintenance logs to determine if the cluster was operating with reduced capability at the time the error was

reported. The reduced capability might be due to a software upgrade, hardware maintenance to a 2145 node, maintenance to a backend disk subsystem or maintenance to the SAN.

4. On the secondary 2145 cluster, correct any errors that are not fixed.
5. On the intercluster link, review the logs of each link component for any incidents that would cause reduced capability at the time of the error. Ensure the problems are fixed.
6. If a reason for the error has been found and corrected, go to Action 10.
7. On the primary cluster reporting the error, examine the 2145 statistics using a SAN productivity monitoring tool and confirm that all the Metro Mirror and Global Mirror requirements described in the ″IBM System Storage SAN Volume Controller Planning Guide″ are met. Ensure that any changes to the applications using Metro Mirror or Global Mirror have been taken into account. Resolve any issues.
8. On the secondary cluster, examine the 2145 statistics using a SAN productivity monitoring tool and confirm that all the Metro Mirror and Global Mirror requirements described in the ″IBM System Storage SAN Volume Controller Software Installation and Configuration Guide″ document are met. Resolve any issues.
9. On the intercluster link, examine the performance of each component using an appropriate SAN productivity monitoring tool to ensure that they are operating as expected. Resolve any issues.
10. Mark the error as ″fixed″ and restart the Metro Mirror or Global Mirror relationship.

When you restart the Metro Mirror or Global Mirror relationship there will be an initial period during which Metro Mirror or Global Mirror performs a background copy to resynchronize the VDisk data on the primary and secondary clusters. During this period the data on the Metro Mirror or Global Mirror auxiliary VDisks on the secondary cluster is inconsistent and the VDisks could not be used as backup disks by your applications.

Note: To ensure the system has the capacity to handle the background copy load you may want to delay restarting the Metro Mirror or Global Mirror relationship until there is a quiet period when the secondary cluster and the SAN fabric (including the intercluster link) have the required capacity. If the required capacity is not available you might experience another 1920 error and the Metro Mirror or Global Mirror relationship will stop in an inconsistent state.

Note: If the Metro Mirror or Global Mirror relationship has stopped in a consistent state (″consistent-stopped″) it is possible to use the data on the Metro Mirror or Global Mirror auxiliary VDisks on the secondary cluster as backup disks by your applications. You might therefore want to start a Flash Copy of your Metro Mirror or Global Mirror auxiliary disks on the secondary system before restarting the Metro Mirror or Global Mirror relationship. This means you maintain the current, consistent, image until the time when the Metro Mirror or Global Mirror relationship is again synchronized and in a consistent state.

Possible Cause-FRUs or other:

- None

Other:

- Primary 2145 cluster or SAN fabric problem (10%)

- Primary 2145 cluster or SAN fabric configuration (10%)
- Secondary 2145 cluster or SAN fabric problem (15%)
- Secondary 2145 cluster or SAN fabric configuration (25%)
- Intercluster link problem (15%)
- Intercluster link configuration (25%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1930 Migration suspended.

Explanation

Migration suspended.

Action

1. Ensure that all error codes of a higher priority have already been fixed.
2. Ask the customer to ensure that all MDisk groups that are the destination of suspended migrate operations have available free extents.
3. Mark this error as "fixed". This causes the migrate operation to be restarted. If the restart fails, a new error is logged.
4. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

1950 Unable to mirror medium error.

Explanation

During the synchronization of a mirrored Virtual Disk Copy it was necessary to duplicate the record of a medium error onto the Virtual Disk Copy, creating a virtual medium error. Each managed disk has a table of virtual medium errors. The virtual medium error could not be created because the table is full. The Virtual Disk Copy is in an inconsistent state and has been taken offline.

Action

Three different approaches can be taken to resolving this problem: a) the source Virtual Disk Copy can be fixed so that it does not contain medium errors, b) the number of virtual medium errors on the target managed disk can be reduced or c) the target Virtual Disk Copy can be moved to a managed disk with more free virtual medium error entries.

The managed disk with a full medium error table can be determined from the data of the root event.

Case a) - This is the preferred procedure because it restores the source Virtual Disk Copy to a state where all of the data can be read. Use the normal service procedures for fixing a medium error (rewrite block or volume from backup or regenerate the data using local procedures).

Case b) - This method can be used if the majority of the virtual medium errors on the target managed disk do not relate to the Virtual Disk Copy. Determine where the virtual medium errors are using the error log events and re-write the block or volume from backup.

Case c) - Delete the offline Virtual Disk Copy and create a new one either forcing the use of different MDisks in the managed disk group or using a completely different managed disk group.

a. Follow your selection option(s) and then mark the error as ″fixed″.

Possible Cause-FRUs or other:

- None

2010 A software upgrade has failed.

Explanation

This might be caused by a hardware error or it might be from a failure in the new version of the software. When the upgrade operation is stopped, an automatic software downgrade is performed to restore the 2145s to their previous software version. If the downgrade operation fails to downgrade a 2145 (for example, because it is offline), the download operation stops and waits for the offline 2145 to be repaired or deleted from the cluster. When the downgrade operation is in progress, configuration commands sent to the cluster fail with a message indicating that a software upgrade operation is still in progress. The downgrade operation might take up to four hours for an eight-node cluster.

Action

1. Display the status of the nodes on the cluster.
2. If any node is offline, delete the offline node from the cluster. See the cluster diagnostic and service-aid commands in your product's command-line interface user's guide for detailed information about deleting a node from a cluster. If the delete operation fails with a message indicating that a software upgrade is in progress, the downgrade process is still active. Wait for this operation to either complete or stop on the offline node and then try the delete operation again. If the downgrade operation had stopped, it can now continue.
3. Solve all logged hardware problems.
4. Ask the user to try the software install again.

5. If the installation fails again, report the problem to your software support center.
6. Mark the error that you have just repaired as ″fixed″.
7. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

2145 software (100%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“Viewing the node status” on page 75
You can view the properties for a node from the Viewing General Details panel.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

“Checking the status of the node using the CLI” on page 75
You can use the command-line interface (CLI) to check the status of the node.

2030 The error that is logged in the cluster error log indicates a software problem either in the 2145 cluster or in a disk enclosure/controller that is connected to the 2145.

Explanation

The error that is logged in the cluster error log indicates a software problem either in the 2145 cluster or in a disk enclosure/controller that is connected to the 2145.

Action

1. Ensure that the software is at the latest level on the cluster and on the controllers.
2. Save the dump data with the configuration dump and logged data dump.
3. Contact your product support center to resolve the problem.
4. Mark the error that you have just repaired as ″fixed″.
5. Go to repair verification Map.

Possible Cause-FRUs or other:

- None

Other:

- 2145 software (50%)
- Enclosure/controller software (50%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

2040 A software upgrade is required.

Explanation

The software cannot determine the VPD for a FRU. Probably, a new FRU has been installed and the software does not recognize that FRU.

Action

1. If a FRU has been replaced, ensure that the correct replacement part was used. The node VPD indicates which part is not recognized.
2. Ensure that the cluster software is at the latest level.
3. Save dump data with configuration dump and logged data dump.
4. Contact your product support center to resolve the problem.
5. Mark the error that you have just repaired as ″fixed″.
6. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

2145 software (100%)

Related tasks

"Marking errors as fixed" on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

2100 A software error has occurred.

Explanation

One of the 2145 server software components (sshd, crond, or httpd) has failed and reported an error.

Action

1. Ensure that the software is at the latest level on the cluster.
2. Save dump data with configuration dump and logged data dump.
3. Contact your product support center to resolve the problem.

4. Mark the error that you have just repaired as ″fixed″.
5. Go to repair verification MAP.

Possible Cause-FRUs or other:

- None

Other:

2145 software (100%)

Related tasks

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

2500 A secure shell (SSH) session limit for the cluster has been reached.

Explanation

Secure Shell (SSH) sessions are used by applications that manage the cluster. An example of such an application is the command-line interface (CLI). An application must initially log in to the cluster to create an SSH session. The cluster imposes a limit on the number of SSH sessions that can be open at one time. This error indicates that the limit on the number of SSH sessions has been reached and that no more logins can be accepted until a current session logs out.

The limit on the number of SSH sessions is usually reached because multiple users have opened an SSH session but have forgotten to close the SSH session when they are no longer using the application.

A separate SSH session limit allocation is maintained for each user type. Examples of user type are ″admin″ and ″service″.

Action

- Because this error indicates a problem with the number of sessions that are attempting external access to the cluster, determine the reason that so many SSH sessions have been opened.
- Select Launch Maintenance Procedures for the cluster on the Viewing Clusters panel of the IBM System Storage SAN Volume Controller Console.
- Select List the current sessions.
- Either use the maintenance procedures option to terminate all sessions, or close individual sessions that are no longer required. Identify sessions based on the host system and application using the session.
- If you are unable to resolve the error using one of the above options, stop and restart the configuration node to terminate all SSH sessions.

- Mark the error as ″fixed″.

Related tasks

Chapter 3, “Using the SAN Volume Controller Console and CLI,” on page 69
The SAN Volume Controller Console is a Web-browser based GUI and an SMI-S compliant CIM Agent that is based on the Open Pegasus CIM Server. The SAN Volume Controller command-line interface (CLI) is a collection of commands that you can use to manage SAN Volume Controller clusters.

“Marking errors as fixed” on page 117
You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

2600 The cluster was unable to send an e-mail.

Explanation

The cluster has attempted to send an e-mail in response to an event, but there was no acknowledgement that it was successfully received by the SMTP mail server. It might have failed because the cluster was unable to connect to the configured SMTP server, the e-mail might have been rejected by the server, or a timeout might have occurred. The SMTP server might not be running or might not be correctly configured, or the cluster might not be correctly configured. This error is not logged by the test e-mail function because it responds immediately with a result code.

Action

- Ensure that the SMTP e-mail server is active.
- Ensure that the SMTP server TCP/IP address and port are correctly configured in the cluster e-mail configuration.
- Send a test e-mail and validate that the change has corrected the issue.
- Mark the error that you have just repaired as fixed.
- Go to MAP 5700: Repair verification.

Possible Cause-FRUs or other:

- None

2601 Error detected while sending an e-mail.

Explanation

An error has occured while the cluster was attempting to send an e-mail in response to an event. The cluster is unable to determine if the e-mail has been sent and will attempt to resend it. The problem might be with the SMTP server or with the cluster e-mail configuration. The problem might also be caused by a failover of the configuration node. This error is not logged by the test e-mail function because it responds immediately with a result code.

Action

- If there are higher-priority unfixed errors in the log, fix those errors first.
- Ensure that the SMTP e-mail server is active.
- Ensure that the SMTP server TCP/IP address and port are correctly configured in the cluster e-mail configuration.
- Send a test e-mail and validate that the change has corrected the issue.
- Mark the error that you have just repaired as fixed.

- Go to MAP 5700: Repair verification.

Possible Cause-FRUs or other:

- None

3000 The 2145 UPS temperature is close to its upper limit. If the temperature continues to rise the 2145 UPS will power off.

Explanation

The temperature sensor in the 2145 UPS is reporting a temperature that is close to the operational limit of the unit. If the temperature continues to rise the 2145 UPS will power off for safety reasons. The sensor is probably reporting an excessively high temperature because the environment in which the 2145 UPS is operating is too hot.

Action

1. Ensure that the room ambient temperature is within the permitted limits.
2. Ensure that the air vents at the front and back of the 2145 UPS are not obstructed.
3. Ensure that other devices in the same rack are not overheating.
4. When you are satisfied that the cause of the overheating has been resolved, mark the error ″fixed″.

   Related tasks

   “Marking errors as fixed” on page 117
   You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

3001 The 2145 UPS-1U temperature is close to its upper limit. If the temperature continues to rise the 2145 UPS-1U will power off.

Explanation

The temperature sensor in the 2145 UPS-1U is reporting a temperature that is close to the operational limit of the unit. If the temperature continues to rise the 2145 UPS-1U will power off for safety reasons. The sensor is probably reporting an excessively high temperature because the environment in which the 2145 UPS-1U is operating is too hot.

Action

1. Ensure that the room ambient temperature is within the permitted limits.
2. Ensure that the air vents at the front and back of the 2145 UPS-1U are not obstructed.
3. Ensure that other devices in the same rack are not overheating.
4. When you are satisfied that the cause of the overheating has been resolved, mark the error ″fixed″.

   Related tasks

   “Marking errors as fixed” on page 117
   You can use the SAN Volume Controller Console to mark errors as fixed for the cluster error log. This action is only necessary if you fix an error without using the online maintenance procedures. The online procedures automatically mark an error as fixed after a successful repair.

3010 Internal uninterruptible power supply software error detected.

Explanation

Some of the tests that are performed during node startup did not complete because some of the data reported by the uninterruptible power supply during node startup is inconsistent because of a software error in the uninterruptible power supply. The node has determined that the uninterruptible power supply is functioning sufficiently for the node to continue operations. The operation of the cluster is not affected by this error. This error is usually resolved by power cycling the uninterruptible power supply.

Action

1. Power cycle the uninterruptible power supply at a convenient time. The one or two nodes attached to the uninterruptible power supply should be powered off before powering off the uninterruptible power supply. Once the nodes have powered down, wait 5 minutes for the uninterruptible power supply to go into standby mode (flashing green AC LED). If this does not happen automatically then check the cabling to confirm that all nodes powered by this uninterruptible power supply have been powered off. Remove the power input cable from the uninterruptible power supply and wait at least 2 minutes for the uninterruptible power supply to clear its internal state. Reconnect the uninterruptible power supply power input cable. Press the uninterruptible power supply ON button. Power on the nodes connected to this uninterruptible power supply.
2. If the error is reported again after the nodes are restarted replace the 2145 UPS electronics assembly.

Possible Cause-FRUs or other:

- 2145 UPS electronics assembly (5%)

Other:

- Transient 2145 UPS error (95%)

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

3029 Virtualization feature capacity is not valid.

Explanation

The setting for the amount of space that can be virtualized is not valid. The value must be an integer number of terabytes.

This error event is created when a SAN Volume Controller cluster is upgraded from a version prior to 4.3.0 to version 4.3.0 or later. Prior to version 4.3.0 the virtualization feature capacity value was in gigabytes and therefore could be set to a fraction of a terabyte. With version 4.3.0 and later the licensed capacity for the virtualization feature must be an integer number of terabytes.

Action

- Review the license conditions for the virtualization feature. If you have one cluster, change the license settings for the cluster to match the capacity that is

licensed. If your license covers more than one cluster, apportion an integer number of terabytes to each cluster. You might have to change the virtualization capacity that is set on the other clusters to ensure that the sum of the capacities for all of the clusters does not exceed the licensed capacity.

- You can view the event data or the feature log to ensure that the licensed capacity is sufficient for the space that is actually being used. Contact your IBM sales representative if you want to change the capacity of the license.
- This error will automatically be fixed when a valid configuration is entered.

Possible Cause-FRUs or other:

- None

3030 Global and Metro Mirror feature capacity not set.

Explanation

The Global and Metro Mirror feature is set to On for the cluster, but the capacity has not been set.

This error event is created when a SAN Volume Controller cluster is upgraded from a version prior to 4.3.0 to version 4.3.0 or later. Prior to version 4.3.0 the feature can only be set to On or Off; with version 4.3.0 and later the licensed capacity for the feature must also be set.

Action

Perform one of the following actions:

- Change the Global and Metro Mirror license settings for the cluster either to the licensed Global and Metro Mirror capacity, or if the license applies to more than one cluster, to the portion of the license allocated to this cluster. Set the licensed Global and Metro Mirror capacity to zero if it is no longer being used.
- View the event data or the feature log to ensure that the licensed Global and Metro Mirror capacity is sufficient for the space actually being used. Contact your IBM sales representative if you want to change the licensed Global and Metro Mirror capacity.
- The error will automatically be fixed when a valid configuration is entered.

Possible Cause-FRUs or other:

- None

3031 FlashCopy feature capacity not set.

Explanation

The FlashCopy feature is set to On for the cluster, but the capacity has not been set.

This error event is created when a SAN Volume Controller cluster is upgraded from a version prior to 4.3.0 to version 4.3.0 or later. Prior to version 4.3.0 the feature can only be set to On or Off; with version 4.3.0 and later the licensed capacity for the feature must also be set.

Action

Perform one of the following actions:

- Change the FlashCopy license settings for the cluster either to the licensed FlashCopy capacity, or if the license applies to more than one cluster, to the portion of the license allocated to this cluster. Set the licensed FlashCopy capacity to zero if it is no longer being used.
- View the event data or the feature log to ensure that the licensed FlashCopy capacity is sufficient for the space actually being used. Contact your IBM sales representative if you want to change the licensed FlashCopy capacity.
- The error will automatically be fixed when a valid configuration is entered.

Possible Cause-FRUs or other:

- None

3032 Feature license limit exceeded.

Explanation

The amount of space that is licensed for a SAN Volume Controller feature is being exceeded.

The feature that is being exceeded might be:

- Virtualization feature - event identifier 009172
- FlashCopy feature - event identifier 009173
- Global and Metro Mirror feature - event identifier 009174

The SAN Volume Controller will continue to operate, but it might be violating the license conditions.

Action

- Determine which feature license limit has been exceeded. This might be:
- Virtualization feature - event identifier 009172
- FlashCopy feature - event identifier 009173
- Global and Metro Mirror feature - event identifier 009174
- Ensure that the feature capacity that is reported by the cluster has been set to match either the licensed size, or if the license applies to more than one cluster, to the portion of the license that is allocated to this cluster.
- Decide whether to increase the feature capacity or to reduce the space that is being used by this feature.
- To increase the feature capacity, contact your IBM sales representative and arrange an increased license capacity. Change the license settings for the cluster to set the new licensed capacity. Alternatively, if the license applies to more than one cluster modify how the licensed capacity is apportioned between the clusters. Update every cluster so that the sum of the license capacity for all of the clusters does not exceed the licensed capacity for the location.
- To reduce the amount of disk space that is virtualized, delete some of the managed disks or image mode VDisks. The used virtualization size is the sum of the capacities of all of the managed disks and image mode disks.
- To reduce the FlashCopy capacity delete some FlashCopy mappings. The used FlashCopy size is the sum of all of the VDisks that are the source VDisk of a FlashCopy mapping.
- To reduce Global and Metro Mirror capacity delete some Global Mirror or Metro Mirror relationships. The used Global and Metro Mirror size is the sum of the capacities of all of the VDisks that are in a Metro Mirror or Global Mirror relationship; both master and auxiliary VDisks are counted.

- The error will automatically be fixed when the licensed capacity is greater than the capacity that is being used.

Possible Cause-FRUs or other:

- None

SAN problem determination

The procedures to service the SAN Volume Controller that are provided here help you solve problems on the SAN Volume Controller and its connection to the storage area network (SAN).

SAN failures might cause the SAN Volume Controller cluster to be unable to form or they might cause SAN Volume Controller disks to be inaccessible to host systems. Failures can be caused by SAN configuration changes or by hardware failures in SAN components.

The following list identifies some of the hardware that might cause failures:

- Power, fan, or cooling switch
- Application-specific integrated circuits
- Installed small form-factor pluggable (SFP) connector
- Fiber-optic cables

Perform the following steps if you were sent here from either the Maintenance Analysis Procedures or the error codes:

1. If the customer has changed the SAN configuration by changing the fibre-channel cable connections or switch zoning, ask the customer to verify that the changes were correct and, if necessary, reverse those changes.
2. Verify that the power is turned on to all switches and redundant array of independent disk (RAID) controllers that the SAN Volume Controller uses and that they are not reporting any hardware failures. If problems are found, resolve those problems before proceeding further.
3. Verify that the fibre-channel cables that connect the SAN Volume Controllers to the switches are securely connected.
4. If the customer is running a SAN management tool that you are familiar with and that you have access to, you can use that tool to view the SAN topology and isolate the failing component. You can also review "Viewing the fibre-channel fabric connections" on page 96 to understand the SAN Volume Controller view of the SAN.

Related tasks

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"Viewing the fibre-channel fabric connections" on page 96
Failures of the SAN Volume Controller hardware, fibre-channel cables, fibre-channel switches, fibre-channel hardware in host systems, or disk controllers can cause fibre-channel connectivity problems.

Fibre-channel link failures

When a failure occurs on a single fibre channel link, the small form-factor pluggable (SFP) connector might need to be replaced.

The following items can indicate that a single fibre-channel link has failed:

- The customer's SAN monitoring tools
- The fibre-channel port status on the front panel of the SAN Volume Controller node
- The fibre-channel status LEDs at the rear of the SAN Volume Controller node
- A SAN Volume Controller cluster, node, or boot error that indicates a single port has failed

Attempt each of the following actions, in the following order, until the failure is fixed:

1. Ensure that the fibre channel cable is securely connected at each end.
2. Replace the fibre channel cable.
3. Replace the SFP connector for the failing port on the SAN Volume Controller node.
4. Have the customer perform the fibre-channel switch service procedures for a failing fibre channel link. This might involve replacing the SFP connector at the switch.
5. Replace the fibre-channel adapter on the SAN Volume Controller node.

Related tasks

"Removing and replacing the fibre-channel SFP connector on a SAN Volume Controller node" on page 523
When a failure occurs on a single fibre channel link, the SFP connector might need to be replaced.

Servicing storage subsystems

Storage subsystems that are supported for attachment to the SAN Volume Controller are designed with redundant components and access paths to allow concurrent maintenance. Hosts have continuous access to their data during component failure and replacement.

The following guidelines apply to all storage subsystems that are attached to the SAN Volume Controller:

- Always follow the service instructions that are provided in the documentation for your storage subsystem.
- Ensure that there are no unfixed errors in the SAN Volume Controller error log before you perform any maintenance procedures.
- After you perform a maintenance procedure, check the SAN Volume Controller error log and fix any errors. Expect to see the following types of errors:
  - MDisk error recovery procedures (ERPs)
  - Reduced paths

The following are the two categories of service actions for storage subsystems:

- Controller code upgrade
- Field replaceable unit (FRU) replacement

Controller code upgrade

Ensure that you are familiar with the following guidelines for upgrading controller code:

- Check to see if the SAN Volume Controller supports concurrent maintenance for your storage subsystem.
- Allow the storage subsystem to coordinate the entire upgrade process.
- If it is not possible to allow the storage subsystem to coordinate the entire upgrade process, perform the following steps:
  1. Reduce the storage subsystem workload by 50%.
  2. Use the configuration tools for the storage subsystem to manually failover all logical units (LUs) from the controller that you want to upgrade.
  3. Upgrade the controller code.
  4. Restart the controller.
  5. Manually failback the LUs to their original controller.
  6. Repeat for all controllers.

FRU replacement

Ensure that you are familiar with the following guidelines for replacing FRUs:

- If the component you want to replace is directly in the host-side data path (for example, cable, fibre-channel port, or controller), disable the external data paths to prepare for upgrade. To disable external data paths, disconnect or disable the appropriate ports on the fabric switch. The SAN Volume Controller ERPs reroute access over the alternate path.
- If the component you want to replace is in the internal data path (for example, cache or disk drive) and did not completely fail, ensure that the data is backed up before you attempt to replace the component.
- If the component you want to replace is not in the data path, (for example, uninterruptible power supplies, fans or batteries) the component is generally dual redundant and can be replaced without additional steps.

Troubleshooting the SAN Volume Controller Console

These topics provide information that can help you troubleshoot and resolve problems with the SAN Volume Controller Console, which is installed on the IBM System Storage Productivity Center (SSPC) or, in previous releases, on the master console server.

In addition to troubleshooting on your own, you can also request an Assist On-site session with an IBM service representative.

Use the following topics to resolve problems with the SAN Volume Controller Console.

Updating SSL certificates

Before you can successfully log onto the IBM System Storage Productivity Center (SSPC) or the master console server, you must have a Secure Sockets Layer (SSL) certificate. During the installation, the SSL certificate is configured automatically. You can also regenerate the SSL certificate file.

Certificates that are not valid and expired certificates are considered valid when they are loaded by the CIM service; however, a warning message is logged if the certificate is expired or is not valid. Note that other non-IBM client applications might require a valid SSL key.

To verify that the currently configured SSL key is valid, complete the following steps:

1. From a command prompt window, go to the installation svcconsole\cimom\bin directory.
2. Issue the command chkcertificate *certname*.

   The following lines are displayed:

   ```
   C:\Program Files\IBM\svcconsole\cimom\bin>mkcertificate ssl
   C:\Program Files\IBM\svcconsole\cimom\bin>chkcertificate ssl
   notBefore=Mar 28 01:56:05 2008 GMT
   notAfter=Mar 28 01:56:05 2009 GMT
   ```

To regenerate a certificate, complete the following steps:

1. From a command prompt window, go to the C:\Program Files\IBM\svcconsole\cimom directory.
2. Issue the command mkcertificate.bat ssl. This creates an ssl.cert file in the certificate directory.
3. Stop the CIM agent server.
4. Issue the command cimconfig -s slCertificateFilePath=C:\"Program Files"\IBM\svcconsole\cimom\certificate\ssl.cert -p.
5. Issue the command cimconfig -s sslKeyFilePath=C:\"Program Files"\IBM\svcconsole\cimom\certificate\ssl.key -p.
6. Copy the files to the following subdirectories:

   Note: Each directory begins with C:\Program Files\IBM\svcconsole\console\embeddedWAS.

   ```
   C:\...\config\cells\DefaultNode\applications\
    ICAConsole.ear\deployments\ICAConsole\ICAConsole.war\
    WEB-INF

   C:\...\config\cells\DefaultNode\applications\
    SVCConsole.ear\deployments\SVCConsole\SVCConsole.war\
    WEB-INF

   C:\...\config\installedApps\DefaultNode\
    ICAConsole.ear\ICAConsole.war\WEB-INF

   C:\...\config\installedApps\DefaultNode\
    SVCConsole.ear\SVCConsole.war\WEB-INF
   ```
7. Stop and then restart the following applications:
   - IBM System Storage SAN Volume Controller Pegasus Server.

     This service is located in **Start -> Programs -> IBM System Storage SAN Volume Controller -> Stop CIMOM Service and Start CIMOM Service**.
   - IBM WebSphere® Application Server V6 - SVC.

     Go to **Start -> Settings -> Control Panel -> Administrative Tools -> Component Services**.

To stop and then restart the services, right-click on the application and select **Stop**, and then **Start**.

Note: If the stop command times-out in the IBM WebSphere application, you can restart the SSPC or master console because this restarts the application, as well.

8. Ensure that both applications are running again. Launch the SAN Volume Controller Console and log on.

Replacing the SSH key pair

You can use the SAN Volume Controller Console to replace the Secure Shell (SSH) key pair.

Scenarios where you must replace the SSH key pair

The following scenarios require you to replace the SSH key pair:

- If you change the SSH keys that are used by the IBM System Storage Productivity Center or the master console to communicate with the SAN Volume Controller Console, you must store the client SSH private key in the SAN Volume Controller Console software and then store the client SSH public key on the SAN Volume Controller cluster.
- If you change the IP address of your SAN Volume Controller cluster after you have added the cluster to SAN Volume Controller Console, the SAN Volume Controller Console is not aware of the existence of the cluster.

Replacing the client SSH private key known to the SAN Volume Controller software

You can replace the client SSH private key that is known to the SAN Volume Controller software.

Attention: If you have successfully contacted other SAN Volume Controller clusters, you will break that connectivity if you replace the client SSH private key that is known to the SAN Volume Controller software.

Perform the following steps to replace the client SSH private key:

1. Sign off the SAN Volume Controller Console.
2. Stop the CIM Agent service. Go to **Start -> Programs -> IBM System Storage SAN Volume Controller -> Stop CIMOM Service**.
3. Perform the following steps to copy the client SSH private key into the appropriate SAN Volume Controller Console directory:
   a. Open a command prompt window.
   b. Issue the following command:

      ```
      copy filename C:\Program Files\IBM\svcconsole\cimom\icat.ppk
      ```

      Where *filename* is the path and file name of the client SSH private key.
4. Restart the CIM Agent service. Go to **Start -> Programs -> IBM System Storage SAN Volume Controller -> Start CIMOM Service**.
5. Log on to the SAN Volume Controller Console.
6. Click **Clusters** in the portfolio.
7. Check the status of the cluster.

Replacing the public SSH key for a SAN Volume Controller cluster

There are times when you must replace the SSH public key used by the SAN Volume Controller cluster. For example, if you change the SSH keys that are used by the IBM System Storage Productivity Center or the master console to communicate with the SAN Volume Controller Console or if you change the IP address of your SAN Volume Controller cluster, you must replace the cluster's SSH public key.

Perform the following steps to replace the public key used by the cluster:

1. Start the SAN Volume Controller Console by clicking on the desktop icon or by using your Web browser to go to http://*IP_address*:9080/ica, where *IP_address* is the IP address of the IBM System Storage Productivity Center or the master console. The Signon window is displayed. This might take a few moments to open.
2. Enter the user ID superuser and the password passw0rd. The Welcome window is displayed.
3. Click **Clusters** from the portfolio.
4. Check the **Select** box for the cluster for which you wish to replace the key.
5. Click **Maintain SSH Keys** from the task list and click **Go**. The SSH Public Key Maintenance panel is displayed.
6. Type your user name and password.
7. Click the **Maintain SSH Keys** option. The window opens to enable you to enter the client SSH public key information that is to be stored on the cluster.
8. Add the SSH client key by performing one of the following actions:
   - If you are adding the SSH client key for the IBM System Storage Productivity Center or the master console, click **Browse** and locate the public key you generated earlier.
   - If you are adding an SSH client key for another system, either click **Browse** and locate the public key or cut and paste the public key into the direct input field.
9. Click **Administrator**.
10. Type a name of your choice in the **ID** field that uniquely identifies the key to the cluster.
11. Click **Add Key**.
12. Click **Maintain SSH Keys**.
13. Click **Show IDs** to see all key IDs that are loaded on the SAN Volume Controller.

Checking connections to the cluster when the status is No Contact

If the Availability Status on the Viewing Clusters page is `No Contact`, the cluster either does not exist or is offline, or there is a network problem.

Also, node error 540 might be displayed on the front panel on the SAN Volume Controller node.

Perform the following actions to make the cluster available:

Note: Click **Refresh** after each step.

1. Restart the IBM System Storage Productivity Center (SSPC) or master console server.
2. If the Availability status is still `No Contact`, open a command prompt from the SSPC or master console server and ping the IP address of the cluster. You can view the IP address either from the SAN Volume Controller Console screens or the front panel of the SAN Volume Controller node.
3. If you can successfully ping the SSPC or master console server, run the CLI command to check the cluster status. Otherwise, see "MAP 5500: Ethernet". If those procedures do not solve the problem, contact the IBM Support Center for assistance.
4. If the Ethernet connection is good and you can access the cluster through PuTTY, the SSH keys might have been corrupted. Recreate the SSH keys to enable communication between the SAN Volume Controller node and the SSPC or master console server. "Replacing the SSH key pair" on page 352 describes how to replace the SSH keys.
5. If the Availability status is still `No Contact`, the connection between the SAN Volume Controller Console and the cluster might have been corrupted. Contact the IBM Support Center.

Cannot access the SAN Volume Controller Console login screen

When you cannot access the SAN Volume Controller Console login screen, but you can access the cluster through PuTTY, a default IP address might be set in the hosts file.

Perform the following actions to access the SAN Volume Controller Console login screen:

1. From the IBM System Storage Productivity Center (SSPC) ormaster console server, go to **Computer management** → **Manage** → **Services and applications** → **Services**. To access **Computer management**, right click on My computer.
2. Check the status of Tivoli NetView services. Ensure that this service has a status of `Stopped` and is configured for `Manual Startup`. If the service was started, the host file on the SSPC or master console server might have a default IP address.
3. Check the hosts file to ensure that the SSPC or master console IP address has not changed to a default IP address.
4. Edit the hosts file if it lists a default IP address. The hosts file is located in the Microsoft Windows `\system32\drivers\etc` directory.
5. Open a new browser from the SAN Volume Controller Console and try to access the login screen again.

Cannot access the cluster from the SAN Volume Controller Console

When you cannot access the SAN Volume Controller cluster from the SAN Volume Controller Console, but you can access the cluster through PuTTY, some of the required services on the IBM System Storage Productivity Center (SSPC) or master console server might be stopped.

Check the messages that begin with the `CMMU` prefix in the SAN Volume Controller Information Center. These messages might provide additional information and solutions for this problem.

Perform the following actions to access the cluster from the SAN Volume Controller Console:

1. From the SSPC or master console server, right-click **My Computer** on your desktop.
2. Click **Computer management** → **Manage** → **Services and applications** → **Services**.
3. Ensure that the following services are configured for `Automatic Startup` with a status of `Started`:
   - Service Location Protocol
   - IBM System Storage SAN Volume Controller Pegasus Server
   - IBM WebSphere Application Server V6 - SVC

   Note: If the status for any of these services changes from `Starting` to `Stopped`, contact the IBM Support Center for assistance.

Troubleshooting unexpected shutdowns of the SAN Volume Controller Console

If you are working with the SAN Volume Controller Console and you receive a `You have signed off` message before the SAN Volume Controller Console closes unexpectedly, use these instructions to help you troubleshoot the problem.

You can perform any of the following actions to troubleshoot an unexpected shutdown of the SAN Volume Controller Console:

- Open a new browser window and try to reconnect to the SAN Volume Controller Console. The logoff message is typically caused when an open session times out. This often happens if the browser window was left open from a previous session.
- Check Windows Task Manager to ensure that the cimserver.exe process is running.
- Ensure that the Websphere Application Server (WAS) service is still running in the Windows Service Manager.
- Ensure that the disk on the server is not full.
- Ensure that the server is not pegged.
- Determine if the IP address of the server where the SAN Volume Controller Console is running has changed since the last time that the server was restarted. If it has changed, restart the server to correct the problem.

WebSphere Application Server service keeps stopping

The IBM WebSphere Application Server V6 - SVC service might stop shortly after it is started if a conflict is detected because another application that is running on the IBM System Storage Productivity Center or master console server is using the same port.

To determine if another application is also using port 9100, issue the following command from a Windows command prompt:

```
netstat -an | find "9100"
```

If any output is returned, another application is using the default WebSphere Application Server (WAS) port.

To resolve the problem, complete the following steps:

1. Identify the application that is conflicting with WAS.
2. Either shut down the conflicting application or change the port that the WAS service uses.
3. Complete the following steps f you decide to change the WAS configuration and use a different port:
   a. Change to the `\Program Files\IBM\svcconsole\console\embeddedWAS\profiles\SVCProfile` directory.
   b. Replace all entries that have 9100 with an alternate port number in the following files:`\config\cells\SVCCell\nodes\SVCNode\serverindex.xml` `\config\templates\servertypes\APPLICATION_SERVER\serverindex.xml` `\properties\portdef.props`
   c. Save your changes and then restart the WAS service:
      1) Right-click on **My Computer** and then click **Manage**. The Computer Management window is displayed.
      2) Expand **Services and Applications** and then click **Services**. The list of services is displayed.
      3) Right-click on **IBM WebSphere Application Server V6 - SVC** and then click **Stop**. After it stops, right-click on the service again and click **Start**.

Troubleshooting the master console

These topics provide information that can help you troubleshoot and resolve problems with the master console server.

In addition to troubleshooting on your own, you can also request an Assist On-site session with an IBM service representative.

For SAN Volume Controller version 4.2.1 and earlier, the master console provides a single point from which to manage the SAN Volume Controller nodes. An existing master console can be upgraded to support clusters that are running the latest SAN Volume Controller software.

Beginning with SAN Volume Controller version 4.3.0, the IBM System Storage Productivity Center (SSPC) is an integrated hardware and software solution that provides a single point of entry for managing SAN Volume Controller clusters, IBM System Storage DS8000 systems, and other components of your data storage infrastructure.

Use the following topics to resolve problems with the master console server.

Clearing the Microsoft Windows event logs

When you change the IBM System Storage Productivity Center or master console IP address or host name, you might create entries in the Microsoft® Windows event logs.

Clear all three logs to ensure that these log entries do not cause confusion when you try to isolate problems.

The following procedure assumes that your Windows desktop is displayed.

Perform the following steps to clear the event logs:

1. Right-click **My Computer** and select **Manage**.
2. Expand **Event Viewer**.

3. Right-click **Application** and select **Clear All Events**. Click **No** when you are asked if you want to save the log before clearing.
4. Right-click **Security** and select **Clear All Events**. Click **No** when you are asked if you want to save the log before clearing.
5. Right-click **System** and select **Clear All Events**. Click **No** when you are asked if you want to save the log before clearing.
6. Close the computer management window.

Troubleshooting Microsoft Windows boot problems

Use this section to help you resolve Microsoft Windows boot problems on the master console system.

Perform the following actions to resolve Windows boot problems:

- If you cannot start the Windows system from the boot drive, try to start the master console system from the second disk drive (the mirrored disk).
- If you continue to have problems starting the system from either the boot disk drive or the second disk drive, you must replace the corrupted disk drive, and then mirror the boot drive again.

Note: After you set up mirroring, the hard disk drive on the system that runs the master console is actually a mirrored pair of hard disks. This strategy protects against loss of access to the master console due to a disk failure. This mirroring can help you start the master console system if the boot disk does not work. Whenever you replace one of the disks on your master console, you must make sure that you mirror the disks again.

Starting the master console hardware from the mirrored disk

During the Microsoft Windows boot process on the master console hardware, if Windows tries to start but fails with an `Inaccessible Boot Device` message on a blue screen, and another restart attempt does not solve the problem, the Windows boot code on the startup device might be corrupted.

The following instructions require that you use the administrator password for the power-on password when you restart the system. If the system is set up with an administrator password and you use a regular power-on password, you can see only a limited version of the **Configuration/Setup** menu.

Perform the following steps to resolve the problem:

1. Restart the master console system and watch the screen. When the `Press F1 for Configuration/Setup` message appears, press F1.

   The main menu for Configuration/Setup Utility is displayed.
2. Select **Start Options** from the main menu.
3. Select **Start Sequence**.
4. Step down the sequence to the one that contains the hard disk.
5. Use the left and right cursor keys to select the other hard disk. For example, if the hard disk is set to 1, select 0. If the hard disk is set to 0, select 1.
6. Press Esc to exit each menu until the option to save and exit is displayed. Select **Yes** to save the changes and exit the Configuration/Setup Utility.
7. If the master console system starts, proceed with the steps for recovering from a master console disk failure. If the master console system does not start, contact your IBM service representative.

Replace a disk on the master console server

If one of the disk drives on the master console server fails, you might need to replace it with a new disk drive. The new drive must be the same capacity or larger than the drive being replaced.

Perform the following steps if one of the mirrored disk drives fails and must be replaced:

1. If you cannot determine which of the two disk drives has failed, restart the server with each disk drive to determine which drive is not functioning.
2. Right-click the **My Computer** icon on your desktop and select **Manage**.
3. Select **Disk Management** from the left navigation panel. The hard drives are displayed in the right panel.
4. If the failing disk drive is displayed, right-click the main volume of the drive and select **Break Mirror**.
5. Shut down the master console hardware and replace the failing disk drive using the procedures that are detailed in the documentation for your replacement hard drive. Ensure that the jumper settings for the new drive are the same as the jumper settings for the drive that is being replaced.

   Notes: If the replacement drive has a master boot record (MBR), erase the MBR prior to using the replacement drive. However, if the master console computer fails to start because it cannot find the MBR, change the start sequence in the BIOS to the other hard drive.
6. Restart the computer.
7. Right-click **My Computer** on your desktop and select **Manage**.
8. Select **Disk Management**. The hard drives are displayed in the right panel.
9. If a disk drive is marked **Missing**, right-click the drive and select **Remove Disk**.
10. If a no entry sign is displayed on the new disk drive, right-click that disk drive and select **Write Signature**. This removes the no entry sign.
11. Right-click the new disk drive and select **Upgrade to Dynamic Disk**.
12. Right-click the volume that you want to mirror and select **Add Mirror**. The Add Mirror wizard is started.
13. Use the Add Mirror wizard to configure the second volume.
14. Ignore the window for making changes to the boot.ini file.

    The status of both volumes, the existing drive, and the new drive changes to **Regenerating**. After a short period of time, the status shows the percentage of regeneration that has completed. When the regeneration completes, the status is displayed as **Healthy**.

Master console recovery procedures

If the master console server disk drive fails and the master console software is also lost, the hardware master console software can be restored to the factory default settings.

The master console server uses a mirrored pair of disk drives to protect the master console software in case a disk drive fails. However, if both copies of the software are also destroyed, you can restore the software to the factory default settings by using the CDs that are supplied with the hardware master console.

Complete the following steps to restore the master console software to the factory default settings:

Hardware master console V4.1 and later

1. Inspect your recovery CDs. Beginning with version 4.1, IBM provides a separate Microsoft Windows CD in addition to the software Master console CDs.
2. Reinstall the Windows operating system using the supplied Windows CDs.
3. Install the master console software from the supplied CDs.
4. Configure the master console software using the instructions in the *IBM System Storage SAN Volume Controller: Software Installation and Configuration Guide*.

Hardware master console versions prior to V4.1

1. Inspect your recovery CDs. Prior to version 4.1, the set of recovery CDs contains both Microsoft Windows and the master console software in one bundle.
2. Insert recovery CD 1.
3. Power off the master console server.
4. Power on the master console server and follow the on-screen instructions.
5. Configure the master console software using the instructions in the *IBM System Storage SAN Volume Controller: Software Installation and Configuration Guide*.

Chapter 8. Using maintenance analysis procedures

The maintenance analysis procedures (MAPs) inform you how to analyze a failure that occurs with a SAN Volume Controller.

With the MAPs you can isolate the field replaceable units (FRUs) of the SAN Volume Controller that fails. The following MAPs are defined for the SAN Volume Controller:

- Start
- Power on
- Power off
- 2145-1U uninterruptible power supply
- 2145 uninterruptible power supply
- 2145-1U uninterruptible power supply repair verification
- 2145 uninterruptible power supply repair verification
- Redundant ac power
- Redundant ac power verification
- Front panel
- Ethernet
- Fibre-channel
- Repair verification
- Light path
- Hardware boot

Note: Start all problem determination procedures and repair procedures with "MAP 5000: Start" on page 362.

Related tasks

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

Using the maintenance analysis procedures

SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

When you service one SAN Volume Controller, the other keeps the storage area network (SAN) operational. With concurrent maintenance, all field replaceable units (FRUs) can be removed, replaced, and tested on one SAN Volume Controller while the SAN and host systems are powered on and doing productive work.

Note: Unless you have a particular reason, do not remove the power from both SAN Volume Controllers unless instructed to do so. When you need to remove power, see "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

- To isolate the FRUs in the failing SAN Volume Controller, complete the actions and answer the questions given in these maintenance analysis procedures (MAPs).
- When instructed to exchange two or more FRUs in sequence:
  1. Exchange the first FRU in the list for a new one.
  2. Verify that the problem is solved.
  3. If the problem remains:
     a. Reinstall the original FRU.
     b. Exchange the next FRU in the list for a new one.
  4. Repeat steps 2 and 3 until either the problem is solved, or all the related FRUs have been exchanged.
  5. Complete the next action indicated by the MAP.
  6. If the MAPs are being used due to a cluster error code, following the repair, mark the error as fixed in the cluster error log before verifying the repair.

Related tasks

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

MAP 5000: Start

MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

If you are not familiar with the MAPs, first read "Using the maintenance analysis procedures" on page 361. This MAP is used for the SAN Volume Controller 2145-4F2, the SAN Volume Controller 2145-8F2, SAN Volume Controller 2145-8F4, and the SAN Volume Controller 2145-8G4. Be sure that you know which model you are using before you start this procedure. To determine which model you are working with, compare your model with the illustrations in "SAN Volume Controller front panel controls and indicators" on page 7.

You might have been sent here for one of the following reasons:

- The web-based Directed Maintenance procedure sent you here
- A problem occurred during the installation of a SAN Volume Controller
- Another MAP sent you here
- A user observed a problem that was not detected by the system

SAN Volume Controller nodes are configured in pairs. While you service one SAN Volume Controller, the other permits access to all the storage managed by the pair. With concurrent maintenance, all FRUs can be removed, replaced, and tested on one SAN Volume Controller while the SAN and host systems are powered on and doing productive work.

Note: Unless you have a particular reason, do not remove the power from both SAN Volume Controller nodes unless instructed to do so.

Perform the following steps:

1. **Were you sent here from a Directed Maintenance procedure?**

   NO Go to step 2 on page 363

YES Go to step 8

2. (from step 1 on page 362)

   Find the IBM System Storage Productivity Center (SSPC) ormaster console server that is used to access the SAN Volume Controller cluster. This is normally located in the same rack as the SAN Volume Controller nodes but might be located in another rack if the master console is used to support more than one SAN Volume Controller cluster or if the user has installed the ″software master″ feature.

3. (from step 2)

   Log in to the (SSPC) ormaster console server using the user ID and password that is provided by the user.

4. (from step 3)

   Log into the SAN Volume Controller Console using the user ID and password that is provided by the user and launch the SAN Volume Controller Console for the cluster that you are repairing.

5. (from step 4)

   Does the SAN Volume Controller Console start?

   NO Go to step 8.

   YES Go to step 6.

6. (from step 5)

   When the SAN Volume Controller cluster that you want to service is selected, is the Welcome panel displayed?

   NO Go to step 8.

   YES Go to step 7.

7. (from step 6)

   Start the Directed Maintenance Procedures.

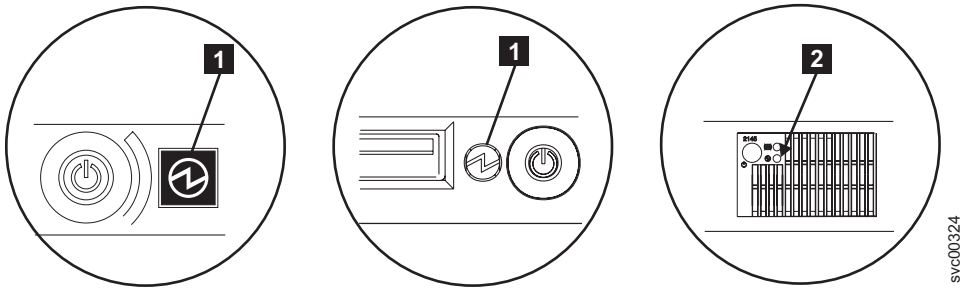
   Did the maintenance procedures find an error that needs to be fixed?

   NO Go to step 8.

   YES Follow the Directed Maintenance procedures.

8. (from steps 1 on page 362, 5, 6, and 7)

   Is the power indicator on any SAN Volume Controller front panel off? On the SAN Volume Controller 2145-4F2, check to see if the power light **2** on the front panel is off; on other models, check to see if the power LED **1** on the operator information panel is off.



1 SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and the SAN Volume Controller 2145-8F2 operator information panel Power LED

2 SAN Volume Controller 2145-4F2 power light

NO Go to step 9.

YES Try to power on the SAN Volume Controller nodes. See "Using the power control for the SAN Volume Controller node" on page 167.

Note: The uninterruptible power supply unit that supplies the SAN Volume Controller might also be powered off. This must be powered on before the SAN Volume Controller powers on.

If the SAN Volume Controller nodes power on, go to step 9; otherwise, go to the appropriate Power MAP: "MAP 5050: Power 2145-8G4, 2145-8F4, and 2145-8F2" on page 370 or "MAP 5100: Power 2145-4F2" on page 375.

9. (from step 8 on page 363)

Does the front panel of any SAN Volume Controller node show a hardware error? There is a hardware error if any of the following conditions are true for the node:

- None of the LEDs on the front panel are on and the front panel display is blank.
- The node is a SAN Volume Controller 2145-4F2 and the check LED on the front panel is on.
- The node is a SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or a SAN Volume Controller 2145-8F2 and the error LED on the front panel is on.

Figure 81 shows the location of the service controller check or error light.

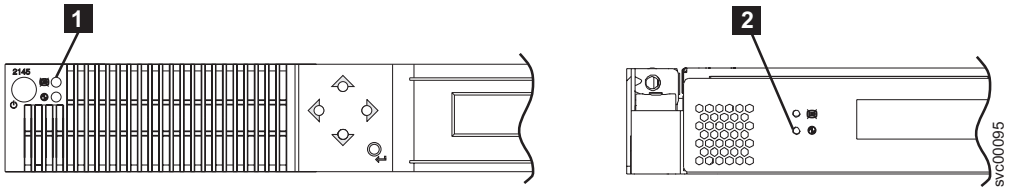


Figure 81. Service controller check lights

1 SAN Volume Controller 2145-4F2 service controller check light

2 SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and the SAN Volume Controller 2145-8F2 and the service controller error light

NO Go to step 10.

YES The service controller for the SAN Volume Controller has failed.

a. Check that the service controller that is indicating an error is correctly installed. If it is, replace the service controller.
b. Go to "MAP 5700: Repair verification" on page 415.

10. Are you working on the SAN Volume Controller 2145-4F2?

NO Go to step 11.

YES Go to step 12 on page 365.

11. (from step 10)

Is the operator panel error LED 1 that you see in Figure 82 illuminated or flashing?

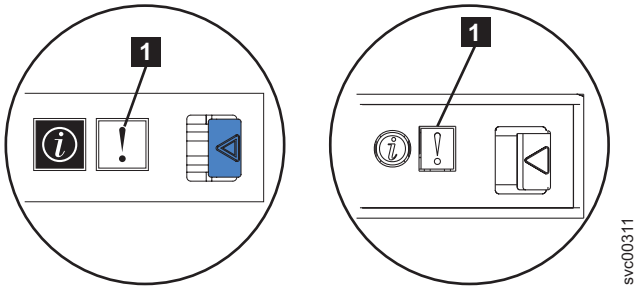


Figure 82. Operator information panel error LED

NO Go to step 12.

YES Go to "MAP 5800: Light path" on page 417.

12. (from step 10 on page 364 and step 11 on page 364)

    Is the hardware boot display that you see in Figure 83 displayed on any of the SAN Volume Controller nodes?

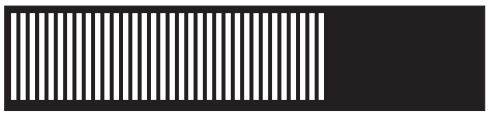


Figure 83. Hardware boot display

NO Go to step 14.

YES Go to step 13.

13. (from step 12)

    Has the hardware boot display that you see in Figure 83 displayed for more than three minutes?

    NO Go to step 14.

    YES Perform the following:

    a. Go to "MAP 5900: Hardware boot" on page 425.
    b. Go to "MAP 5700: Repair verification" on page 415.

14. (from steps 12 and 13)

    Is `Failed` displayed on the top line of the service display of any SAN Volume Controller node?

    NO Go to step 15.

    YES Perform the following:

    a. Note the failure code and go to "Understanding the boot codes" on page 202 to perform the repair actions.
    b. Go to "MAP 5700: Repair verification" on page 415.

15. (from step 14)

    Is `Booting` displayed on the top line of the service display of any SAN Volume Controller node?

    NO Go to step 17 on page 366.

YES Go to step 16.

16. (from step 15 on page 365)

    A progress bar and a boot code are displayed. If the progress bar does not advance for more than three minutes, it has stalled.

    Has the progress bar stalled?

    NO Go to step 17.

    YES Perform the following:

    a. Note the failure code and go to boot code "Understanding the boot codes" on page 202 to perform the repair actions.
    b. Go to "MAP 5700: Repair verification" on page 415.

17. (from steps 15 on page 365 and step 16)

    If you pressed any of the navigation buttons on the front panel, wait for 60 seconds to ensure that the display has switched to its default display.

    Is `Node Error` displayed on the top line of the service display of any SAN Volume Controller node?

    NO Go to step 18.

    YES Perform the following steps:

    a. Note the failure code and go to "Understanding the node error codes" on page 232 to perform the repair actions.
    b. Go to "MAP 5700: Repair verification" on page 415.

18. (from step 17)

    Is `Cluster Error` displayed on the top line of the service display of any SAN Volume Controller node?

    NO Go to step 19.

    YES A cluster error was detected. This error code is displayed on all the operational nodes in the cluster. This type of error is normally repaired using the Directed Maintenance procedures. Perform the following steps:

    a. Go to step 2 on page 363 to perform the Directed Maintenance procedure. If you return here, go to "Understanding cluster error codes" on page 248 to perform the repair actions.
    b. Go to "MAP 5700: Repair verification" on page 415.

19. (from step 18)

    Is `Powering Off`, `Restarting`, `Shutting Down`, or `Power Failure` displayed in the top line of the service display?

    NO Go to step 21 on page 367.

    YES The progress bar moves every few seconds. Wait for the operation to complete and then return to step 1 on page 362 in this MAP. If the progress bar does not move for three minutes, press the power button and go to step 20.

20. (from step 19)

    Did the SAN Volume Controller node power off?

    NO Perform the following steps:

    a. Remove the power cord from the rear of the box.
    b. Wait 60 seconds.
    c. Replace the power cord.

d. If the node does not power on, press the power button to power-on the SAN Volume Controller node and then return to step 1 on page 362 in this MAP.

YES Perform the following steps:

a. Wait 60 seconds.

b. Click the power button to power-on the SAN Volume Controller node and then return to step 1 on page 362 in this MAP.

Note: If the SAN Volume Controller node is powered off for more than five minutes and it is the only SAN Volume Controller node that is connected to the 2145 uninterruptible power supply, the 2145 uninterruptible power supply also powers off. Before pressing the power button on the SAN Volume Controller node, press the power-on button on the 2145 uninterruptible power supply. The 2145-1U uninterruptible power supply does not power-off if the SAN Volume Controller node was powered off. The 2145-1U uninterruptible power supply only powers off if its power button is pressed, input power has been lost for more than five minutes, or the SAN Volume Controller node has shut it down following a reported loss of input power.

21. (from step 20 on page 366)

Is `Charging` or `Recovering` displayed in the top line of the service display of any SAN Volume Controller node?

NO Go to step 22.

YES

- If `Charging` is displayed, the uninterruptible power supply battery is not yet charged sufficiently to support the SAN Volume Controller node. If `Charging` is displayed for more than two hours, go to the MAP for your uninterruptible power supply: "MAP 5150: 2145-1U uninterruptible power supply" on page 379 or "MAP 5200: 2145 uninterruptible power supply" on page 384.
- If `Recovering` is displayed, the uninterruptible power supply battery is not yet charged sufficiently to be able to support the SAN Volume Controller node immediately following a power supply failure. However, if `Recovering` is displayed, the SAN Volume Controller node can be used normally.
- If `Recovering` is displayed for more than two hours, go to the MAP for your specific uninterruptible power supply: "MAP 5150: 2145-1U uninterruptible power supply" on page 379 or "MAP 5200: 2145 uninterruptible power supply" on page 384.

22. (from step 21)

Is `Validate WWNN?` displayed on the service display of any SAN Volume Controller node?

NO Go to step 23 on page 368.

YES The node is indicating that its WWNN might need changing. It enters this mode when the node service controller or disk has been changed but the required service procedures have not been followed.

Note: Do not validate the WWNN until you read the following information to ensure that you choose the correct value. If you

choose an incorrect value, you might find that the SAN zoning for the node is also not correct and more than one node is using the same WWNN. Therefore, it is important to establish the correct WWNN before you continue.

a. Determine which WWNN that you want to use.
   - If the service controller has been replaced, the correct value is probably the WWNN that is stored on disk (the disk WWNN).
   - If the disk has been replaced, perhaps as part of a frame replacement procedure, but has not been re-initialized, the correct value is probably the WWNN that is stored on the service controller (the panel WWNN).

b. Select the stored WWNN that you want this node to use:
   - To use the WWNN that is stored on the disk, perform the following steps:
     1) From the Validate WWNN? panel, press and release the select button. The Disk WWNN: panel is displayed and shows the last five digits of the WWNN that is stored on the disk.
     2) From the Disk WWNN: panel, press and release the down button. The Use Disk WWNN? panel is displayed.
     3) Press and release the select button.
   - To use the WWNN that is stored on the service controller, perform the following steps:
     1) From the Validate WWNN? panel, press and release the select button. The Disk WWNN: panel is displayed.
     2) From the Disk WWNN: panel, press and release the right button. The Panel WWNN: panel is displayed and shows the last five numbers of the WWNN that is stored on the service controller.
     3) From the Panel WWNN: panel, press and release the down button. The Use Panel WWNN? panel is displayed.
     4) Press and release the select button.

c. After you set the WWNN, check the front panel display:
   - If the Node WWNN: panel is displayed on the front panel, the node is now using the selected WWNN. The Node WWNN: panel shows the last five numbers of the WWNN that you selected.
   - If the front panel shows `Cluster:` but does not show a cluster name, you must use the console application to delete the node from the cluster and add the node back into the cluster.

23. (from step 22 on page 367)

    Is there a node that is not a member of a cluster? You can tell if a node is not a member of a cluster by checking the front panel cluster menu. If `Cluster:` is displayed but no cluster name is shown, the node is not a member of a cluster. (The cluster name is on the second line of the front panel display if the current language font allows a two-line display. Otherwise, you can press the select button to display the cluster name.)

    NO Go to step 24 on page 369.

    YES The node is not a member of a cluster. The node might have been deleted from the cluster during a maintenance procedure and has not

been added back into the cluster. Make sure that each I/O group in the cluster contains two nodes. If an I/O group in the cluster has only one node, add the node back into that cluster and ensure that the node is restored to the same I/O group that it was deleted from.

24. (from step 23 on page 368)

    Is the service display unreadable?

    NO Go to step 25.

    YES Perform the following steps:

    a. Check the language. The display might be set to another language.
    b. If the language is set correctly, go to "MAP 5400: Front panel" on page 402.

25. (from step 24)

    No errors were detected by the SAN Volume Controller. If you suspect that the problem that is reported by the customer is a hardware problem, perform the following tasks:

    a. Perform Problem Determination procedures on your host systems, disk controllers, and fibre-channel switches.
    b. Ask your hardware support center for assistance.

If you suspect that the problem is a software problem, see Chapter 4, "Upgrading the SAN Volume Controller software," on page 123.

Related concepts

"Validate WWNN?" on page 147
The front panel prompts you to validate the WWNN when the worldwide node name (WWNN) that is stored in the service controller (the panel WWNN) does not match the WWNN that is backed up on the SAN Volume Controller disk (the disk WWNN).

Related tasks

"Using directed maintenance procedures" on page 118
You can use directed maintenance procedures (DMP) to diagnose and resolve problems with the SAN Volume Controller.

"Select language? option" on page 162
You can change the language that displays on the front panel.

"Determining a hardware boot failure" on page 202
If you see that the hardware boot display stays on the front panel for more than three minutes, the node cannot boot. The cause might be a hardware failure or the software on the hard disk drive is missing or damaged.

"Fibre-channel link failures" on page 349
When a failure occurs on a single fibre channel link, the small form-factor pluggable (SFP) connector might need to be replaced.

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"Viewing the vital product data" on page 133
You can view the vital product data for a node from the Viewing Vital Product Data panel.

Related reference

"Displaying the vital product data using the CLI" on page 134
You can use the command-line interface (CLI) to display the SAN Volume Controller cluster or node vital product data (VPD).

MAP 5050: Power 2145-8G4, 2145-8F4, and 2145-8F2

MAP 5050: Power 2145-8G4, 2145-8F4, and 2145-8F2 helps you to solve problems that have occurred on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 power. If you are using the SAN Volume Controller 2145-4F2, see the MAP for the SAN Volume Controller 2145-4F2 node.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maintenance analysis procedures" on page 361.

You might have been sent here for one of the following reasons:

- A problem occurred during the installation of a SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or SAN Volume Controller 2145-8F2 node.
- The power switch failed to turn the node on
- The power switch failed to turn the node off
- Another MAP sent you here

Perform the following steps:

1. **Are you here because the node is not powered on?**

   NO Go to step 8 on page 373.

   YES Go to step 2.

2. (from step 1)

   Is the power light (shown in Figure 84 or Figure 85) continuously illuminated?

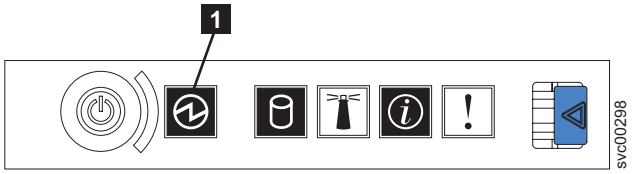


Figure 84. The SAN Volume Controller 2145-8G4 operator information panel

1 Power LED

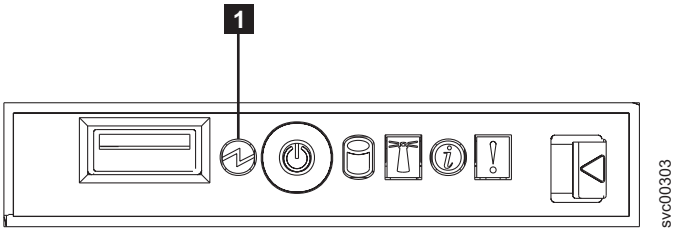


Figure 85. The SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2 operator information panel

NO Go to step 3 on page 371.

YES The node is powered on correctly. Reassess the symptoms and return

to “MAP 5000: Start” on page 362 or go to “MAP 5700: Repair verification” on page 415 to verify the correct operation.

3. (from step 2 on page 370)

   Is the power light on the node operator information panel flashing?

   NO Go to step 5.

   YES The node is in standby mode. Input power is present. Go to step 4.

4. (from step 3)

   Press the power-on button on the front panel of the node.

   Is the Power On indicator on the front panel of the node illuminated a solid green?

   NO Verify that the operator panel cable is correctly seated at both ends.

   If you are working on a SAN Volume Controller 2145-8G4, verify that the operator information panel cable is correctly seated on the system board. If the SAN Volume Controller 2145-8G4 still fails to power on, replace parts in the following sequence:

   a. Operator information panel assembly
   b. System board assembly

   If the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 node still fails to power on, replace parts in the following sequence:

   a. Operator information panel
   b. Cable, signal, front panel
   c. Frame assembly

   Verify the repair by continuing with “MAP 5700: Repair verification” on page 415.

   YES The power-on indicator on the front panel shows that the node has successfully powered on. Continue with “MAP 5700: Repair verification” on page 415 to verify the correct operation.

5. (from step 3)

   Is the rear panel power LED (shown in Figure 86 on page 372) on or flashing?

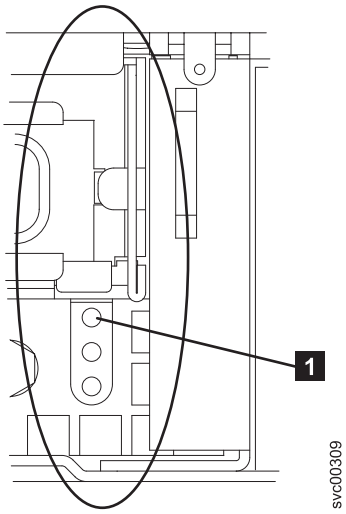


Figure 86. Power LED

1 Power LED

NO Go to step 6.

YES The operator panel is failing.

If you are working on a SAN Volume Controller 2145-8G4, verify that the operator information panel cable is correctly seated on the system board. If the SAN Volume Controller 2145-8G4 still fails to power on, replace parts in the following sequence:

a. Operator information panel assembly
b. System board assembly

If you are working on a SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2, verify that the operator information panel cable is correctly seated at both ends. If the cable is correctly seated and the operator panel power light is still not on or blinking, replace the parts in the following sequence:

a. Operator information panel
b. Cable, signal, front panel
c. Frame assembly

6. (from step 5 on page 371)

   Locate the 2145-1U uninterruptible power supply (2145-1U uninterruptible power supply) that is connected to this node.

   Does the 2145-1U uninterruptible power supply powering this node have its power on and load segment 2 indicators a solid green?

   NO Go to "MAP 5150: 2145-1U uninterruptible power supply" on page 379.

   YES Go to step 7.

7. (from step 6)

   Is the ac indicator (shown in Figure 87 on page 373) on the rear of the node power supply assembly illuminated?

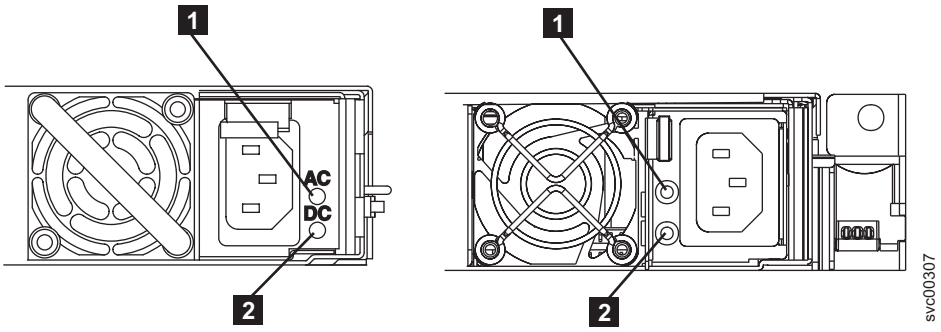


Figure 87. ac and dc LED indicators

1 ac LED

2 dc LED

NO Verify that the input power cable is securely connected at both ends and shows no sign of damage. If the cable is faulty or damaged, then replace it; otherwise, replace the SAN Volume Controller 2145-8G4 parts in the following sequence:

a. Power supply 670W

b. Power backplane

Replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 parts in the following sequence:

a. Power supply, 585 watt

b. Power backplane

Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Go to step 8.

8. (from step 7 on page 372)

Is the dc indicator (shown in Figure 87) on the rear of the node power supply assembly illuminated?

NO Replace the SAN Volume Controller 2145-8G4 parts in the following sequence:

a. Power backplane

b. Power supply 670W

c. System board assembly

Replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 parts in the following sequence:

a. Power backplane

b. Power supply, 585 watt

c. Frame assembly

Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Verify that the operator panel cable is correctly seated at both ends. If the node still fails to power on, replace parts in the following sequence:

a. Operator information panel

b. Cable, signal, front panel
c. System board assembly (if the node is a SAN Volume Controller 2145-8G4)
d. Frame assembly (if the node is a SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2)

Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

9. (from step 1 on page 370)

   The node will not power off when the power button is pressed. When the node is fully booted, power-off is performed under the control of the SAN Volume Controller software. The power-off operation can take up to five minutes to complete.

   Is Powering Off displayed on the front panel?

   NO Go to step 10.

   YES Wait for the node to power off. If the node fails to power off after 5 minutes, go to step 10.

10. (from step 9)

    Attention: Powering off the node by any means other than using the SAN Volume Controller Console might cause a loss of data in the node cache. If you are performing concurrent maintenance, this node must be deleted from the cluster before you proceed. Ask the customer to delete the node from the cluster now. If they are unable to delete the node, call your support center for assistance before you proceed.

    The node cannot be powered off either because of a software fault or because of a hardware failure. Press and hold the power button. The node should power off within five seconds.

    Did the node power off?

    NO Power off the 2145-1U uninterruptible power supply that is connected to this node.

    Attention: Be sure that you are powering of the correct 2145-1U uninterruptible power supply. If necessary, trace the cables back to the 2145-1U uninterruptible power supply assembly. Powering off the wrong 2145-1U uninterruptible power supply might cause customer data loss.
    Go to step 11.

    YES Go to step 11.

11. (from step 10)

    If necessary, power on the 2145-1U uninterruptible power supply that is connected to this node and then press the power button to power the node on.

    Did the node power on and boot correctly?

    NO Go to "MAP 5000: Start" on page 362 to resolve the problem.

    YES Go to step 12.

12. (from step 11)

    The node has probably suffered a software failure. Dump data might have been captured that will help resolve the problem. Call your support center for assistance.

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5150: 2145-1U uninterruptible power supply" on page 379
MAP 5150: 2145-1U uninterruptible power supply helps you solve problems that have occurred in the 2145-1U uninterruptible power supply systems that are used on a SAN Volume Controller.

"MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389
MAP 5250: 2145-1U uninterruptible power supply repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs, or repair actions that were done, have solved all the problems on the SAN Volume Controller 2145-1U uninterruptible power supply.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

Related reference

"SAN Volume Controller front panel controls and indicators" on page 7
The controls and indicators are used for power and navigation and to indicate information, such as system activity, service and configuration options, service controller failures, and node identification.

"SAN Volume Controller rear panel indicators and connectors" on page 15
The rear panel indicators for the SAN Volume Controller are located on the back panel assembly. The connectors are located on the SAN Volume Controller node and the power supply assembly.

"Understanding the fields for the node VPD" on page 136
The node vital product data (VPD) provides information about the system board, processor, processor cache, fans, memory module, fibre-channel adapter card, SCSI and IDE devices, software, front panel assembly, and the uninterruptible power supply.

MAP 5100: Power 2145-4F2

MAP 5100: Power 2145-4F2 helps you to solve problems that have occurred on the SAN Volume Controller 2145-4F2 power. If you are using the SAN Volume Controller 2145-8F2, the SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8G4, see the MAP for the SAN Volume Controller 2145-8F2, the SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8G4 node.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maintenance analysis procedures" on page 361.

You might have been sent here for one of the following reasons:

- A problem occurred during the installation of a SAN Volume Controller 2145-4F2
- The power-on switch failed to turn the node on
- Another MAP sent you here

Perform the following steps:

1. Press the power-on switch on the SAN Volume Controller 2145-4F2 front panel.

   Is the power-on indicator on the SAN Volume Controller 2145-4F2 front panel illuminated a solid green?

NO Go to step 2.

YES The Ppower-on indicator on the front panel shows that the SAN Volume Controller 2145-4F2 has successfully powered on. Continue with "MAP 5700: Repair verification" on page 415 to verify the correct operation.

2. **Is the system board power LED indicator on the SAN Volume Controller 2145-4F2 rear panel flashing green?**

   NO Go to step 3.

   YES The system board power LED indicator on the node rear panel shows that power is present at the power supply but the power-on switch failed to turn the node on.

   - Replace the parts in the following sequence:
     - Power supply unit
     - Service controller
     - Front panel assembly
     - System board assembly
   - Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

3. **Is the system board power LED indicator on the SAN Volume Controller 2145-4F2 rear panel illuminated a solid green?**

   NO Go to step 4.

   YES The System board power LED indicator on the node rear panel shows that the power-on switch on the SAN Volume Controller 2145-4F2 is on, but is not being displayed on the front panel power-on indicator.

   - Replace the parts in the following sequence:
     - Service controller
     - Front panel assembly
     - System board assembly
   - Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

4. **Determine the type of uninterruptible power supply that you are using.**

   You can find out which uninterruptible power supply you are using by one of the following methods:

   - Do a physical check of the uninterruptible power supply. The 2145 uninterruptible power supply is 2U high (3.5 in), while the 2145-1U uninterruptible power supply is 1U high (1.75 in).
   - Through the user interface, look at the node vital product data (VPD). See "Viewing the vital product data" on page 133 for more information.
   - Through the command-line interface, look at the node VPD by issuing the following command:

     ```
     svcinfo lsnodevpd nodeID
     ```

   If your uninterruptible power supply is a 2145 uninterruptible power supply:

   Go to step 5 on page 377

   If your uninterruptible power supply is a 2145-1U uninterruptible power supply:

   Go to step 9 on page 377.

5. (from step 4 on page 376)

   Does the 2145 uninterruptible power supply powering this SAN Volume Controller 2145-4F2 node have its mode indicator a solid green?

   NO Refer to "MAP 5200: 2145 uninterruptible power supply" on page 384.

   YES Go to step 6.

6. (from step 5)

   Does the 2145 uninterruptible power supply powering this SAN Volume Controller 2145-4F2 node have all of its circuit breakers on?

   NO Go to step 7.

   YES The input power to the SAN Volume Controller 2145-4F2 node is missing. Verify that the power cord assembly is correctly plugged in to the SAN Volume Controller 2145-4F2 and the 2145 uninterruptible power supply.

   - Replace the parts in the following sequence:
     - Power supply assembly
     - Power cord assembly
     - Verify the repair by continuing with "MAP 5700: Repair verification" on page 415

7. (from step 6)

   One of the circuit breakers on the 2145 uninterruptible power supply has tripped. Reset the tripped circuit breaker to on.

   Does the circuit breakers on the 2145 uninterruptible power supply remain on?

   NO Go to step 8.

   YES Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

8. (from step 7)

   One of the 2145 uninterruptible power supply's output loads caused a circuit breaker to trip. Remove each of up to eight SAN Volume Controller 2145-4F2 node power cables in turn and try to reset the circuit breakers to on.

   Does the removal of any SAN Volume Controller 2145-4F2 node power cables enable the circuit breaker to remain on?

   NO 2145 uninterruptible power supply output circuit breaker is faulty.

   a. Replace the 2145 uninterruptible power supply assembly.
   b. Go to "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

   YES The input power current to the SAN Volume Controller 2145-4F2 node is too high.

   a. Replace the parts in the following sequence
      1) Power supply assembly
      2) Power cord assembly
   b. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

9. (from step 4 on page 376)

   Does the 2145-1U uninterruptible power supply powering this SAN Volume Controller 2145-4F2 node have its power-on and load segment 2 indicators a solid green, with service, on-battery, and overload indicators off?

NO Refer to "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.

YES The input power to the SAN Volume Controller 2145-4F2 node is missing. Verify that the power cord assembly is correctly plugged in to the SAN Volume Controller 2145-4F2 and the 2145-1U uninterruptible power supply.

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5150: 2145-1U uninterruptible power supply" on page 379
MAP 5150: 2145-1U uninterruptible power supply helps you solve problems that have occurred in the 2145-1U uninterruptible power supply systems that are used on a SAN Volume Controller.

"MAP 5200: 2145 uninterruptible power supply" on page 384
MAP 5200: 2145 uninterruptible power supply helps you solve problems that have occurred in the 2145 uninterruptible power supply systems used on a SAN Volume Controller 2145-4F2.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the front panel from the SAN Volume Controller 2145-4F2" on page 562
You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Removing the power supply" on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"MAP 5300: 2145 uninterruptible power supply repair verification" on page 390
MAP 5300: 2145 uninterruptible power supply repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply.

"MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389
MAP 5250: 2145-1U uninterruptible power supply repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs, or repair actions that were done, have solved all the problems on the SAN Volume Controller 2145-1U uninterruptible power supply.

Related reference

"Understanding the fields for the node VPD" on page 136
The node vital product data (VPD) provides information about the system board, processor, processor cache, fans, memory module, fibre-channel adapter card, SCSI and IDE devices, software, front panel assembly, and the uninterruptible power supply.

MAP 5150: 2145-1U uninterruptible power supply

MAP 5150: 2145-1U uninterruptible power supply helps you solve problems that have occurred in the 2145-1U uninterruptible power supply systems that are used on a SAN Volume Controller.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maintenance analysis procedures" on page 361.

You may have been sent here for one of the following reasons:

- The system problem determination procedures sent you here
- A problem occurred during the installation of a SAN Volume Controller
- Another MAP sent you here
- A customer observed a problem that was not detected by the system problem determination procedures

Figure 88 shows an illustration of the front of the panel for the 2145-1U uninterruptible power supply.

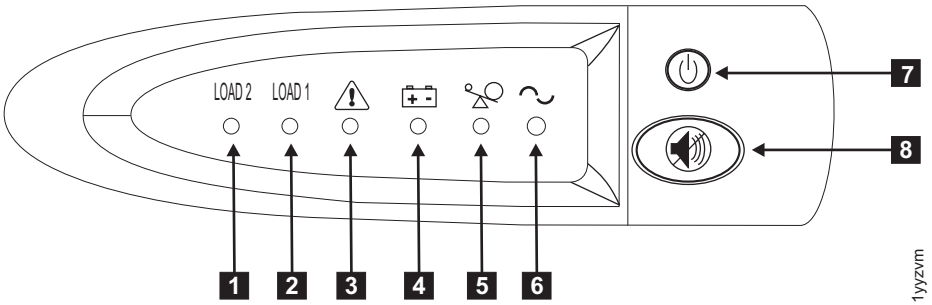


Figure 88. 2145-1U uninterruptible power supply front panel assembly

1. Load segment 2 indicator
2. Load segment 1 indicator
3. Alarm
4. On-battery indicator
5. Overload indicator
6. Power-on indicator
7. On/off button
8. Test and alarm reset button

Table 27 on page 380 identifies which status and error LEDs that display on the 2145-1U uninterruptible power supply front panel assembly relate to the specified error conditions. It also lists the uninterruptible power supply alert buzzer behavior.

Table 27. Uninterruptible power supply error indicators

[1] Load2	[2] Load1	[3] Alarm	[4] Battery	[5] Overload	[6] ac-on	Buzzer	Error condition
Green (see Note 1)					Green	(see Note 3)	No errors; the uninterruptible power supply was configured by the SAN Volume Controller
Green	Amber (see Note 2)				Green		No errors; the uninterruptible power supply is not yet configured by the SAN Volume Controller
Green	Either on or off		Amber		Green	Beeps for two seconds and then stops	ac over or under limit (on battery)
		Flashing red	Flashing amber	Flashing red	Flashing green	Three beeps every ten seconds	Battery undervoltage
Green	Either on or off	Flashing red			Flashing green	solid on	Battery overvoltage
		Flashing red	Flashing amber		Flashing green	solid on	Output wave is abnormal when the charger is open, on battery mode
		Flashing red	Flashing amber			solid on	ac output wave is under low limit or above high limit on battery mode
Green	Either on or off		Amber			Beeps for four seconds and then stops	On battery (no ac)
Green	Either on or off		Flashing amber			Beeps for two seconds and then stops	Low battery (no ac)
Green	Either on or off			Red	Green	Beeps for one second and then stops	Overload while on line
			Amber	Red		Beeps for one second and then stops	Overload while on battery
Either on or off	Either on or off	Flashing red			Green	solid on	Fan failure
Either on or off	Either on or off	Flashing red	Amber			solid on	Battery test fail

Table 27. Uninterruptible power supply error indicators (continued)

[1] Load2	[2] Load1	[3] Alarm	[4] Battery	[5] Overload	[6] ac-on	Buzzer	Error condition
		Flashing red		Red		solid on	Overload timeout
		Flashing red	Amber		Green	solid on	Over temperature
		Flashing red	Amber	Red	Green		Output short circuit

Notes:

1. The green Load2 LED ([1]) indicates that power is being supplied to the right pair of ac power outlets (viewed from the rear of the uninterruptible power supply).
2. The amber Load1 LED ([2]) indicates that power is being supplied to the left pair of ac power outlets (viewed from the rear of the uninterruptible power supply). These outlets are not used by the SAN Volume Controller.

   This LED might be illuminated during power-on sequences, but it is typically extinguished by the SAN Volume Controller node that is attached to the uninterruptible power supply.
3. A blank cell indicates that the light or buzzer is off.

1. **Is the power-on indicator for the 2145-1U uninterruptible power supply that is connected to the failing SAN Volume Controller off?**

   NO Go to step 3.

   YES Go to step 2.
2. (from step 1)

   Are other 2145-1U uninterruptible power supply units showing the power-on indicator as off?

   NO The 2145-1U uninterruptible power supply might be in standby mode. This can be because the on/off button on this 2145-1U uninterruptible power supply was pressed, input power has been missing for more than five minutes, or because the SAN Volume Controller shut it down following a reported loss of input power. Press and hold the on/off button until the 2145-1U uninterruptible power supply power-on indicator is illuminated (approximately five seconds). On some versions of the 2145-1U uninterruptible power supply, you need a pointed device, such as a screwdriver, to press the on/off button.

   Go to step 3.

   YES Either main power is missing from the installation or a redundant ac power switch has failed. If the 2145-1U uninterruptible power supply units are connected to a redundant ac power switch, go to "MAP 5320: Redundant ac power" on page 391. Otherwise, complete these steps:

   a. Restore main power to installation.
   b. Verify the repair by continuing with "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.
3. (from step 1 and step 2)

   Are the power-on and load segment 2 indicators for the 2145-1U uninterruptible power supply illuminated solid green, with service, on-battery, and overload indicators off?

   NO Go to step 4 on page 382.

   YES The 2145-1U uninterruptible power supply is no longer showing a

fault. Verify the repair by continuing with "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.

4. (from step 3 on page 381)

   Is the 2145-1U uninterruptible power supply on-battery indicator illuminated yellow (solid or flashing), with service and overload indicators off?

   NO Go to step 5.

   YES The input power supply to this 2145-1U uninterruptible power supply is not working or is not correctly connected, or the 2145-1U uninterruptible power supply is receiving input power that might be unstable or outside the specified voltage or frequency range. (The voltage should be between 200V and 240V and the frequency should be either 50 Hz or 60 Hz.) The SAN Volume Controller automatically adjusts the 2145-1U uninterruptible power supply voltage range. If the input voltage has recently changed, the alarm condition might be present until the SAN Volume Controller has adjusted the alarm setting. Power on the SAN Volume Controller that is connected to the 2145-1U uninterruptible power supply. If the SAN Volume Controller starts the on-battery indicator should go off within five minutes. If the SAN Volume Controller powers off again or if the condition persists for at least five minutes, do the following:

   a. Check the input circuit protector on the 2145-1U uninterruptible power supply rear panel, and press it, if it is open.
   b. If redundant ac power is used for the 2145-1U uninterruptible power supply, check the voltage and frequency at the redundant ac power switch output receptable connected to this 2145-1U uninterruptible power supply. If there is no power, go to "MAP 5340: Redundant ac power verification" on page 393. If the power is not within specification, ask the customer to resolve the issue. If redundant ac power is not used for this uninterruptible power supply, check the site power outlet for the 2145-1U uninterruptible power supply providing power to this SAN Volume Controller. Check the connection, voltage, and frequency. If the power is not within specification, ask the customer to resolve the issue.
   c. If the input power is within specification and the input circuit protector is stable, replace the field replaceable units (FRUs) in the following sequence:
      1) 2145-1U uninterruptible power supply power cord
      2) 2145-1U uninterruptible power supply
   d. Verify the repair by continuing with "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.

5. (from step 4)

   Is the 2145-1U uninterruptible power supply overload indicator illuminated solid red?

   NO Go to step 6 on page 383.

   YES The 2145-1U uninterruptible power supply output power requirement has exceeded the 2145-1U uninterruptible power supply capacity.

   a. Check that only one SAN Volume Controller node is connected to the 2145-1U uninterruptible power supply.
   b. Check that no other loads are connected to the 2145-1U uninterruptible power supply.

c. After ensuring that the output loading is correct, turn off and unplug the input power from the 2145-1U uninterruptible power supply. Wait at least five seconds until all LEDs are off and restart the 2145-1U uninterruptible power supply by reconnecting it to input power and pressing the on/off button until the 2145-1U uninterruptible power supply power-on indicator is illuminated (approximately five seconds). On some versions of the 2145-1U uninterruptible power supply, you need a pointed device, such as a screwdriver, to press the on/off button.

d. If the condition persists, replace the 2145-1U uninterruptible power supply.

e. Verify the repair by continuing with "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.

6. (from step 5 on page 382)

   Is the 2145-1U uninterruptible power supply service indicator illuminated flashing red and the on-battery indicator illuminated solid yellow, with the power-on and overload indicators off?

   NO Go to step 7.

   YES The 2145-1U uninterruptible power supply battery might be fully discharged or faulty.

   a. Check that the 2145-1U uninterruptible power supply has been connected to a power outlet for at least two hours to charge the battery. After charging the battery, press and hold the test/alarm reset button for three seconds; and then check the service indicator.

   b. If the service indicator is still flashing, replace the 2145-1U uninterruptible power supply.

   c. Verify the repair by continuing with "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.

7. (from step 6)

   Is the 2145-1U uninterruptible power supply service indicator illuminated flashing red, the on-battery indicator illuminated solid yellow, and the power-on illuminated solid green, with the overload indicator off?

   NO Go to step 8.

   YES The 2145-1U uninterruptible power supply internal temperature is too high.

   a. Turn off and unplug the 2145-1U uninterruptible power supply. Clear vents at the front and rear of the 2145-1U uninterruptible power supply. Remove any heat sources. Ensure the airflow around the 2145-1U uninterruptible power supply is not restricted.

   b. Wait at least five minutes and restart the 2145-1U uninterruptible power supply by reconnecting to input power and pressing the on/off button until the 2145-1U uninterruptible power supply power-on indicator is illuminated (approximately five seconds).

   c. If the condition persists, replace the 2145-1U uninterruptible power supply.

   d. Verify the repair by continuing with "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.

8. (from step 7)

   Is the 2145-1U uninterruptible power supply, service, on-battery, overload, and power-on indicators illuminated and flashing?

NO The 2145-1U uninterruptible power supply has an internal fault.

a. Replace the 2145-1U uninterruptible power supply.
b. Verify the repair by continuing with "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.

YES The 2145-1U uninterruptible power supply battery might be fully discharged or faulty.

a. Check that the 2145-1U uninterruptible power supply has been connected to a power outlet for at least two hours to charge the battery. After charging the battery, press and hold the test/alarm reset button for three seconds and then check the service indicator.
b. If the service indicator is still flashing, replace the 2145-1U uninterruptible power supply.
c. Verify the repair by continuing with "MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389.

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5250: 2145-1U uninterruptible power supply repair verification" on page 389
MAP 5250: 2145-1U uninterruptible power supply repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs, or repair actions that were done, have solved all the problems on the SAN Volume Controller 2145-1U uninterruptible power supply.

"Removing the power cable from the 2145-1U uninterruptible power supply" on page 605
You can remove the power cable from the 2145-1U uninterruptible power supply if you are having problems with the power supply and suspect that the power cable is defective.

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

MAP 5200: 2145 uninterruptible power supply

MAP 5200: 2145 uninterruptible power supply helps you solve problems that have occurred in the 2145 uninterruptible power supply systems used on a SAN Volume Controller 2145-4F2.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maintenance analysis procedures" on page 361.

You might have been sent here for one of the following reasons:

- The system problem determination procedures sent you here
- A problem occurred during the installation of a SAN Volume Controller 2145-4F2
- Another MAP sent you here
- A customer observed a problem that was not detected by the system problem determination procedures

Figure 89 shows an illustration of the front of the panel for the 2145 uninterruptible power supply.

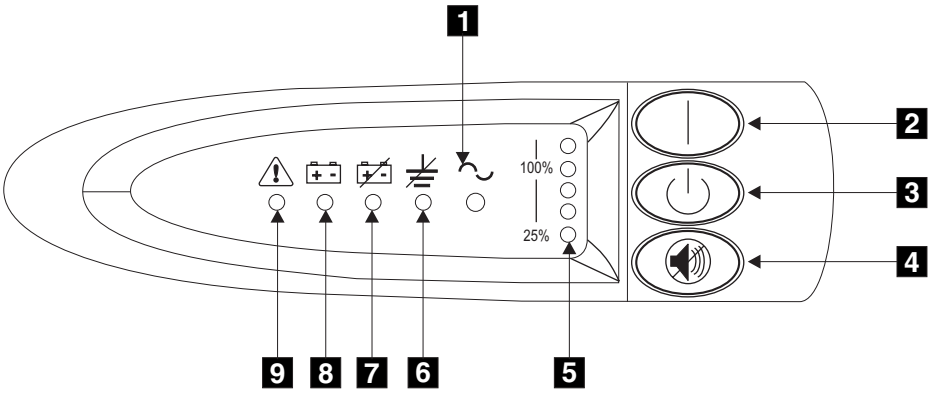


Figure 89. 2145 uninterruptible power supply front panel assembly

1. Mode indicator
2. On button
3. Off button
4. Test and alarm reset button
5. Load-level indicator
6. Site wiring fault indicator
7. Battery service indicator
8. Battery mode indicator
9. General alarm indicator

1. **Is the mode indicator for the 2145 uninterruptible power supply that is connected to the failing SAN Volume Controller 2145-4F2 off?**

   NO Go to step 3 on page 386.

   YES Go to step 2.

2. (from step 1)

   Are other 2145 uninterruptible power supplys showing mode indicator off?

   NO The power supply to this 2145 uninterruptible power supply is faulty or not connected correctly.

   a. Ask the customer to check the site power connection to this 2145 uninterruptible power supply.

   b. If the input power connection is stable, replace the field replaceable units (FRUs) in the following sequence:

      1) 2145 uninterruptible power supply power cord

      2) 2145 uninterruptible power supply electronics assembly

      3) 2145 uninterruptible power supply assembly

   c. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

   YES Main power is missing from installation.

   a. Restore main power to installation.

b. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

3. (from step 1 on page 385)

   Is the 2145 uninterruptible power supply mode indicator illuminated and flashing green?

   NO Go to step 4.

   YES The 2145 uninterruptible power supply is in standby mode. This can be because the SAN Volume Controller 2145-4F2 nodes powered by this 2145 uninterruptible power supply have been powered off for more than five minutes, or the off button on this 2145 uninterruptible power supply was pressed.

   a. Press and hold the on button until you hear the 2145 uninterruptible power supply beep (approximately one second) and the power-on indicator shows solid green. If the mode indicator does not change to solid green, replace the 2145 uninterruptible power supply electronics assembly.
   b. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

4. (from step 3)

   Is the mode indicator illuminated solid red?

   NO Go to step 8 on page 387.

   YES The 2145 uninterruptible power supply is in bypass mode. Go to step 5

5. (from step 4)

   Is the 2145 uninterruptible power supply overload load level indicator illuminated red?

   NO Go to step 6.

   YES The 2145 uninterruptible power supply output power requirement exceeded the 2145 uninterruptible power supply capacity.

   a. Check that no more than four SAN Volume Controller 2145-4F2 nodes are connected to the 2145 uninterruptible power supply.
   b. Check that only SAN Volume Controller 2145-4F2 nodes are connected to the 2145 uninterruptible power supply.
   c. After ensuring output loading is correct, turn off and unplug the input power from the 2145 uninterruptible power supply. Wait at least five seconds until all LEDs are off and restart the 2145 uninterruptible power supply by reconnecting to input power and pressing the on button until you hear the 2145 uninterruptible power supply beep (approximately one second).
   d. If the condition persists, call the IBM Support Center.
   e. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

6. (from step 5)

   Is the 2145 uninterruptible power supply general alarm indicator illuminated and flashing red (causing a continuous audible alarm)?

   NO Go to step 7 on page 387.

   YES The 2145 uninterruptible power supply internal temperature is too high.

a. Turn off and unplug the 2145 uninterruptible power supply. Clear the vents at the front and rear of the 2145 uninterruptible power supply. Remove any heat sources. Ensure the airflow around the 2145 uninterruptible power supply is not restricted.
b. Wait at least five minutes and restart the 2145 uninterruptible power supply by reconnecting to input power and pressing the on button until you hear the 2145 uninterruptible power supply beep (approximately one second).
c. If the condition persists, replace the 2145 uninterruptible power supply electronics assembly.
d. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

7. (from step 6 on page 386)

   Is the 2145 uninterruptible power supply Battery Mode indicator illuminated and flashing red (causing an audible beep every five seconds)?

   NO The 2145 uninterruptible power supply is in bypass mode because of an internal 2145 uninterruptible power supply fault.
   a. Replace the following assemblies in turn:
      - 2145 uninterruptible power supply electronics assembly
      - 2145 uninterruptible power supply battery assembly
      - 2145 uninterruptible power supply assembly
   b. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

   YES The 2145 uninterruptible power supply battery might be fully discharged or not connected correctly.
   a. Check that the 2145 uninterruptible power supply battery assembly is installed correctly.
   b. Check that the 2145 uninterruptible power supply has been connected to a power outlet for at least two hours to charge the battery. After charging the battery, press and hold the test/alarm reset button for three seconds; and then check the battery mode indicator.
   c. If the battery mode indicator is still on, replace the 2145 uninterruptible power supply battery assembly.
   d. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

8. (from step 4 on page 386

   Is the 2145 uninterruptible power supply wiring fault indicator illuminated and flashing red (causing an audible beep every five seconds)?

   NO Go to step 9.

   YES The 2145 uninterruptible power supply ground wire connection does not exist or the power input line and neutral wires are reversed.
   a. Check the grounding of the 2145 uninterruptible power supply.
   b. Ask the customer to check the 2145 uninterruptible power supply input power connection.
   c. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

9. (from step 8)

Is the 2145 uninterruptible power supply mode indicator flashing red (causing an audible beep every five seconds)?

NO Go to step 10.

YES The 2145 uninterruptible power supply is receiving input power that might be unstable or outside the specified voltage or frequency range. The SAN Volume Controller 2145-4F2 automatically adjusts the 2145 uninterruptible power supply voltage range. If the input voltage has recently changed, the alarm condition might be present until the SAN Volume Controller 2145-4F2 has adjusted the alarm setting. Ensure that an operational SAN Volume Controller 2145-4F2 is connected to the 2145 uninterruptible power supply. If the condition persists for at least five minutes, do the following:

a. Ask the customer to check the site power for the 2145 uninterruptible power supply that is providing power to this SAN Volume Controller 2145-4F2. Check the connection, voltage, and frequency.
b. If input power is available, replace the 2145 uninterruptible power supply electronics assembly.
c. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

10. (from step 9 on page 387)

Are the 2145 uninterruptible power supply general alarm, battery power, battery mode, wiring fault, and mode indicators illuminated and flashing red (causing a continuous audible alarm)?

NO The 2145 uninterruptible power supply is no longer showing a fault. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 390.

YES The 2145 uninterruptible power supply is reporting a fault condition.

a. Replace the following assemblies in turn:
   - 2145 uninterruptible power supply electronics assembly
   - 2145 uninterruptible power supply battery assembly
   - 2145 uninterruptible power supply assembly
b. Verify the repair by continuing with "MAP 5300: 2145 uninterruptible power supply repair verification" on page 3902145 uninterruptible power supply.

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5300: 2145 uninterruptible power supply repair verification" on page 390
MAP 5300: 2145 uninterruptible power supply repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply.

"Removing the power cable from the 2145 uninterruptible power supply" on page 624
You can replace the power cable from the 2145 uninterruptible power supply if you are having problems with the power supply and suspect that the power cable is defective.

"Removing the 2145 uninterruptible power supply" on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

MAP 5250: 2145-1U uninterruptible power supply repair verification

MAP 5250: 2145-1U uninterruptible power supply repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs, or repair actions that were done, have solved all the problems on the SAN Volume Controller 2145-1U uninterruptible power supply.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maintenance analysis procedures" on page 361.

You may have been sent here because you have performed a repair and want to confirm that no other problems exist on the machine.

Perform the following steps:

1. **Are the power-on and load segment 2 indicators for the repaired 2145-1U uninterruptible power supply illuminated solid green, with service, on-battery, and overload indicators off?**

   NO Continue with "MAP 5000: Start" on page 362.

   YES Go to step 2.

2. (from step 1)

   Is the SAN Volume Controller node powered by this 2145-1U uninterruptible power supply powered on?

   NO Press power-on on the SAN Volume Controller node that is connected to this 2145-1U uninterruptible power supply and is powered off. Go to step 3.

   YES Go to step 3.

3. (from step 2)

   Is the node that is connected to this 2145-1U uninterruptible power supply still not powered on or showing error codes in the front panel display?

   NO Go to step 4.

   YES Continue with "MAP 5000: Start" on page 362.

4. (from step 3)

   Does the SAN Volume Controller node that is connected to this 2145-1U uninterruptible power supply show "Charging" on the front panel display?

   NO Go to step 5.

   YES Wait for the "Charging" display to finish (this might take up to two hours). Go to step 5.

5. (from step 4)

   Press and hold the test/alarm reset button on the repaired 2145-1U uninterruptible power supply for three seconds to initiate a self-test. During the test, individual indicators illuminate as various parts of the 2145-1U uninterruptible power supply are checked.

   Does the 2145-1U uninterruptible power supply service, on-battery, or overload indicator stay on?

NO 2145-1U uninterruptible power supply repair verification has completed successfully. Continue with “MAP 5700: Repair verification” on page 415.

YES Continue with “MAP 5000: Start” on page 362.

Related tasks

“Using the maintenance analysis procedures” on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

“MAP 5000: Start” on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

“MAP 5700: Repair verification” on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

MAP 5300: 2145 uninterruptible power supply repair verification

MAP 5300: 2145 uninterruptible power supply repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller 2145 uninterruptible power supply.

If you are not familiar with these maintenance analysis procedures (MAPs), first read “Using the maintenance analysis procedures” on page 361.

You might have been sent here because you have performed a repair and want to confirm that no other problems exist on the machine.

Attention: If a SAN Volume Controller 2145-4F2 is powered off for more than five minutes and it is the only SAN Volume Controller 2145-4F2 that is connected to this 2145 uninterruptible power supply, the 2145 uninterruptible power supply also powers off. To power on the 2145 uninterruptible power supply, press and hold the on button until you hear the 2145 uninterruptible power supply beep (approximately one second) and the mode indicator shows solid green.

Perform the following steps to verify your repair to the 2145 uninterruptible power supply:

1. **Is the mode indicator for the repaired 2145 uninterruptible power supply illuminated solid green and the Load level indicators showing an output load level between 25% and 100%?**

   NO Continue with “MAP 5000: Start” on page 362.

   YES Go to step 2.

2. (from step 1)

   Are all SAN Volume Controller 2145-4F2 nodes powered by repaired 2145 uninterruptible power supply powered on?

   NO Press power-on on all SAN Volume Controller 2145-4F2 nodes that are powered off. Go to step 3.

   YES Go to step 3.

3. (from step 2)

Are any nodes still not powered on or showing error codes on the front panel display?

NO Go to step 4.

YES Continue with "MAP 5000: Start" on page 362.

4. (from step 3 on page 390)

   Do SAN Volume Controller 2145-4F2 nodes show "charging" on the front panel display?

   NO Go to step 5.

   YES Wait for the charging display to finish. (This might take up to two hours). Go to step 5.

5. (from step 4)

   Press and hold the test/alarm reset button on the repaired 2145 uninterruptible power supply for three seconds to initiate a self-test. During the test, individual indicators illuminate as various parts of the 2145 uninterruptible power supply are checked.

   Does the alarm beep or a 2145 uninterruptible power supply alarm indicator stay on?

   NO 2145 uninterruptible power supply repair verification has been successfully completed. Continue with "MAP 5700: Repair verification" on page 415.

   YES Continue with "MAP 5000: Start" on page 362.

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

MAP 5320: Redundant ac power

MAP 5320: Redundant ac power helps you solve problems that have occurred in the redundant ac power switches used on a SAN Volume Controller. Use this MAP when a 2145-1U uninterruptible power supply that is connected to a redundant ac power switch does not appear to have input power.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maintenance analysis procedures" on page 361.

You might have been sent here for one of the following reasons:

- A problem occurred during the installation of a SAN Volume Controller.
- "MAP 5150: 2145-1U uninterruptible power supply" on page 379 sent you here.

Perform the following steps to solve problems that have occurred in the redundant ac power switches:

1. One or two 2145-1U uninterruptible power supplys might be connected to the redundant ac power switch. **Is the power-on indicator on any of the connected 2145-1U uninterruptible power supplys on?**

   NO Go to step 3.

   YES The redundant ac power switch is powered. Go to step 2.

2. (from step 1)

   Measure the voltage at the redundant ac power switch output socket connected to the 2145-1U uninterruptible power supply that is not showing power-on.

   CAUTION:
   Ensure that you do not remove the power cable of any powered uninterruptible power supply units

   Is there power at the output socket?

   NO One redundant ac power switch output is working while the other is not. Replace the redundant ac power switch.

   CAUTION:
   You might need to power-off an operational node to replace the redundant ac power switch assembly. If this is the case, consult with the customer to determine a suitable time to perform the replacement. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394. After you replace the redundant ac power switch, continue with "MAP 5340: Redundant ac power verification" on page 393.

   YES The redundant ac power switch is working. There is a problem with the 2145-1U uninterruptible power supply power cord or the 2145-1U uninterruptible power supply . Return to the procedure that called this MAP and continue from where you were within that procedure. It will help you analyze the problem with the 2145-1U uninterruptible power supply power cord or the 2145-1U uninterruptible power supply.

3. (from step 1)

   None of the used redundant ac power switch outputs appears to have power.

   Are the two input power cables for the redundant ac power switches correctly connected to the redundant ac power switch and to different mains circuits?

   NO Correctly connect the cables. Go to "MAP 5340: Redundant ac power verification" on page 393.

   YES Verify that there is main power at both the site's power distribution units that are providing power to this redundant ac power switch. Go to step 4.

4. (from step 3)

   Is power available at one or more of the site's power distribution units that are providing power to this redundant ac power switch?

   NO Have the customer fix the mains circuits. Return to the procedure that called this MAP and continue from where you were within that procedure.

   YES The redundant ac power switch should operate in this situation. Replace the redundant ac power switch assembly. After you replace the redundant ac power switch, continue with "MAP 5340: Redundant ac power verification" on page 393.

MAP 5340: Redundant ac power verification

MAP 5340: Redundant ac power verification helps you verify that a redundant ac power switch is functioning correctly.

If you are not familiar with these maintenance analysis procedures (MAPs), first read "Using the maintenance analysis procedures" on page 361.

You might have been sent here because you have replaced a redundant ac power switch or corrected the cabling of a redundant ac power switch. You can also use this MAP if you think a redundant ac power switch might not be working correctly, because it is connected to nodes that have lost power when only one ac power circuit lost power.

In this MAP, you will be asked to confirm that power is available at the redundant ac power switch output sockets 1 and 2. If the redundant ac power switch is connected to nodes that are not powered on, use a voltage meter to confirm that power is available.

If the redundant ac power switch is powering nodes that are powered on (so the nodes are operational), take some precautions before continuing with these tests. Although you do not have to power off the nodes to conduct the test, the nodes will power off if the redundant ac power switch is not functioning correctly.

For each of the powered-on nodes connected to this redundant ac power switch, perform the following steps:

1. Use the graphical user interface (GUI) or the command-line interface (CLI) to confirm that the other node in the same I/O group as this node is online.
2. Use the GUI or the CLI to confirm that all virtual disks connected to this I/O group are online.
3. Check the redundant ac power switch output cables to confirm that the redundant ac power switch is not connected to two nodes in the same I/O group.

If any of these tests fail, correct any failures before continuing with this MAP. If you are performing the verification using powered-on nodes, understand that power is no longer available if the following is true:

- The on-battery indicator on the 2145-1U uninterruptible power supply that connects the redundant ac power switch to the node lights for more than five seconds.
- The SAN Volume Controller node display shows `Power Failure`.

When the instructions say "remove power," you can switch the power off if the sitepower distribution unit has outputs that are individually switched; otherwise, remove the specified redundant ac power switch power cable from the site power distribution unit's outlet.

Perform the following steps:

1. Are the two site power distribution units providing power to this redundant ac power switch connected to different power circuits?

   NO Correct the problem and then return to this MAP.

   YES Go to step 2.
2. (from step 1)

Are both of the site power distribution units providing power to this redundant ac power switch powered?

NO Correct the problem and then return to the start of this MAP.

YES Go to step 3.

3. (from step 2 on page 393)

   Are the two cables that are connecting the site power distribution units to the redundant ac power switch connected?

   NO Correct the problem and then return to the start of this MAP.

   YES Go to step 4.

4. (from step 3)

   Is there power at the redundant ac power switch output socket 2?

   NO Go to step 8.

   YES Go to step 5.

5. (from step 4)

   Is there power at the redundant ac power switch output socket 1?

   NO Go to step 8.

   YES Go to step 6.

6. (from step 5)

   Remove power from the Main power cable to the redundant ac power switch. Is there power at the redundant ac power switch output socket 1?

   NO Go to step 8.

   YES Go to step 7.

7. (from step 6)

   Reconnect the Main power cable. Remove power from the Backup power cable to the redundant ac power switch. Is there power at the redundant ac power switch output socket 1?

   NO Go to step 8.

   YES Reconnect the Backup power cable. The redundant ac power verification has been successfully completed. Continue with "MAP 5700: Repair verification" on page 415.

8. (from steps 4, 5, 6, and 7)

   The redundant ac power switch has not functioned as expected. Replace the redundant ac power switch assembly. Return to the start of this MAP.

MAP 5350: Powering off a SAN Volume Controller node

MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

Powering off a single node will not normally disrupt the operation of a SAN Volume Controller cluster. This is because, within a SAN Volume Controller cluster, nodes operate in pairs called an I/O group. An I/O group will continue to handle I/O to the disks it manages with only a single node powered on. There will, however, be degraded performance and reduced resilience to error.

Care must be taken when powering off a node to ensure the cluster is not impacted more than it need be. If the procedures outlined here are not followed, it is possible your application hosts will lose access to their data or, in the worst case, data will be lost.

There are two preferred methods that you can use to power off a node that is a member of a cluster and not offline:

1. Use the **Shut Down a Node** option on the SAN Volume Controller Console
2. Use the CLI command **svctask stopcluster –node** *name*

It is preferable to use either the SAN Volume Controller Console or the command-line interface (CLI) to power off a node, as these methods provide a controlled handover to the partner node and provide better resilience to other faults in the system.

If a node is offline or not a member of a cluster, it must be powered off using the power button.

To provide the least disruption when powering off a node, the following should all apply:

- The other node in the I/O group should be powered on and active in the cluster.
- The other node in the I/O group should have SAN fibre channel connections to all the hosts and disk controllers managed by the I/O group.
- All the virtual disks handled by this I/O group should be online.
- The host multipathing is online to the other node in the I/O group.

In some circumstances, the reason you are powering off the node might make meeting these conditions impossible; for instance, if you are replacing a broken fibre channel card, the virtual disks will not be showing an online status. You should use your judgment to decide when it is safe to proceed when a condition has not been met. Always check with the system administrator before proceeding with a power off that you know will disrupt I/O access, as they might prefer to either wait until a more suitable time or suspend the host applications

To ensure a smooth restart, a node must save the date structures it cannot recreate to its local, internal, disk drive. The amount of data it saves to local disk can be high, so this operation might take several minutes. Do not attempt to interrupt the controlled power off.

Attention: The following actions do not allow the node to save data to its local disk. Therefore you should NOT power off a node using these methods:

- Removing the power cable between the node and the uninterruptible power supply. Normally the uninterruptible power supply provides sufficient power to allow the write to local disk in the event of a power failure, but obviously it is unable to provide power in this case.
- Holding down the node's power button. When the power button is pressed and released, the SAN Volume Controller indicates this to the software and the node can write its data to local disk before it powers off. If the power button is held down, the SAN Volume Controller hardware interprets this as an emergency power off and shuts down immediately without giving you the opportunity to save the data to a local disk. The emergency power off occurs approximately four seconds after the power button is pressed and held down.
- Pressing the reset button on the light path diagnostic panel.

The following topics describe the methods for powering off a node:

- "Using the SAN Volume Controller Console to power off a node"
- "Using the SAN Volume Controller CLI to power off a node" on page 399
- "Using the SAN Volume Controller Power button" on page 400

Related tasks

"Removing the redundant ac power switch" on page 585
Use this topic when you need to remove a redundant ac power switch.

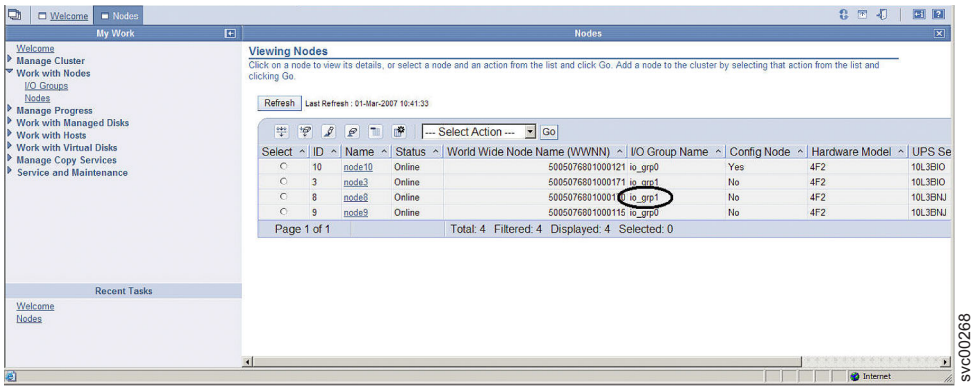
"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

Using the SAN Volume Controller Console to power off a node

This topic describes how to power off a node using the SAN Volume Controller Console.

Perform the following steps to use the SAN Volume Controller Console to power off a node:

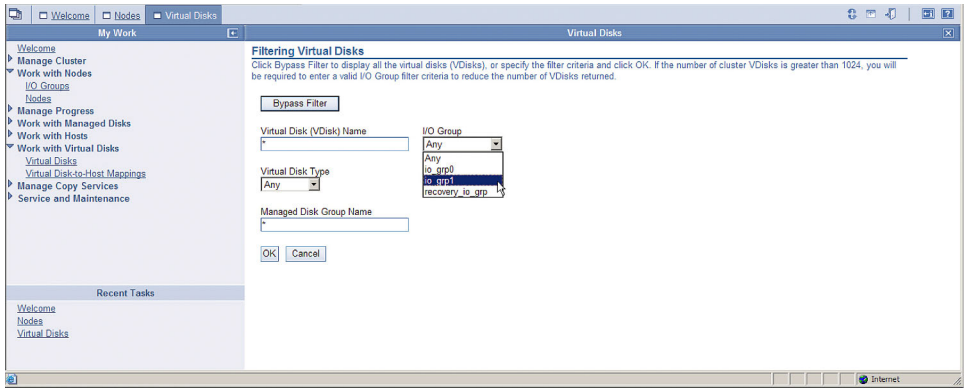
1. Sign on to the IBM System Storage Productivity Center or master console as an administrator and then launch the SAN Volume Controller Console for the cluster that you are servicing.
2. Click **Work with Nodes → Nodes** in the My Work pane and click on the submenu that opens. The Viewing Nodes panel is displayed. Find the node that you are about to shut down and write down the name of the I/O group it belongs to. Confirm that the other node in the I/O group is `Online`.



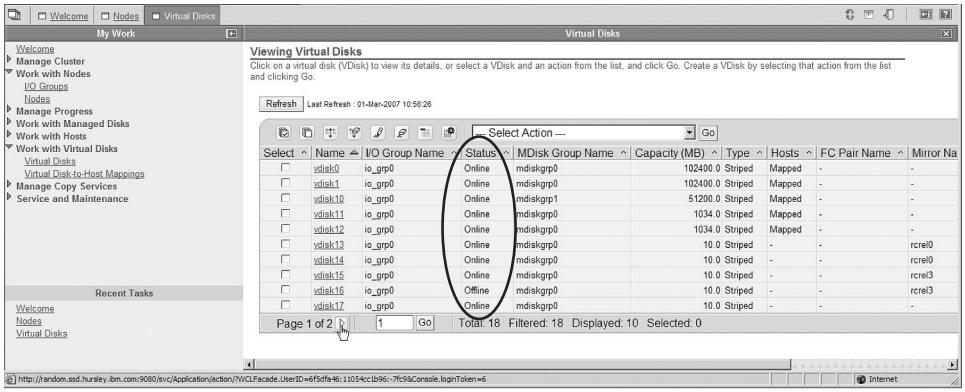
If the node that you want to power off is shown as `Offline`, then the node is not participating in the cluster and is not processing I/O requests. In these circumstances, you must use the power button on the node to power off the node.

If the node that you want to power off is shown as `Online` but the other node in the I/O group is not online, powering off the node impacts all the hosts that are submitting I/O requests to the VDisks that are managed by the I/O group. Ensure that the other node in the I/O group is online before you continue.

3. Click **Work with Virtual Disks** → **Virtual Disks** in the My Work pane and then click in the submenu that opens. The filtering virtual disks panel is displayed.



4. Open the **I/O Group** drop-down menu and select the I/O group that you wrote down in step 2 on page 396 for the node. Then click **OK**. The list of virtual disks in the I/O group is displayed. Make sure that the status of each virtual disk in the I/O group is `Online`. You might need to view more than one page.



If any VDisks are shown as degraded, only one node in the I/O is processing I/O requests for that VDisk. If that node is powered off, it impacts all the hosts that are submitting I/O requests to the degraded VDisks.

If any virtual disks are degraded and you believe this might be because the partner node in the I/O group has been powered off recently, wait until a refresh of the screen shows all the virtual disks online. All the virtual disks should be online within thirty minutes of the partner node being powered off.

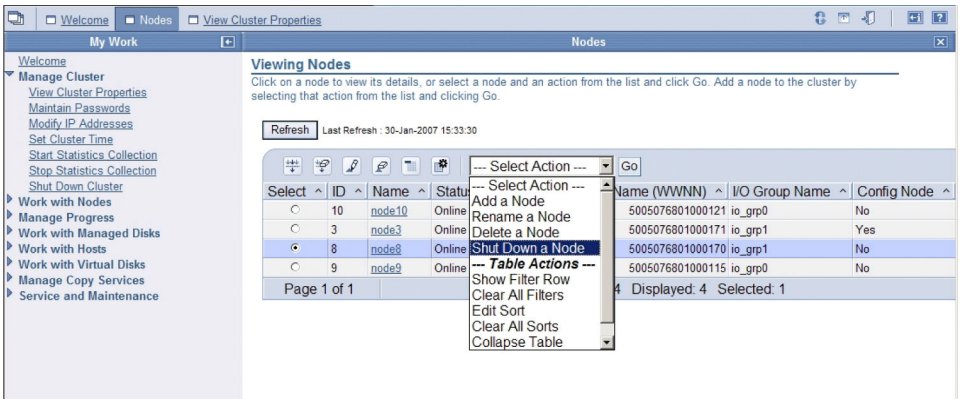
Note: If, after waiting 30 minutes, you have a degraded VDisk and all of the associated nodes and MDisks are online, contact the IBM Support Center for assistance.

Ensure that all VDisks that are being used by hosts are online before you continue.

5. If possible, check that all the hosts that access VDisks that are managed by this I/O group are able to fail over to use paths that are provided by the other node in the group.

   Perform this check using the host system's multipathing device driver software. The commands to use differ, depending on the multipathing device driver being used. If you are using the System Storage Multipath Subsystem Device Driver (SDD), the command to query paths is datapath query device. It can take some time for the multipathing device drivers to rediscover paths after a node is powered on. If you are unable to check on the host that all paths to both nodes in the I/O group are available, do not power off a node within 30 minutes of the partner node being powered on or you might lose access to VDisks.

6. If you have decided it is okay to continue and power off the node, click **Work with Nodes** → **Nodes** in the My Work pane. The list of nodes in the cluster is displayed. Select the node that you are connecting to the redundant ac power switch, and select **Shut Down a Node** from the drop-down menu.



During the shut down, the node saves its data structures to its local disk and destages all the write data held in cache to the SAN disks; this processing can take several minutes.

At the end of this process, the node powers off.

Using the SAN Volume Controller CLI to power off a node

This topic describes how to power off a node using the SAN Volume Controller CLI.

1. Issue the **svcinfo lsnode** CLI command to display a list of nodes in the cluster and their properties. Find the node that you are about to shut down and write down the name of the I/O group it belongs to. Confirm that the other node in the I/O group is `online`.

   ```
   svcinfo lsnode -delim :

   id:name:UPS_serial_number:WWNN:status:IO_group_id: IO_group_name:config_node:
   UPS_unique_id
   1:group1node1:10L3ASH:500507680100002C:online:0:io_grp0:yes:202378101C0D18D8
   2:group1node2:10L3ANF:5005076801000009:online:0:io_grp0:no:202378101C0D1796
   3:group2node1:10L3ASH:5005076801000001:online:1:io_grp1:no:202378101C0D18D8
   4:group2node2:10L3ANF:50050768010000F4:online:1:io_grp1:no:202378101C0D1796
   ```

   If the node that you want to power off is shown as `Offline`, the node is not participating in the cluster and is not processing I/O requests. In these circumstances, you must use the power button on the node to power off the node.

   If the node that you want to power off is shown as `Online` but the other node in the I/O group is not online, powering off the node impacts all the hosts that are submitting I/O requests to the VDisks that are managed by the I/O group. Ensure that the other node in the I/O group is online before you continue.

2. Issue the **svcinfo lsvdisk** CLI command to list the Vdisks managed by the I/O Group that you wrote down for the node in step 1.

   ```
   svcinfo lsvdisk -filtervalue IO_group_name=io_grp0 –delim :

   0:mainvdisk1:0:io_grp0:online:0:mainmdiskgroup: 512.0GB:striped::::
   1:bkpvdisk1:1:io_grp0:online:1:bkpmdiskgroup: 512.0GB:striped::::
   ```

   The list of virtual disks in the I/O group is displayed. Ensure that the status of each virtual disk in the I/O group is online.

If the node you want to power off is shown as `Offline`, the node is not participating in the cluster and is not processing I/O requests. In these circumstances, you must use the power button on the node to power off the node.

If the node you want to power off is shown as `Online`, but the other node in the I/O group is not `Online`, powering off the node impacts all the hosts that are submitting I/O requests to the VDisks that are managed by the I/O group.

If any VDisks are shown as degraded, only one node in the I/O is processing I/O requests for that VDisk. If that node is powered off, it affects all the hosts that are submitting I/O requests to the degraded VDisks.

If any virtual disks are degraded and you believe this might be because the partner node in the I/O group has recently been powered off, wait until a refresh of the screen shows all the virtual disks online. All the virtual disks should be online within 30 minutes of the partner node being powered on.

Ensure that all VDisks that are being used by hosts are online before you continue.

3. If possible, check that all the hosts that access VDisks that are managed by this I/O group are able to fail over to use paths that are provided by the other node in the group.

   Perform this check using the host system's multipathing device driver software. The commands to use differ, depending on the multipathing device driver being used. If you are using the System Storage Multipath Subsystem Device Driver (SDD), the command to query paths is datapath query device. It can take some time for the multipathing device drivers to rediscover paths after a node is powered on. If you are unable to check on the host that all paths to both nodes in the I/O group are available, do not power off a node within 30 minutes of the partner node being powered on or you might lose access to VDisks.

4. If you have decided that it is okay to continue and that you can power off the node, issue the **svctask stopcluster –node <name>** CLI command to power off the node. Ensure that you use the **–node** parameter, because you do not want to power off the whole cluster:

   ```
   svctask stopcluster –node group1node2
   Are you sure that you want to continue with the shut down? yes
   ```

   During the shut down, the node saves its data structures to its local disk and destages all the write data held in the cache to the SAN disks; this process can take several minutes.

   At the end of this process, the node powers off.

Using the SAN Volume Controller Power button

Do not use the power button to power off a node unless it is an emergency.

With this method, you cannot check the cluster status from the front panel, so you cannot tell if the power off is liable to cause excessive disruption to the cluster. Instead, use the SAN Volume Controller Console or the CLI commands, described in the previous topics, to power off an active node.

If you must use this method, notice in Figure 90 on page 401, Figure 91 on page 401, and Figure 92 on page 401 that each SAN Volume Controller model type has a power button on the front.

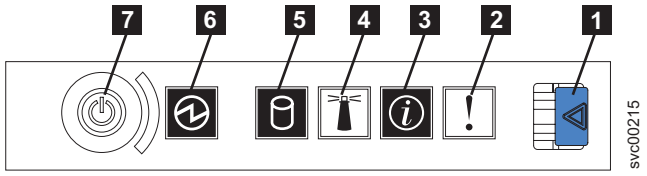


Figure 90. SAN Volume Controller 2145-8G4 operator information panel

1. Release latch for light path diagnostics panel
2. System-error LED (amber)
3. System-information LED (amber)
4. Location LED (blue)
5. Hard disk drive activity LED (green)
6. Power LED (green)
7. Power-control button

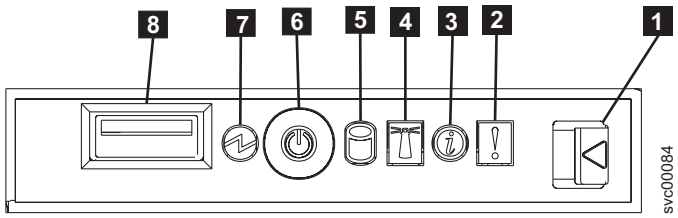


Figure 91. SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2 operator information panel

1. Release latch for light path diagnostics panel
2. System-error LED (amber)
3. Information LED (amber)
4. Location LED (blue)
5. Hard disk drive activity LED (green)
6. Power control button
7. Power LED (green)
8. USB connector

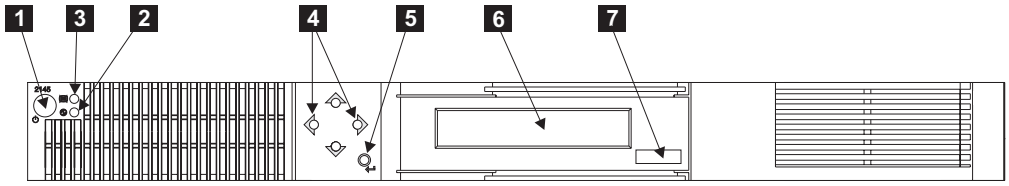


Figure 92. SAN Volume Controller 2145-4F2 front panel assembly

1. Power button

2 Power LED

3 Check LED

4 Navigation buttons

5 Select button

6 Front panel display

7 Node identification label

When you have determined it is safe to do so, press and immediately release the power button. The front panel display changes to display `Powering Off`, and a progress bar is displayed.

If you press the power button for too long, the node cannot write all the data to its local disk. An extended service procedure is required to restart the node, which involves deleting the node from the cluster and adding it back into the cluster.

The node saves its data structures to disk while powering off. The power off process can take up to five minutes.

When a node is powered off by using the power button (or because of a power failure), the partner node in its I/O group immediately stops using its cache for new write data and destages any write data already in its cache to the SAN attached disks. The time taken by this destage depends on the speed and utilization of the disk controllers; it should complete in less than 15 minutes, but it could be longer, and it cannot complete if there is data waiting to be written to a disk that is offline.

If a node powers off and restarts while its partner node continues to process I/O, it might not be able to become an active member of the I/O group immediately. It has to wait until the partner node completes its destage of the cache. If the partner node is powered off during this period, access to the SAN storage that is managed by this I/O group is lost. During the period when a 2145 node is destaging its cache data, the VDisks managed by the I/O group have a status of `Degraded`.

MAP 5400: Front panel

MAP 5400: Front panel helps you to solve problems that have occurred on the SAN Volume Controller front panel.

If you are not familiar with these maintenance analysis procedures (MAPs), first read “Using the maintenance analysis procedures” on page 361.

This MAP is used for SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, and the SAN Volume Controller 2145-4F2. Be sure that you know which model you are using before you start this procedure. To determine which model you are working with, see the SAN Volume Controller overview.

You might have been sent here because:

- A problem occurred during the installation of a SAN Volume Controller system, the front panel display test failed, or the correct node number failed to be displayed
- Another MAP sent you here

Perform the following steps:

1. **Is the power-on indicator on the SAN Volume Controller front panel illuminated and showing a solid green?**

   NO Continue with the power MAP.

   YES Go to step 2.

2. (from step 1)

   Is the service controller check indicator on the SAN Volume Controller front panel illuminated and showing a solid amber? See Figure 93.

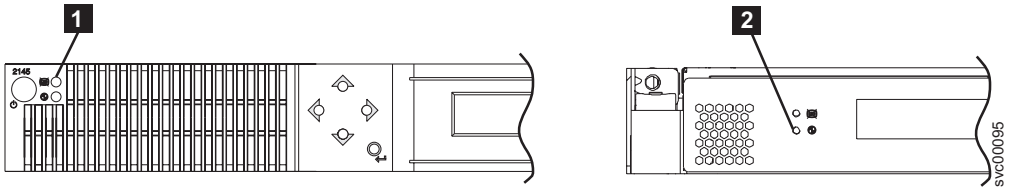


Figure 93. Service controller check lights

1 SAN Volume Controller 2145-4F2 service controller check light

2 SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 service controller check light

NO Start the front panel tests by pressing and holding the select button for five seconds. Go to step 3.

Attention: Do not start this test until the node is powered on for at least two minutes. You may receive unexpected results.

YES The SAN Volume Controller service controller has failed. Replace the parts in the following sequence:

SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2	Service controller
SAN Volume Controller 2145-4F2	1. Service controller 2. Front panel assembly

Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

3. (from step 2)

   The front panel check light illuminates and the display test of all display bits turns on for 3 seconds and then turns off for 3 seconds, then a vertical line travels from left to right, followed by a horizontal line travelling from top to bottom. The test completes with the switch test display of a single rectangle in the center of the display.

   Did the front panel lights and display behave as described?

NO SAN Volume Controller front panel has failed its display test.

- Replace the parts in the following sequence:

SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2	Service controller
SAN Volume Controller 2145-4F2	1. Service controller 2. Front panel assembly

- Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Go to step 4.

4. (from step 3 on page 403)

   Figure 94 provides four examples of what the front panel display shows before you press any button and then when you press the up button, the left and right buttons, and the select button. To perform the front panel switch test, press any button in any sequence or any combination. The display indicates which buttons you pressed.

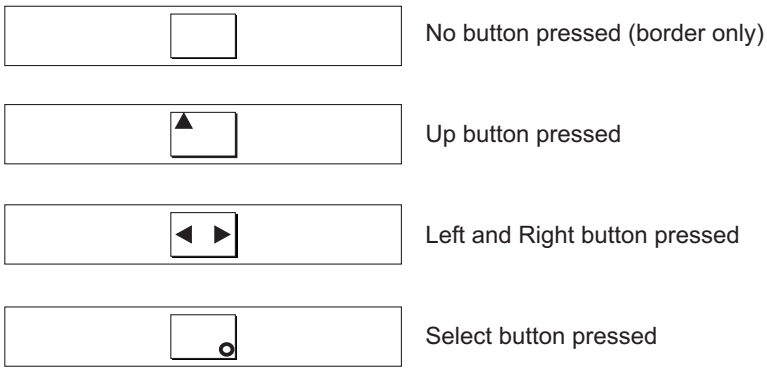


Figure 94. Sequence in which to push buttons on front panel display

   Check each switch in turn. Did the service panel switches and display behave as described in Figure 94?

   NO The SAN Volume Controller front panel has failed its switch test.

   - Replace the parts in the following sequence:

SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2	Service controller
SAN Volume Controller 2145-4F2	1. Front panel assembly 2. Service controller

   - Verify the repair by continuing with the repair verification MAP.

   YES Press and hold the select button for five seconds to exit the test. Go to step 5.

5. (from step 4 on page 391)

   Is front panel display showing: `Charging`, `Cluster Error`, or `Node Error`?

   NO Go to step 6 on page 405.

YES Press down. Go to step 6.

6. **Is front panel display now showing its `Default Menu`?**

   NO Continue with "MAP 5000: Start" on page 362.

   YES Keep pressing and releasing the down button until `Node` is displayed in line 1 of the menu screen. Go to step 7.

7. (from step 6)

   Is this MAP being used as part of the installation of a new node?

   NO Front panel tests have completed with no fault found. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

   YES Go to step 8.

8. (from step 7)

   Is the node number that is displayed in line 2 of the menu screen the same as the node number that is printed on the front panel of the node?

   NO Node number stored in front panel electronics is not the same as that printed on the front panel.

SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2	Service controller
SAN Volume Controller 2145-4F2	Front panel assembly

YES Front panel tests have completed with no fault found. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

Related concepts

"SAN Volume Controller menu options" on page 148
During normal operations, menu options are available on the front panel display of the SAN Volume Controller node.

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5100: Power 2145-4F2" on page 375
MAP 5100: Power 2145-4F2 helps you to solve problems that have occurred on the SAN Volume Controller 2145-4F2 power. If you are using the SAN Volume Controller 2145-8F2, the SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8G4, see the MAP for the SAN Volume Controller 2145-8F2, the SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8G4 node.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

Related reference

Chapter 9, “Removing and replacing parts,” on page 431
You can remove and replace field replaceable units (FRUs) from the SAN Volume Controller, redundant ac power switch, and uninterruptible power supply.

MAP 5500: Ethernet

MAP 5500: Ethernet helps you solve problems that have occurred on the SAN Volume Controller Ethernet.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the MAPs.

This MAP is used for the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, and the SAN Volume Controller 2145-4F2. Be sure that you know which model you are using before you start this procedure. To determine which model you are working with, see the SAN Volume Controller overview.

You might have been sent here for one of the following reasons:

- A problem occurred during the installation of a SAN Volume Controller system and the Ethernet checks failed
- Another MAP sent you here

Perform the following steps:

Note: If the Ethernet connection to the configuration node has failed, the cluster is unable to report failure conditions and the SAN Volume Controller Console is unable to access the cluster to perform administrative or service tasks. If this is the case and the customer needs immediate access to the cluster, you can make the cluster use an alternate configuration node. If only one node is displaying `Node Error 540` on the front panel, perform the following steps:

1. Press and release the power button on the node that is displaying `Node Error 540`.
2. When `Powering off` is displayed on the front panel display, press the power button again.

   `Restarting` is displayed. The cluster will select a new configuration node. The SAN Volume Controller Console is able to access the cluster again.

1. **Is the front panel of any node in the cluster displaying `Node Error` with error code 540?**

   NO Go to step 2.

   YES Go to step 4 on page 407.

2. (from step 1)

   Is the front panel displaying `Cluster Error` with error code 1400?

   NO Go to step 3.

   YES Go to step 6 on page 408.

3. (from step 2)

   Using the front panel, display the Ethernet port status. Check the Ethernet status on every node in the cluster.

   Is the display showing an Ethernet port status of `Failed`?

NO Go to step 6 on page 408.

YES Go to step 4.

4. (from steps 1 on page 406 and 3 on page 406)

   On the node showing the error, move the Ethernet cable to Ethernet Port 2. For SAN Volume Controller 2145-8G4 nodes, press the blue tab downward to remove the Ethernet cable.

   Note: This Ethernet port is not functional for normal operations. It is being moved to this location to test the cable. It must be returned to Port 1 when the problem is resolved.

   Is the green LED on the Ethernet port assembly illuminated? Figure 95 shows the location of the port 2 Ethernet link LED.

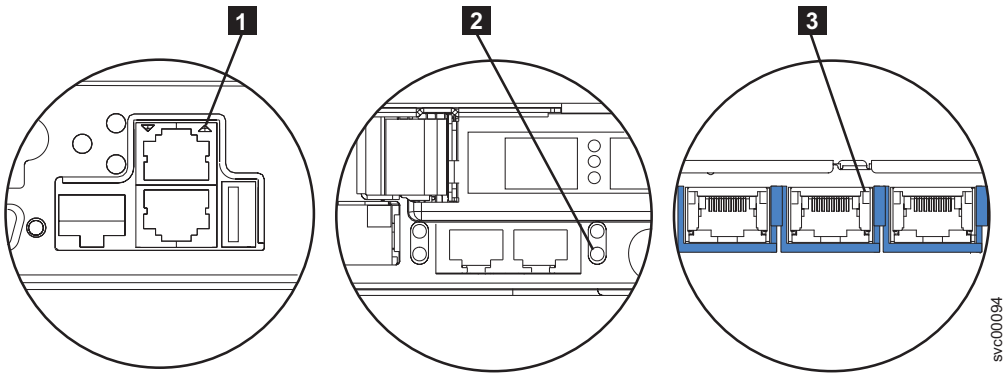


Figure 95. SAN Volume Controller port 2 Ethernet link LEDs

| **1** SAN Volume Controller 2145-4F2 port 2 (upper) Ethernet link LED

| **2** SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 port 2 (lower right) Ethernet link LED

| **3** SAN Volume Controller 2145-8G4 port 2 (center) Ethernet link LED

NO Go to step 5.

YES Ethernet interfaces on the system board assembly are not working correctly.

Perform the following tasks:

| • For the SAN Volume Controller 2145-8G4 or the SAN Volume Controller 2145-4F2, replace the system board assembly.
| • For the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2, replace the frame assembly.
• Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

5. (from step 4)

   Move the Ethernet cable to Ethernet Port 2 on any other node. For SAN Volume Controller 2145-8G4 nodes, press the blue tab downward to remove the Ethernet cable.

   Note: This Ethernet port is not functional for normal operations. It is being moved to this location to test the cable. It must be returned to Port 1 when the problem is resolved.

Is the green link LED on Ethernet port 2 illuminated? Figure 95 on page 407 shows the location of the link LED.

NO The Ethernet connection between the SAN Volume Controller and the Ethernet network is faulty.

- Perform the following tasks:
  - Replace the Ethernet cable with a new cable.
  - If the port 2 link LED is not illuminated, perform the following steps:
    a. Use the problem determination procedures for your Ethernet hub to resolve an Ethernet network connection problem.
    b. When a working Ethernet port is detected, the port 2 link LED is illuminated.
    c. Restore the Ethernet cable to its original Port 1 location.
    d. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Ethernet interfaces on the system board assembly are not working correctly.

Perform the following tasks:

- Replace the following part:

SAN Volume Controller 2145-8G4 and the SAN Volume Controller 2145-4F2	System board assembly
SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2	Frame assembly

- Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

6. (from steps 2 on page 406 and 3 on page 406)

A previously reported fault with the Ethernet interface is no longer present. A problem with the Ethernet might have been fixed, or there might be an intermittent problem. Check with the customer to determine that the Ethernet interface has not been intentionally disconnected. Also check that there is no recent history of fixed Ethernet problems with other components of the Ethernet network.

Is the Ethernet failure explained by the previous checks?

NO There might be an intermittent Ethernet error. Perform these steps in the following sequence until the problem is resolved:

a. Use the Ethernet hub problem determination procedure to check for and resolve an Ethernet network connection problem. If you resolve a problem continue with "MAP 5700: Repair verification" on page 415.

b. Determine if similar Ethernet connection problems have occurred recently on this node. If they have, replace the following part:

SAN Volume Controller 2145-8G4 and the SAN Volume Controller 2145-4F2	System board assembly
SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2	Frame assembly

c. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

MAP 5600: Fibre-channel

MAP 5600: Fibre-channel helps you to solve problems that have occurred on the SAN Volume Controller fibre-channel ports.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the MAPs.

This MAP is used for SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, and the SAN Volume Controller 2145-4F2. Be sure that you know which model you are using before you start this procedure. To determine which model you are working with, see the SAN Volume Controller overview.

You might have been sent here for one of the following reasons:

- A problem occurred during the installation of a SAN Volume Controller system and the fibre-channel checks failed
- Another MAP sent you here

Perform the following steps to solve problems caused by the fibre-channel ports:

1. **Are you here to diagnose a problem on a SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-4F2?**

   NO Go to step 2.

   YES Go to step 3.
2. **Are you trying to resolve a fibre-channel port speed problem?**

   NO Go to step 3.

   YES Go to step 12 on page 414.
3. Display fibre-channel port 1 status on the SAN Volume Controller front panel display. See the topic concerning SAN Volume Controller menu options.

   Is the front panel display on the SAN Volume Controller showing fibre-channel port-1 active?

   NO A fibre-channel port is not working correctly. Check the port status on the second line of the display.

- **Inactive:** The port is operational but cannot access the fibre-channel fabric. The fibre-channel adapter is not configured correctly, or the fibre-channel cable has failed, is not installed, or the device at the other end of the cable has failed. Make a note of port-1. Go to step 8 on page 411.
- **Failed:** The port is not operational because of a hardware failure. Make a note of port-1. Go to step 10 on page 412.
- **Not installed:** This port is not installed. Make a note of port-1. Go to step 11 on page 413.

YES Press and release the right button to display fibre-channel port-2 . Go to step 4.

4. (from step 3 on page 409)

   Is the front panel display on the SAN Volume Controller showing fibre-channel port-2 active?

   NO A fibre-channel port is not working correctly. Check the port status on the second line of the display.

   - **Inactive:** The port is operational but cannot access the fibre-channel fabric. The fibre-channel adapter is not configured correctly, or the fibre-channel cable has failed, is not installed, or the device at the other end of the cable has failed. Make a note of port-2. Go to step 8 on page 411.
   - **Failed:** The port is not operational because of a hardware failure. Make a note of port-2. Go to step 10 on page 412.
   - **Not installed:** This port is not installed. Make a note of port-2. Go to step 11 on page 413.

   YES Press and release the right button to display fibre-channel port-3. Go to step 5.

5. (from step 4)

   Is the front panel display on the SAN Volume Controller showing fibre-channel port-3 active?

   NO A fibre-channel port is not working correctly. Check the port status on the second line of the display.

   - **Inactive:** The port is operational but cannot access the fibre-channel fabric. The fibre-channel adapter is not configured correctly, or the fibre-channel cable has failed, is not installed, or the device at the other end of the cable has failed. Make a note of port-3. Go to step 8 on page 411.
   - **Failed:** The port is not operational because of a hardware failure. Make a note of port-3. Go to step 10 on page 412.
   - **Not installed:** This port is not installed. Make a note of port-3. Go to step 11 on page 413.

   YES Press and release the right button to display fibre-channel port-4. Go to step 6.

6. (from step 5)

   Is the front panel display on the SAN Volume Controller showing fibre-channel port-4 active?

   NO A fibre-channel port is not working correctly. Check the port status on the second line of the display.

- **Inactive:** The port is operational but cannot access the fibre-channel fabric. The fibre-channel adapter is not configured correctly, or the fibre-channel cable has failed, is not installed, or the device at the other end of the cable has failed. Make a note of port-4. Go to step 8.
- **Failed:** The port is not operational because of a hardware failure. Make a note of port-4. Go to step 9 on page 412.
- **Not installed:** This port is not installed. Make a note of port-4. Go to step 11 on page 413.

YES Go to step 7.

7. (from step 6 on page 410)

   A previously reported fault with a fibre-channel port is no longer being shown. A problem with the SAN fibre-channel fabric might have been fixed or there might be an intermittent problem.

   Check with the customer to see if any fibre-channel ports have been disconnected or if any component of the SAN fibre-channel fabric has failed and has been fixed recently.

   Is the fibre-channel port failure explained by the previous checks?

   NO There might be an intermittent fibre-channel error.

   a. Use the SAN problem determination procedure to check for and resolve any fibre-channel fabric connection problems. If you resolve a problem, continue with "MAP 5700: Repair verification" on page 415.
   b. Check if similar fibre-channel errors have occurred recently on the same port on this SAN Volume Controller node. If they have, replace the fibre-channel cable, unless it has already been replaced.
   c. Replace the fibre-channel SFP connector.
   d. Replace the fibre-channel adapter assembly shown in the following table.

SAN Volume Controller 2145-8G4 port 1, 2, 3, or 4	4-port fibre channel HBA
SAN Volume Controller 2145-8F4 port 1, 2, 3, or 4	4-port fibre channel HBA
SAN Volume Controller 2145-8F2 port 1 or 2	Dual port fibre-channel host bus adapter (HBA) - Low profile
SAN Volume Controller 2145-8F2 port 3 or 4	Dual port fibre-channel HBA - Full height
SAN Volume Controller 2145-4F2 port 1, 2, 3 or 4	Fibre-channel adapter

   e. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

   YES Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

8. (from steps 3 on page 409, 4 on page 410, 5 on page 410, and 6 on page 410)

   The noted port on the SAN Volume Controller is showing a status of inactive. For certain models, this might occur when the fibre-channel speed is not set correctly.

   Are you diagnosing a problem on a SAN Volume Controller 2145-8F2 or a SAN Volume Controller 2145-4F2?

NO Go to step 9.

YES Check that the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-4F2 is set to the correct speed for the SAN. Obtain the SAN speed of all the SANs connected to the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-4F2 from the SAN administrator. Check that all the SANs are able to run at either 1 Gbps or 2 Gbps. On the front panel, navigate to the fibre-channel port status that shows inactive. Now perform the following steps:

- Press and hold the down button.
- Press and release the select button.
- Release the down button.
  The fibre-channel speed setting is shown on the display. If this value does not match the speed of the SAN, use the down and up buttons to set it correctly.
- Press the select button to accept any changes and return to the fibre-channel status display.
- If the status shows active, continue with "MAP 5700: Repair verification" on page 415. Otherwise, go to step 9.

9. (from step 8 on page 411)

   The noted port on the SAN Volume Controller is displaying a status of inactive. If the noted port still displays a status of inactive, replace the parts that are associated with the noted port in the following order:

   a. Fibre-channel cables from the SAN Volume Controller to fibre-channel network.
   b. Faulty fibre-channel fabric connections. Use the SAN problem determination procedure procedure to resolve any fibre-channel fabric connection problem.
   c. Fibre-channel SFP connector.
   d. Fibre-channel adapter assemblies.

SAN Volume Controller 2145-8G4 port 1, 2, 3, or 4	4-port fibre channel HBA
SAN Volume Controller 2145-8F4 port 1, 2, 3, or 4	4-port fibre channel HBA
SAN Volume Controller 2145-8F2 port 1 or 2	Dual port fibre-channel host bus adapter (HBA) - Low profile
SAN Volume Controller 2145-8F2 port 3 or 4	Dual port fibre-channel HBA - Full height
SAN Volume Controller 2145-4F2 port 1, 2, 3 or 4	Fibre-channel adapter

   e. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

10. (from steps 3 on page 409, 4 on page 410, 5 on page 410, and 6 on page 410)

    The noted port on the SAN Volume Controller is displaying a status of failed. Verify that the fibre-channel cables that connect the SAN Volume Controllers to the switches are securely connected. Replace the parts that are associated with the noted port in the following order:

    a. Fibre-channel SFP connector.

b. Fibre-channel adapter assemblies.

SAN Volume Controller 2145-8G4 port 1, 2, 3, or 4	4-port fibre channel HBA
SAN Volume Controller 2145-8F4 port 1, 2, 3 or 4	4-port fibre channel HBA
SAN Volume Controller 2145-8F2 port 1 or 2	Dual port fibre-channel host bus adapter (HBA) - Low profile
SAN Volume Controller 2145-8F2 port 3 or 4	Dual port fibre-channel HBA - Full height
SAN Volume Controller 2145-4F2 port 1, 2, 3 or 4	Fibre-channel adapter

c. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

11. (from steps 3 on page 409, 4 on page 410, 5 on page 410, and 6 on page 410)

The noted port on the SAN Volume Controller is displaying a status of not installed. If you have just replaced the fibre-channel adapter, make sure that it is installed correctly. If you have replaced any other system board components, make sure that the fibre-channel adapter has not been disturbed.

Is the fibre channel adapter failure explained by the previous checks?

NO

a. Fibre-channel adapter assemblies.

SAN Volume Controller 2145-8G4 port 1, 2, 3, or 4	4-port fibre channel HBA
SAN Volume Controller 2145-8F4 port 1, 2, 3, or 4	4-port fibre channel HBA
SAN Volume Controller 2145-8F2 port 3 or 4	Dual port fibre-channel HBA - Full height
SAN Volume Controller 2145-8F2 port 1 or 2	Dual port fibre-channel host bus adapter (HBA) - Low profile
SAN Volume Controller 2145-4F2 port 1, 2, 3 or 4	Fibre-channel adapter

b. Fibre-channel adapter connection hardware:

SAN Volume Controller 2145-8G4 port 1, 2, 3, or 4	1. Riser card, PCI Express 2. System board assembly
SAN Volume Controller 2145-8F4 port 1, 2, 3, or 4	1. Riser card, PCI Express 2. Frame assembly
SAN Volume Controller 2145-8F2 port 1 or 2	1. Riser card, PCI Low profile 2. Frame assembly
SAN Volume Controller 2145-8F2 port 3 or 4	1. Riser card, PCI 2. Frame assembly
SAN Volume Controller 2145-4F2	System board assembly

c. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

12. (from step 2 on page 409)

    For the SAN Volume Controller 2145-8G4 and the SAN Volume Controller 2145-8F4, each fibre-channel port autonegotiates its operating speed with the switch to which it is connected. If the speed at which it is operating is lower than the operating speed that is supported by the switch, this indicates that a high number of link errors are being detected.

    To display the current speed of the link, perform the following steps:

    a. Press the up or down button on the front panel until `FC Port-1:` is displayed on the first line of the service panel.
    b. Press the left or right button until the required port is displayed.
    c. Press and hold the down button.
    d. Press and release the select button.
    e. Release the down button.

    The second line of the front-panel display shows the current fibre-channel speed of the port.

    Is the port operating at lower than the expected speed?

    NO Repeat the check with the other fibre-channel ports until the failing port is located. If no failing port is located, the problem no longer exists. Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

    YES Perform the following steps:

    a. Check the routing of the fibre-channel cable to ensure that no damage exists and that the cable route contains no tight bends. Any bend should have no less than a 3-inch radius. Either reroute or replace the fibre-channel cable.
    b. Remove the fibre-channel cable for 2 seconds and then reinsert it. This will cause the fibre-channel adapter to renegotiate its operating speed.
    c. Recheck the speed of the fibre-channel port. If it is now correct, you have resolved the problem. Otherwise, the problem might be caused by one of the following:
        - 4-port fibre channel HBA
        - Fibre-channel switch GBIC
        - Fibre-channel switch

        Recheck the speed after changing any component until the problem is resolved and then verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

Related concepts

"SAN Volume Controller menu options" on page 148
During normal operations, menu options are available on the front panel display of the SAN Volume Controller node.

"Fibre-channel port-1 through 4 option" on page 162
The fibre-channel port-1 through 4 options display the operational status of the fibre-channel ports.

Related tasks

"SAN problem determination" on page 348
The procedures to service the SAN Volume Controller that are provided here help you solve problems on the SAN Volume Controller and its connection to the storage area network (SAN).

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5700: Repair verification"
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

MAP 5700: Repair verification

MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the MAPs.

You might have been sent here because you performed a repair and want to confirm that no other problems exists on the machine.

Perform the following steps to verify your repair:

1. **Are the Power LEDs on all the SAN Volume Controllers on?** See the power LED topic.

   NO Go to "MAP 5000: Start" on page 362.

   YES Go to step 2.

2. (from step 1)

   Are the Check LEDs on all SAN Volume Controllers off? See the check LED topic.

   NO Go to "MAP 5000: Start" on page 362.

   YES Go to step 3.

3. (from step 2)

   Are all the SAN Volume Controllers displaying `cluster` on the top line of the front panel display with the second line blank or displaying a cluster name?

   NO Go to "MAP 5000: Start" on page 362.

   YES Go to step 4.

4. (from step 3)

   Using the SAN Volume Controller application for the cluster you have just repaired, check the status of all configured managed disks (MDisks).

   Do all MDisks have a status of online?

   NO If any MDisks have a status of offline, repair the MDisks. See the topic about how to determine the failing enclosure or disk controller to locate the disk controller with the offline MDisk. Use the problem determination procedure for the disk controller to repair the MDisk faults before returning to this MAP.

   If any MDisks have a status of degraded, repair any storage area network (SAN) and MDisk faults before returning to this MAP.

If any MDisks show a status of excluded, include MDisks before returning to this MAP.

Go to "MAP 5000: Start" on page 362.

YES Go to step 5.

5. (from step 4 on page 415)

   Using the SAN Volume Controller application for the cluster you have just repaired, check the status of all configured virtual disks (VDisks). **Do all vdisks have a status of online?**

   NO Go to step 6.

   YES Go to step 7.

6. (from step 5)

   Following a repair of the SAN Volume Controller, a number of VDisks are showing a status of offline. VDisks will be held offline if SAN Volume Controller cannot confirm the integrity of the data. The VDisk might be the target of a copy that did not complete, or cache write data that was not written back to disk might have been lost. Determine why the VDisk is offline. If the VDisk was the target of a copy that did not complete, you can start the copy again. Otherwise, write data might not have been written to the disk, so its state cannot be verified. Your site procedures will determine how data is restored to a known state. To bring the VDisks online, you will need to move all the offline disks to the recovery I/O group and then move them back to an active I/O group. Go to "MAP 5000: Start" on page 362.

7. (from step 5)

   You have successfully repaired the SAN Volume Controller.

   Related tasks

   "SAN problem determination" on page 348
   The procedures to service the SAN Volume Controller that are provided here help you solve problems on the SAN Volume Controller and its connection to the storage area network (SAN).

   "Using the maintenance analysis procedures" on page 361
   SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

   "MAP 5000: Start" on page 362
   MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

   Related reference

   "Determining the failing enclosure or disk controller using the CLI" on page 104
   You can use the command-line interface (CLI) to determine the failing enclosure or disk controller.

   "Power LED" on page 13
   The green power LED indicates the power status of the SAN Volume Controller.

   "Check LED" on page 15
   The amber check LED is used to indicate critical failures on the service controller.

   Chapter 7, "Diagnosing problems," on page 169
   You can diagnose problems with SAN Volume Controller, the uninterruptible power supply, the IBM System Storage Productivity Center, or the master console server using either the command-line interface (CLI) or the SAN

Volume Controller Console. For the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 users, you can also use the light path diagnostics to help find the cause of errors.

Related information

"Understanding cluster error codes" on page 248
Every cluster error code includes an error code number, a description, action, and possible field replaceable units (FRUs).

MAP 5800: Light path

MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the MAPs.

You might have been sent here because of the following:

- The Error LED on the operator panel is on or flashing
- Another MAP sent you here

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

Related reference

Chapter 8, "Using maintenance analysis procedures," on page 361
The maintenance analysis procedures (MAPs) inform you how to analyze a failure that occurs with a SAN Volume Controller.

Light path for SAN Volume Controller 2145-8G4

Ensure the node is powered on and then perform the following steps to enable the node to boot:

1. **Is the Error LED, shown in Figure 96 on page 418, on the SAN Volume Controller 2145-8G4 operator panel illuminated or flashing?**

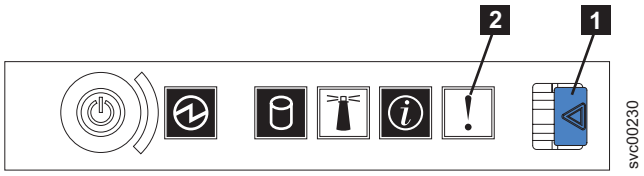


Figure 96. SAN Volume Controller 2145-8G4 operator information panel

1 Release latch

2 Error LED

NO Reassess your symptoms and return to "MAP 5000: Start" on page 362.

YES Go to step 2.

2. (from step 1 on page 417)

   Press the release latch and open the light path diagnostics panel, which is shown in Figure 97.

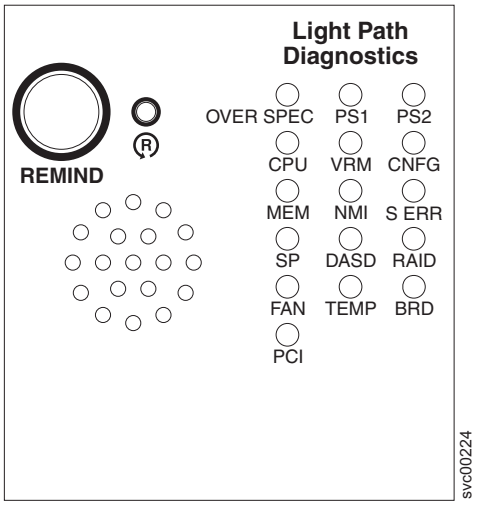


Figure 97. SAN Volume Controller 2145-8G4 light path diagnostics panel

Are one or more LEDs on the light path diagnostic panel on or flashing?

NO Verify that the operator panel cable is correctly seated at both ends. If the error LED is still illuminated but no LEDs are illuminated on the light path diagnostics panel, replace parts in the following sequence:

a. Operator information panel

b. System board assembly

Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Refer to Table 28 on page 420 and perform the action specified for the specific light path diagnostic LEDs, then go to step 3 on page 421. Some actions will require that you observe the state of LEDs on the system board. Figure 98 on page 419 shows the location of the system board LEDs. The fan LEDs are located adjacent to each FAN. To view the LEDs you will need to do the following:

a. Remove power from the SAN Volume Controller 2145-8G4.

b. Remove the SAN Volume Controller 2145-8G4 from the rack.

c. Remove the top cover and open the fan doors.

d. Press the light path diagnostic button (7 in Figure 98).

Note: The light path diagnostic button is used to illuminate the light path diagnostic LEDs when power is disconnected from the SAN Volume Controller 2145-8G4.

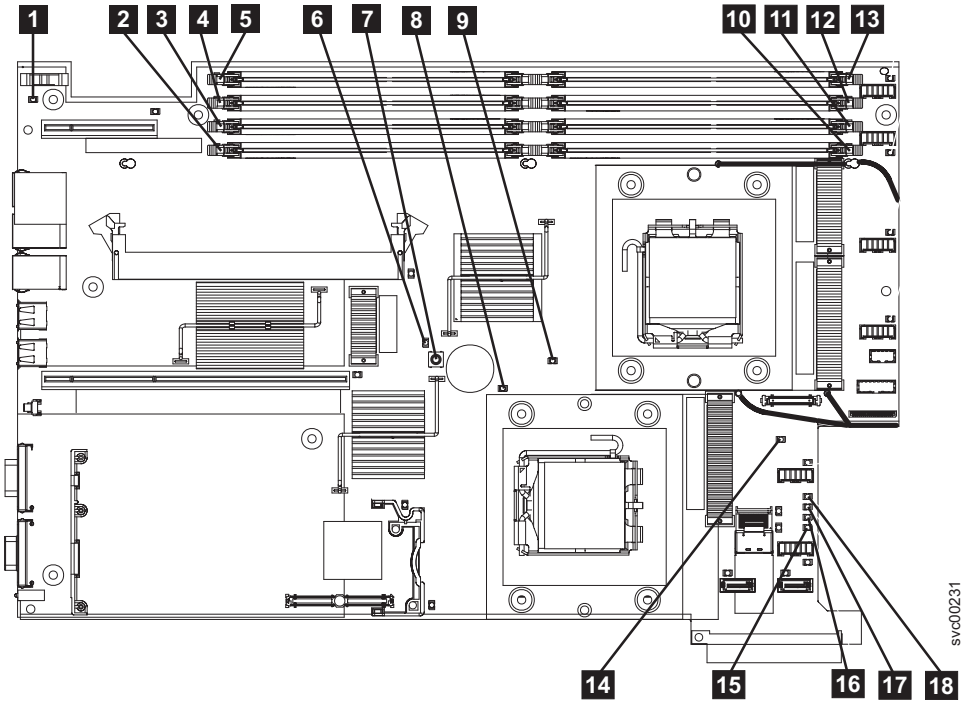


Figure 98. Bird's eye view of the SAN Volume Controller 2145-8G4 system board

1 System-board battery error LED

2 DIMM 5 error LED

3 DIMM 6 error LED

4 DIMM 7 error LED

5 DIMM 8 error LED

6 Light path diagnostics active LED

7 Light path diagnostics button

8 Microprocessor 2 error LED

9 Microprocessor 1 error LED

10 DIMM 1 error LED

11 DIMM 2 error LED

12 DIMM 3 error LED

13 DIMM 4 error LED

14 System-board fault LED

15 Power B error LED

16 Power A error LED

17 Power C error LED

18 Power D error LED

Table 28. Diagnostics panel LED prescribed actions

Diagnostics panel LED	Action
OVER SPEC	Replace the power supply
PS1	If you have just replaced the power supply, check that it is correctly installed. If it is correctly installed, replace parts in the following sequence: 1. Power supply 2. Power backplane
PS2	This is not used on the SAN Volume Controller 2145-8G4. This is a false indication. A sensor has failed or the system board service processor firmware is not functioning correctly. Contact your support center to see if a firmware update is available. If not, replace parts in the following sequence: 1. Power backplane 2. Operator information panel 3. System board assembly
CPU	A microprocessor has failed. Make sure that the failing microprocessor, which is indicated by a lit LED on the system board, is installed correctly. If it is installed correctly, replace the microprocessor.
VRM	This is not used on the SAN Volume Controller 2145-8G4.
CNFG	Microprocessor configuration error. Check the installed microprocessors for compatibility.
MEM	Observe the DIMM LEDs on the system board. If any DIMM LED is flashing, make sure that the correct type of DIMM is installed in every slot. Replace parts in the following sequence: 1. Failing DIMM 2. System board assembly **Note:** If more than one DIMM is indicated by the light path diagnostics, replace the DIMMs one-at-a-time, starting at the lowest-numbered DIMM slot that the diagnostics indicated.
NMI	A non-maskable interrupt occurred. Call your support center and check if any software updates need to be applied to this SAN Volume Controller 2145-8G4. If this node will not join the cluster, run node recovery. If node recovery does not resolve the problem, replace the system board assembly.
S ERR	A soft error occurred. Call your support center and check if any software updates need to be applied to this SAN Volume Controller 2145-8G4. If this node will not join the cluster, run node recovery. If node recovery does not resolve the problem, replace the system board assembly.
SP™	The Service processor has failed. Replace the system board assembly.

Table 28. Diagnostics panel LED prescribed actions (continued)

Diagnostics panel LED	Action
DASD	This is not used on the SAN Volume Controller 2145-8G4. A sensor has failed or the system board service processor firmware is not functioning correctly. Contact your support center to see if a firmware update is available. If not, replace parts in the following sequence: 1. Operator information panel 2. System board assembly
BRD	Observe the battery LED and the system board LED. If the battery LED is illuminated, replace the battery. If the system board LED is illuminated, replace the system board assembly.
FAN	A fan has failed, is operating too slowly, or has been removed. A failing fan can also cause the TEMP LED to be lit. Replace the failing fan, which is indicated by a lit LED near the fan connector on the system board.
TEMP	If any fan failures exist, repair those before attempting this procedure. Verify that the ambient temperature is within normal operating specifications. Make sure that airflow in and around the SAN Volume Controller 2145-8G4 is not obstructed. If the error persists, replace the system board assembly.
RAID	This is not used on the SAN Volume Controller 2145-8G4.
PCI	The fibre-channel card might be failing. Ensure the fibre-channel card and the riser card are correctly installed. If the error persists, replace the fibre-channel card.

3. Continue with "MAP 5700: Repair verification" on page 415 to verify the correct operation.

Light path for SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2

Ensure the node is powered on and then perform the following steps to enable the node to boot:

1. **Is the Error LED, shown in Figure 99, on the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 operator panel illuminated or flashing?**

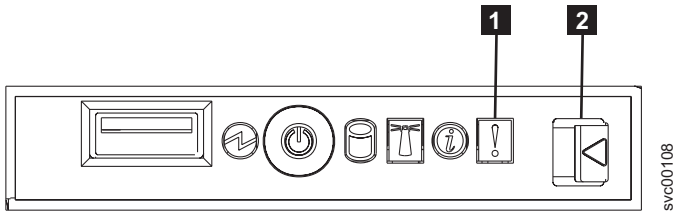


Figure 99. SAN Volume Controller 2145-8F4 operator information panel

1 Error LED

2 Release latch

NO Reassess your symptoms and return to "MAP 5000: Start" on page 362.

YES Go to step 2 on page 422.

2. (from step 1 on page 421)
   Press the release latch and open the light path diagnostics panel, which is shown in Figure 100.

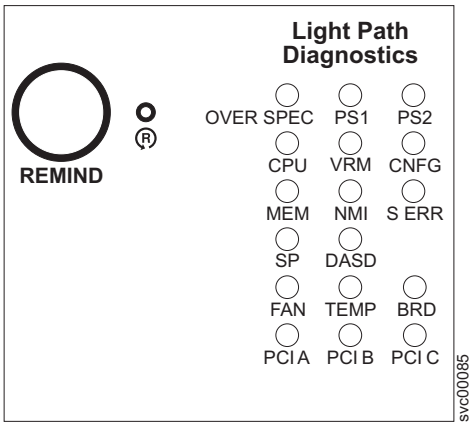


Figure 100. SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2 light path diagnostics panel

Are one or more LEDs on the light path diagnostic panel on or flashing?

NO Verify that the operator panel cable is correctly seated at both ends. If the error LED is still illuminated but no LEDs are illuminated on the light path diagnostics panel, replace parts in the following sequence:

a. Operator information panel
b. Cable, signal, front panel
c. Frame assembly

Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Refer to Table 29 on page 423 and perform the action specified for the specific light path diagnostic LEDs, then go to step 3 on page 425. Some actions will require that you observe the state of LEDs on the system board or on the fan backplanes. The location of the system board LEDs are shown in Figure 101 on page 423. The fan LEDs are located adjacent to each FAN. To view the LEDs you will need to do the following:

a. Remove power from the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
b. Remove the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 from the rack.
c. Remove the top cover and open the fan doors.
d. Press the light path diagnostic button **1** . See Figure 101 on page 423.

   Note: The light path diagnostic button is used to illuminate the light path diagnostic LEDs when power is disconnected from the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2.

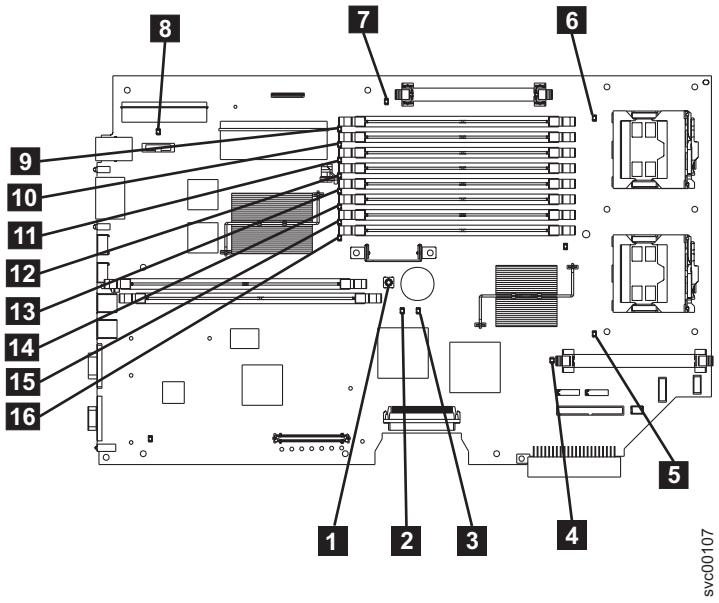


Figure 101. The SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 system board

1. Light path diagnostic button
2. System board fault LED
3. Light path activity LED
4. VRM 2 Error LED
5. CPU 2 Error LED
6. CPU 1 Error LED
7. VRM 1 Error LED
8. Battery LED
9. DIMM 1 error LED
10. DIMM 2 error LED
11. DIMM 3 error LED
12. DIMM 4 error LED
13. DIMM 5 error LED
14. DIMM 6 error LED
15. DIMM 7 error LED
16. DIMM 8 error LED

Table 29. Diagnostics panel LED prescribed actions

Diagnostics panel LED	**Action**
OVER SPEC	Replace the power supply

Table 29. Diagnostics panel LED prescribed actions (continued)

Diagnostics panel LED	Action
PS1	If you have just replaced the power supply, check that it is correctly installed. If it is correctly installed, replace parts in the following sequence: 1. Power supply 2. Power backplane
PS2	This is not used on the SAN Volume Controller 2145-8F4 nor the SAN Volume Controller 2145-8F2. A sensor has failed or the system board service processor firmware is not functioning correctly. Contact your support center to see if a firmware update is available. If not, replace parts in the following sequence: 1. Power backplane 2. Operator information panel 3. Frame assembly
CPU	Observe the CPU indicators on the system board. The microprocessor adjacent to the illuminated LED is failing. If you have installed the incorrect type of microprocessor, the LED will be flashing. Replace parts in the following sequence: 1. Microprocessor 2. Frame assembly
VRM	Observe the VRM indicators on the system board. The VRM adjacent to the illuminated LED is failing. Verify that the VRM is correctly installed. Replace parts in the following sequence: 1. VRM 2. Frame assembly
CNFG	Observe all system board LEDs. Make sure that DIMMs, microprocessors, and VRMs are installed correctly and are of the correct type. Replace parts in the following sequence: 1. Component adjacent to the illuminated LED 2. Frame assembly
MEM	Observe the DIMM LEDs on the system board. If any DIMM LED is flashing, make sure that the correct type of DIMM is installed in every slot. Replace parts in the following sequence: 1. Failing DIMM 2. Frame assembly **Note:** If more than one DIMM is indicated by the light path diagnostics, replace the DIMMs one-at-a-time, starting at the lowest-numbered DIMM slot that the diagnostics indicated.
NMI	A non-maskable interrupt occurred. Call your support center and check if any software updates need to be applied to this SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4. If this node will not join the cluster, run node recovery. If node recovery does not resolve the problem, replace the frame assembly.
S ERR	A soft error occurred. Call your support center and check if any software updates need to be applied to this SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4. If this node will not join the cluster, run node recovery. If node recovery does not resolve the problem, replace the frame assembly.
SP	The Service processor has failed. Replace the frame assembly.

Table 29. Diagnostics panel LED prescribed actions (continued)

Diagnostics panel LED	Action
DASD	This is not used on the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4. This is a false indication. A sensor has failed or the system board service processor firmware is not functioning correctly. Contact your support center to see if a firmware update is available. If not, replace parts in the following sequence: 1. Operator information panel 2. Frame assembly
FAN	Observe the LEDs on the fan backplanes. The fan adjacent to the failing LED is failing. Replace parts in the following sequence: 1. Fan 2. Fan backplane
TEMP	If any fan failures exist, repair those before attempting this procedure. Verify that the ambient temperature is within normal operating specifications. Make sure that airflow in and around the SAN Volume Controller 2145-8F2 or the SAN Volume Controller 2145-8F4 is not obstructed. Replace the frame assembly.
BRD	Observe the battery LED and the system board LED. If the battery LED is illuminated, replace the battery. If the system board LED is illuminated, replace the frame assembly.
PCI A	This is not used on the SAN Volume Controller 2145-8F4 nor the SAN Volume Controller 2145-8F2. This is a false indication. A sensor has failed or the system board service processor firmware is not functioning correctly. Contact your support center to see if a firmware update is available. If not, replace parts in the following sequence: 1. Operator information panel 2. Frame assembly
PCI B	One of the fibre-channel adapter cards connected to this bus may be failing. Ensure that both adapters are correctly installed and that the riser card latches are fully closed. If possible, display the fibre-channel card status on the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 front panel to determine the failing card. Otherwise, remove the fibre-channel cards one-at-a-time to determine the failing card. Replace parts in the following sequence: 1. Fibre-channel adapter card 2. Frame assembly
PCI C	Replace the frame assembly.

3. Continue with "MAP 5700: Repair verification" on page 415 to verify the correct operation.

MAP 5900: Hardware boot

MAP 5900: Hardware boot helps you solve problems that are preventing the node from starting its boot sequence.

If you are not familiar with these maintenance analysis procedures (MAPs), first read the topic concerning using the MAPs.

This MAP is applicable to the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, and the SAN Volume Controller 2145-4F2. Be aware of which model you are using before you start this procedure.

You might have been sent here for one of the following reasons:

- The hardware boot display, shown in Figure 102, is displayed continuously.

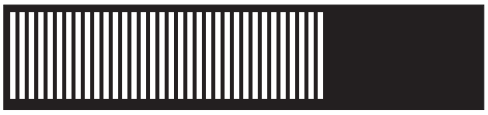


Figure 102. Hardware boot display

- The node rescue display, shown in Figure 103, is displayed continuously.

Figure 103. Node rescue display

- The boot progress is hung and `Booting 100` is displayed on the front panel
- Another MAP sent you here

Perform the following steps to allow the node to start its boot sequence:

1. **Is this a SAN Volume Controller 2145-4F2?**

   NO Go to step 2.

   YES Go to step 3.
2. (From step 1)

   Is the Error LED on the operator panel illuminated or flashing?

   NO Go to step 3.

   YES Go to "MAP 5800: Light path" on page 417 to resolve the problem.
3. (From steps 1 and 2)

   If you have just installed the SAN Volume Controller node or have just replaced a field replaceable unit (FRU) inside the node, perform the following steps:

   a. Turn off power to the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
   b. Remove the node from the rack. See "Removing the SAN Volume Controller from a rack" on page 435.
   c. Remove the top cover from the node. See "Removing the top cover" on page 459.
   d. If you have just replaced a FRU, ensure that the FRU is correctly placed and that all connections to the FRU are secure.
   e. Ensure that all memory modules are correctly installed and that the latches are fully closed. See "Replacing the memory modules (DIMM)" on page 485.

f. Ensure that the fibre-channel adapter cards are correctly installed. See "Replacing the fibre-channel adapter assembly" on page 529.

g. Ensure that the disk drive and its connectors are correctly installed. See "Replacing the disk drive" on page 494

h. Ensure that the service controller is correctly installed. See "Replacing the service controller" on page 472.

i. If it is not a SAN Volume Controller 2145-4F2, ensure the operator information panel cable is correctly installed on the system board.

j. Replace the top cover to the node. See "Replacing the top cover" on page 463.

k. Replace the node in the rack. See "Replacing the SAN Volume Controller in a rack" on page 442.

l. Return power to the node.

Does the boot operation still hang?

NO Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Go to step 4.

4. (from step 3 on page 426)

   Check if the system BIOS is reporting any errors. You need to attach a display and keyboard to see the BIOS output. The customer should be able to supply a suitable display and keyboard. If this is a SAN Volume Controller 2145-4F2, you need a special cable to connect the display and keyboard. If you do not have this cable, go to the next step.

   a. Turn off the power to the SAN Volume Controller.

   b. Connect the keyboard **1** and the display **2**. Figure 104 shows the location of the keyboard and monitor ports.

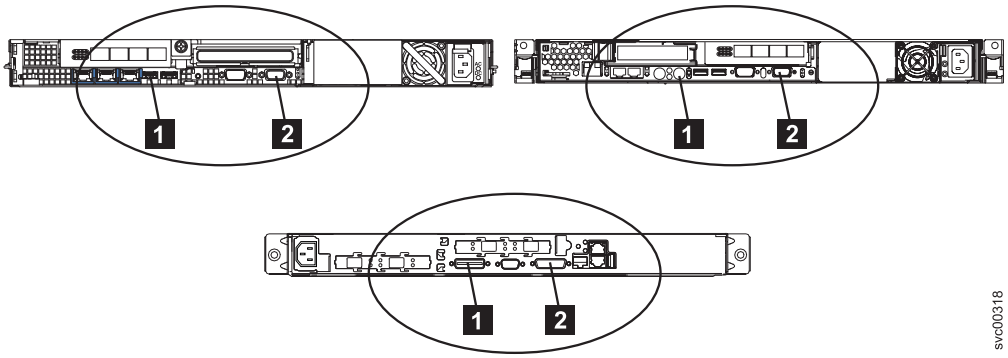


Figure 104. Keyboard and monitor ports on the SAN Volume Controller 2145-8G4 and the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2, and the SAN Volume Controller 2145-4F2

   c. Return power to the SAN Volume Controller.

   d. Watch the display.

      - If the POST sequence indicates an error, or if the BIOS Configuration/Setup Utility program indicates an error during startup, you need to resolve the error.

- If it indicates an error with a specific hardware item, power off the node and remove it from the rack. Ensure the item specified is correctly installed, replace the node, and then restart the node. If the error is still reported, replace the specified item.
- If a configuration error is reported, run the Configuration/Setup Utility program option to reset the BIOS to its default (factory) settings.

e. Turn off power to the node and remove the keyboard and display.

f. Return power to the node.

Does the boot operation still hang?

NO Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Go to step 5.

5. (from step 4 on page 427)
   a. Turn off power to the node.
   b. Remove the node from the rack.
   c. Remove the top cover from the node.
   d. Remove some of the memory modules:
      - If you are using the SAN Volume Controller 2145-8G4, remove the memory modules in slots 2 and 4 through 8.
      - If you are using the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2, remove the memory modules in slots 3 through 8.
      - If you are using the SAN Volume Controller 2145-4F2, remove all memory modules in Bank 1.
   e. Remove all installed fibre-channel cards.
   f. Remove the disk drive.
   g. Replace the top cover to the node.
   h. Replace the node in the rack.
   i. Return power to the node.

   Does the boot operation still hang with the booting display or is `Booting 100` displayed on the front panel?

   Note: With the FRUs removed, the boot will hang with a different boot failure code.

   NO Replace the FRUs, one-at-a-time, until the failing FRU is isolated.

   YES Go to step 6.

6. (from step 5)
   a. Turn off power to the node.
   b. Remove the node from the rack.
   c. Remove the top cover from the node.
   d. Replace the fibre-channel cards and the disk drive.
   e. Replace the memory modules:
      - If you are using the SAN Volume Controller 2145-8G4, replace the memory modules in slots 1 and 3 with any two of the removed memory modules from slots 2 and 4 through 8.
      - If you are using the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2, replace the memory modules in slots 1 and 2 with any two of the removed memory modules from slots 3 through 8.

- If you are using the SAN Volume Controller 2145-4F2, replace all memory modules in Bank 1 and remove the memory modules in Bank 2.

f. Replace the top cover to the node.

g. Replace the node in the rack.

h. Return power to the node.

Does the boot operation still hang with the booting display or is `Booting 100` displayed on the front panel?

NO Exchange the failing memory modules for new FRUs and verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

YES Replace the parts in the following sequence:

- For the SAN Volume Controller 2145-8G4:
  a. Service controller
  b. System board assembly
- For the SAN Volume Controller 2145-8F4 and SAN Volume Controller 2145-8F2:
  a. Service controller
  b. Frame assembly
- For the SAN Volume Controller 2145-4F2:
  a. Service controller
  b. System board

Verify the repair by continuing with "MAP 5700: Repair verification" on page 415.

Related tasks

"Using the maintenance analysis procedures" on page 361
SAN Volume Controllers must be configured in pairs. This allows conncurrent maintenance to be done.

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

"MAP 5700: Repair verification" on page 415
MAP 5700: Repair verification helps you to verify that field replaceable units (FRUs) that you have exchanged for new FRUs or repair actions that have been done have solved all the problems on the SAN Volume Controller.

"Removing the memory modules (DIMM)" on page 482
You might need to remove one or more faulty memory modules.

"Replacing the memory modules (DIMM)" on page 485
The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the frame assembly" on page 520
This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Removing the SAN Volume Controller 2145-8G4 system board" on page 564
You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

"Replacing the SAN Volume Controller 2145-8G4 system board" on page 571
All the components that were removed when you removed the system board are reused during the installation of the new system board.

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

"Replacing the SAN Volume Controller 2145-4F2 system board" on page 582
During routine maintenance, you may be required to replace the system board.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

Related reference

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

Related information

"Understanding the boot codes" on page 202
The boot codes are displayed on the screen when a node is booting.

Chapter 9. Removing and replacing parts

You can remove and replace field replaceable units (FRUs) from the SAN Volume Controller, redundant ac power switch, and uninterruptible power supply.

Each FRU has its own removal procedure. Sometimes you can find that a step within a procedure might refer you to a different remove/replace procedure. You might want to complete the new procedure before you continue with the first procedure that you started.

Only remove or replace parts when you are directed to do so by the maintenance analysis procedures (MAPs). Start all problem determination and repair procedures with "MAP 5000: Start" on page 362.

Related tasks

"MAP 5000: Start" on page 362
MAP 5000: Start is an entry point to the maintenance analysis procedures (MAPs) for the SAN Volume Controller.

"MAP 5800: Light path" on page 417
MAP 5800: Light path helps you to solve hardware problems on the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or the SAN Volume Controller 2145-8F2 that are preventing the node from booting.

Related information

"Removing and replacing SAN Volume Controller parts" on page 432
The remove and replace procedures for the SAN Volume Controller field replaceable units are described in the topics that follow.

"Removing and replacing 2145-1U uninterruptible power supply parts" on page 588
The remove and replace procedures for the 2145-1U uninterruptible power supply field replaceable units are described in the topics which follow.

"Removing and replacing 2145 uninterruptible power supply parts" on page 615
The remove and replace procedures for the 2145 uninterruptible power supply field replaceable units are described in the topics which follow.

Enabling concurrent maintenance

To allow concurrent maintenance, SAN Volume Controllers must be configured in pairs.

While one SAN Volume Controller is being serviced, the other keeps the I/O group operational. With concurrent maintenance, all field replaceable units (FRUs) can be removed, replaced, and tested on one SAN Volume Controller while the SAN and host systems are powered on and doing productive work.

Attention: Do not remove the power from both SAN Volume Controllers unless the procedures instruct you to do so.

Preparing to remove and replace parts

Before you remove and replace parts, you must be aware of all safety issues.

First, read the safety precautions in the *IBM Systems Safety Notices*. These guidelines help you safely work with the SAN Volume Controller, redundant ac power switch, and uninterruptible power supply.

Removing and replacing SAN Volume Controller parts

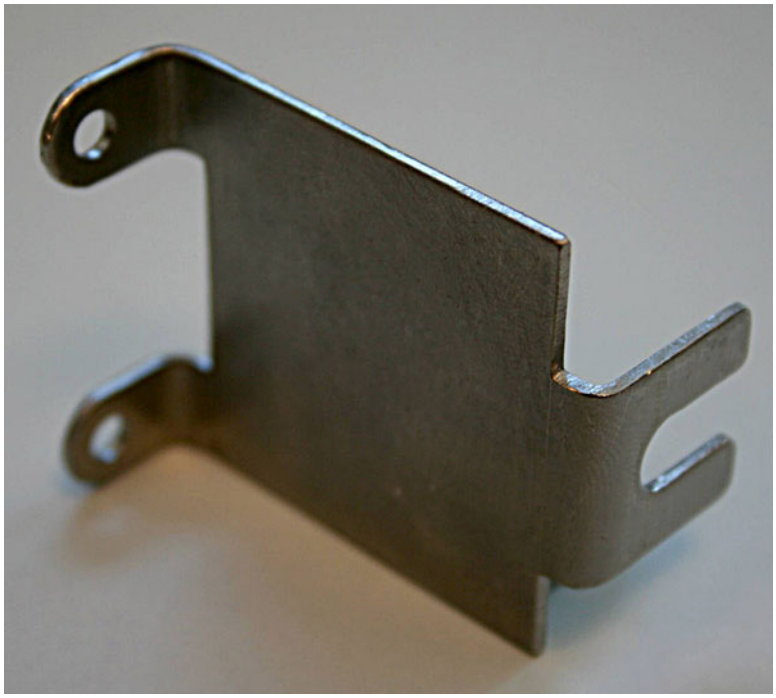
The remove and replace procedures for the SAN Volume Controller field replaceable units are described in the topics that follow.

Removing and replacing the SAN Volume Controller 2145-8G4 cable retention bracket

The cable retention bracket ensures that the SAN Volume Controller 2145-8G4 node does not mistakenly become unplugged from the uninterruptible power supply.

The SAN Volume Controller 2145-8G4 uses one of two different cable retention brackets. Depending on which bracket you have, use the appropriate instructions to remove and replace the cable retention bracket.

- If your cable retention bracket looks like the following, go to "Removing and replacing the cable retention bracket - option A" on page 433.



- If your cable retention bracket looks like the following, go to "Removing and replacing the cable retention bracket - option B" on page 435.

Removing and replacing the cable retention bracket - option A

The cable retention bracket attaches to the back of the SAN Volume Controller 2145-8G4 node. It is connected with the screws that already hold the rear plate of the power supply in place.

Removing the cable retention bracket

Remove the cable retention bracket before you remove the SAN Volume Controller 2145-8G4 node from the rack.

1. Carefully remove the two retaining screws on the right side of the power supply rear plate.
2. Remove the bracket.
3. Replace the screws in the power supply rear plate.

Replacing the cable retention bracket

Replace the SAN Volume Controller 2145-8G4 cable retention bracket after you replace the node in the rack.

To attach the bracket to the rack rail, perform the following steps:

1. With the node powered off and the power cable removed, loosen and remove the two screws **1** on the right side of the rear plate that covers the power supply fan unit, as shown in Figure 105 on page 434.

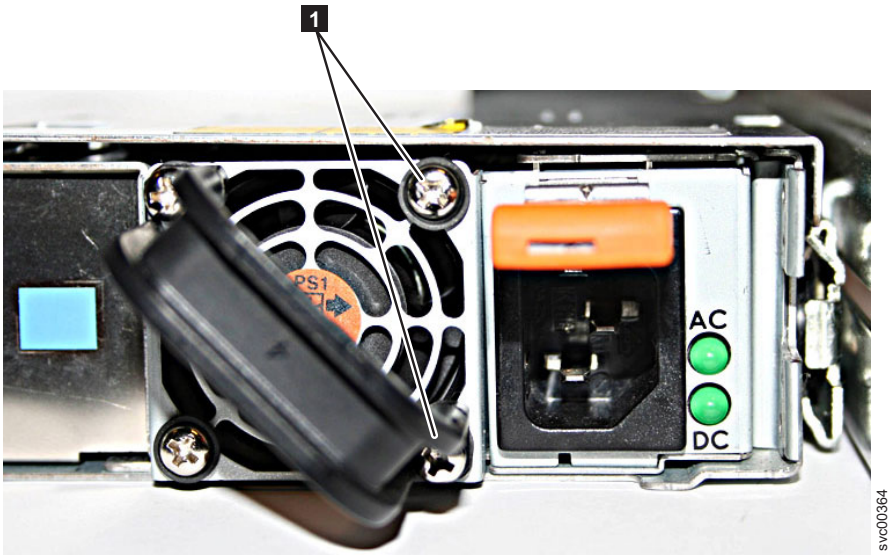


Figure 105. The SAN Volume Controller 2145-8G4 before you attach the cable retention bracket

2. Insert the power cable.
3. Position the cable retention bracket so that the power cable runs through the slot in the bracket, as shown in Figure 106. Align the screw holes in the bracket with the holes that are in the rear plate where you removed the two screws.
4. Replace the top screw.
5. Move the power supply handle back into place over the retention bracket, and replace the lower screw so that it holds the power supply handle, cable retention bracket, and power supply rear plate in place.

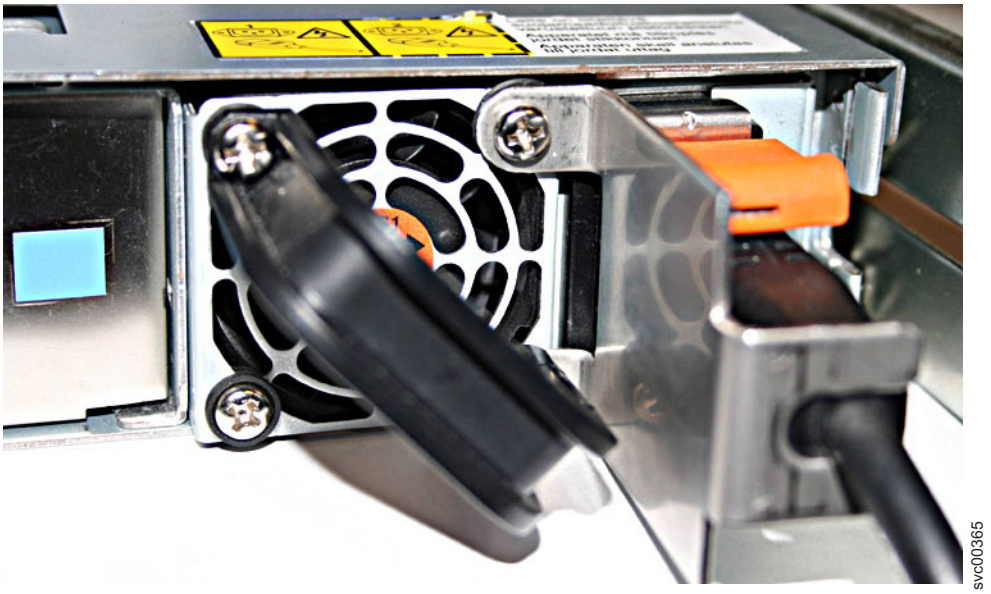


Figure 106. The SAN Volume Controller 2145-8G4 with the cable retention bracket attached

Removing and replacing the cable retention bracket - option B

Removing the cable retention bracket

Remove the cable retention bracket before you remove the SAN Volume Controller 2145-8G4 from the rack.

1. Remove the securing bolt from the node side rail (shown in Figure 107) next to the power supply.
2. Remove the bracket.
3. Replace the bolt in the node side rail.

Replacing the cable retention bracket

Replace the SAN Volume Controller 2145-8G4 cable retention bracket after you replace the node in the rack.

Install the SAN Volume Controller 2145-8G4 cable retention bracket after you install the node in the rack.

To attach the bracket to the rack rail, perform the following steps:

1. Install the power cable into the power supply.
2. At the back of the cabinet, remove the securing bolt from the node side rail next to the power supply, as shown in Figure 107.

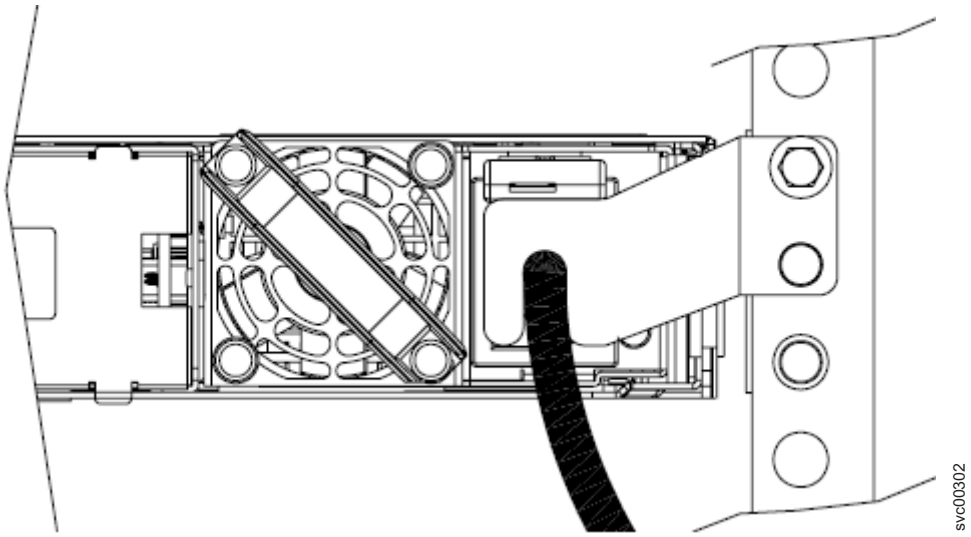


Figure 107. The SAN Volume Controller 2145-8G4 with cable retention bracket option B attached

3. Slide the cable retention bracket over the cable and position it over the side rail. Secure it in place using the original bolt.

Removing the SAN Volume Controller from a rack

During some service procedures, you might need to remove the SAN Volume Controller from a rack.

Related tasks

"Accessing the SAN Volume Controller CLI" on page 72
If you must enter and run command-line instructions, you can access the SAN

Volume Controller command-line interface (CLI) from the server where the SAN Volume Controller Console is installed.

"Deleting a node from the cluster using the CLI" on page 78
You can use the command-line interface (CLI) to delete a node from the cluster.

"Adding a node to the cluster using the CLI" on page 79
You can use the command-line interface (CLI) to add a node that has either been removed or rejected by a cluster, into the cluster.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Powering off the SAN Volume Controller

When instructed to do so, shut down and power off the SAN Volume Controller before you remove and replace parts.

For more information about how to power off the SAN Volume Controller, see "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

Attention: Unless host systems or fibre-channel switches must be switched off for some other reason, do not turn them off when you are servicing the SAN Volume Controller. Shut down the SAN Volume Controller before you remove the power cables. You can connect or disconnect Ethernet and fibre-channel cables at any time.

After you have powered off the SAN Volume Controller node, perform the following steps:

1. Make a note of the positions of all the external cables that are connected at the back of the SAN Volume Controller.
2. Disconnect all the external cables from the back of the SAN Volume Controller node. If you are using the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8G4 node and have installed the power cable retainer, remove it before removing any cables.

Removing the SAN Volume Controller 2145-8G4 from a rack

Use these instructions when you are prompted to remove a SAN Volume Controller 2145-8G4 from a rack.

If the SAN Volume Controller is not already powered off, see "Powering off the SAN Volume Controller."

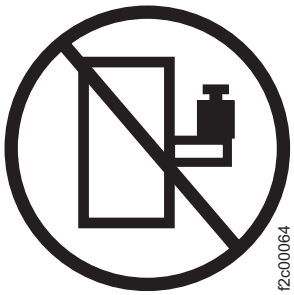
Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to power off and make customer data inaccessible.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

To remove the SAN Volume Controller 2145-8G4 from a rack, complete these steps:

1. Disconnect the cables from the SAN Volume Controller 2145-8G4 node.
2. Slide the SAN Volume Controller 2145-8G4 node forward until it latches in the service position.
3. Position yourself to support the weight of the node when it is no longer held by the slides and then press the rear slide release latches (**1** in Figure 108) on both sides of the SAN Volume Controller 2145-8G4 node.
4. Pull the SAN Volume Controller 2145-8G4 node completely out of the slides.

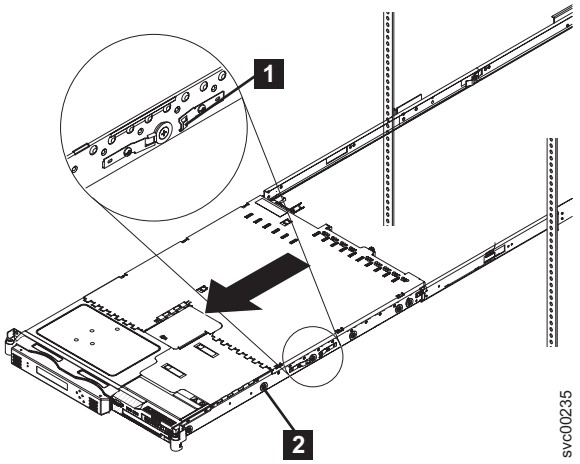


Figure 108. Removing the SAN Volume Controller 2145-8G4 from the rack

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 from a rack

Use these instructions when you are directed to remove a SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 from a rack.

If the SAN Volume Controller is not already powered off, see "Powering off the SAN Volume Controller" on page 436.

Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to power off and make customer data inaccessible.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**

- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

To remove the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 node from a rack, complete these steps:

1. Unlatch the two latches on the front of the rack.
2. Pull the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 node forward and remove it from the rack.

Removing the SAN Volume Controller 2145-4F2 from a rack

Use these instructions when you are directed to remove a SAN Volume Controller 2145-4F2 from a rack.

If the SAN Volume Controller is not already powered off, see "Powering off the SAN Volume Controller" on page 436.

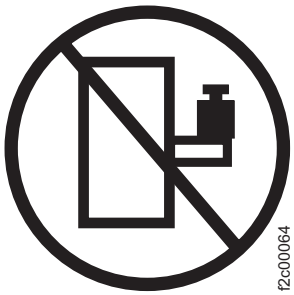
Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller nodes in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to power off and make customer data inaccessible.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

To remove the SAN Volume Controller 2145-8F2 from a rack, complete these steps:

1. Unscrew the two front screws (**1** in Figure 109 on page 442).

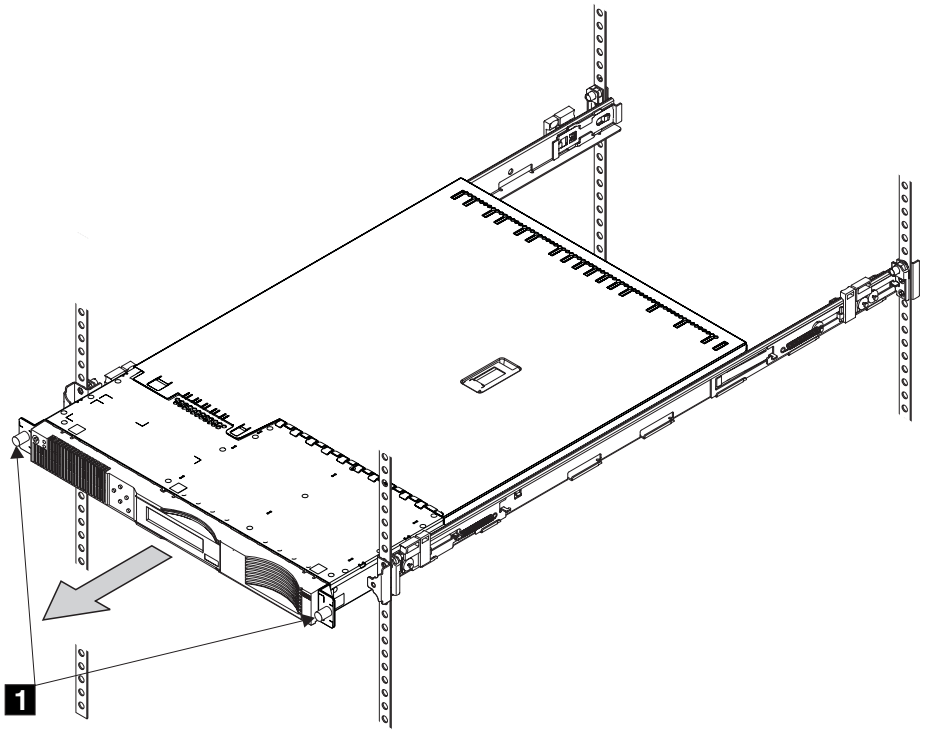


Figure 109. Loosening the front screws to remove the SAN Volume Controller 2145-4F2

2. Pull the SAN Volume Controller 2145-4F2 node forward and remove it from the rack.

Replacing the SAN Volume Controller in a rack

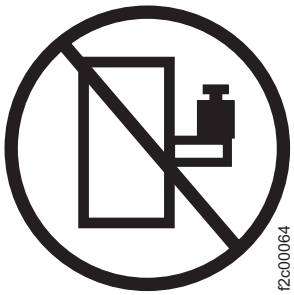
You must use caution when you replace the SAN Volume Controller in a rack.

Note: If you have recently replaced a field replaceable unit (FRU) in the node, the repaired node normally rejoins the cluster as soon as it is powered-on and has completed its self-tests. There are some exceptions to this, such as when a disk drive has been replaced, or when for some other reason the node has lost its identity or the integrity of its cluster metadata. Under these circumstances, the node goes offline. If you are performing this repair under directed maintenance procedures, those procedures will automatically restore the node to the cluster. If you are not performing the repair under directed maintenance procedures, you might be required to delete and add the node back into the cluster.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Related tasks

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

Replacing the SAN Volume Controller 2145-8G4 in a rack

Follow these instructions when you are prompted to replace the SAN Volume Controller 2145-8G4.

Perform the following steps to replace the SAN Volume Controller 2145-8G4 in a rack:

1. Extend the slides approximately 150mm (6 inches) from the front of the rack cabinet.
2. Align the two rear wheels on the node with the opening in the slides and then push the node into the slides until the rear slide release latches (**2** in Figure 110 on page 445) click into place, locking the node in the slides.

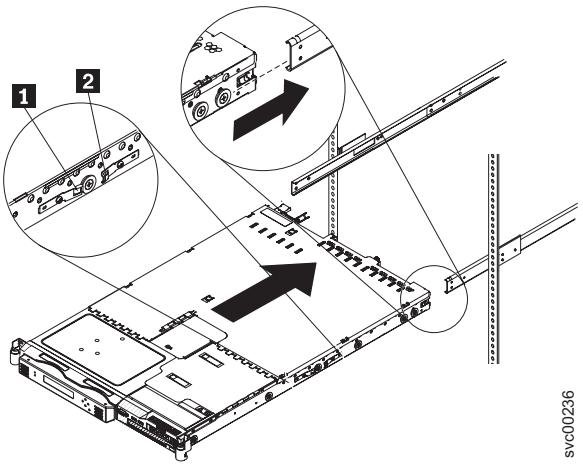


Figure 110. Aligning the SAN Volume Controller 2145-8G4 with the rack slides

3. Pull the node out of the rack so the slides are fully extended.
4. Press the front slide release latches (**1** in Figure 110) on both sides of the node and move the node into the rack cabinet and back out to verify that the node moves freely.
5. Connect all the external cables on the back of the SAN Volume Controller 2145-8G4.

   Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to power off and make customer data inaccessible.

   For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.
6. Restore all power to the SAN Volume Controller.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 in a rack

Follow these instructions when you are prompted to replace the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 in a rack.

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 in the rack:

1. Slide the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 node into the rack.
2. Latch the two latches on the front of the rack to attach the SAN Volume Controller node to the rack. (**1** in Figure 111 on page 446).

   Note: The front of the rail assembly looks different from the front, as you can see in Figure 111 on page 446.
3. Connect all the external cables on the back of the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 node.

   Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to power off and make customer data inaccessible.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

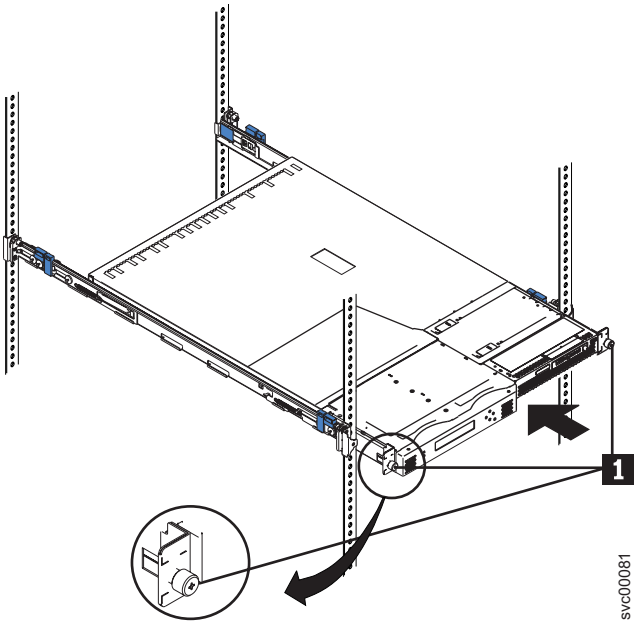


Figure 111. Sliding the SAN Volume Controller 2145-8F4 into the rack

4. Restore all power to the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2.

Replacing the SAN Volume Controller 2145-4F2 in a rack

Follow these instructions when you are prompted to replace the SAN Volume Controller 2145-4F2 in a rack.

Perform the following steps to replace the SAN Volume Controller 2145-4F2 in the rack:

1. Slide the SAN Volume Controller 2145-4F2 into the rack.
2. Screw in the two front screws (**1** in Figure 112 on page 447).

   Note: The front of the rail assembly looks different from the front, as you can see in Figure 112 on page 447.
3. Connect all the external cables on the back of the SAN Volume Controller 2145-4F2 node.

   Attention: Do not touch the power control switches on adjacent SAN Volume Controller nodes when you remove or install SAN Volume Controller in a rack. Touching these switches on adjacent SAN Volume Controller nodes might cause those devices to power off and make customer data inaccessible.

   For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

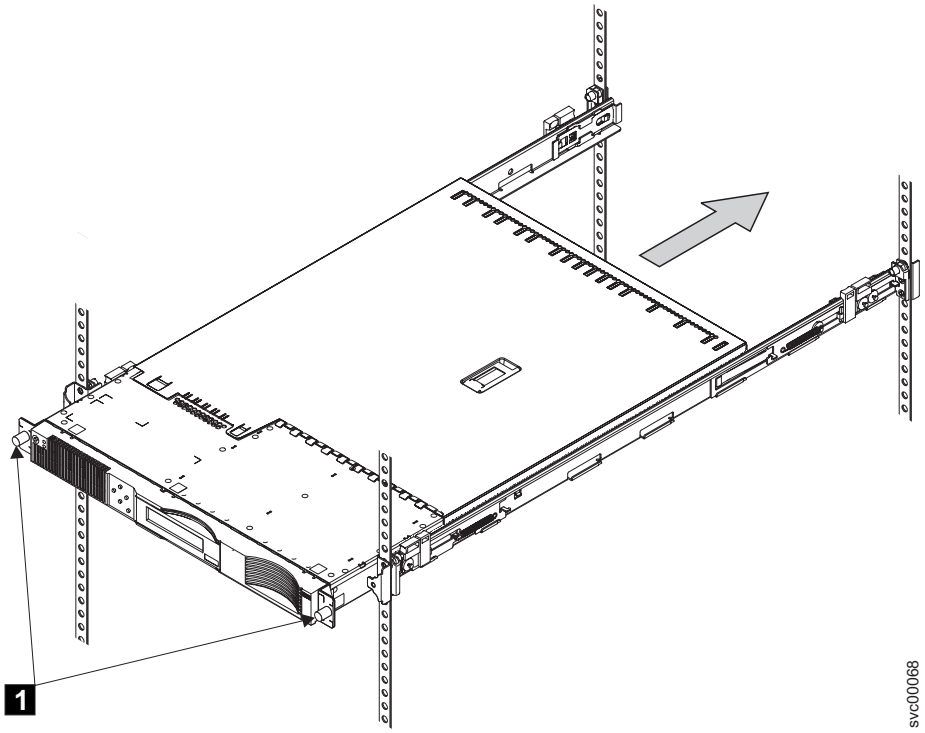


Figure 112. Attaching the SAN Volume Controller 2145-4F2 with the front screws

4. Restore all power to the SAN Volume Controller 2145-4F2.

Removing the support rails for a SAN Volume Controller

The SAN Volume Controller support rails can be removed if you need to move the SAN Volume Controller.

Related tasks

"Installing the support rails for a SAN Volume Controller" on page 449
You must install the support rails that hold the SAN Volume Controller.

Removing the SAN Volume Controller 2145-8G4 support rails

This topic describes how to remove the SAN Volume Controller 2145-8G4 support rails.

Perform the following steps to remove the SAN Volume Controller 2145-8G4 support rails:

1. Loosen and remove the captive screw **3** and latch strike **1** from the left rear mounting flange, as shown in Figure 113 on page 448, to release the slide rail **2**. Loosen and remove the captive screw from the right rear mounting flange and release the other slide rail in the same way.

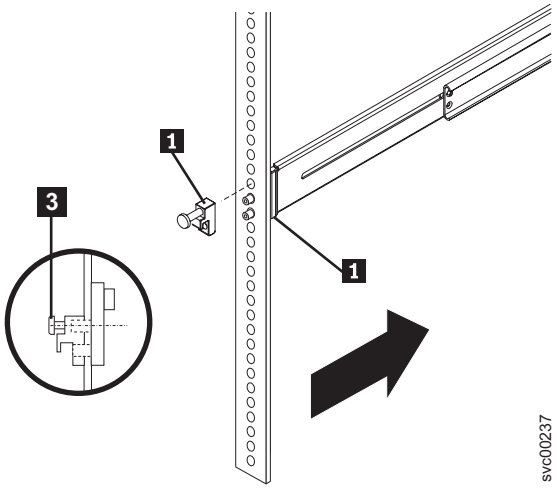


Figure 113. Removing the latch strike from the front of the slide rail

2. Loosen and remove the captive screw from the front of the right rail and then remove the latch strike. Remove the captive screw and latch strike from the front of the left rail in the same way.
3. Push the rail pins **1** out of the front rack mounting flange, as shown in Figure 114, to shorten the right slide rail and remove it from the front flange. Then pull the right slide rail forward to remove the slide rail from the rear rack mounting flange. Remove the left slide rail in the same way.

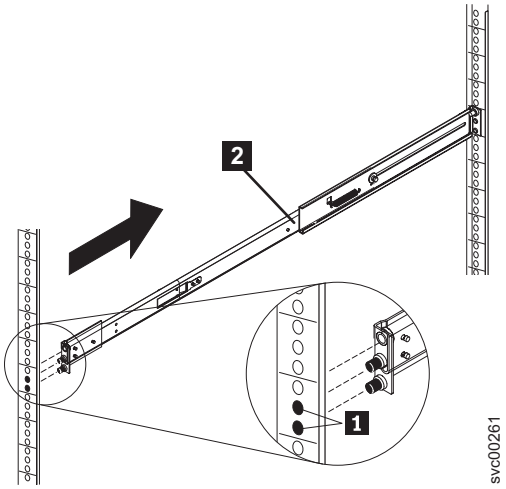


Figure 114. Removing the right slide rail from the front of the rack

Removing the SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, or SAN Volume Controller 2145-4F2 support rails

This topic describes how to remove the SAN Volume Controller 2145-8F4, SAN Volume Controller 2145-8F2, or SAN Volume Controller 2145-4F2 support rails.

Perform the following steps to remove the SAN Volume Controller support rails:

1. Go to the front of the left support rail.

2. Put your left index finger onto the back edge of the latch lever 2 and your left thumb on the front edge of the latch lock 1, as shown in Figure 115.

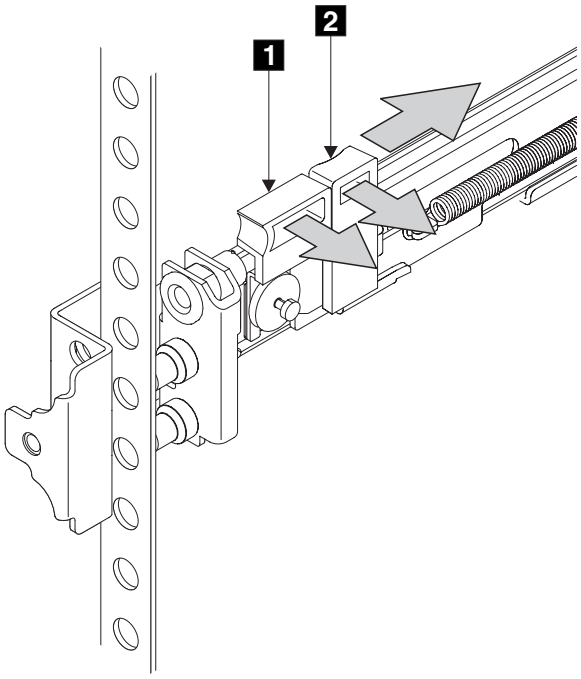


Figure 115. The left support rail for the SAN Volume Controller

3. Gently move the latch lock inward and push the latch-lock carrier toward the back of the rack until it latches onto the rail.
4. Pull the rail out from the front rack-mounting flange.
5. Repeat the action at the back of the rail.
6. Remove the rail from the rack.
7. Repeat steps 2 through 6 for the right support rail.

Installing the support rails for a SAN Volume Controller

You must install the support rails that hold the SAN Volume Controller.

The instructions for installing the SAN Volume Controller are found in the topics that follow.

Related tasks

"Removing the support rails for a SAN Volume Controller" on page 447
The SAN Volume Controller support rails can be removed if you need to move the SAN Volume Controller.

Installing the support rails for the SAN Volume Controller 2145-8G4

You must install the support rails that hold the SAN Volume Controller 2145-8G4.

When you are ready to install the support rails, perform the following tasks:

- Refer to the Hardware Location Chart to determine where the SAN Volume Controller is to be installed in the rack.

- Refer to the Electronic Industries Alliance (EIA) markings on the rack and decide where you are going to install the support rails.

Perform the following steps to install the support rails (shown in Figure 116) for the SAN Volume Controller 2145-8G4:

1. Make sure you have all the items that you need for installing the support rails.

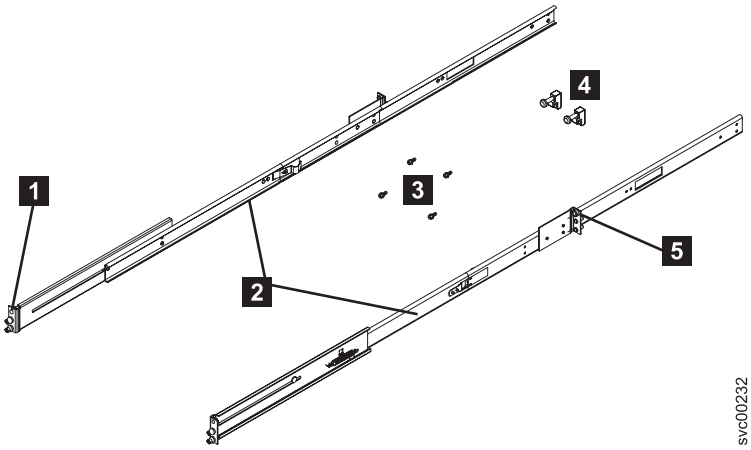


Figure 116. SAN Volume Controller 2145-8G4 support rails installation kit

1 Rear of rail

2 Rack mounting rails

3 M6 screws

4 Latches

5 Front of rail

Note: You might find it helpful, with some types of racks, to remove the rack doors and side panels to provide easier access during installation.

2. Check the labels on the support rails. Each rail has a label that indicates which is the front end of the rail and whether the rail is for the left or right side of the rack. Perform this procedure for both rails.
3. Insert the right slide rail **2** into the rear rack mounting flange, as shown in Figure 117 on page 451, with the rail pins **1** protruding through the flange.

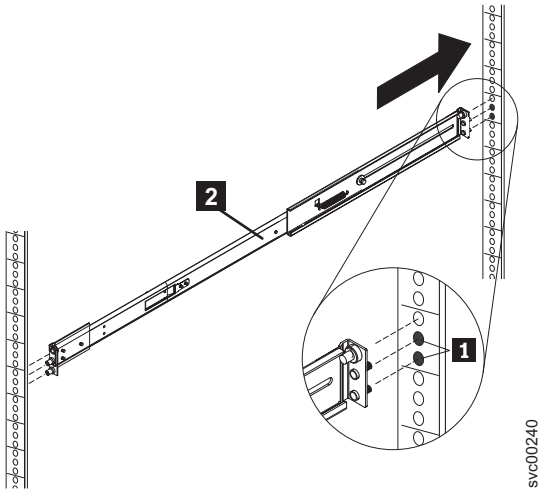


Figure 117. Inserting the right slide rail into the rear rack mounting flange

4. Extend the right slide rail **2** and insert it into the front rack mounting flange, as shown in Figure 118, with the rail pins **1** protruding through the flange. Insert the left slide rail in the same way.

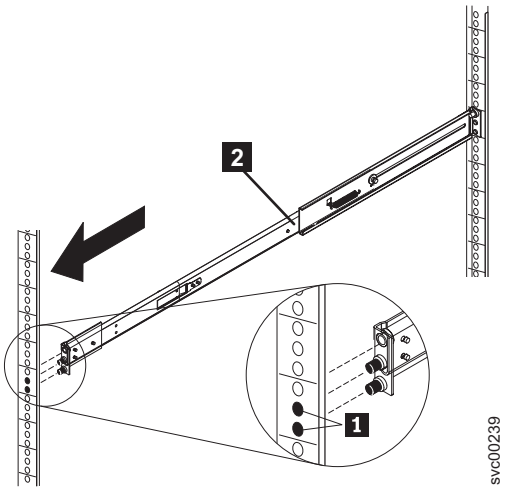


Figure 118. Extending the right slide rail

5. Attach one latch strike **1** to the front of the right rail **2**, as shown in Figure 119 on page 452, using the captive screw **3**. Turn the screw only finger tight. Attach the other latch strike to the front of the left rail in the same way.

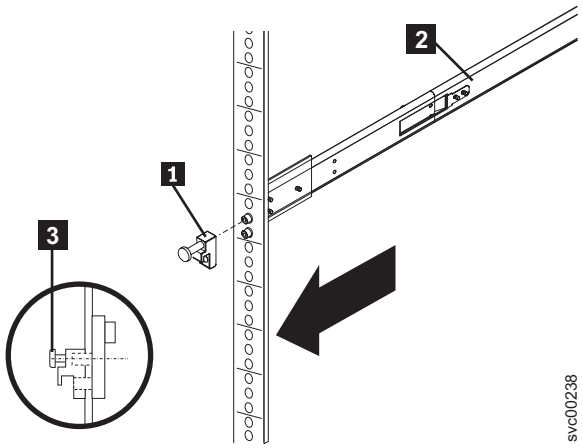


Figure 119. Attaching the latch strike to the front of the rail

6. Attach the slide rail to the left rear mounting flange with a single screw and latch strike. The screw should be only finger tight. Likewise, attach the other slide rail to the right rear mounting flange.

The installation of the support rails for the SAN Volume Controller 2145-8G4 is complete.

Installing the support rails for the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2

You must install the support rails that hold the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2.

When you are ready to install the support rails, perform the following tasks:

- Refer to the Hardware Location Chart to determine where the SAN Volume Controller is to be installed in the rack.
- Refer to the Electronic Industries Alliance (EIA) markings on the rack and decide where you are going to install the support rails.

Perform the following steps to install the support rails:

1. Check the labels on the support rails. Each rail has a label that indicates which is the front end of the rail and whether the rail is for the left or right side of the rack. Perform this procedure for both rails.
2. Put your index finger against the side of the latch-lever, **1** in Figure 120 on page 453, and put your thumb against the front of the latch-lock **2** .

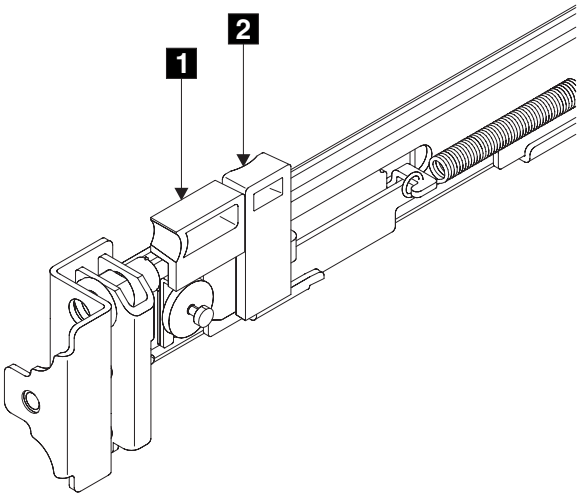


Figure 120. Retracting the latch lock carrier

1 Latch-lever

2 Latch-lock

3. Gently push the latch lock 2 away from the rail as you move the latch lever 1 toward the far end of the rail (Figure 121). The latch-lock carrier assembly slides against the spring tension.

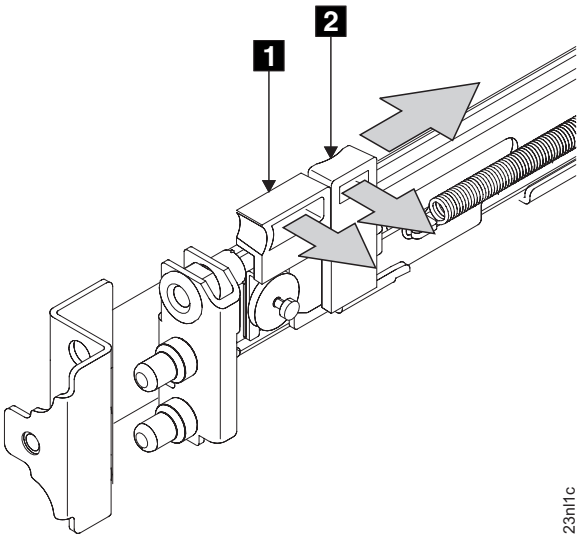


Figure 121. Opening the front latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

4. Continue to slide the latch-lock carrier for approximately 13 mm (0.5 in). The latch-lever engages a hole in the back bracket assembly and holds the latch-lock carrier in the retracted position.
5. Push the back rail bracket 1 (Figure 122 on page 454) toward the front of the rail until it stops. The rail is now at its shortest adjustment.

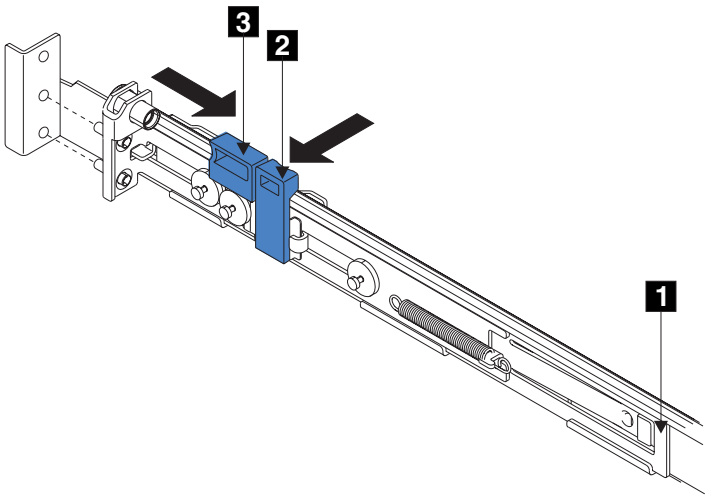


Figure 122. Opening the back latch-lock carrier assembly

1. Back rail bracket
2. Latch-lock
3. Latch-lever

6. Place the front end of the left rail in the rack cabinet. Align the top of the front bracket 1 (Figure 123) with the required EIA marking that is on the rack.

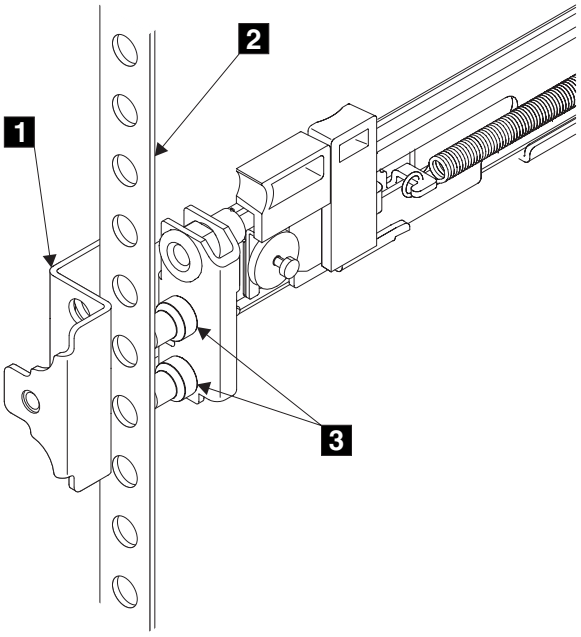


Figure 123. Installing the front end of the rail

1. Front bracket
2. Rack-mounting flange
3. Locating pins

7. Align the locating pins 3 with the holes that are in the rack-mounting flange.
8. Push the latch lock 2 (Figure 124) away from the rail to release the carrier. The latch-lock carrier slides toward the front of the rack and the locating pins project through the holes that are in the front flange and in the front rail bracket.

   Important: Ensure that the locating pins are fully extended through the front rail bracket.

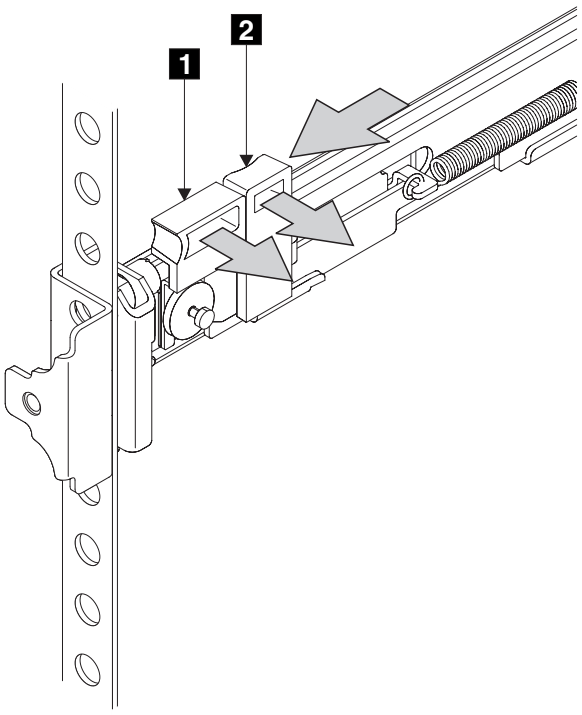


Figure 124. Closing the latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

9. Push the back rail bracket toward the rear of the rack and align the locating pins with the rack-mounting flange.
10. Push the latch lock 2 away from the rail to release the carrier. The latch-lock carrier slides toward the rear of the rack, and the locating pins project through the holes that are in the rear flange and in the rear rail bracket.

    Important: Ensure that the locating pins are fully extended through the rear rail bracket.

11. On the rear of each rail, press the blue release tab and slide the shipping bracket off the slide rail. Store the shipping bracket for further use.

You must perform this procedure for both rails.

Installing the support rails for the SAN Volume Controller 2145-4F2

You must install the support rails that hold the SAN Volume Controller 2145-4F2.

When you are ready to install the support rails, perform the following tasks:

- Refer to the Hardware Location Chart to determine where the SAN Volume Controller 2145-4F2 is to be installed in the rack.
- Refer to the Electronic Industries Alliance (EIA) markings on the rack and decide where you are going to install the support rails.

Perform the following steps to install the support rails:

1. Check the labels on the support rails. Each rail has a label that indicates which is the front end of the rail and whether the rail is for the left or right side of the rack. Perform this procedure for both rails.
2. Put your index finger against the side of the latch-lever, **1** in Figure 125, and put your thumb against the front of the latch-lock **2**.

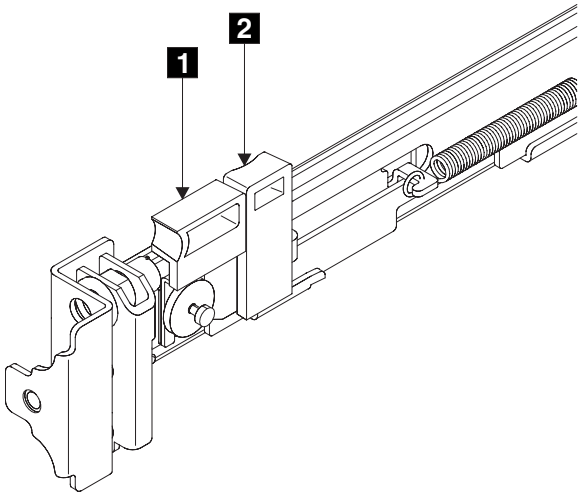


Figure 125. Retracting the latch lock carrier

1 Latch-lever

2 Latch-lock

3. Gently push the latch lock **2** away from the rail as you move the latch lever **1** toward the far end of the rail (Figure 126 on page 457). The latch-lock carrier assembly slides against the spring tension.

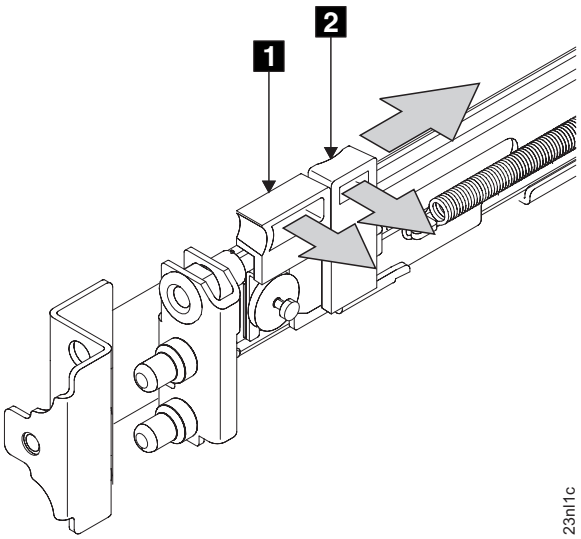


Figure 126. Opening the front latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

4. Continue to slide the latch-lock carrier for approximately 13 mm (0.5 in). The latch-lever engages a hole in the back bracket assembly and holds the latch-lock carrier in the retracted position.
5. Push the back rail bracket 1 (Figure 127) toward the front of the rail until it stops. The rail is now at its shortest adjustment.

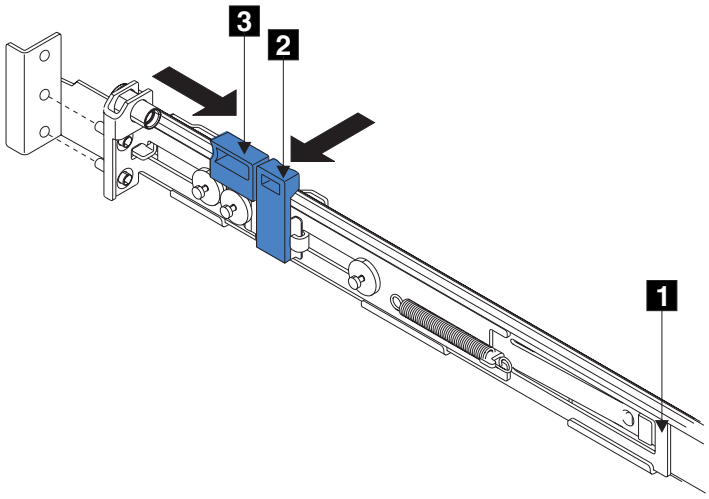


Figure 127. Opening the back latch-lock carrier assembly

1 Back rail bracket

2 Latch-lock

3 Latch-lever

6. Place the front end of the left rail in the rack cabinet. Align the top of the front bracket 1 (Figure 128 on page 458) with the required EIA marking that

is on the rack.

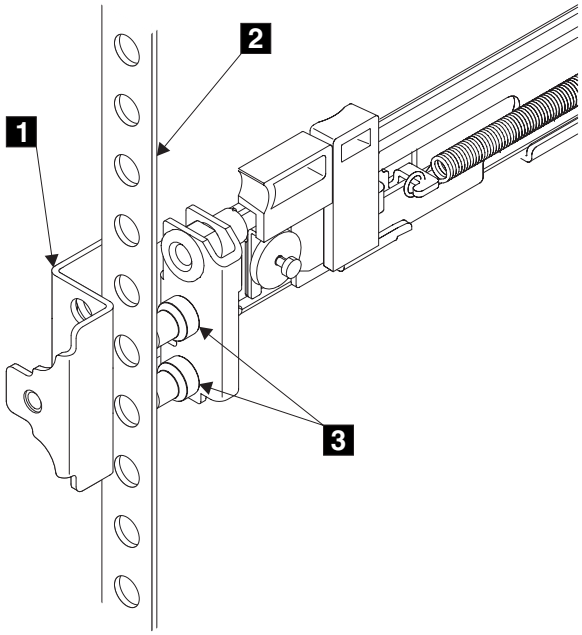


Figure 128. Installing the front end of the rail

1 Front bracket

2 Rack-mounting flange

3 Locating pins

7. Align the locating pins 3 with the holes that are in the rack-mounting flange.
8. Push the latch lock 2 (Figure 129 on page 459) away from the rail to release the carrier. The latch-lock carrier slides toward the front of the rack and the locating pins project through the holes that are in the front flange and in the front rail bracket.

   Important: Ensure that the locating pins are fully extended through the front rail bracket.

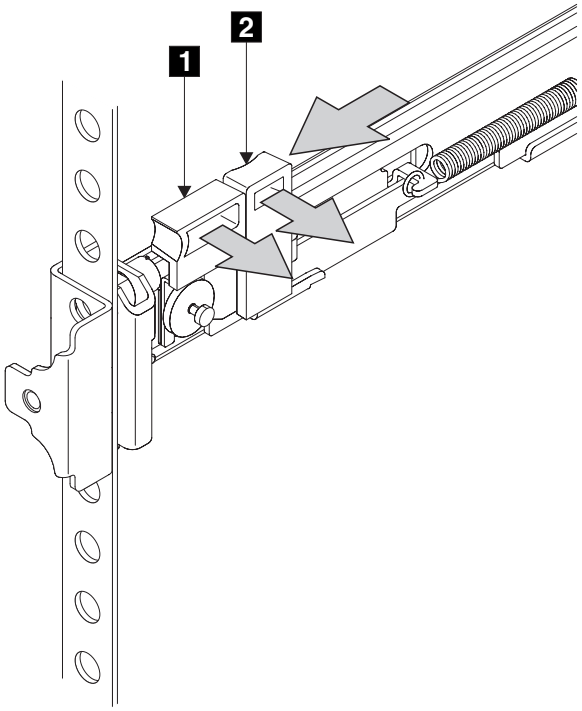


Figure 129. Closing the latch-lock carrier assembly

1 Latch-lever

2 Latch-lock

9. Push the back rail bracket toward the rear of the rack and align the locating pins with the rack-mounting flange.
10. Push the latch lock **2** away from the rail to release the carrier. The latch-lock carrier slides toward the rear of the rack, and the locating pins project through the holes that are in the rear flange and in the rear rail bracket.

    Important: Ensure that the locating pins are fully extended through the rear rail bracket.
11. On the rear of each rail, press the blue release tab and slide the shipping bracket off the slide rail. Store the shipping bracket for further use.

You must perform this procedure for both rails.

Removing the top cover

You can remove the SAN Volume Controller's top cover if maintenance is necessary.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the power cable from the 2145-1U uninterruptible power supply" on page 605
You can remove the power cable from the 2145-1U uninterruptible power supply if you are having problems with the power supply and suspect that the power cable is defective.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

Removing the SAN Volume Controller 2145-8G4 top cover

This topic describes how to remove the SAN Volume Controller 2145-8G4 top cover.

To remove the SAN Volume Controller 2145-8G4 cover, complete the following steps.

Attention: Never remove the SAN Volume Controller 2145-8G4 cover with power applied. To remove all power from the SAN Volume Controller 2145-8G4, see "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

1. Read the safety information that is referenced in "Preparing to remove and replace parts" on page 431.
2. Remove the node from the rack. See "Removing the SAN Volume Controller 2145-8G4 from a rack" on page 436.
3. Loosen the thumbscrew (**1** in Figure 130) that secures the cover at the rear of the SAN Volume Controller 2145-8G4.

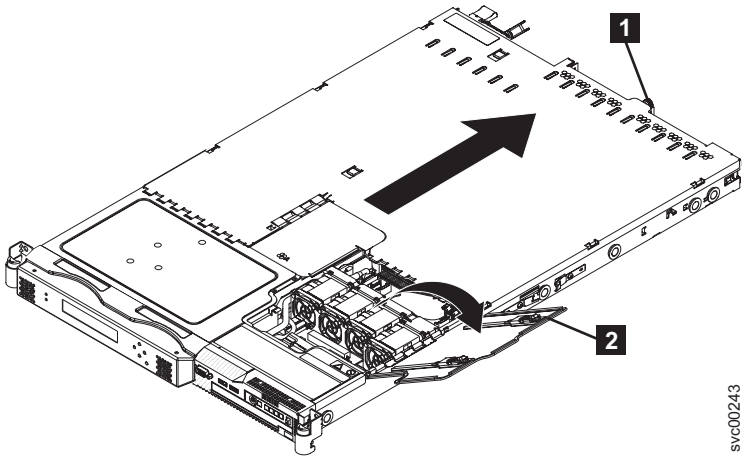


Figure 130. The SAN Volume Controller 2145-8G4 with fan door open

4. Open the fan door **2**. To open the fan door, slide the two latches to the right, and raise the door panel.
5. Remove the SAN Volume Controller 2145-8G4 cover:

a. Slide the cover slightly toward the rear of the SAN Volume Controller 2145-8G4 until it comes free. Make sure that the cover tabs all slide away from the insets that are on the front, rear, and sides of the SAN Volume Controller 2145-8G4.
b. Lift the cover off the SAN Volume Controller 2145-8G4 and set the cover aside.

Important: Before you turn on the node, replace the cover for proper cooling and airflow. Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover

This topic describes how to remove the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover.

Before you remove the cover, you must remove all power from the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

Perform the following steps to remove the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover:

1. Remove the server from the rack:
   a. Pull the node out, about a third of the way, until it stops.
   b. Slide both side release latches (left and right) toward the front of the node. Make sure that both rail-lock pins (**2** in Figure 131) are in a vertical position, pull the node out, and remove it from the rack.

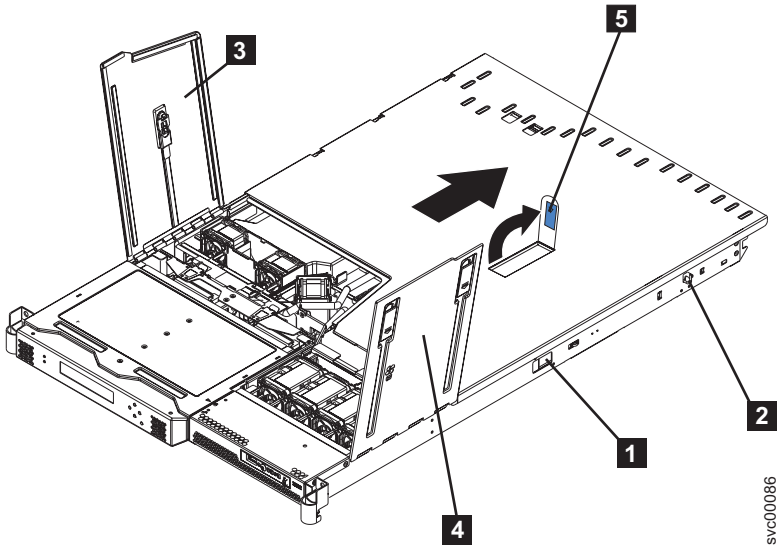


Figure 131. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 with fan doors open

1 Side release latch

2 Rail lock pin

3 Fan door A

4 Fan door B

5 Cover release latch

2. Open fan door A 3 and fan door B 4. To open fan door A, slide the slide latch to the left and lift up the door panel. To open fan door B, slide the two slide latches to the right and lift up the door panel.
3. Perform the following steps to remove the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 cover:
   a. Lift up the cover release latch 5 and slide the cover to the rear of the node.
   b. Make sure that the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 cover slides away from the insets that are on the front, rear, and sides of the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 cover.
   c. Lift the cover off the node and set the cover aside.

   Important: Before you turn on the node, replace the cover for proper cooling and airflow. Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Removing the SAN Volume Controller 2145-4F2 top cover

Before you can replace the top cover, you must remove it.

Perform the following steps to remove the top cover from the SAN Volume Controller 2145-4F2:

1. Remove all power from the SAN Volume Controller 2145-4F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Lift the lever (1 in Figure 132). This action moves the top cover rearward approximately 13 mm (0.5 in).

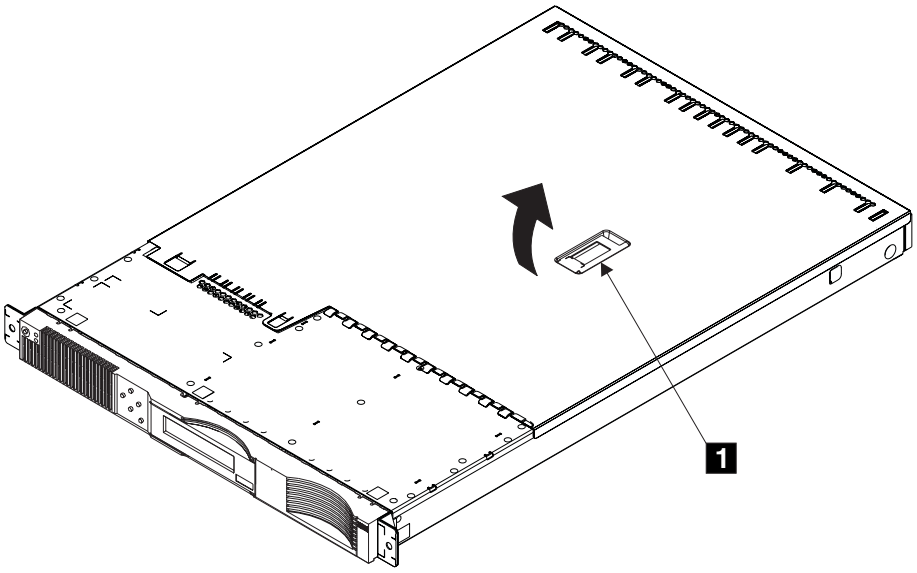


Figure 132. Removing the SAN Volume Controller 2145-4F2 top cover

4. Lift the front of the cover, and lift the cover away from the SAN Volume Controller 2145-4F2 and set it aside.

Important: Before you turn on the node, replace the cover for proper cooling and airflow. Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Replacing the top cover

You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related tasks

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

Replacing the SAN Volume Controller 2145-8G4 top cover

This topic describes how to replace the SAN Volume Controller 2145-8G4 top cover.

1. Position the internal cables so that they do not interfere with the cover installation.

   Important: Before you slide the cover forward, make sure that all the tabs on both the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.

2. Position the cover on top of the SAN Volume Controller 2145-8G4 and open the fan door.
3. Tighten the thumbscrew **1**, which is shown in Figure 133, until the cover correctly engages all the inset tabs on the SAN Volume Controller 2145-8G4.

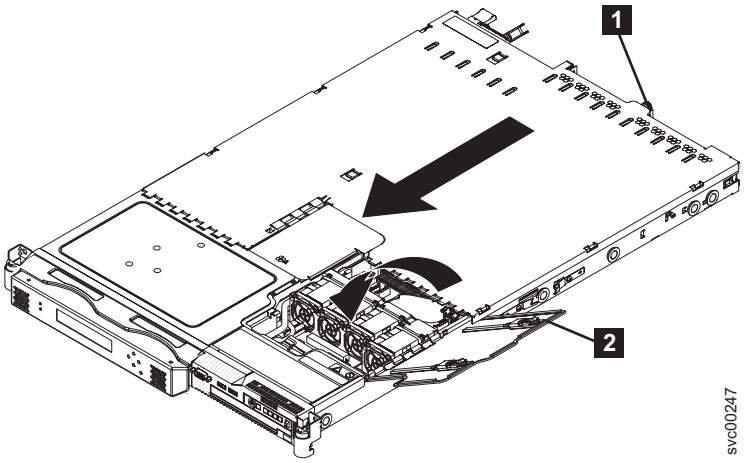


Figure 133. SAN Volume Controller 2145-8G4 with the fan door open

4. Close the fan door **2**.
5. Replace the SAN Volume Controller 2145-8G4 in the rack.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover

This topic describes how to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover.

Before you turn on the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2, replace the node cover for proper cooling and airflow. Operating the node for extended periods of time (more than 30 minutes) with the cover removed might damage components.

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 top cover:

1. Position the internal cables so that they do not interfere with the cover installation.

   Important: Before you slide the cover forward, make sure that all the tabs on both the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.
2. Position the cover on top of the node and slide it forward.
3. Press down on the cover release latch **3** , which is shown in Figure 134, until the cover properly engages all the inset tabs on the SAN Volume Controller 2145-8F2.

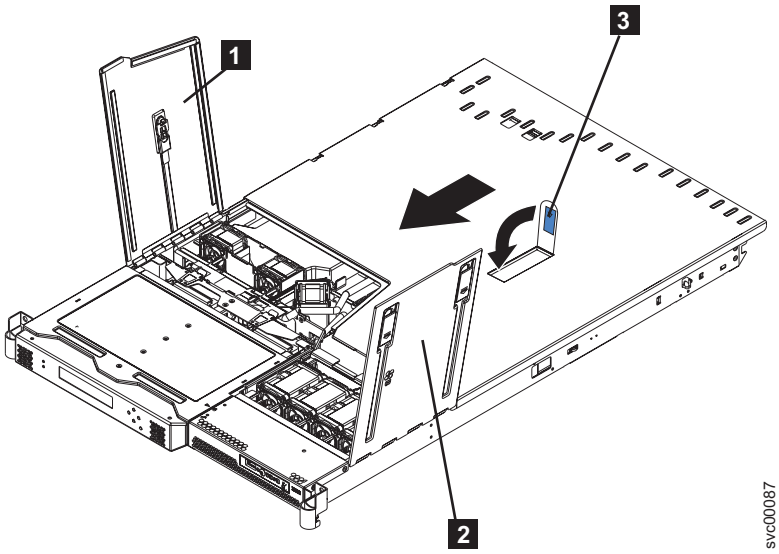


Figure 134. The SAN Volume Controller 2145-8F2 with the fan doors open

1 Fan door A

2 Fan door B

3 Cover release latch

4. Close the fan doors.
5. Install the node in the rack.

Replacing the SAN Volume Controller 2145-4F2 top cover

Before moving the top cover into place, position the internal cables so that they do not interfere with the cover.

Important: Before you slide the cover forward, make sure that all the tabs on both the front, rear, and side of the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be very difficult to remove the cover later.

Perform the following steps to replace the top cover on the SAN Volume Controller 2145-4F2:

1. Ensure that the lever **1** is fully up, as shown in Figure 135.

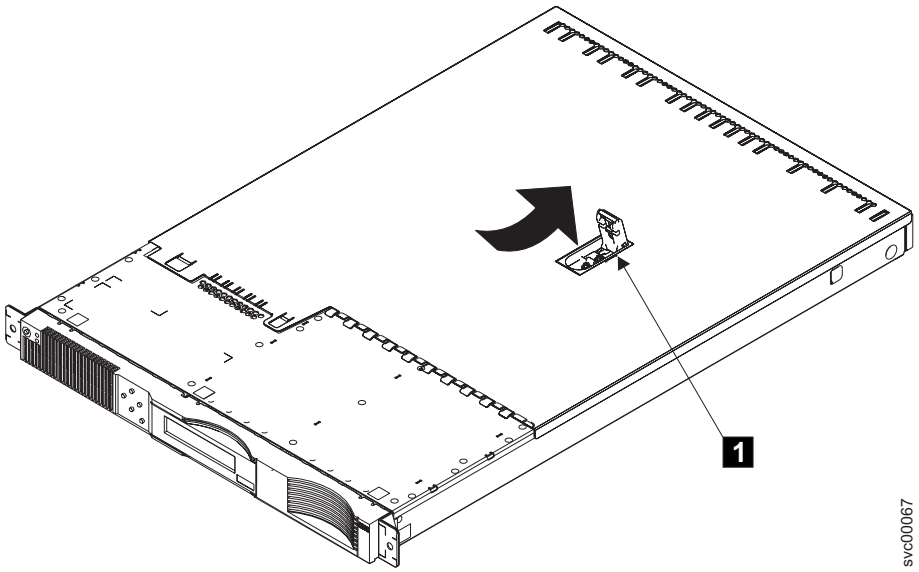


Figure 135. SAN Volume Controller 2145-4F2 with the fan door open

2. Place the cover onto the SAN Volume Controller 2145-4F2 so that about 13 mm (0.5 in.) of the cover protrudes over the back edge of the SAN Volume Controller 2145-4F2 frame.
3. Press the lever downward. The top cover moves toward the front of the SAN Volume Controller 2145-4F2.
4. Ensure that top fingers and back lugs of the cover correctly engage the frame of the SAN Volume Controller 2145-4F2.
5. Press the lever until it fully engages.

Removing the service controller

You can remove the service controller from the SAN Volume Controller.

Related concepts

"SAN Volume Controller menu options" on page 148
During normal operations, menu options are available on the front panel display of the SAN Volume Controller node.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the front panel from the SAN Volume Controller 2145-4F2" on page 562
You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

Related reference

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

"Displaying the vital product data using the CLI" on page 134
You can use the command-line interface (CLI) to display the SAN Volume Controller cluster or node vital product data (VPD).

Removing the SAN Volume Controller 2145-8G4 service controller

You can remove the service controller from the SAN Volume Controller.

Perform the following steps to remove the service controller:

1. Power off the SAN Volume Controller 2145-8G4 node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. When the power off has fully completed, remove the main power cable retention bracket and remove the power cable from the rear of the node.
3. After ensuring that there is enough slack in the cables connected to the rear of the SAN Volume Controller 2145-8G4 node, slide the node forward in the rack by approximately 10cm (4in).
4. Locate the recessed service controller release button on the left side of the controller, which is marked in blue, as shown in Figure 136.

Figure 136. SAN Volume Controller 2145-8G4 service controller release button

5. Use a small screwdriver to gently press the release button and release the catch while pulling gently forward on the service controller. The service controller will move slightly forward.

   Note: If you meet any resistance, do not press harder, or you might damage the release mechanism.

6. You can stop pressing the release button and pull the service controller fully out of the frame, as shown in Figure 137

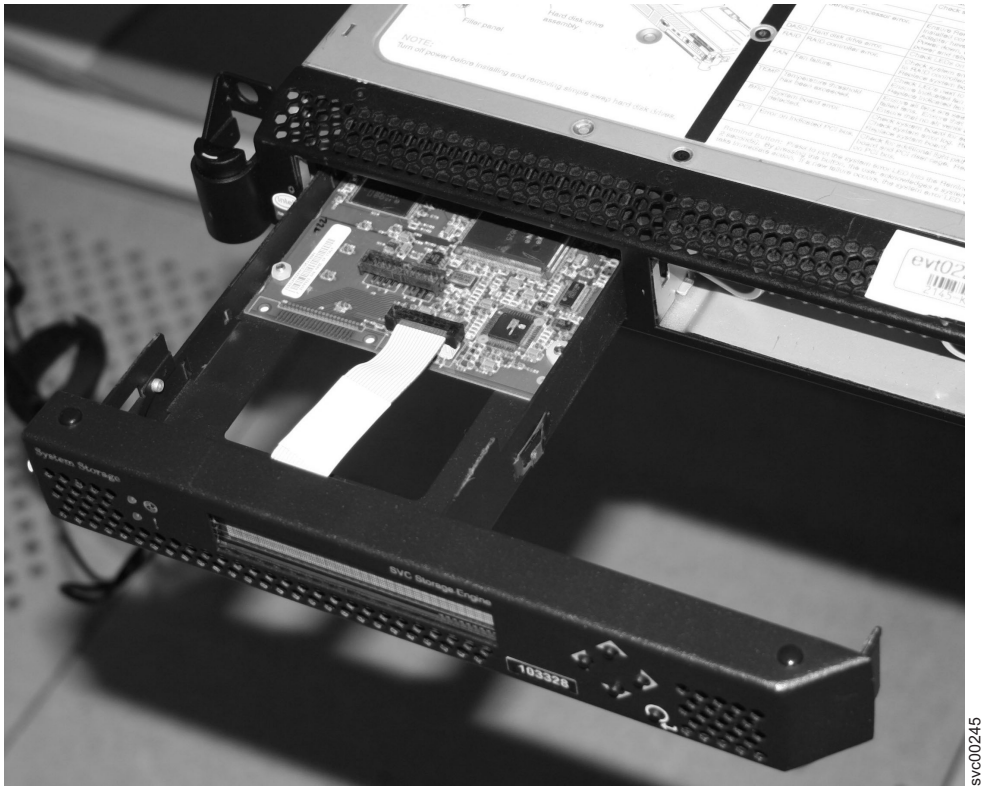


Figure 137. Removing the service controller from the SAN Volume Controller 2145-8G4

Note: When you replace a service controller, it is normal to change the worldwide node name (WWNN) of the new service controller to match the one that is being replaced. In this case, you will have two service controllers with the same WWNN. Clearly label the service controller that you are removing and indicate that its WWNN is now a duplicate and that it must not be connected to a SAN before its WWNN is reset.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 service controller

Perform the following steps to remove the service controller:

1. Remove all power from the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack.
3. Open fan door A (**1** in Figure 138 on page 468) of the node.

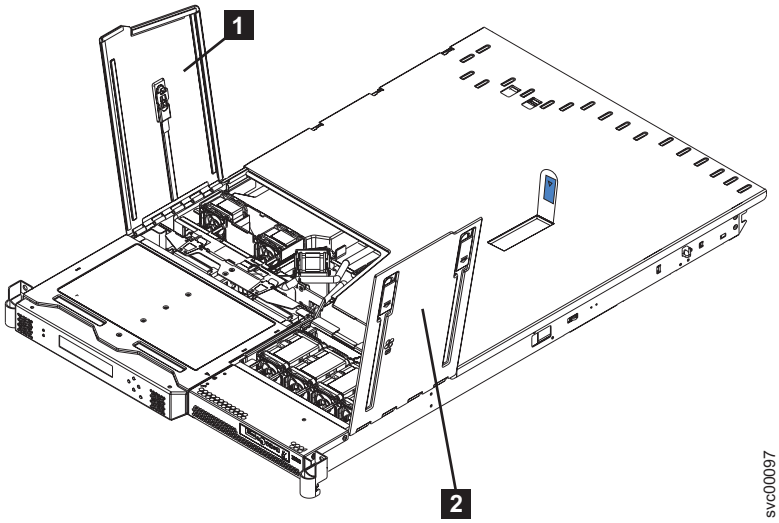


Figure 138. The SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 with fan doors open

1 Fan door A

2 Fan door B

4. Lift the two blue levers on the rear of the cage assembly to release it from the frame.
5. Lift the cage assembly until the blue release latch (**1** in Figure 139) on the left side of the service controller assembly is accessible.

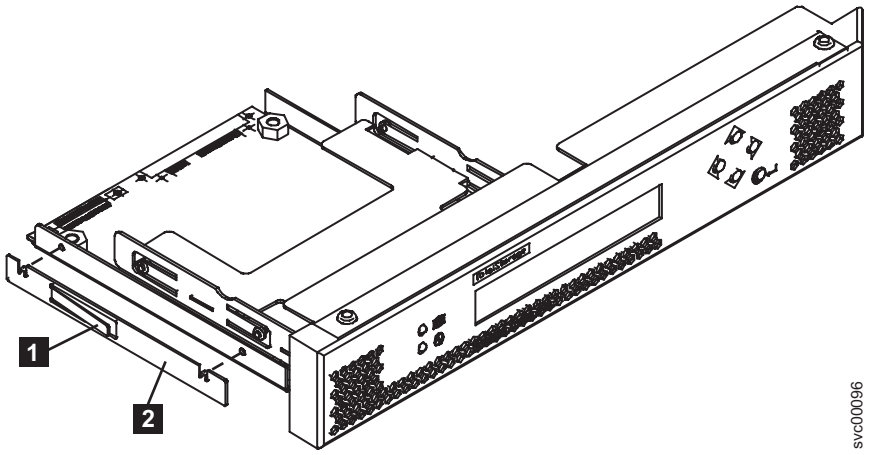


Figure 139. The SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 service controller

1 Release latch

2 Retention clip

6. Press the release latch 1 and then pull the service controller forward and out of the cage assembly.

   Note: When you replace a service controller, it is normal to change the worldwide node name (WWNN) of the new service controller to match the one that is being replaced. In this case, you will have two service controllers with the same WWNN. Clearly label the service controller that you are removing and indicate that its WWNN is now a duplicate and that it must not be connected to a SAN before its WWNN is reset.

7. Remove the retention clip 2. Make sure to save the retention clip for when you reinstall the node.

Removing the SAN Volume Controller 2145-4F2 service controller

Attention: If you are replacing the service controller and the disk drive as part of the same repair operation, see the related documentation.

Perform the following steps to remove the service controller:

1. Remove all power from the SAN Volume Controller 2145-4F2 node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack.
3. Remove the top cover of the node.
4. Remove the front panel of the node.
5. Pull the two handles (2 in Figure 140) to release the latches.

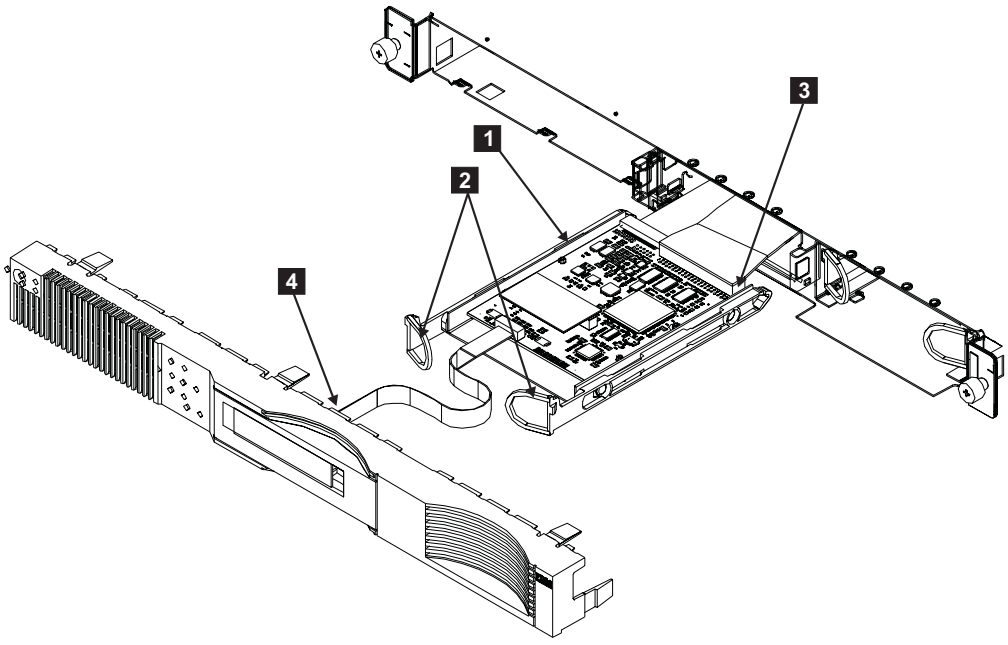


Figure 140. The SAN Volume Controller 2145-4F2 service controller

6. Carefully pull the service controller 1 out of the node to avoid damaging the attached cables.

   Note: When you replace a service controller, it is normal to change the worldwide node name (WWNN) of the new service controller to match the one that is being replaced. In this case, you will have two service

controllers with the same WWNN. Clearly label the service controller that you are removing and indicate that its WWNN is now a duplicate and that it must not be connected to a SAN before its WWNN is reset.

Removing and replacing the SAN Volume Controller 2145-4F2 service controller cables

You can remove the SAN Volume Controller 2145-4F2 service controller cables from the SAN Volume Controller 2145-4F2.

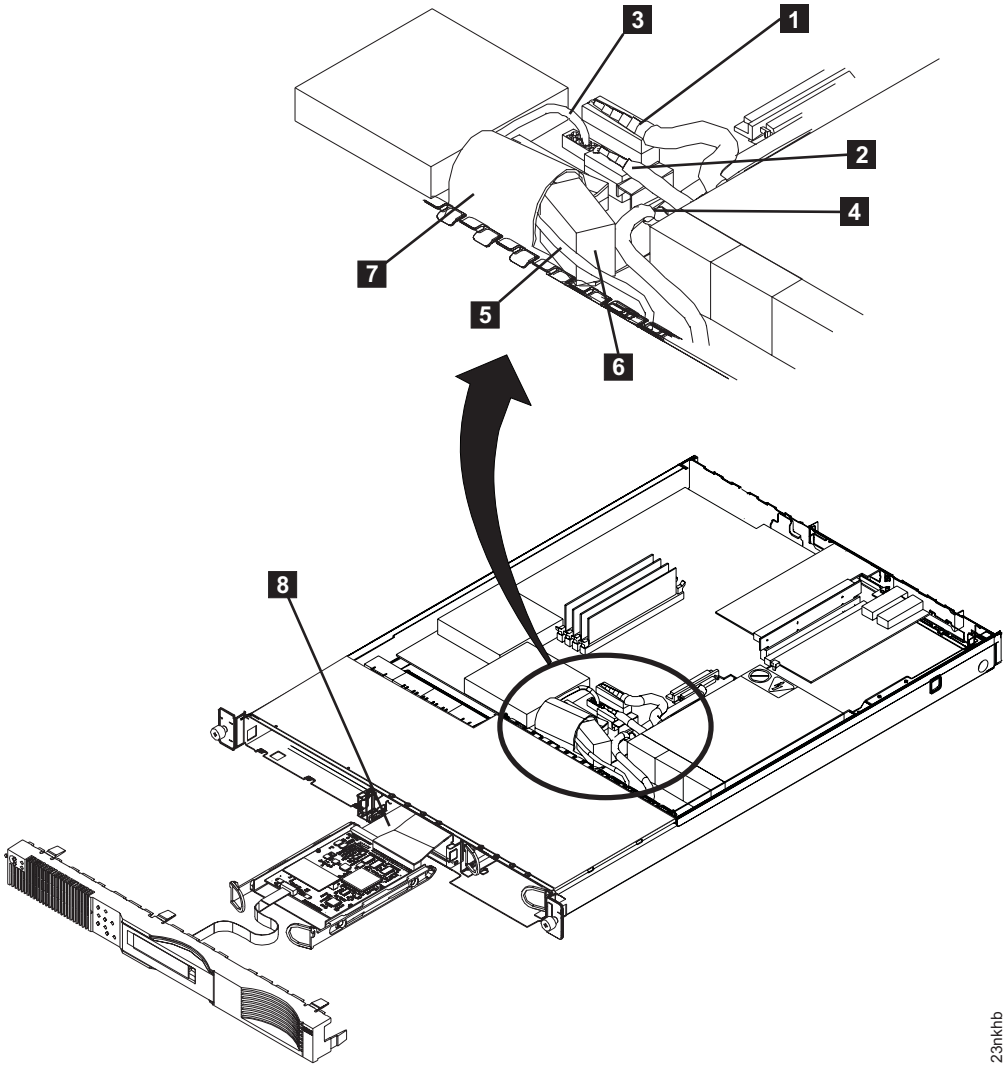


Figure 141. Service controller cables for the SAN Volume Controller 2145-4F2

1. Power connector P1
2. Power connector P2
3. Fan cable
4. SCSI signal cable
5. ATA (Advanced Technology Attachment) cable
6. Fan

7 Fan clip

8 Ribbon cable

Perform the following steps to remove the service controller cables:

1. Remove all power from the SAN Volume Controller 2145-4F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover of the SAN Volume Controller 2145-4F2.
4. Remove the service controller and the front panel cable from the front of the service controller.
5. Press the latch on power connector P1 **1** and power connector P2 **2**, and disconnect them from the system board. See Figure 141 on page 470.
6. Disconnect the fan cable **3**.
7. Disconnect the ATA cable **5**.
8. Lift the SCSI signal cable **4** away from the fan bracket.
9. Slide the right-hand side of the fan **6** forward, and pull the fan away from the clip **7**.
10. Lift the ribbon cable **8** out from the connector.

    Notes:

    a. The ribbon cable is labeled System Planar.
    b. The ribbon cable is pre-folded so that it automatically follows the correct route inside the SAN Volume Controller 2145-4F2.
11. To reinstall the cables, *carefully* install the one end of the ribbon cable (marked `System Planar`) to the system board being sure to install the cable straight in. See Figure 142 on page 472.
12. Route the flat cable and feed it through the opening where the service controller is to be installed and bring the other end of the cable (marked `Controller Card`) out of the front end of the SAN Volume Controller 2145-4F2 chassis. *Carefully* install this other end of the cable to the rear of the service controller, being sure to install the cable straight in with no rocking or twisting during installation.
13. Install the ATA cable to the rear of the service controller.
14. Carefully install the service controller while ensuring the cables do not get damaged as they slide into the chassis.
15. Verify that the blue line on each of the cable connector ends is not visible. This ensures that it is fully seated. For more information, see the documentation on removing the service controller from the SAN Volume Controller 2145-4F2.

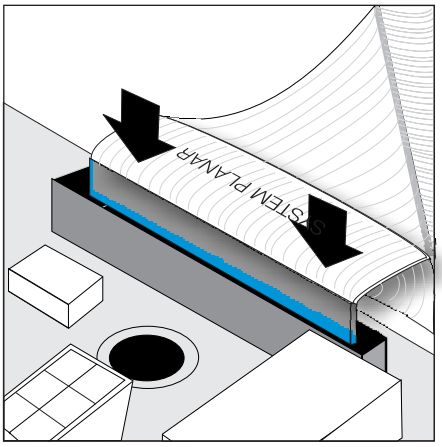


Figure 142. Install the service controller card cable into the system board of the SAN Volume Controller 2145-4F2

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

Related reference

Appendix C, "Fitting the service controller ATA cable," on page 665
You must position the ATA (Advanced Technology Attachment) cable correctly when you fit it in the SAN Volume Controller 2145-4F2 to avoid damaging the cable.

Replacing the service controller

You can replace the SAN Volume Controller service controller.

Related concepts

"SAN Volume Controller menu options" on page 148
During normal operations, menu options are available on the front panel display of the SAN Volume Controller node.

Related tasks

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Viewing the node status" on page 75
You can view the properties for a node from the Viewing General Details panel.

"Viewing the vital product data" on page 133
You can view the vital product data for a node from the Viewing Vital Product Data panel.

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Replacing the front panel on the SAN Volume Controller 2145-4F2" on page 563
You can remove the front panel of the SAN Volume Controller 2145-4F2 in order to replace it.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

"Displaying the vital product data using the CLI" on page 134
You can use the command-line interface (CLI) to display the SAN Volume Controller cluster or node vital product data (VPD).

Replacing the SAN Volume Controller 2145-8G4 service controller

Perform the following steps to replace the SAN Volume Controller 2145-8G4 service controller:

1. Gently push the service controller (shown in Figure 143 on page 474) into the frame until the rear connectors are fully seated and the service controller front metal work is up to the frame.

Figure 143. SAN Volume Controller 2145-8G4 service controller

2. Slide the SAN Volume Controller 2145-8G4 back into the rack and check that all cables are still firmly in place.
3. Connect the power cable to the SAN Volume Controller 2145-8G4 and replace the cable retention bracket.

   Note: The worldwide port names (WWPNs) of the fibre-channel ports are derived from the worldwide node name (WWNN) of the service controller. If you do not perform step 4, you might have to re-zone the fibre-channel switches if the switch zoning uses WWPN. You must restart the host systems before they are able to access disks through this node.
4. If you replaced the service controller as part of concurrent maintenance, you must rewrite the WWNN on the new service controller. If you do not, and the fibre-channel switch zoning uses WWPNs, you cannot add the node back into the cluster until the fibre-channel switches in the SAN are re-zoned. Also, the host systems cannot access the fibre-channel ports on that node until the host systems are rebooted.

   To restore the WWNN, perform the following steps:

   a. Determine the WWNN for the node by examining the VPD of the node or the zoning that is defined in the SAN switch. Record the last five numbers of the WWNN for the node that you are working on.
   b. Start the node by performing a node rescue.
   c. Change the node WWNN by performing the following steps:
      1) On the front panel display, press and release the down button until the Node panel is displayed. Then press and release the right button until the Node WWNN: panel is displayed.
      2) Press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display shows the last five numbers of the WWNN that is currently set. The first number is highlighted.
      3) Change the highlighted number to match the number from the VPD or from customer zoning. Use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
      4) When the displayed value matches the numbers in the VPD or customer zoning, press and release the select button to accept the numbers. The

Node WWNN: panel is displayed and the second line shows the last five numbers of the restored WWNN.

Wait one minute. If `Cluster:` is displayed on the front panel, this indicates that the node is ready to be added to the cluster. If `Cluster:` does not display, see the *IBM System Storage SAN Volume Controller: Service Guide* to determine how to address this problem or contact the IBM Support Center.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 service controller

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 service controller:

1. Place the retention clip (**2** in Figure 144) over the locating holes on the left side of the service controller.

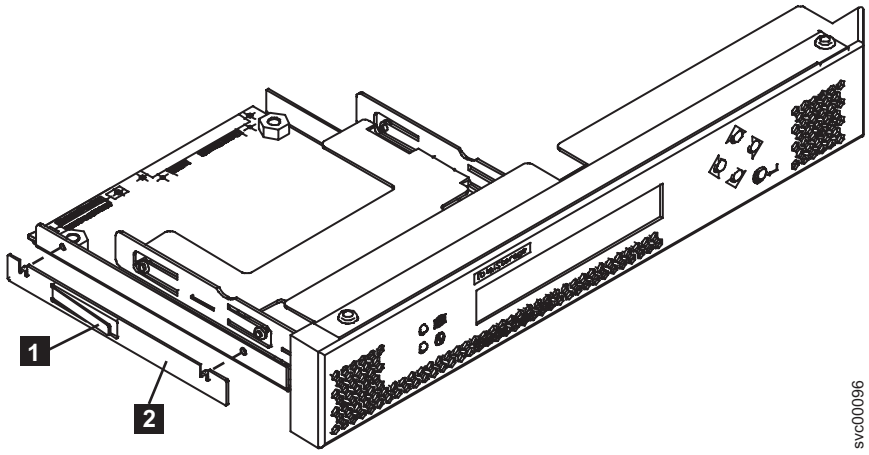


Figure 144. The SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 service controller

2. Push the service controller into the cage until the retention clip engages.
3. Relocate the cage assembly and close the blue levers to secure the cage assembly to the frame.
4. Close the fan door (**1** in Figure 145 on page 476) and replace the node in the rack.

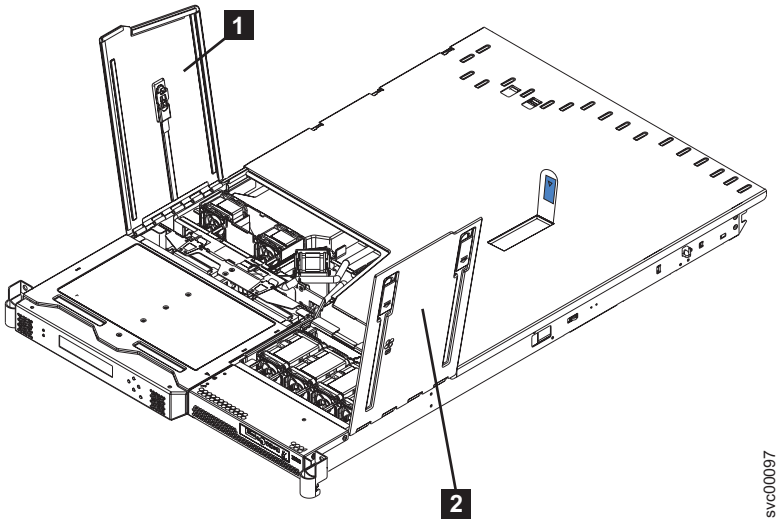


Figure 145. The SAN Volume Controller 2145-8F4 or the SAN Volume Controller 2145-8F2 with fan doors open

Note: The worldwide port names (WWPNs) of the fibre-channel ports are derived from the worldwide node name (WWNN) of the service controller. If you do not perform step 5, you might have to re-zone the fibre-channel switches if the switch zoning uses WWPN. You must restart the host systems before they are able to access disks through this node.

5. If you replaced the service controller as part of concurrent maintenance, you must rewrite the WWNN on the new service controller. If you do not, and the fibre-channel switch zoning uses WWPNs, you cannot add the node back into the cluster until the fibre-channel switches in the SAN are re-zoned. Also, the host systems cannot access the fibre-channel ports on that node until the host systems are rebooted.

   To restore the WWNN, perform the following steps:

   a. Determine the WWNN for the node by examining the VPD of the node or the zoning that is defined in the SAN switch. Record the last five numbers of the WWNN for the node that you are working on.
   b. Start the node by performing a node rescue.
   c. Change the node WWNN by performing the following steps:
      1) On the front panel display, press and release the down button until the Node panel is displayed. Then press and release the right button until the Node WWNN: panel is displayed.
      2) Press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display shows the last five numbers of the WWNN that is currently set. The first number is highlighted.
      3) Change the highlighted number to match the number from the VPD or from customer zoning. Use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
      4) When the displayed value matches the numbers in the VPD or customer zoning, press and release the select button to accept the numbers. The Node WWNN: panel is displayed and the second line shows the last five numbers of the restored WWNN.

Wait one minute. If `Cluster:` is displayed on the front panel, this indicates that the node is ready to be added to the cluster. If `Cluster:` does not display, see the *IBM System Storage SAN Volume Controller: Service Guide* to determine how to address this problem or contact the IBM Support Center.

Replacing the SAN Volume Controller 2145-4F2 service controller

Attention: If you are replacing the service controller as part of a problem determination procedure, you must also replace the cables that are supplied as part of the service controller field replaceable unit (FRU). If you are replacing the service controller *and* the disk drive as part of the same repair operation, see "Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479.

Perform the following steps to replace the service controller:

1. Carefully push the service controller (**1** in Figure 146) into the SAN Volume Controller 2145-4F2.

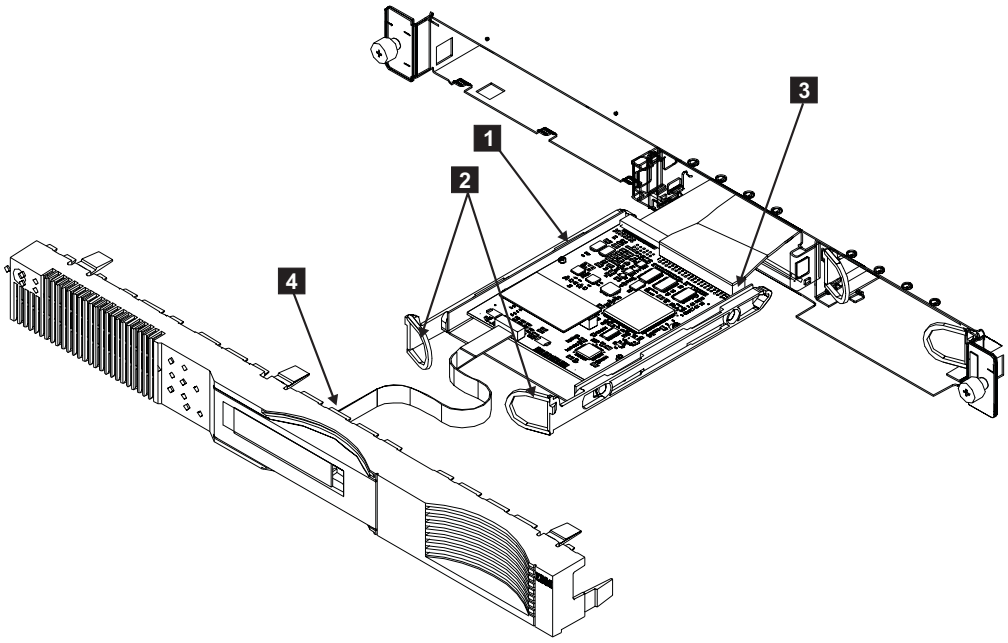


Figure 146. The SAN Volume Controller 2145-4F2 service controller

Notes:

a. The 40-way cable connector is keyed.

b. Before you reconnect the ribbon cable, ensure that its contacts are downward. *Carefully* install the cable to the rear of the service controller, being sure to install the cable straight in with no rocking or twisting during installation. Be sure to verify that the dark blue line on each cable connector end is not visible. This ensures that the cable is fully seated. See Figure 147 on page 478 for an example of the cable when it is installed properly and Figure 148 on page 478 for an example of the cable when it is not installed properly.

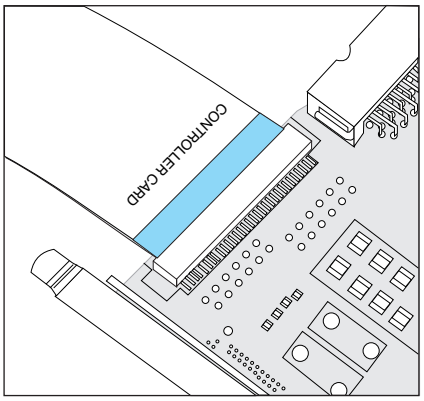


Figure 147. Service Controller card cable installed properly

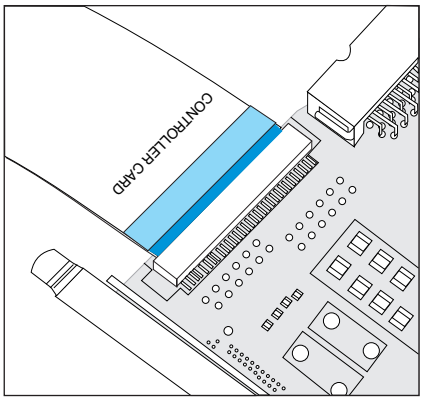


Figure 148. Service Controller card cable not properly seated

c. When you install the service controller, ensure that the cables do not come in contact with the fan assembly that is mounted behind the service controller bay. Fold the cables under the service controller as you push the service controller into the SAN Volume Controller 2145-4F2. Keep pushing the service controller until the latches click into place.

d. From the inside of the SAN Volume Controller 2145-4F2, ensure that the cables are correctly attached to the service controller.

2. Place the front panel on the SAN Volume Controller 2145-4F2.
3. Place the top cover back on the SAN Volume Controller 2145-4F2.
4. Place the SAN Volume Controller 2145-4F2 in the rack.
5. Restore all power to the SAN Volume Controller 2145-4F2.

   Note: The worldwide port names of the fibre-channel ports are derived from the worldwide node name (WWNN) of the service controller. If you do not rewrite the WWNN on the new service controller, you must restart the host systems before they are able to access disks through this SAN Volume Controller 2145-4F2.

6. If you are replacing the service controller as part of concurrent maintenance, you must rewrite the WWNN on the new service controller. Failure to do so means the host systems cannot access the fibre-channel ports on that node until the host systems are rebooted.

Perform the following steps to restore the WWNN:

a. Determine the WWNN for the node by examining the VPD of the node or the zoning that is defined in the SAN switch. Record the last five numbers of the WWNN for the node that you are working on.
b. Start the node by performing a node rescue.
c. Change the node WWNN by performing the following steps:
   1) On the front panel display, press and release the down button until the Node panel is displayed. Then press and release the right button until the Node WWNN: panel is displayed.
   2) Press and hold the down button, press and release the select button, and then release the down button. The display switches into edit mode. `Edit WWNN` is displayed on line 1. Line 2 of the display shows the last five numbers of the WWNN that is currently set. The first number is highlighted.
   3) Change the highlighted number to match the number from the VPD or from customer zoning. Use the up and down buttons to increase or decrease the numbers. The numbers wrap F to 0 or 0 to F. Use the left and right buttons to move between the numbers.
   4) When the displayed value matches the numbers in the VPD or customer zoning, press and release the select button to accept the numbers. The Node WWNN: panel is displayed and the second line shows the last five numbers of the restored WWNN.

Wait one minute. If `Cluster:` is displayed on the front panel, this indicates that the node is ready to be added to the cluster. If `Cluster:` does not display, see the *IBM System Storage SAN Volume Controller: Service Guide* to determine how to address this problem or contact the IBM Support Center.

Replacing a disk drive and a service controller on the SAN Volume Controller

When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

Also, if you must replace the hard disk and the service controller at the same time, you cannot boot the node to perform node rescue. Perform the following step to be able to perform node rescue after replacing the disk drive *and* the service controller:

- Swap the service controller with a service controller from a working node. The results are the following:
  - The "new" service controller that is swapped into the working node has its nonvolatile memory updated when the node is booted from the hard disk.
  - The service controller that is swapped into the failed node from the working node contains the operating system that is required to perform node rescue on that failed node.
- When all updates are complete, swap the service controllers again, returning them to their original nodes.

Related tasks

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

Removing and replacing the SAN Volume Controller power cable assembly

Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

The power cable assembly comprises a power cable and a signal cable that are bound together. You can remove the power cable assembly if you have problems with the power supply and suspect that the power or signal cable are defective. When removing the power cable assembly, ensure that you also remove it from the uninterruptible power supply. Perform the following steps to remove the power cable assembly:

1. Check the SAN Volume Controller 2145-8G4 (1 in Figure 149), SAN Volume Controller 2145-8F4 (1 in Figure 150), SAN Volume Controller 2145-8F2 power LED (1 in Figure 150), or the SAN Volume Controller 2145-4F2 power light (1 in Figure 151 on page 481).
   - If the light is on, go to step 2 on page 481.
   - If the light is either off or flashing, power has already been removed from the SAN Volume Controller. Go to step 4 on page 481.

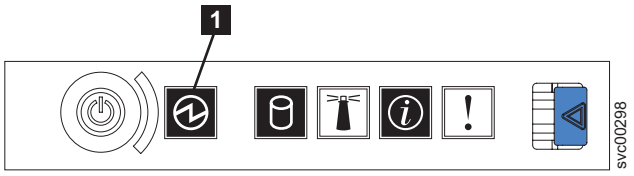


Figure 149. SAN Volume Controller 2145-8G4 operator information panel

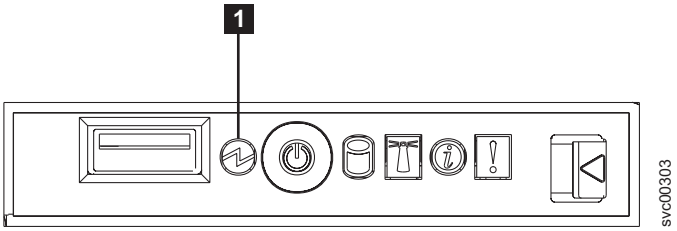


Figure 150. SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 operator information panel

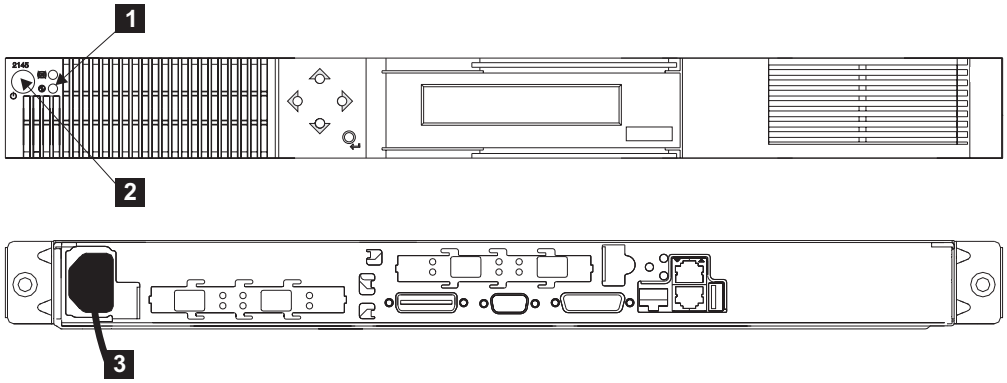


Figure 151. Front and back panel views of the SAN Volume Controller 2145-4F2

1 Power light

2 Power button

3 Power cable

Important: SAN Volume Controller nodes operate in pairs. Both SAN Volume Controller nodes are in the same I/O group. One SAN Volume Controller must be operational if you are servicing the other SAN Volume Controller. If both SAN Volume Controller nodes are not functioning, you cannot access any of the disks in that I/O group.

2. Power off the SAN Volume Controller. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

   Attention: If both SAN Volume Controller nodes are online, removing the power from one SAN Volume Controller causes some performance degradation because I/O operations are automatically rerouted through the other SAN Volume Controller. You must obtain the customer's agreement before you continue with this procedure.

3. Press and release the power control button (SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2) or the power switch (SAN Volume Controller 2145-4F2,) 2 . Wait one minute for the SAN Volume Controller to power off. The other SAN Volume Controllers in the cluster might display an error code indicating that a node is missing from the cluster. Ignore this error code; it is automatically resolved when the repair is complete.
4. Remove the power cable from the back of the SAN Volume Controller.
5. Replace the power cable and make sure it is seated.
6. Replace the SAN Volume Controller cable retention bracket and the 2145-1U uninterruptible power supply cable retention bracket.
7. If the SAN Volume Controller does not turn on automatically, press and release the power switch.

   Note: If the SAN Volume Controller is powered off and it is the only SAN Volume Controller that is connected to the 2145 uninterruptible power supply, the 2145 uninterruptible power supply also powers off within five minutes. You must press the power-on button on the 2145 uninterruptible power supply before the SAN Volume Controller can be powered on. The 2145-1U uninterruptible power supply; however, does not power off when the SAN Volume Controller is shut down from the power button.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Deleting a node from the cluster" on page 77
If it is required, you can delete a node from a cluster.

"Adding a node to a cluster" on page 78
You might have to add a node into the cluster if it has been removed or rejected by a cluster.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

Related reference

"Checking the status of the node using the CLI" on page 75
You can use the command-line interface (CLI) to check the status of the node.

Removing the memory modules (DIMM)

You might need to remove one or more faulty memory modules.

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

Related tasks

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Locating the memory modules

If you do not need to remove all of the memory modules, use this information to locate a specific memory module for the SAN Volume Controller model.

After you locate the location of the faulty memory module, go to "Removing memory modules" on page 484.

SAN Volume Controller 2145-8G4: These modules are numbered **5** through **8** and **1** through **4**, as shown in Figure 152 on page 483.

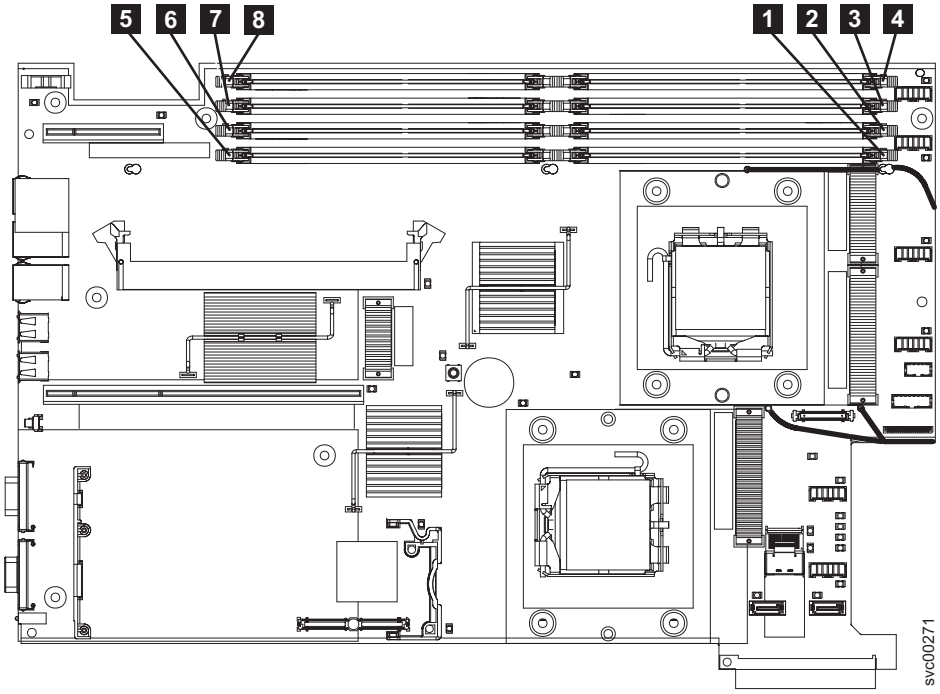


Figure 152. SAN Volume Controller 2145-8G4 system board

SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2: These modules are numbered **1** through **8**, as shown in Figure 153 on page 484.

Note: If more than one SAN Volume Controller 2145-8F2, SAN Volume Controller 2145-8F4, or SAN Volume Controller 2145-8G4 DIMM is indicated by the light path diagnostics, replace the DIMMs one-at-a-time, starting at the lowest numbered DIMM slot that is indicated by the diagnostics.

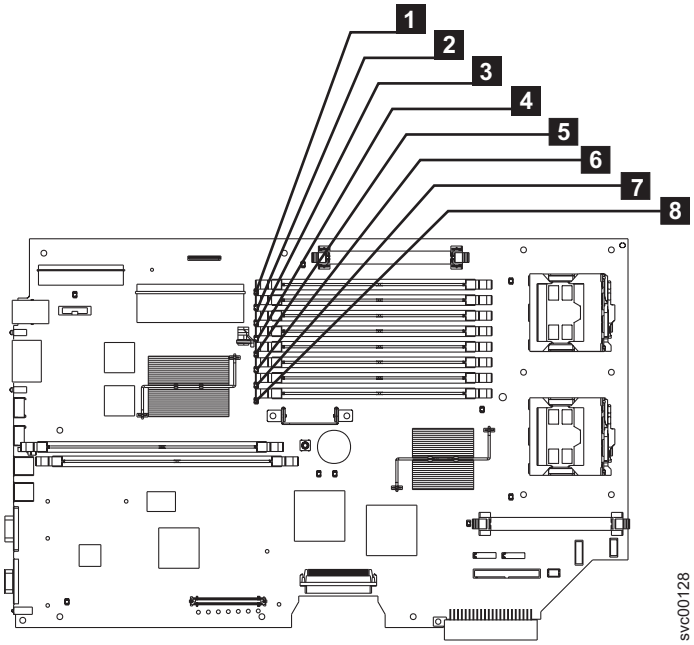


Figure 153. SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 system board

SAN Volume Controller 2145-4F2: When these memory modules are viewed from the front of the node, as shown in Figure 154, the modules are numbered **4** through **1**, from left to right. Modules **4** and **3** are in bank 2; modules **2** and **1** are in bank.

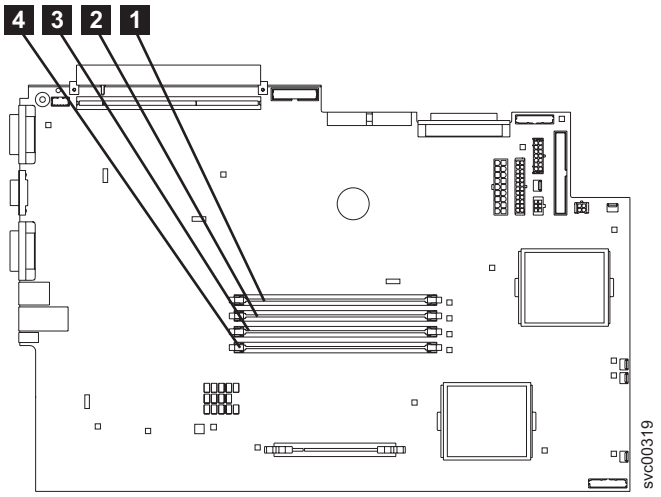


Figure 154. SAN Volume Controller 2145-4F2 system board

Removing memory modules

This topic describes how to remove the memory modules.

Perform the following steps to remove the memory modules:

1. Remove all power from the SAN Volume Controller. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

2. Remove the SAN Volume Controller from the rack. See “Removing the SAN Volume Controller from a rack” on page 435.
3. Remove the top cover from the SAN Volume Controller. See “Removing the top cover” on page 459.

   Attention: If the fault has been isolated only to the bank of modules instead of to a particular module, exchange both modules of the bank. Otherwise, if you need to remove fewer memory modules, see “Locating the memory modules” on page 482. If more than one SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, or SAN Volume Controller 2145-8F2 DIMM is indicated by the light path diagnostics, replace the DIMMs one-at-a-time, starting at the lowest numbered DIMM slot that is indicated by the diagnostics.
4. Open the clips **2** by pressing them outward, as shown in Figure 155. This action pulls the memory module **3** out of the connector.

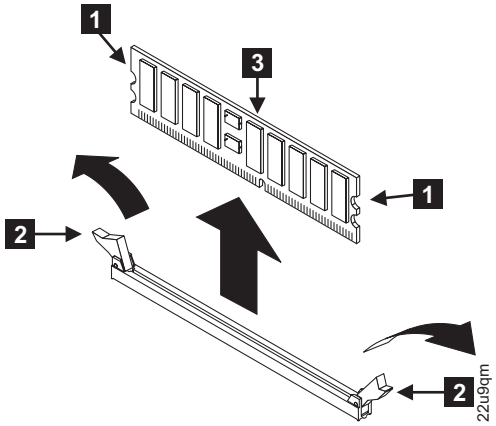


Figure 155. Removing the memory modules

1 Side connector latch

2 Memory clips

3 Memory module

5. If you have other tasks to complete inside the SAN Volume Controller, do those tasks now.

Replacing the memory modules (DIMM)

The memory modules are electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity.

These instructions assume the following:

- You have turned off all power to the SAN Volume Controller node.
- You have removed the node from the rack.
- You have removed the top cover from the node.
- You have removed the memory module to be replaced.

Perform the following steps to replace the memory modules:

Attention: To avoid breaking the retaining clips or damaging the memory module connectors, open and close the clips gently.

1. With the clips 2 open, lower the memory module 3 into the connector, as shown in Figure 156. Close the clips by pressing them inward.

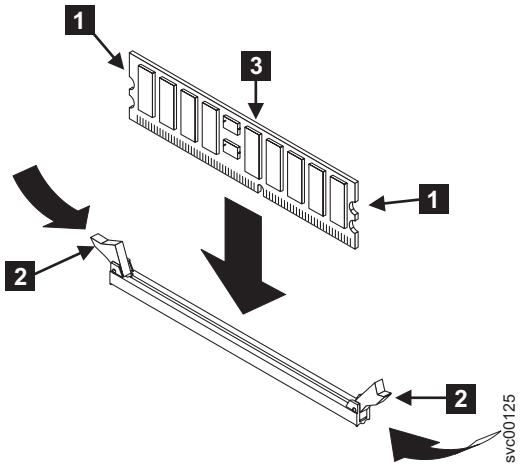


Figure 156. Replacing a memory module

2. Replace the top cover on the node.
3. Replace the node in the rack.
4. Restore all power to the node. If a node error between 511 and 515 displays on the front panel, complete the following steps:
   a. Use the power button to power off the node.
   b. Remove the power cable from the node.
   c. Wait 20 seconds and then replace the power cable.
   d. Power on the node.
   e. If the error displays again, the memory bank might be disabled.
      - For the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and the SAN Volume Controller 2145-8F2 nodes, complete the following steps to enable a disabled memory bank:
        1) Use the power button to power off the node.
        2) Attach the display and keyboard to the rear panel connectors. No special cables are required.
        3) Power on the node and press F1 until you the setup menu displays.
        4) Go to the configuration menu, select **Memory**, and enable the disabled memory bank.
        5) Save the settings, exit the configuration program, and then restart the node.
      - For the SAN Volume Controller 2145-4F2 node, complete the following steps to enable a disabled memory bank:
        1) Order a CT2 cable (part number 00N7004). The cable is a 3-in-1 keyboard, display, and mouse cable that plugs into the C2T OUT port 2 on the rear of the node, as shown in Figure 157 on page 487.

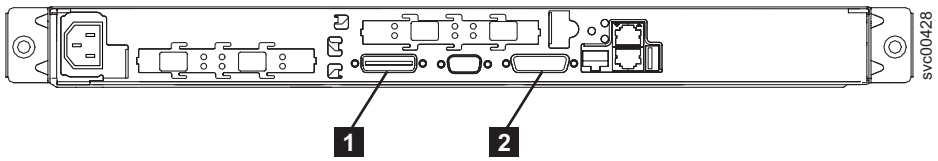


Figure 157. SAN Volume Controller 2145-4F2 CT2 IN and CT2 OUT ports

1 C2T IN

2 C2T OUT

2) Connect the C2T cable to the C2T OUT port with the display and keyboard attached.
3) Power on the node and press F1 on the keyboard during restart. This takes you into the server BIOS. A message displays that memory bank *x* is disabled.
4) Go to the configuration menu in BIOS, select **Memory**, and use the Tab key to toggle memory bank *x* from `disabled` to `enabled`.
5) Save the settings and restart the node.

f. If the error displays again, remove and replace the memory module again to ensure that it is seated correctly. If that does not resolve the error, the memory module connector might be the problem. Replace the system board on the SAN Volume Controller 2145-8G4 and the SAN Volume Controller 2145-4F2 or the frame assembly on the SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the disk drive

You might have to remove the disk drive for a service action.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Replacing the disk drive" on page 494
You might have to replace the disk drive for a service action.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Performing the node rescue" on page 130
If it is necessary to replace the hard disk drive or if the software on the hard disk drive is corrupted, you can use the node rescue procedure to reinstall the SAN Volume Controller software.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Related reference

"Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479
When you replace a service controller at the same time that you replace the disk drive, you cannot perform a node rescue because the nonvolatile memory in the "new" service controller does not contain the operating system software required to do so.

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8G4 SATA disk drive

This topic describes how to remove the SAN Volume Controller 2145-8G4 SATA disk drive.

You can remove the SAN Volume Controller 2145-8G4 disk drive after you shut down the node.

Perform the following steps to remove the SAN Volume Controller 2145-8G4 disk drive:

1. Make sure that the SAN Volume Controller 2145-8G4 cover is in place and fully closed.

   Attention: To avoid damage to the hard disk drive connectors, make sure that the SAN Volume Controller 2145-8G4 cover is in place and fully closed whenever you install or remove a hard disk drive.
2. Power off the SAN Volume Controller 2145-8G4 and disconnect all power cords. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394 for more information.
3. Remove the service controller. See "Removing the service controller" on page 465.
4. Pull the loops of the drive tray (shown in Figure 158) toward each other and pull the tray out of the bay.

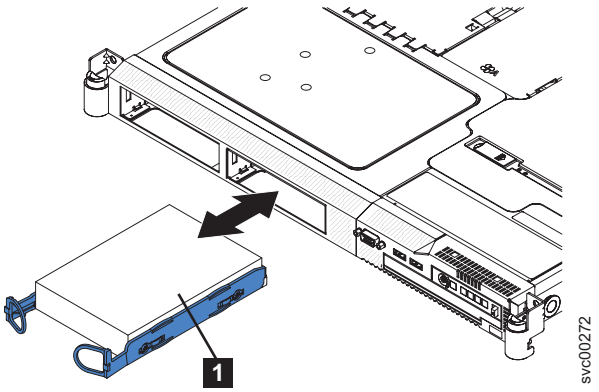


Figure 158. Removing the SATA disk drive from the SAN Volume Controller 2145-8G4

Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 SATA disk drive

You can remove the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 disk drive after you shut down the node.

Perform the following steps to remove the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 disk drive:

1. Turn off the power to the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394 for more information.
2. Remove and disconnect all power cords and external signal cables.
3. Remove the node from the rack.
4. Open fan door A (**1** in Figure 159).
5. Remove the service controller. See "Removing the service controller" on page 465.
6. Pull the disk drive out of the bay.

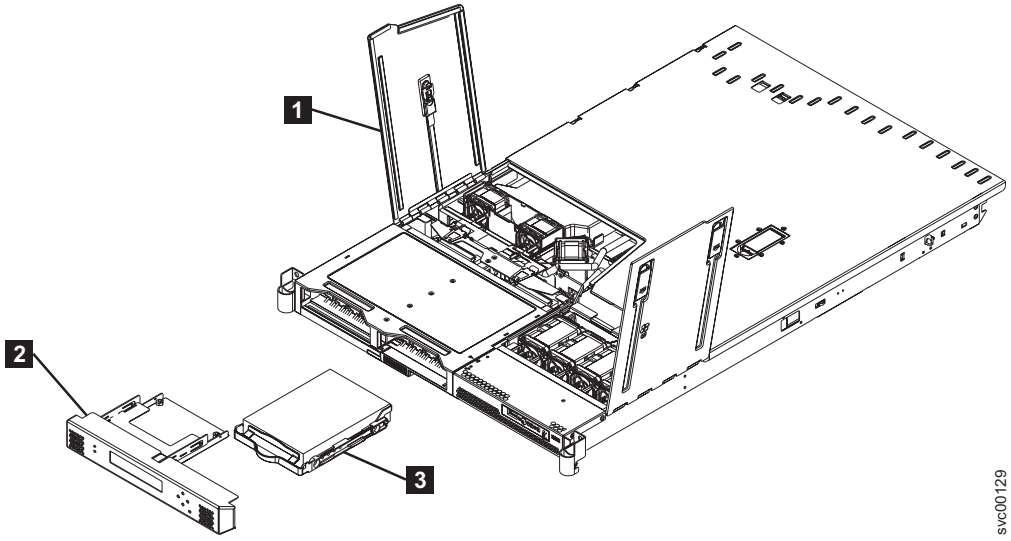


Figure 159. Removing the SATA disk drive

1 Fan door A

2 Service controller

3 SATA disk drive

You may now replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 disk drive.

Removing the SAN Volume Controller 2145-4F2 disk drive

Attention:

- Handle the disk drive with care and keep it away from strong magnetic fields.
- The disk drive is electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity. See the documentation on handling static-sensitive devices.

Perform the following steps to remove the disk drive and cables:

1. Verify that all operations between the SAN Volume Controller 2145-4F2 and the host system have been stopped.
2. Remove all power from the SAN Volume Controller 2145-4F2. See “MAP 5350: Powering off a SAN Volume Controller node” on page 394 for more information.
3. Remove the SAN Volume Controller 2145-4F2 from the rack.
4. Remove the top cover of the SAN Volume Controller 2145-4F2.
5. Disconnect the SCSI signal connector **1** and the power connector **2** from the back of the disk drive.

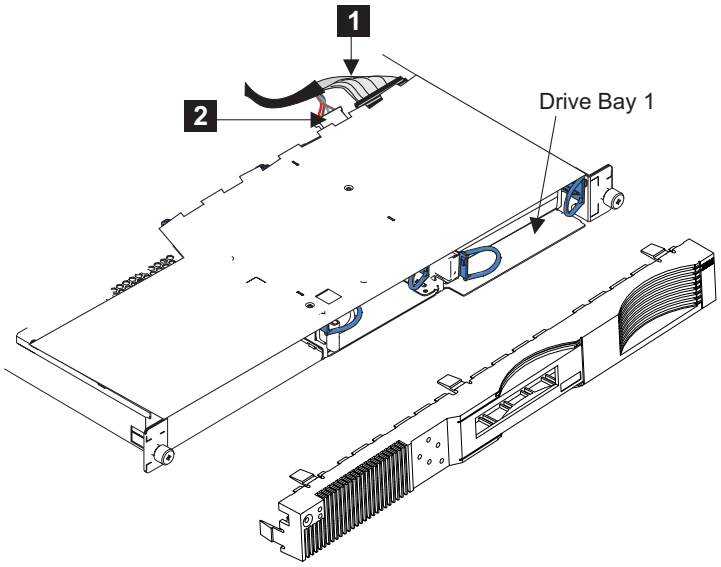


Figure 160. SAN Volume Controller 2145-4F2 disk drive

6. Remove the front panel.
7. Pull the two handles to release the latches, and pull the disk drive forward and out of the SAN Volume Controller 2145-4F2.
8. If you are exchanging the disk drive for another, locate the rails and screws that are shipped with the new disk drive. Attach the rails to the disk drive, as shown in Figure 161.

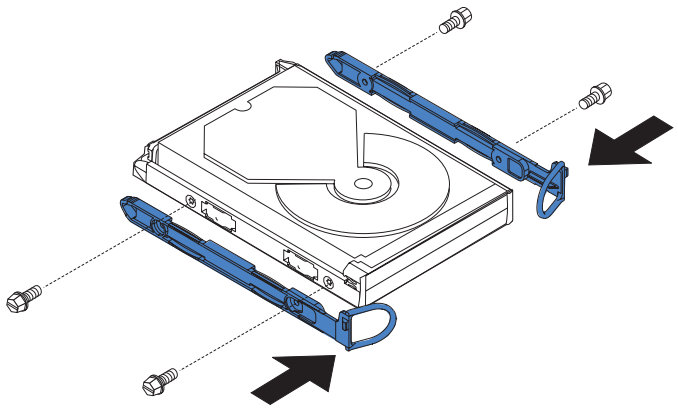


Figure 161. Attaching the rails to the SAN Volume Controller 2145-4F2 disk drive

9. Check whether the old disk drive has any jumpers installed. If it does, install matching jumpers onto the new disk drive. Figure 162 shows the location of the jumpers.

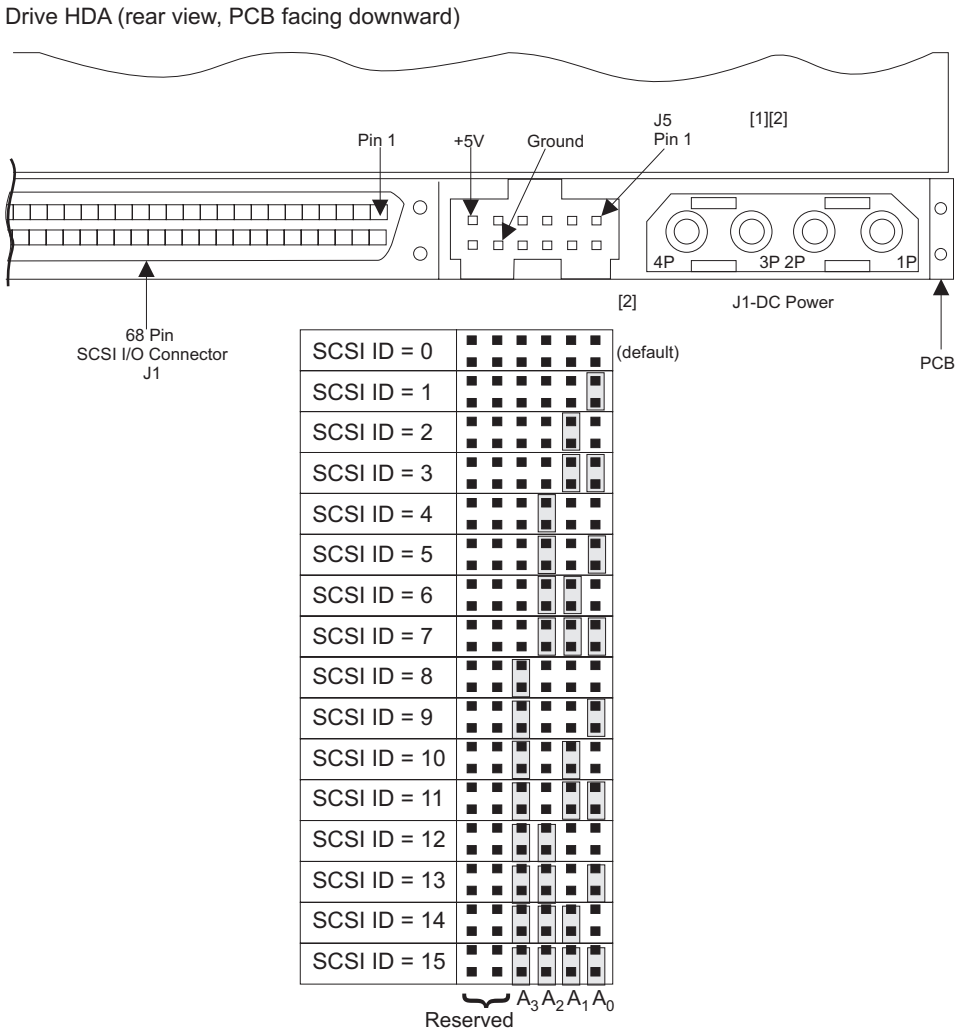


Figure 162. SAN Volume Controller 2145-4F2 disk drive jumpers

If you have any tasks that you need to perform while the service controller is removed, do them now.

Note: When you install the disk drive, push it into the SAN Volume Controller 2145-4F2 until the latches click into place.

10. After you replace a disk drive, you must reinstall the software on the SAN Volume Controller 2145-4F2 by using the node rescue procedure.

Note: If you must replace the hard disk and the service controller at the same time, you cannot start the node to perform node rescue. See "Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479.

Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate

You might have to remove the SATA backplate for a service action.

To remove the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate, complete the following steps.

1. Power off the node. See “MAP 5350: Powering off a SAN Volume Controller node” on page 394.
2. Disconnect and remove all power cords.
3. Remove the node from the rack. See “Removing the SAN Volume Controller from a rack” on page 435.
4. Remove the service controller. See “Removing the service controller” on page 465.
5. Pull the hard disk drive out of the node slightly to disengage it from the backplate.
6. Remove the top cover from the SAN Volume Controller 2145-8G4. See “Removing the top cover” on page 459.
7. Disconnect the two blue signal cables from the system board and disconnect the power cable from the power supply backplane card.
8. Press the locking tab **1**, which is shown in Figure 163, and lift the backplate out of the node slightly. Disconnect the power cable and remove the backplate.

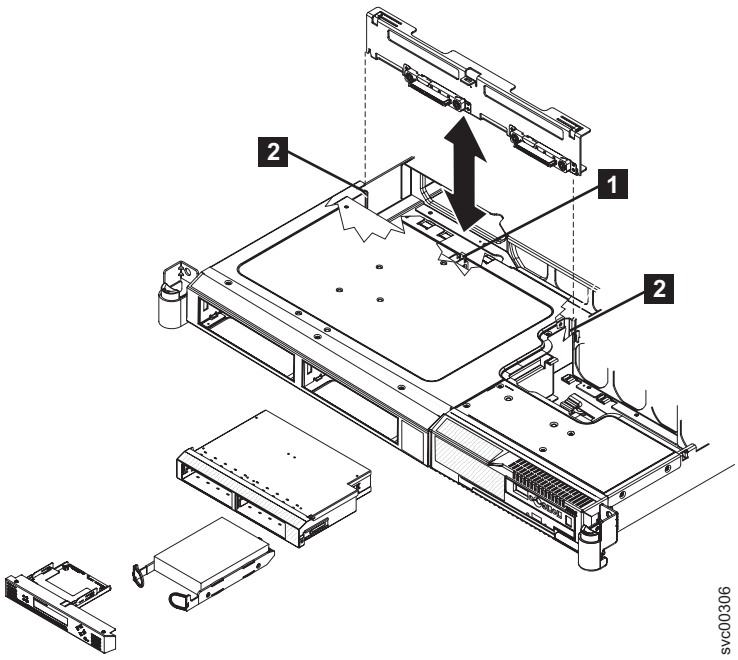


Figure 163. Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate

1 Locking tab

2 Mounting channel

Related tasks

“Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate” on page 497
You might have to replace the SATA backplate for a service action.

“Removing the SAN Volume Controller from a rack” on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

Removing the SAN Volume Controller 2145-4F2 disk drive cables

The disk drive cables must be removed if they become defective or if you want to replace them.

Perform the following steps to remove the disk drive cables:

1. Remove all power from the SAN Volume Controller 2145-4F2 node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack. See "Removing the SAN Volume Controller from a rack" on page 435.
3. Remove the top cover from the SAN Volume Controller 2145-4F2 node. See "Removing the top cover" on page 459.
4. Disconnect the SCSI signal connector **1** and the power connector **2** from the back of the disk drive, as shown in Figure 164, and then remove the cable.

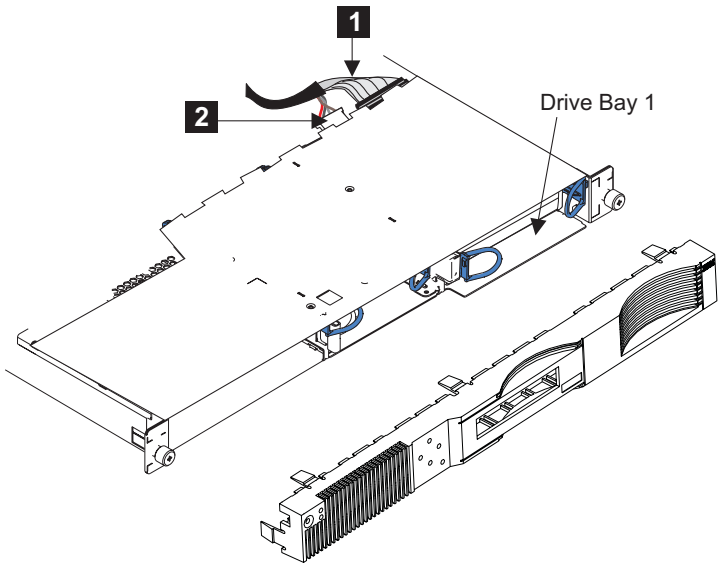


Figure 164. SAN Volume Controller 2145-4F2 disk drive

If you have any other tasks to do inside the SAN Volume Controller 2145-4F2 node, do those tasks now.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

Replacing the disk drive

You might have to replace the disk drive for a service action.

The following topics describe how to remove the SATA disk drive.

Related tasks

"Removing the disk drive" on page 487
You might have to remove the disk drive for a service action.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 497
You might have to replace the SATA backplate for a service action.

Replacing the SAN Volume Controller 2145-8G4 SATA disk drive

This topic describes how to replace the SAN Volume Controller 2145-8G4 SATA disk drive.

You can replace the SAN Volume Controller 2145-8G4 SATA (serial advanced technology attachment) disk drive after you remove the existing disk drive.

Perform the following steps to replace the SAN Volume Controller 2145-8G4 disk drive:

1. Make sure that the node cover is in place and fully closed.

   Attention: To avoid damage to the hard disk drive connectors, make sure that the node cover is in place and fully closed whenever you remove or replace a hard disk drive.
2. Find the rails assembly and screws that are shipped with the new disk drive. Attach the rails assembly to the disk drive with four screws, as shown in Figure 165 on page 495, using two on each side of the disk.

Figure 165. Attaching the rails assembly to the SAN Volume Controller 2145-8G4 SATA disk drive

3. Pull the loops of the rails toward each other and slide the drive into the node until the drive connects to the backplate.
4. Release the loops of the drive tray.
5. Replace the service controller. See "Replacing the service controller" on page 472.
6. Reconnect the power cords and all external signal cables. When powering on the node, use the node rescue procedure to install the SAN Volume Controller software on the new disk. Then add the node back into the cluster. .

   Note: If you must replace the hard disk and the service controller at the same time, you cannot start the node to perform node rescue. See "Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479.
7. Power-on the node.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 SATA disk drive

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 SATA (serial advanced technology attachment) disk drive can be replaced after you remove the existing disk drive.

Perform the following steps to replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 disk drive:

1. Slide the disk drive into the bay until the rear of the drive snaps into place with the rear panel-mount connector.
2. Place the service controller in the node. See "Replacing the service controller" on page 472.
3. Replace the node in the rack.
4. Reconnect the power cords and all external signal cables. When powering on the node, use the node rescue procedure to install the SAN Volume Controller software on the new disk. Then add the node back into the cluster. .

Note: If you must replace the hard disk and the service controller at the same time, you cannot start the node to perform node rescue. See "Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479.

5. Power-on the node.

Replacing the SAN Volume Controller 2145-4F2 disk drive

Attention:

- Handle the disk drive with care and keep it away from strong magnetic fields.
- The disk drive is electrostatic-discharge (ESD) sensitive. Take precautions to avoid damage from static electricity. See the documentation on handling static-sensitive devices.

Perform the following steps to replace the disk drive and cables:

1. Find the rails and screws that are shipped with the new disk drive and attach the rails to the disk drive, as shown in Figure 166.

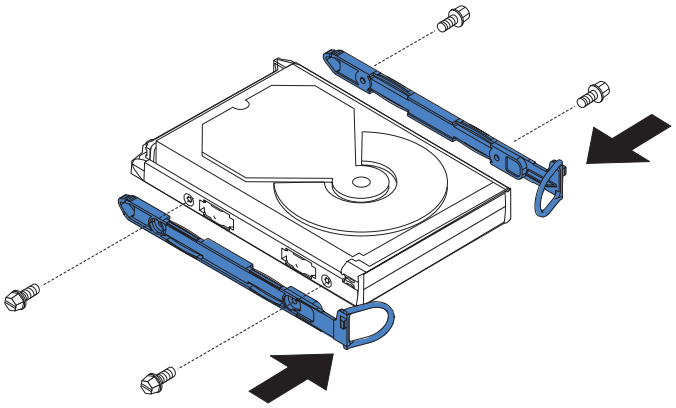


Figure 166. Attaching the rails to the SAN Volume Controller 2145-4F2 disk drive

2. Push the disk drive forward and into the SAN Volume Controller 2145-4F2.

   Note: When you install the disk drive, push it into the SAN Volume Controller 2145-4F2 until the latches click into place.

3. Restore the front panel.
4. Connect the SCSI signal connector **1** and the power connector **2**, which are shown in Figure 167 on page 497, to the back of the disk drive.

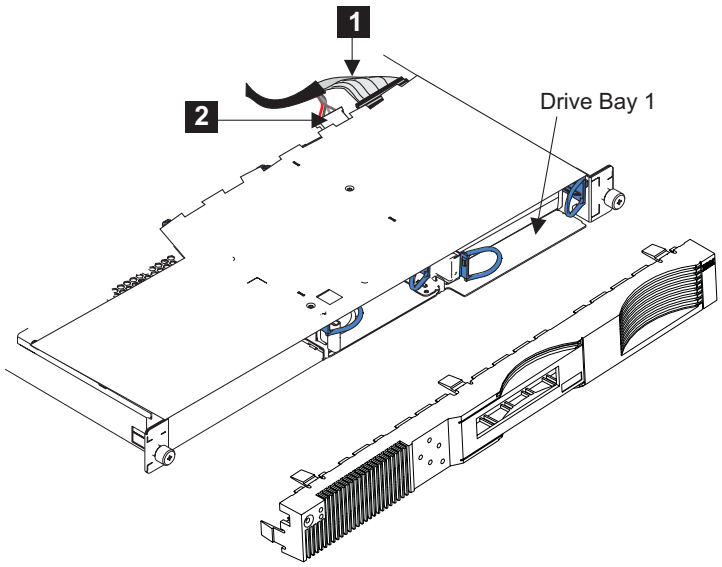


Figure 167. Replacing the SAN Volume Controller 2145-4F2 disk drive

5. Replace the top cover of the SAN Volume Controller 2145-4F2.
6. Place the SAN Volume Controller 2145-4F2 in the rack.
7. Reconnect the power cords and all external signal cables. When powering on the node, use the node rescue procedure to install the SAN Volume Controller software on the new disk. Then add the node back into the cluster. .

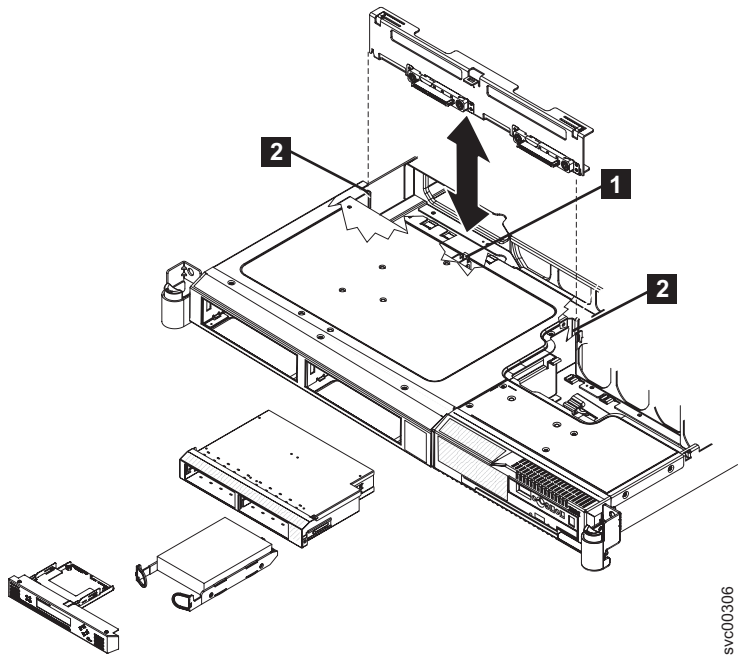
   Note: If you must replace the hard disk and the service controller at the same time, you cannot start the node to perform node rescue. See "Replacing a disk drive and a service controller on the SAN Volume Controller" on page 479.
8. Power-on the node.

Replacing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate

You might have to replace the SATA backplate for a service action.

To replace the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate, complete the following steps.

1. Connect the power cable to the replacement backplate.
2. Slide the backplate into the mounting channels, **2** making sure not to trap or pinch any nearby wires or cables.



1 Locking tab

2 Mounting channel

3. Press firmly until the backplate is fully seated and the locking tab 1 snaps into place.
4. Reconnect the power cable to the power supply backplane card. Then reconnect the two blue signal cables to the system board. The left cable goes to the front system board connector and the right cable goes to the rear system board connector, as shown in Figure 168.

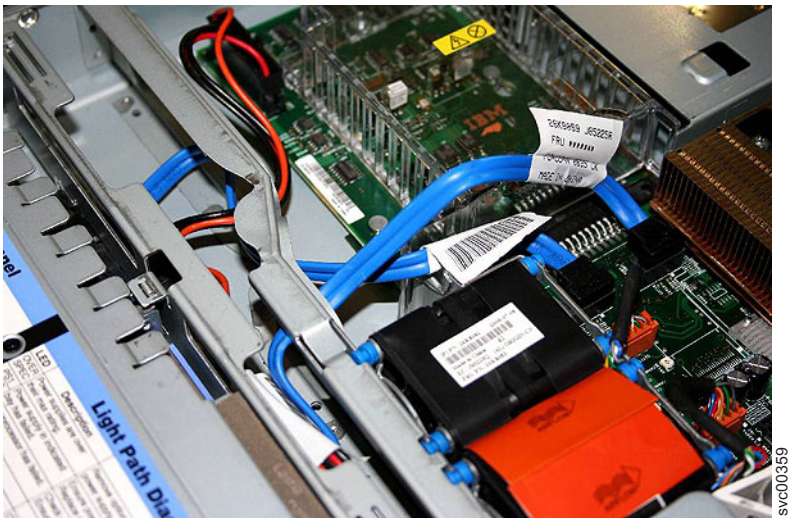


Figure 168. Reconnecting the SATA cable assembly

5. Install the hard disk drive. See "Replacing the disk drive" on page 494.
6. Install the service controller. See "Replacing the service controller" on page 472.
7. Slide the node into the rack.
8. Reconnect the power cords that were removed.

9. Power on the node.

Related tasks

"Removing the SAN Volume Controller 2145-8G4 SATA cable assembly with backplate" on page 491
You might have to remove the SATA backplate for a service action.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

Replacing the SAN Volume Controller 2145-4F2 disk drive cables

The disk drive cables must be replaced if they are removed.

Perform the following steps to replace the SAN Volume Controller 2145-4F2 disk drive cables:

1. Connect the SCSI signal connector **1** and the power connector **2** to the back of the disk drive, as shown in Figure 169, and then replace the cable.

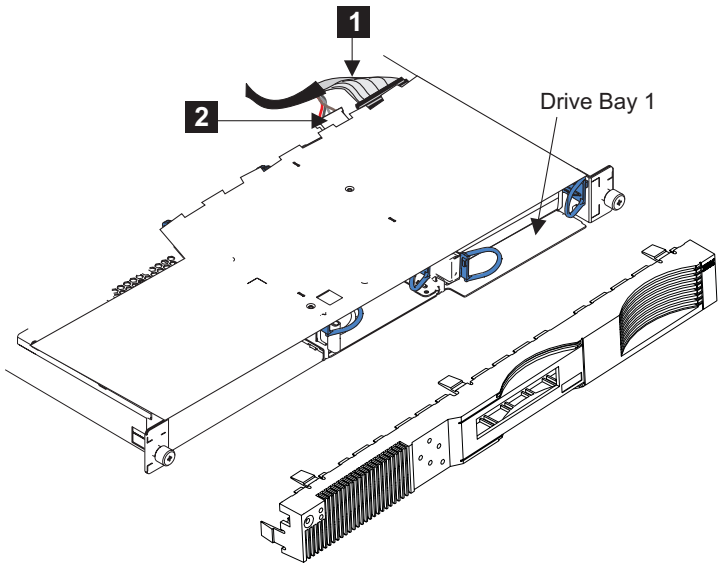


Figure 169. SAN Volume Controller 2145-4F2 disk drive

2. Replace the top cover on the SAN Volume Controller 2145-4F2 node.
3. Place the SAN Volume Controller 2145-4F2 node in the rack.
4. Return power to the SAN Volume Controller 2145-4F2 node.

Replacing the SAN Volume Controller 2145-4F2 disk drive fan

The disk drive fan must be removed if it is defective or if it needs to be replaced.

Perform the following steps to replace the disk drive fan:

1. Remove all power from the SAN Volume Controller 2145-4F2.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.

4. Unplug the power cables connected to the system board.
5. Remove the entire fan assembly **1**, as shown in Figure 170, by sliding the right-hand side of the disk drive fan forward. Then, pull the assembly away from the clip.

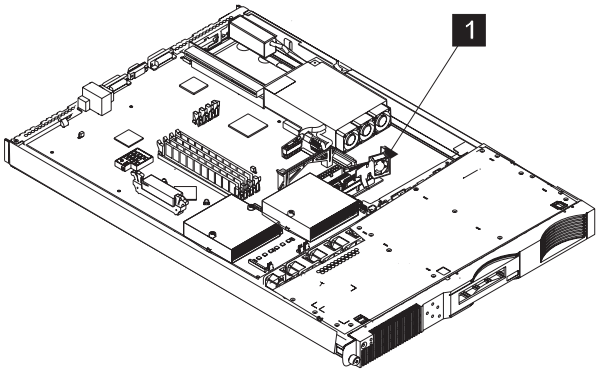


Figure 170. Removing a SAN Volume Controller 2145-4F2 disk drive fan

6. Remove the fan from the bracket by pulling the sides of the bracket apart.
7. Insert the new fan into the bracket by pulling the sides of the bracket apart.
8. If you have any other tasks that you need to perform while the fan is removed, do those tasks now. Otherwise, reinstall the parts in the reverse sequence.

Note:

- The airflow is from the front to the back of the SAN Volume Controller 2145-4F2.
- The fan cable comes out of the back of the fan. When you install a fan, ensure that the back of the fan is facing the back of the SAN Volume Controller 2145-4F2.

Related tasks

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

Removing the CMOS battery

You must remove the system board complementary metal-oxide semiconductor (CMOS), or system-board, battery to replace it or to perform routine maintenance.

This product was designed with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8G4 CMOS battery

This topic describes how to remove the SAN Volume Controller 2145-8G4 CMOS battery.

Perform the following steps to remove the SAN Volume Controller 2145-8G4 CMOS battery:

1. Turn off the SAN Volume Controller 2145-8G4 and disconnect all power cords. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the cover. See "Removing the top cover" on page 459.
3. Locate the battery **1** on the system board. Figure 171 on page 502 shows the location of the battery.

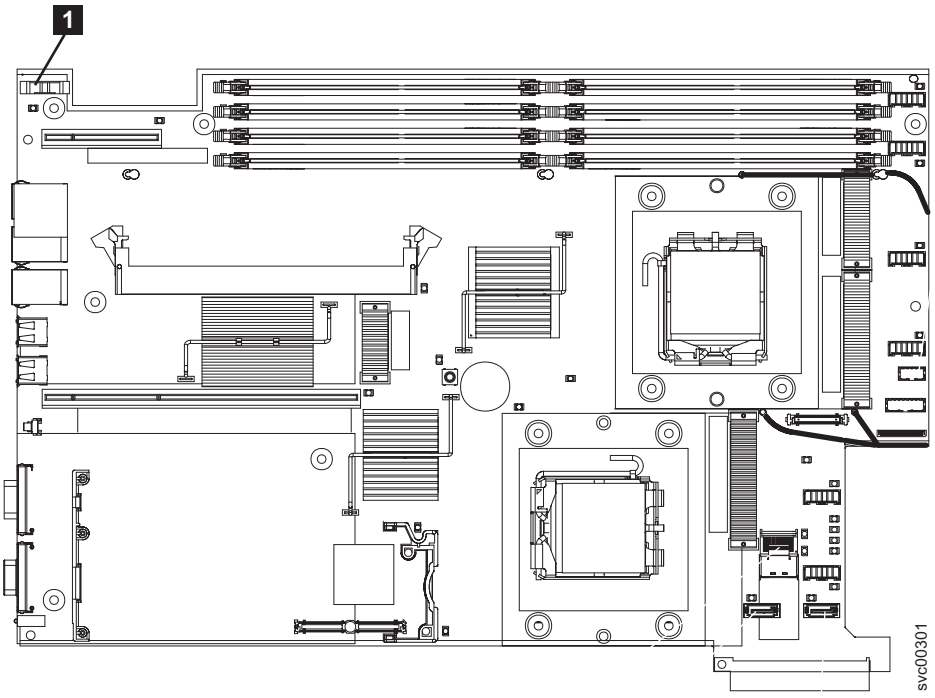


Figure 171. Location of SAN Volume Controller 2145-8G4 CMOS battery holder

4. Remove the CMOS battery, as shown in Figure 172:

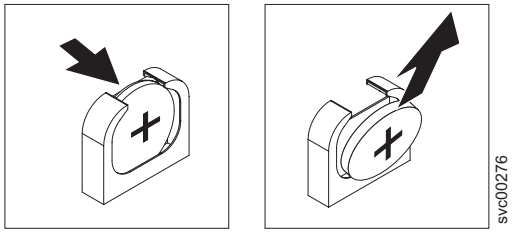


Figure 172. SAN Volume Controller 2145-8G4 CMOS battery holder

   a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when released.
   b. Use your thumb and index finger to lift the battery from the socket.

   CAUTION:
   The battery is a lithium ion battery. To avoid possible explosions, do not burn. Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. (C007a)

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 CMOS battery

The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions.

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

Perform the following steps to remove the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 CMOS battery:

1. Follow any special handling and installation instructions supplied with the battery.
2. Remove all power from the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
3. Remove the node from the rack.
4. Remove the top cover from the node. See "Removing the top cover" on page 459.
5. Locate the battery **1** on the system board. Figure 173 shows the location of the battery.

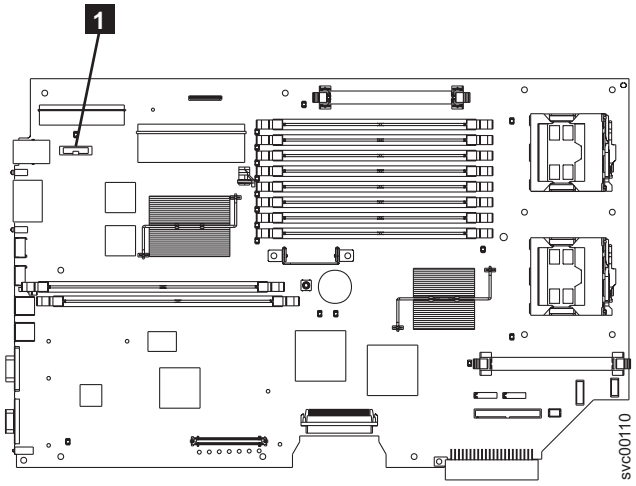


Figure 173. Battery location on the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2

6. Remove the battery:
   a. Use one finger to pull the retainer tab, which is shown in Figure 174 on page 504, that secures the battery to its housing.

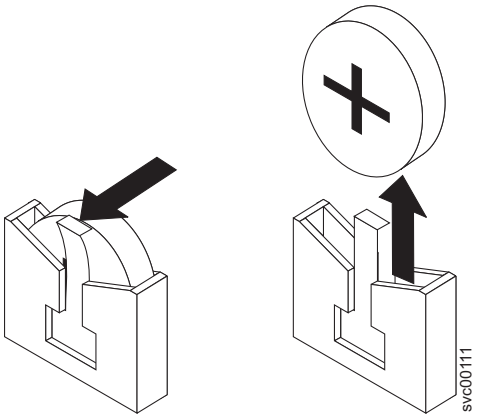


Figure 174. CMOS battery holder

b. Use one finger to slide the battery up and out from its socket.

Removing the SAN Volume Controller 2145-4F2 system-board CMOS battery

CAUTION:
Only trained service personnel may replace this battery. The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C002)

CAUTION:
The battery is a lithium ion battery. To avoid possible explosions, do not burn. Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. (C007a)

Perform the following steps to remove the system-board CMOS battery:

1. Remove all power from the SAN Volume Controller 2145-4F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2. See "Removing the top cover" on page 459.
4. Use a finger to lift the battery clip above the battery, which is shown in Figure 175 on page 505.

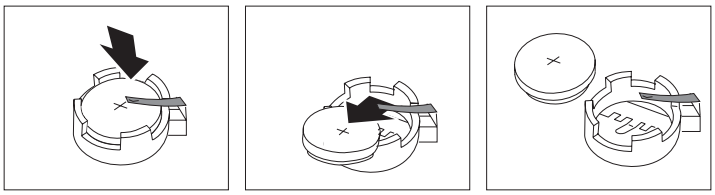


Figure 175. Removing the SAN Volume Controller 2145-4F2 system-board CMOS battery

5. Use one finger to slightly slide the battery out from its socket. The spring mechanism pushes the battery out toward you as you slide it from the socket.
6. Use your thumb and index finger to pull the battery out from under the battery clip.
7. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.

Replacing the CMOS battery

You must replace the system board complementary metal-oxide semiconductor (CMOS) battery after you perform routine maintenance.

The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

Related tasks

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8G4 system-board CMOS battery

This topic describes how to replace the system-board SAN Volume Controller 2145-8G4 CMOS battery.

If you are exchanging the battery for a new one, use only IBM Part Number 33F8354 or a similar type of battery that the manufacturer recommends.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

Perform the following steps to replace the SAN Volume Controller 2145-8G4 system-board CMOS battery:

1. Follow any special handling and installation instructions that come with the replacement battery.
2. Locate the battery on the system board. Figure 176 shows the location (**1**) of the battery.

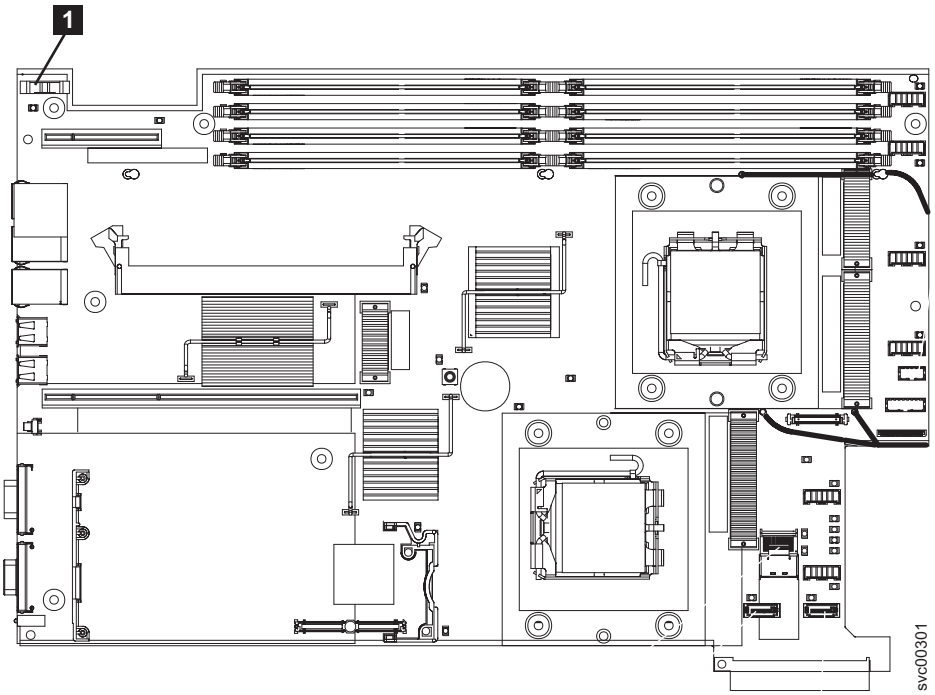


Figure 176. Location of SAN Volume Controller 2145-8G4 CMOS battery holder

3. Insert the new battery:
   a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
   b. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely, as shown in Figure 177 on page 507.

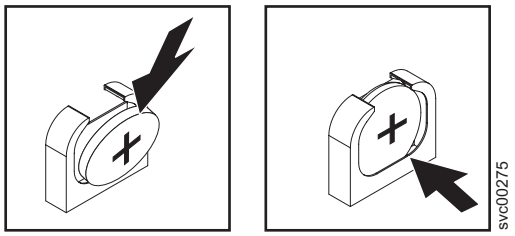


Figure 177. SAN Volume Controller 2145-8G4 CMOS battery holder

4. Replace the cover.
5. Replace the node in the rack.
6. Reconnect the external cables, and then reconnect the power cords and the node.
7. If there is a problem restarting the node, see "MAP 5900: Hardware boot" on page 425 and then connect a monitor and keyboard to the system and reset the BIOS date and time.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 CMOS battery

This product was designed with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to all safety instructions.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

CAUTION:
Only trained service personnel may replace this battery. The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C002)

Perform the following steps to replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 CMOS battery:

1. Insert the new battery in the battery socket. Figure 178 on page 508 shows the location (**1** of the battery socket.

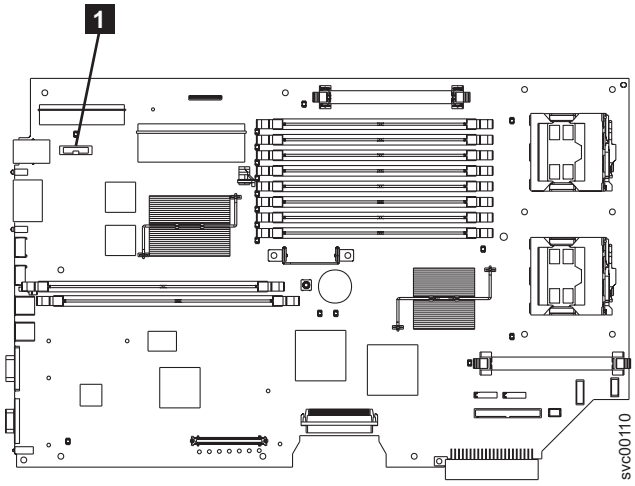


Figure 178. Location of the CMOS battery on the SAN Volume Controller 2145-8F2

a. Hold the battery so that the positive (+) side of the battery is facing toward the center of the server.
b. Pull the retainer tab out of the way so that you can slide the battery into its socket.
c. Slide the battery down until it snaps into place, as shown in Figure 179.

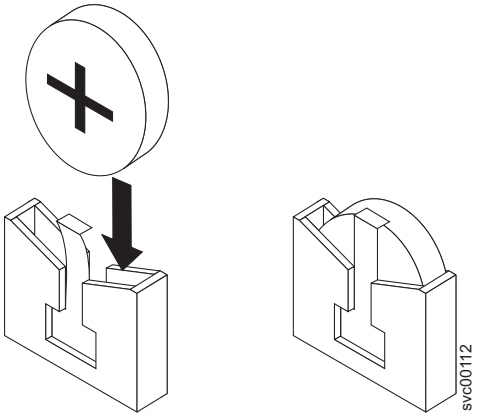


Figure 179. CMOS battery socket

2. Reinstall the node cover.
3. Replace the node in the rack.

Replacing the SAN Volume Controller 2145-4F2 system-board CMOS battery

If you are exchanging the battery for a new one, use only IBM Part Number 33F8354 or a similar type of battery that the manufacturer recommends.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

CAUTION:
Only trained service personnel may replace this battery. The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C002)

CAUTION:
The battery is a lithium ion battery. To avoid possible explosions, do not burn. Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. (C007a)

Perform the following steps to replace the system board CMOS battery.

1. Tilt the battery so that you can insert it into the socket under the battery clip.
2. As you slide it under the battery clip, press the battery down into the socket, as shown in Figure 180.

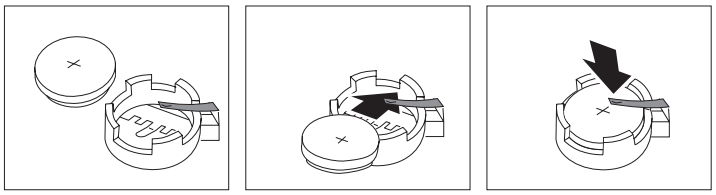


Figure 180. Replacing the SAN Volume Controller 2145-4F2 system board CMOS battery

3. Place the top cover on the SAN Volume Controller 2145-4F2.
4. Place the SAN Volume Controller 2145-4F2 in the rack.
5. Restore all power to the SAN Volume Controller 2145-4F2.

If this SAN Volume Controller 2145-4F2 was the configuration node when the CMOS battery failed, the cluster date and time might not be correct. After replacing the CMOS battery, check the cluster time from the IBM System Storage Productivity Center or master console server and correct it if necessary.

Removing the power supply

You must remove the SAN Volume Controller power supply if you intend to replace it.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Replacing the SAN Volume Controller 2145-4F2 disk drive fan" on page 499
The disk drive fan must be removed if it is defective or if it needs to be replaced.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing a SAN Volume Controller 2145-8G4 power supply

This topic describes how to remove a SAN Volume Controller 2145-8G4 power supply.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8G4 power supply.

Perform the following steps to remove the power supply:

1. Power off the node and disconnect all power cords. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. At the back of the node, remove the cable restraint bracket to gain access to the rear of the node and the power supply **1**.
3. Press and hold down the orange release tab **2**, which is shown in Figure 181, and pull the power supply out of the node.

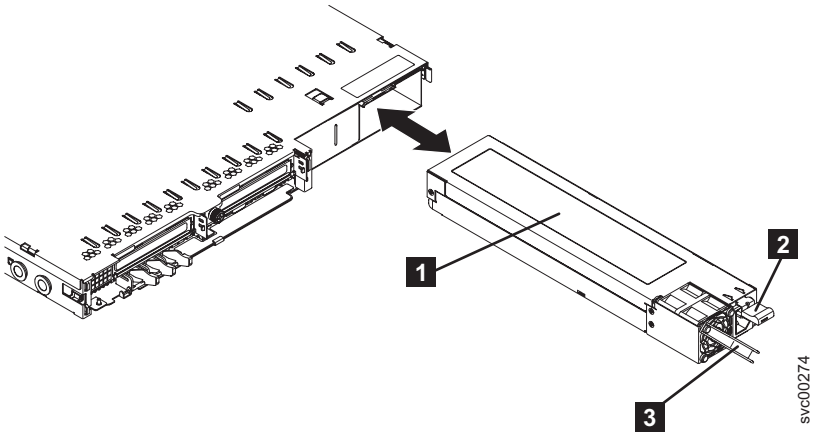


Figure 181. Removing the SAN Volume Controller 2145-8G4 power supply

1 Power supply

2 Power supply release tab

3 Power supply handle

Removing a SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power supply

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power supply.

Perform the following steps to remove the power supply:

1. Power off the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Power off the 2145-1U uninterruptible power supply that is supplying this node.
3. Remove the cable retention bracket and the power cord.
4. From the rear of the node, as shown in Figure 182, push the orange release lever to the left and then push down on it to release the power-supply assembly. This will move the power supply back, slightly, for easy removal.

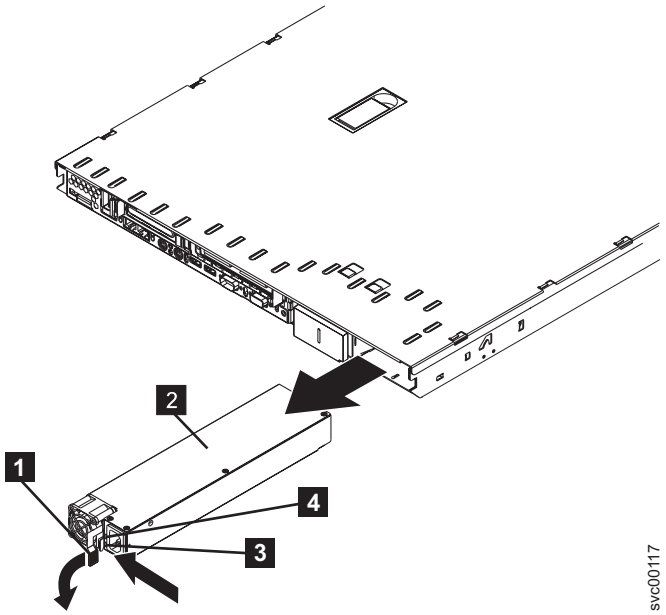


Figure 182. Removing the SAN Volume Controller 2145-8F2 power supply

1. Handle
2. Power supply
3. dc power LED
4. ac power LED

5. Pull the power supply out of the power-supply bay.

Removing the SAN Volume Controller 2145-4F2 power supply

Perform the following steps to remove the power supply:

1. Power off the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.

4. Remove the disk drive fan.
5. Press down on the clip **1** at the front of the power-cable module, as shown in Figure 183, and slide the module toward the front of the SAN Volume Controller 2145-4F2 until the alignment tab is free of the slot that is on the side of the SAN Volume Controller 2145-4F2.

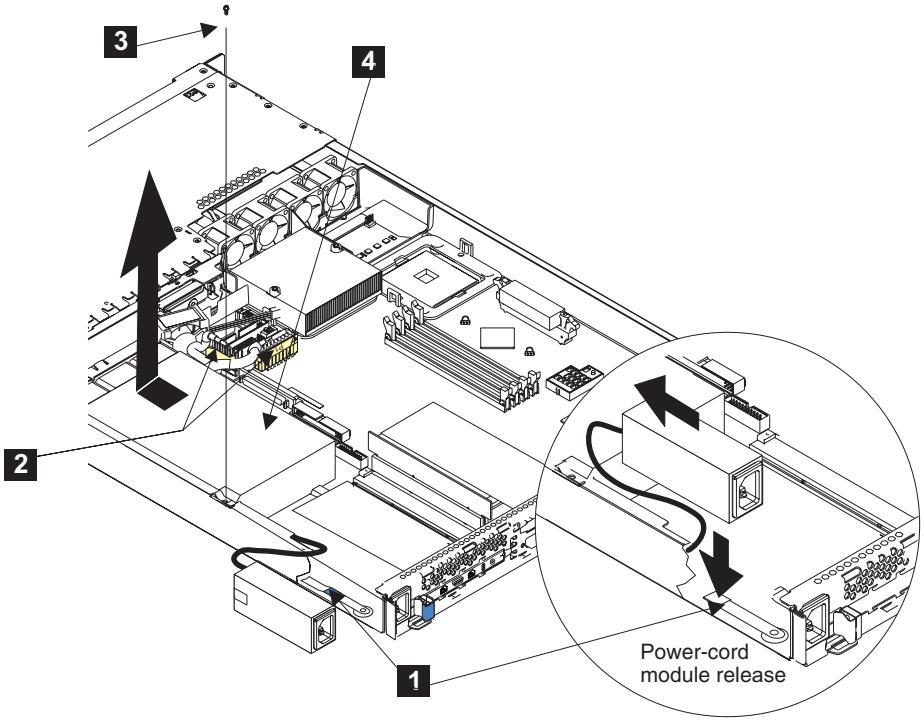


Figure 183. Removing the SAN Volume Controller 2145-4F2 power supply

6. Lift the power-cable module out from the SAN Volume Controller 2145-4F2 as far as its cable allows, and put it to one side.
7. Disconnect the power connector **2**.
8. Remove the screw **3**.
9. Slide the power supply **4** forward, and then lift it from the SAN Volume Controller 2145-4F2.

   The power supply is a complete FRU. Do not try to repair or exchange any part of it.

   Note: For a translation of the following notice, see *IBM Systems Safety Notices*.

   DANGER

Do not open or service any power supply assembly. (D005a)

10. If you have any other tasks to perform while the power supply is removed, do those tasks now.

Replacing the power supply

You might need to replace the SAN Volume Controller power supply for a service action.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing a SAN Volume Controller 2145-8G4 power supply

This topic describes how to replace a SAN Volume Controller 2145-8G4 power supply.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power supply.

Perform the following steps to replace the SAN Volume Controller 2145-8G4 power supply:

1. Grasp the handle on the rear of the power supply (shown in Figure 184) and slide the power supply forward fully into the node until it clicks in place.

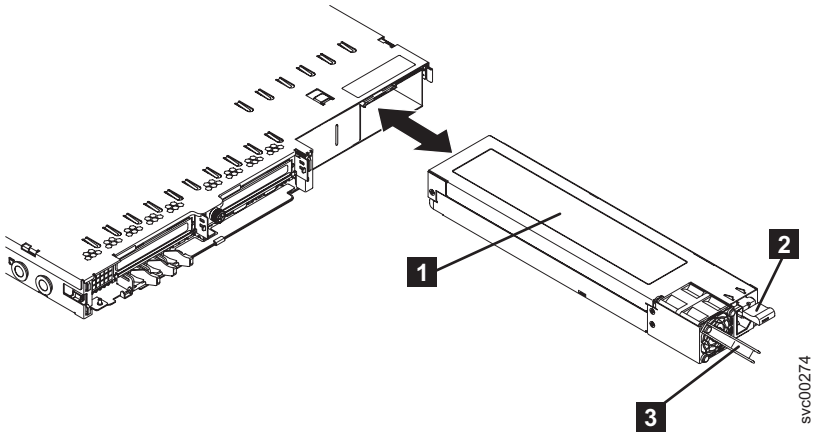


Figure 184. SAN Volume Controller 2145-8G4 power supply

1 Power supply

2 Power supply release tab

3 Power supply handle

2. Connect the power cord to the power-cord connector on the power supply, being sure to route the cord through the cable restraint bracket in order to minimize mechanical strain on the cord.
3. Reconnect the power cord and power-on the 2145-1U uninterruptible power supply.
4. Make sure that the ac power LED **1** and the dc power LED **2** (shown in Figure 185 on page 514) on the power supply are lit, indicating that the power supply is operating correctly. The two green LEDs are next to the power-cord connector.

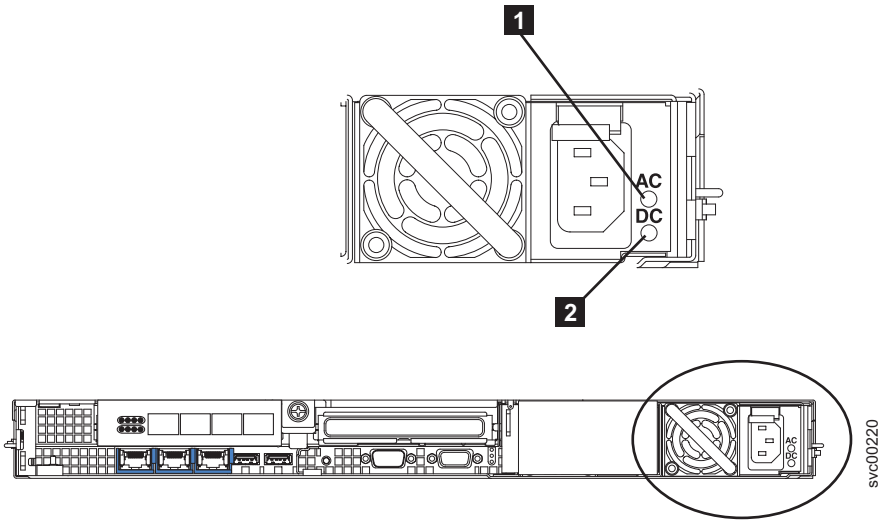


Figure 185. SAN Volume Controller 2145-8G4 ac and dc LEDs

5. Power-on the node.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 power supply

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power supply.

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 power supply:

1. Install the power supply in the empty power supply bay:
   a. Rotate the handle **1** down on the rear of the power supply to the open position, and then slide the power supply forward into the power-supply bay, as shown in Figure 186.

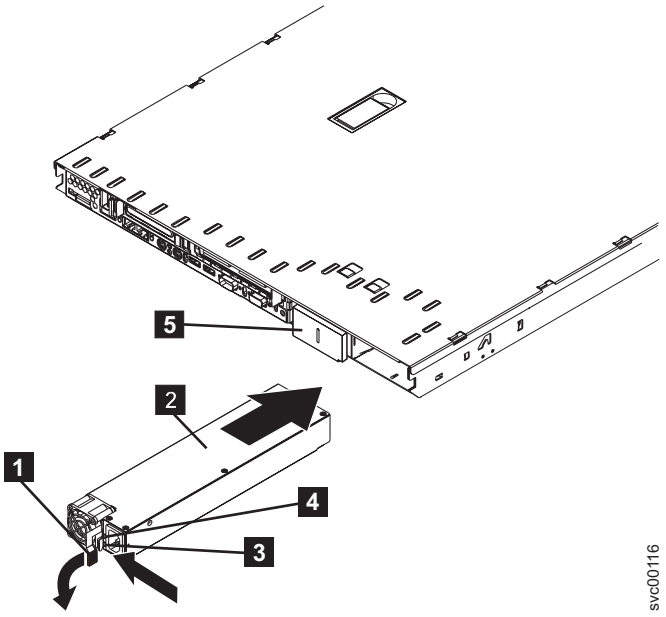


Figure 186. SAN Volume Controller 2145-8F2 power supply handle

1 Handle

2 Power supply

3 Dc power LED

4 Ac power LED

b. Gently lift the handle up until it clicks. This signals that the power supply is securely seated in the bay.

2. Connect the power cord for the new power supply to the power-cord connector on the power supply.
3. Reconnect the power cord and power-on the 2145-1U uninterruptible power supply.
4. Power-on the node.
5. Make sure that the power-supply fan starts and the ac power LED 1 and dc power LED 2 (shown in Figure 187) on the power supply are lit, indicating that the power supply is operating correctly.

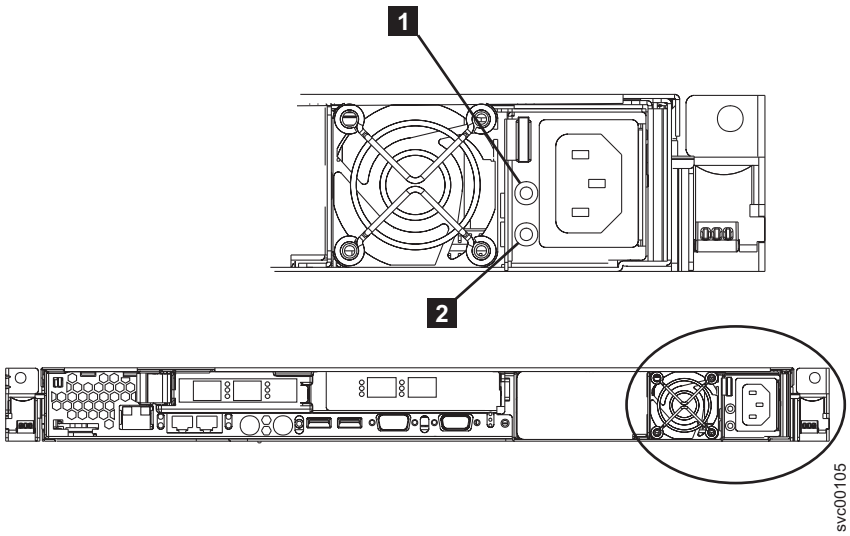


Figure 187. SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 ac and dc power LEDs

Replacing the SAN Volume Controller 2145-4F2 power supply

Perform the following steps to replace the power supply:

1. Slide the power supply 4 into the SAN Volume Controller 2145-4F2, as shown in Figure 188 on page 516.

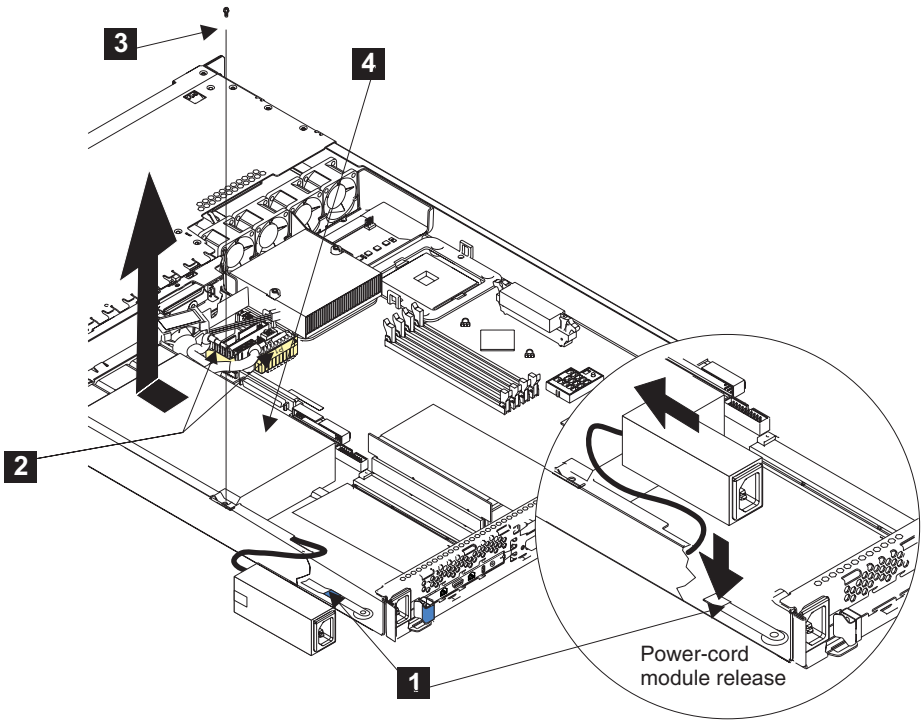


Figure 188. Replacing the SAN Volume Controller 2145-4F2 power supply

Note: For a translation of the following notice, see *IBM Systems Safety Notices*.

DANGER

Do not open or service any power supply assembly. (D005a)

2. Replace the screw 3 .
3. Connect the power connector 2 .
4. Place the power-cable module into the SAN Volume Controller 2145-4F2.
5. Slide the module toward the back of the SAN Volume Controller 2145-4F2 until the alignment tab snaps into the slot that is on the side of the SAN Volume Controller 2145-4F2.
6. Replace the disk drive fan.
7. Replace the SAN Volume Controller 2145-4F2 top cover.
8. Place the SAN Volume Controller 2145-4F2 in the rack.
9. Return all power to the SAN Volume Controller 2145-4F2.

Removing the power backplane

The SAN Volume Controller power backplane might have to be removed.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power backplane.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Removing the power supply" on page 509
You must remove the SAN Volume Controller power supply if you intend to replace it.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

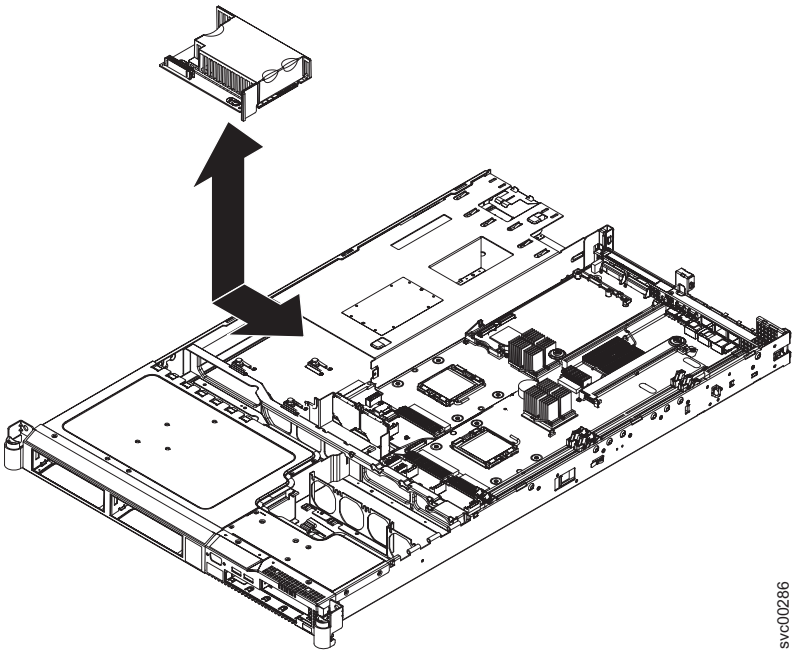
Removing the SAN Volume Controller 2145-8G4 power backplane

This topic describes how to remove the SAN Volume Controller 2145-8G4 power backplane.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power backplane.

Perform the following steps to remove the power backplane:

1. Power off the node and disconnect all power cords. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack. See "Removing the SAN Volume Controller from a rack" on page 435.
3. Remove the cover. See "Removing the top cover" on page 459.
4. Disconnect the power supplies from the power-supply backplane.



5. Disconnect the cable connected to the power-supply backplane.
6. Slide the power-supply backplane to the left, disconnecting it from the system board.

7. Lift the power-supply backplane to remove it from the node.

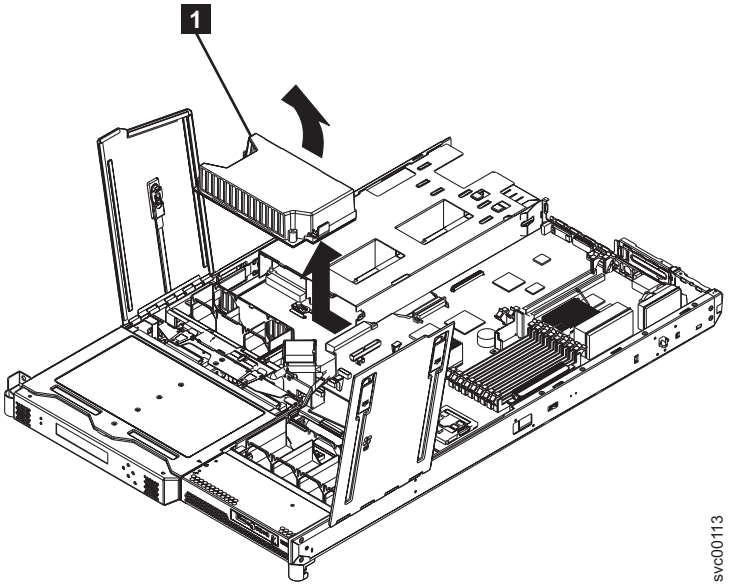
Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power backplane

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power backplane might have to be replaced.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the power backplane.

Perform the following steps to remove the power backplane:

1. Turn off the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Disconnect all power cords and external cables from the back of the node.
3. Remove the node from the rack.
4. Remove the top cover.
5. Disconnect the power supply from the power backplane.
6. Slide the power backplane to the left and disconnect it from the system board.



7. Remove the power backplane from the node.

Replacing the power backplane

The power backplane might have to be replaced for a service action.

Related tasks

"Replacing the power supply" on page 512
You might need to replace the SAN Volume Controller power supply for a service action.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

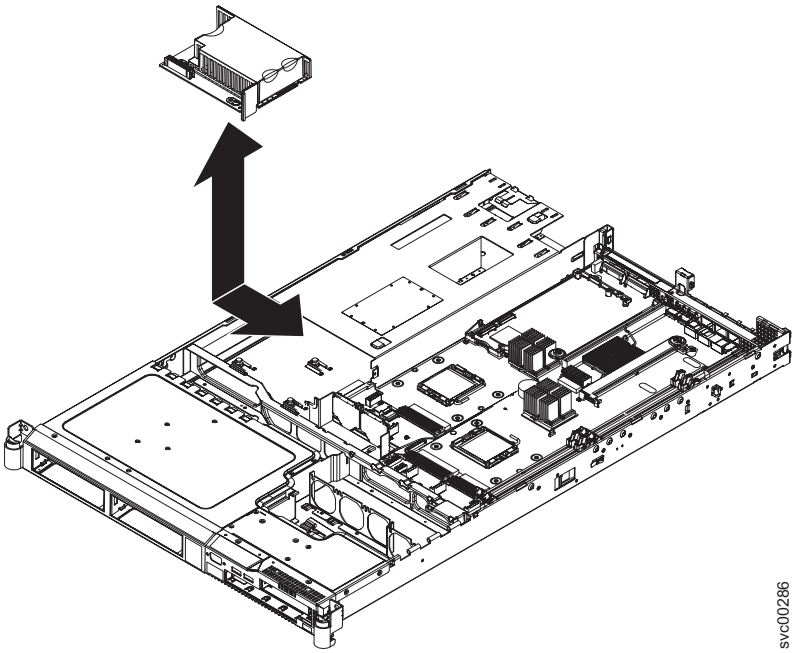
Replacing the SAN Volume Controller 2145-8G4 power backplane

This topic describes how to replace the SAN Volume Controller 2145-8G4 power backplane.

Ensure that you are aware of the procedures for handling static-sensitive devices before you replace the power backplane.

Perform the following steps to replace the power backplane:

1. Align the keyhole slots in the power-supply backplane with the mounting pins in the node.
2. Slide the power-supply backplane toward the right side of the node until the edge-connectors are fully connected.
3. Reconnect the cables to the power supply backplane.
4. Install the power supply into the power-supply bay.



5. Replace the cover.
6. Replace the node in the rack.
7. Reconnect the power cords and any cables that were removed.
8. Power on the node.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power backplane

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 power backplane might have to be replaced.

Ensure that you are aware of the procedures for handling static-sensitive devices before you replace the power backplane.

Perform the following steps to replace the power backplane:

1. Lower the power backplane into position on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 and slide it to the right to connect it to the system board. See Figure 189.

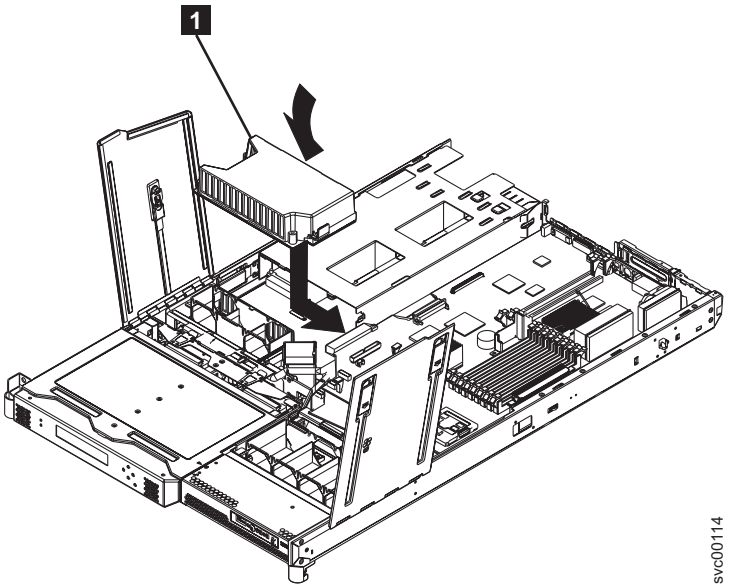


Figure 189. Replacing the power backplane

2. Connect the power supply to the power backplane.
3. Replace the top cover.
4. Place the node into the rack.
5. Connect all power cords and external cables into the back of the node.
6. Turn on the node.

Replacing the frame assembly

This topic describes how to replace the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and SAN Volume Controller 2145-8F2 frame assembly.

The SAN Volume Controller 2145-8F4 and the SAN Volume Controller 2145-8F2 frame assembly must be replaced when the system board fails or when replacing other system board components fails to isolate the error.

The SAN Volume Controller 2145-8G4 frame assembly must be replaced if other repair actions have not resolved the problem. The SAN Volume Controller 2145-8G4 frame assembly is not specified as a FRU in any service procedure. Replace the frame assembly FRU only when directed to do so by the IBM Support Center.

Note: If you are replacing the frame assembly after you replaced the service controller, you must ensure that the node can be added back to the cluster. Use the following choices, which are based on the actions that you must take or have already taken, to determine how the node can be added back to the cluster:

- If you are replacing the node because the new service controller did not fix the original problem and you could not update the WWNN of the service controller, use the original service controller when you perform the frame replacement. This ensures that the WWNN is correct.

- If you have already made any required updates to the worldwide node name (WWNN) and the updates are stored in the service controller, continue with the following instructions to replace the frame assembly.
- If you must use a new service controller when you replace the frame assembly, use the following instructions to replace the frame assembly and make sure that you follow the special instructions in step 11.

Perform the following steps to replace the frame assembly:

1. Make a note of the seven-character system serial number that is on the serial number label on the front of the node.

   For the SAN Volume Controller 2145-8G4, SAN Volume Controller 2145-8F4, and the SAN Volume Controller 2145-8F2 models only: If you cannot read the serial number or if you want to verify that it is correct, you can also find it on the node vital product data (VPD).

   Perform the following steps to find the serial number in the VPD:

   a. Start the SAN Volume Controller application.
   b. Display the VPD for the failed node.
   c. Note the system serial number.
2. Power off the node and disconnect all power cords. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
3. Remove the node from the rack.
4. Remove the top cover.
5. Remove the fibre-channel adapter cards from the frame assembly that you are replacing.
6. Remove the service controller from the frame assembly you are replacing.
7. Install the fibre-channel adapter cards into the new frame assembly.
8. Install the service controller into the new frame assembly.
9. Replace the top cover.
10. Install the node in the rack.
11. Start the node using the node rescue procedure.

    Note: If you have to install a new service controller in the frame assembly, you must perform the next steps to allow the node rescue to find a suitable donor node.

    a. Start the node. Use your SAN monitoring tools to determine the WWNN of the node.
    b. Rezone the switch to allow at least one port of the replaced node to connect to at least one port of an existing node.
    c. Perform a node rescue.
    d. Set the WWNN of the replacement node to match the node that it replaced. See "Node WWNN" on page 155 for more information.
    e. Rezone the switch to its original settings.
    f. Add the node back into the cluster.
    g. Clearly label the original service controller to indicate that its WWNN has been re-used, and that the part cannot be used without first changing the WWNN.

    Note: It is essential that you perform the next steps to restore the original machine serial number. Failure to do this might invalidate the customer's warranty or service agreement.

12. If you are performing this repair as part of a directed maintenance procedure, you will be prompted to type the machine serial number that you noted above. Otherwise, perform the following steps:
    a. Delete the failed node from the cluster.
    b. Add the repaired node to the cluster.
    c. Start the command-line interface.
    d. Issue the following command:

       `svcservicetask writesernum -sernum` *`nodeserialnumber nodename`*

       where *nodeserialnumber* is the number that you noted previously and *nodename* is the name of the repaired node that you added in this step.

       The `svcservicetask writesernum -sernum` *`nodeserialnumber nodename`* command writes the machine serial number to the SAN Volume Controller system board.

       Note: The node will restart as soon as the serial number has been written to it.
    e. Write the serial number, noted previously, on the blank serial number label on the front of the node.

Related tasks

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Replacing the fibre-channel adapter assembly" on page 529
Use these instructions when you need to replace the adapter assemblies.

"Removing the service controller" on page 465
You can remove the service controller from the SAN Volume Controller.

"Replacing the service controller" on page 472
You can replace the SAN Volume Controller service controller.

"Adding a node to a cluster" on page 78
You might have to add a node into the cluster if it has been removed or rejected by a cluster.

Chapter 3, "Using the SAN Volume Controller Console and CLI," on page 69
The SAN Volume Controller Console is a Web-browser based GUI and an SMI-S compliant CIM Agent that is based on the Open Pegasus CIM Server. The SAN Volume Controller command-line interface (CLI) is a collection of commands that you can use to manage SAN Volume Controller clusters.

"Viewing the vital product data" on page 133
You can view the vital product data for a node from the Viewing Vital Product Data panel.

"Deleting a node from the cluster" on page 77
If it is required, you can delete a node from a cluster.

"Accessing the SAN Volume Controller CLI" on page 72
If you must enter and run command-line instructions, you can access the SAN Volume Controller command-line interface (CLI) from the server where the SAN Volume Controller Console is installed.

Removing and replacing the fibre-channel SFP connector on a SAN Volume Controller node

When a failure occurs on a single fibre channel link, the SFP connector might need to be replaced.

The SFP connector is designed to be hot-plugged, so that you do not need to power off the SAN Volume Controller node.

CAUTION:
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

Perform the following steps to remove and then replace the SFP connector:

1. Carefully determine the failing physical port connection. See "Fibre-channel port numbers and worldwide port names" on page 47 for illustrations of the fiber-channel port locations.

   Note: Removing the wrong SFP connector could result in loss of data access.
2. Remove the fibre-channel cable by pressing the release tab and pulling the SFP connector out. Be careful to exert pressure only on the SFP connector and do not pull on the fibre-channel cables.
3. Remove the SFP connector. There are a number of different handling or locking mechanisms that are used on the SFP connectors. Table 30 describes the usual type of mechanisms that are found on a SAN Volume Controller model. It is possible, however, that the installed SFP connectors have a different mechanism than is indicated.

Table 30. Instructions for removing the SFP connector

SAN Volume Controller model	Removal instructions
SAN Volume Controller 2145-8G4 and SAN Volume Controller 2145-8F4	Locate the release handle that is incorporated into the SFP connector, pull the handle down, and then use the handle to pull out the SFP connector.
SAN Volume Controller 2145-8F2 and SAN Volume Controller 2145-4F2	Locate the small black locking tag on the bottom of the SFP connector, push it back, and then pull out the SFP connector.
Note: Other SFP connectors might have a plastic tag. If so, pull the tag to remove the SFP connector.	

4. Push the new SFP connector into the aperture and ensure it is securely pushed home. Swing the release handle up until it locks flush with the SFP connector. Figure 190 on page 524 illustrates an SFP connector and its release handle.

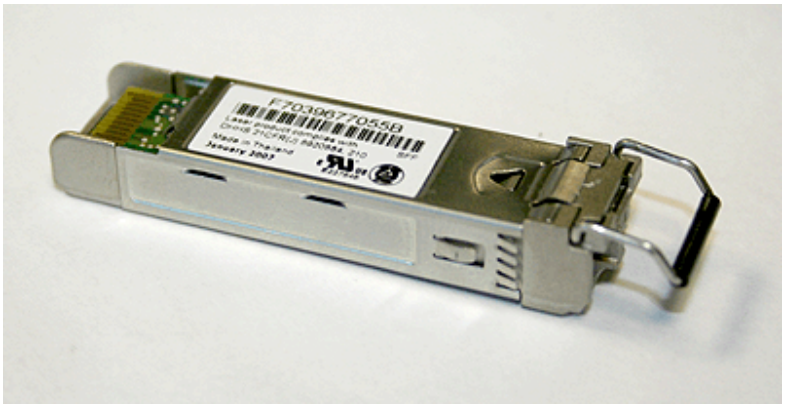


Figure 190. Fibre-channel SFP connector

5. Reconnect the fibre-channel cable.
6. Confirm that the error is now fixed. Check the fibre-channel port status using the front panel. If possible, check the status given by the customer's SAN monitoring tools. Either mark the error as fixed or restart the node depending on the failure indication that you originally noted.

Related tasks

"Fibre-channel link failures" on page 349
When a failure occurs on a single fibre channel link, the small form-factor pluggable (SFP) connector might need to be replaced.

Removing the fibre-channel adapter assembly

Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

Note: The adapter assemblies are electrostatic-discharge sensitive. Take precautions when removing or replacing them to avoid damage from static electricity.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly

Perform the following steps to remove the SAN Volume Controller 2145-8G4 fibre channel adapter assembly:

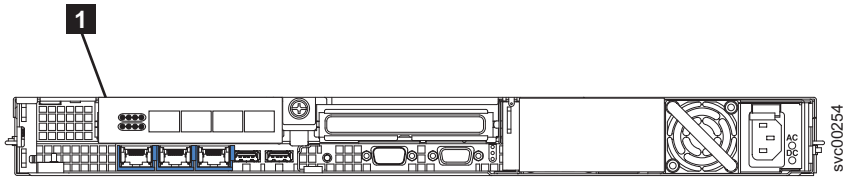


Figure 191. Rear view of the SAN Volume Controller 2145-8G4 with fibre-channel ports indicated

1. Power off the SAN Volume Controller 2145-8G4. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

   Attention: When you install an adapter, make sure that the adapter is correctly seated in the connector before you turn on the server. An incorrectly seated adapter might cause damage to the system board, the riser-card assembly, or the adapter.
2. When the power off has fully completed, remove the mains power cable retention bracket and remove the power cable from the rear of the SAN Volume Controller 2145-8G4.
3. After writing down their locations, remove all other cables from the SAN Volume Controller 2145-8G4.
4. Remove the node from the rack.
5. Remove the top cover of the node.
6. Grasp the riser-card assembly (**2** in Figure 192) at the rear edge and lift to remove the riser-card assembly.

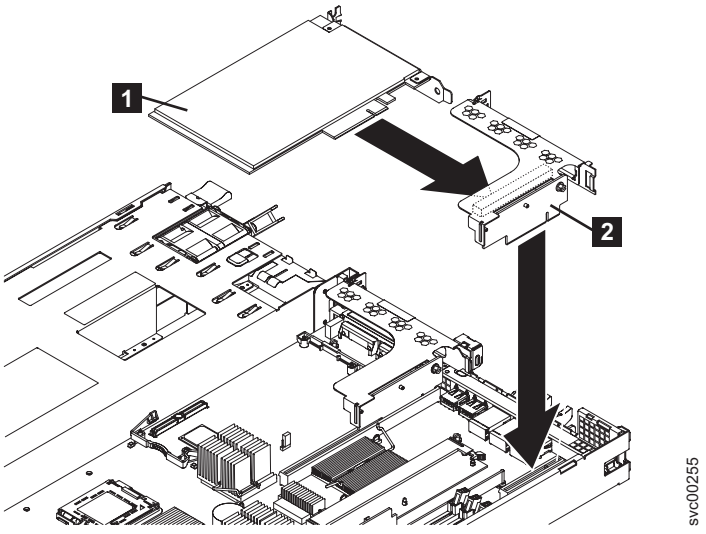


Figure 192. Removing the riser-card assembly from the SAN Volume Controller 2145-8G4

7. Place the riser-card assembly on a flat, static-protective surface.

8. Carefully grasp the adapter 1 by its top edge or upper corners, and pull the adapter from the riser-card assembly 2.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 adapter assemblies

The SAN Volume Controller 2145-8F2 contains two types of fibre-channel adapters that are functionally identical but not interchangeable. The SAN Volume Controller 2145-8F4 contains a single 4-Port adapter in PCI slot 2.

Figure 193 shows the rear view of the SAN Volume Controller 2145-8F2 with the two fibre-channel ports identified:

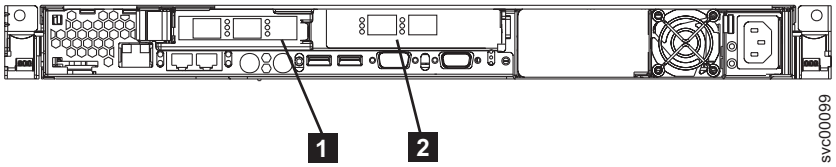


Figure 193. Rear view of the SAN Volume Controller 2145-8F2 with fibre-channel ports indicated

1 PCI slot 1 - contains a dual port fibre-channel host bus adapter (HBA) in a low profile

2 PCI slot 2 - contains a dual port fibre-channel HBA at full height

Figure 194 shows the rear view of the SAN Volume Controller 2145-8F4 with the 4-port fibre-channel HBA identified:

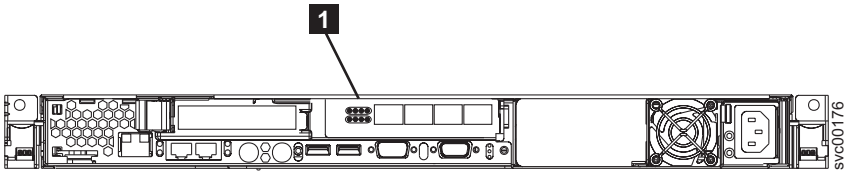


Figure 194. Rear view of the SAN Volume Controller 2145-8F4

1 PCI slot 2 - contains a 4-port fibre-channel HBA

Perform the following steps to remove a fibre-channel adapter assembly:

1. Remove all power from the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack.
3. Remove the top cover of the node.
4. Perform the following steps to remove the PCI card from PCI slot 1 (low profile):
   a. Pull the blue PCI card retainer 1 from the rear of the node, shown in Figure 195 on page 527.

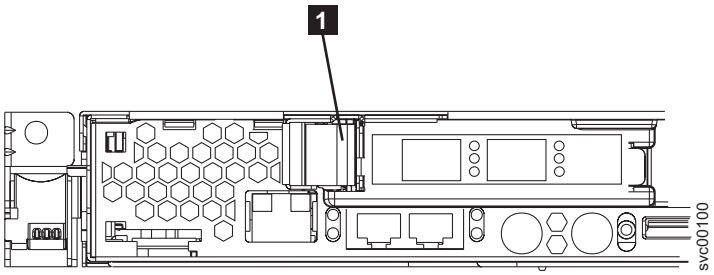


Figure 195. SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 PCI slot 1 card retainer

1 Slot 1 card retainer

b. Hold the blue adapter support away from the card and pull it away from the edge connector on the riser card assembly, as shown in Figure 196.

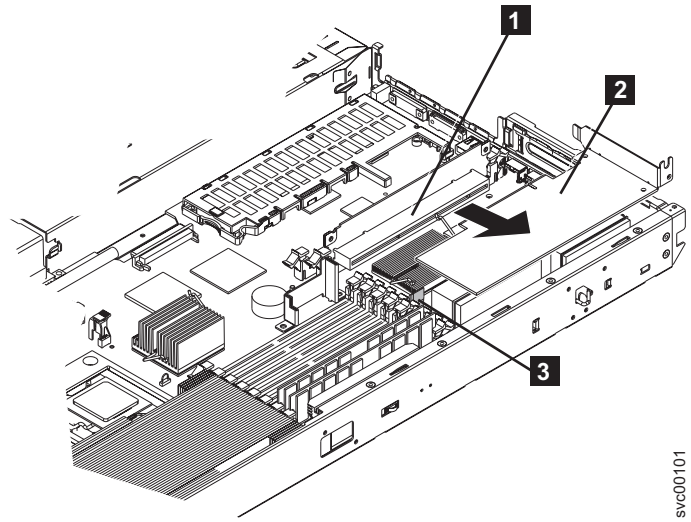


Figure 196. SAN Volume Controller 2145-8F2 riser card and low profile adapter

1 Riser card

2 Low-profile adapter

3 Low-profile adapter support

5. Perform the following steps to remove the PCI card from PCI slot 2:

   a. Open the retaining clips on both sides of the slot 2 riser card (**2** in Figure 197 on page 528) by pushing the clips down and away from the riser card until the clips are no longer attached to the riser card.

      Note: Insert your finger into the access hole on the slot 2 adapter cover to open the retention latch at the rear of the node.

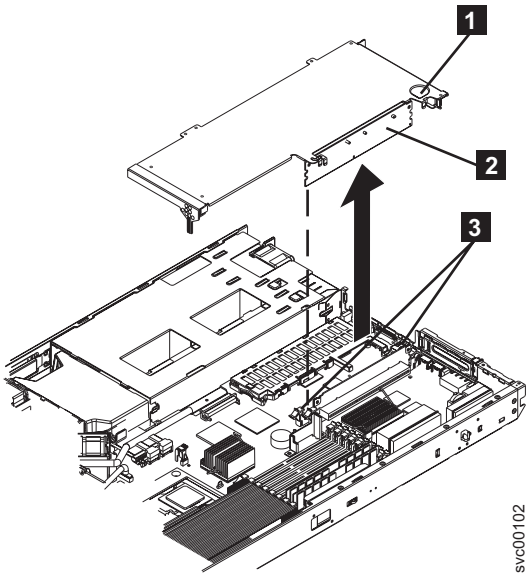


Figure 197. SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 slot 2 adapter

1 Access hole to retention latch

2 Riser card

3 Riser card retention latches

b. Unlatch the PCI slot 2 riser card **2** and pull it clear of the system board edge connector.

c. Lift the riser card clear of the frame and pull the fibre-channel card from the riser card edge connector.

Removing a SAN Volume Controller 2145-4F2 adapter

Perform the following steps to remove an adapter:

1. Remove all power from the SAN Volume Controller 2145-4F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.
4. For the adapter that you are going to remove, press the sides of the expansion-slot clip (**3** or **4** in Figure 198 on page 529) together to unlock the clip, and then pivot the expansion-slot clip away from the adapter. The expansion-slot clip remains loosely attached to the SAN Volume Controller 2145-4F2.

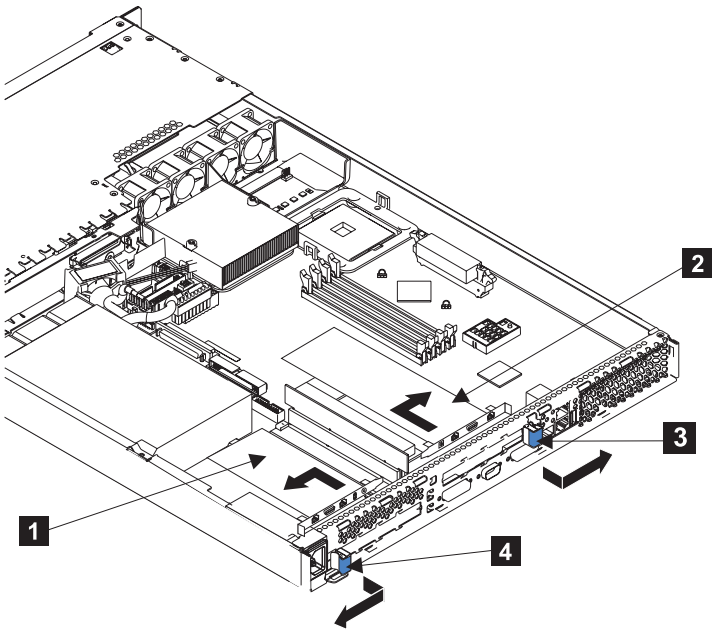


Figure 198. SAN Volume Controller 2145-4F2 before removing an adapter

| 1 Adapter 1
| 2 Adapter 2
| 3 Adapter 2 expansion-slot clip
| 4 Adapter 1 expansion-slot clip

Attention: Do not touch the components and gold-edge connectors of the adapter.

5. Unplug the adapter (1 or 2) from the connector.
6. Remove the adapter from the SAN Volume Controller 2145-4F2.

Replacing the fibre-channel adapter assembly

Use these instructions when you need to replace the adapter assemblies.

Related tasks

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly

Perform the following steps to replace the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly:

| 1. As you start inserting the adapter, align the edge connector on the low-profile
| adapter 1 with the connector 3 on the riser-card assembly 4 Make sure

that the adapter snaps into the riser-card securely. Press the riser-card edge connector firmly into the system-board connector. **5** , as shown in Figure 199.

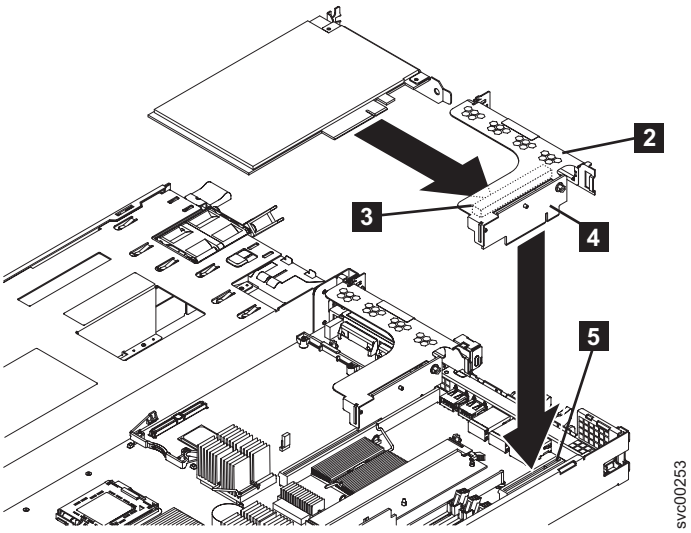


Figure 199. Replacing the riser-card assembly for the SAN Volume Controller 2145-8G4

1 Fibre-channel adapter

2 Adapter support bracket

3 Riser-card-adapter connector

4 Riser-card assembly

5 System-board-riser-card connector

2. Replace the top cover of the node.
3. Replace the node in the rack.
4. Replace the cables that were removed from the node, and make sure that you replace the fibre-channel cables in the same ports from which they were removed. Figure 200 shows the location of the fibre-channel ports.

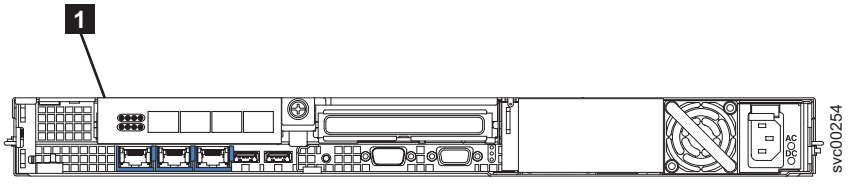


Figure 200. Rear view of the SAN Volume Controller 2145-8G4 with fibre-channel ports indicated

5. Replace the power cable in the node and replace the power cable retention bracket.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 adapter assemblies

Perform the following steps to install the fibre-channel card into the riser-card assembly:

Note: The adapter assemblies are electrostatic-discharge sensitive. Take precautions when removing or replacing them to avoid damage from static electricity.

1. Install the fibre-channel card in slot 1, which is shown in Figure 201.

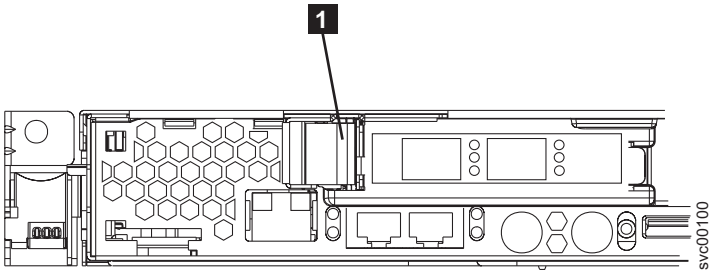


Figure 201. SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 PCI slot 1 card retainer

   a. Slide the I/O connector portion of the adapter through the slot 1 opening and align the edge connector on the low-profile adapter with the connector on the riser card. Press the edge connector firmly into the riser-card connector. Make sure that the adapter snaps into the riser card securely and the adapter is lying on top of the low-profile adapter support.
   b. Push the adapter down past the tab so that the adapter snaps into place on the support.
   c. Check the retention latches on the riser card and make sure that they are still securely in place.
   d. Close the fibre-channel card retainer to secure the card.
2. Install the fibre-channel card in slot 2.
   a. Align the edge connector on the fibre-channel adapter with the connector on the riser card. Press the edge connector firmly into the riser-card connector. The card is fully installed when the gold connectors on the edge of the fibre-channel cards are no longer visible.
   b. Grasp the riser card assembly by its top edge or upper corners and align the riser card with the guides for the riser-card connector.
   c. Press the riser card edge connector firmly into the slot 2 riser-card edge connector on the system board. Make sure that the retention latches snap into place to secure the riser card into the slot 2 riser-card connector.
3. Replace the top cover of the node.
4. Replace the node in the rack.

Replacing a SAN Volume Controller 2145-4F2 adapter

Perform the following steps to replace an adapter assembly:

Attention: Do not touch the components and gold-edge connectors of the adapter. When you install the adapter, ensure that it is correctly seated in the connector before you turn on the SAN Volume Controller 2145-4F2. Incorrectly-seated adapters might cause damage to the system board, the riser card for slot 1, or the adapter.

1. If you are installing a new adapter, remove it from its static-protective package.
2. Hold the adapter by its top edge or upper corners and align it with the connector. Support the riser card and press the adapter fully into the connector.

3. Pivot the expansion-slot clip (3 or 4 in Figure 202) toward the adapter and press it into place.

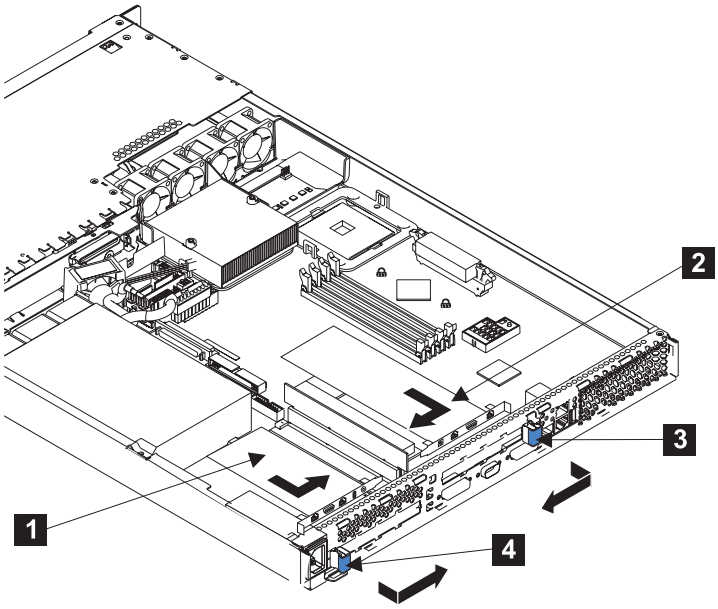


Figure 202. The SAN Volume Controller 2145-4F2 with its adapters installed

1 Adapter 1

2 Adapter 2

3 Adapter 2 expansion-slot clip

4 Adapter 1 expansion-slot clip

Removing the SAN Volume Controller 2145-8G4 PCI express riser card assembly

Use these instructions when you are prompted to remove the SAN Volume Controller 2145-8G4 PCI express riser card assembly.

Note: The adapter assemblies are electrostatic-discharge sensitive. Take precautions when removing or replacing them to avoid damage from static electricity.

To remove the SAN Volume Controller 2145-8G4 PCI express riser card assembly, follow the instructions in "Removing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly" on page 525.

Replacing the SAN Volume Controller 2145-8G4 PCI express riser card assembly

Use these instructions when you are prompted to replace the SAN Volume Controller 2145-8G4 PCI express riser card assembly.

Follow the instructions in "Replacing the SAN Volume Controller 2145-8G4 fibre-channel adapter assembly" on page 529.

Removing the operator information panel assembly

You might be prompted to remove the SAN Volume Controller operator information panel.

Ensure that you are aware of how to handle static-sensitive devices.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8G4 operator information panel assembly

You might have to replace the operator information panel assembly on a SAN Volume Controller 2145-8G4 due to required maintenance.

Make careful note of the layout of the cables as you go through this procedure as they will need replacing in the same position when you replace the operator information panel assembly.

1. Power off the node and remove it from the rack. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the cover and open the fan door. See "Removing the top cover" on page 459.
3. Release the dummy CD/DVD drive **2** by pressing the release button **1** and sliding the drive out approximately 2 cm (1 in), as shown in Figure 203 on page 534. It is possible to push the drive from the back to start it moving. Do not remove the drive from the casing.

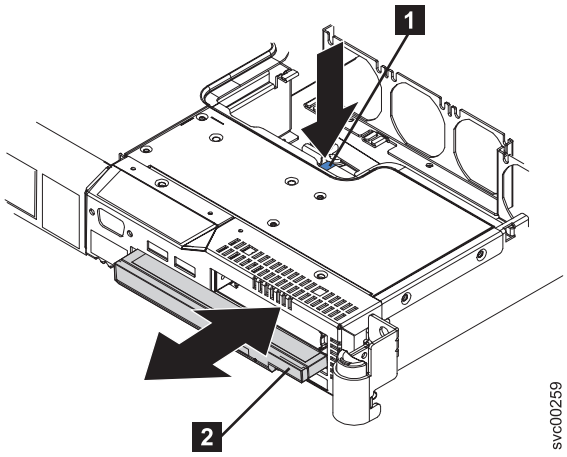


Figure 203. Releasing and sliding out the dummy CD/DVD drive

1 Release button

2 Dummy CD/DVD drive

4. Remove the CD interposer card (2 in Figure 204) by unscrewing it, lifting it slightly and then removing the cable from it.

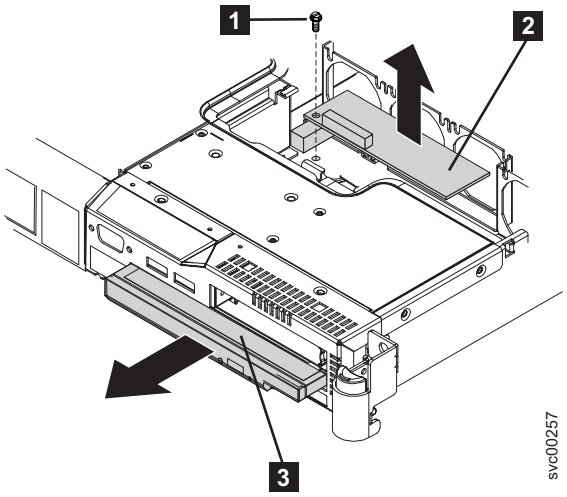


Figure 204. Removing the CD interposer card

1 Screw

2 Interposer card

3 Dummy CD/DVD drive

5. Remove fan 3, as shown in Figure 205 on page 535.

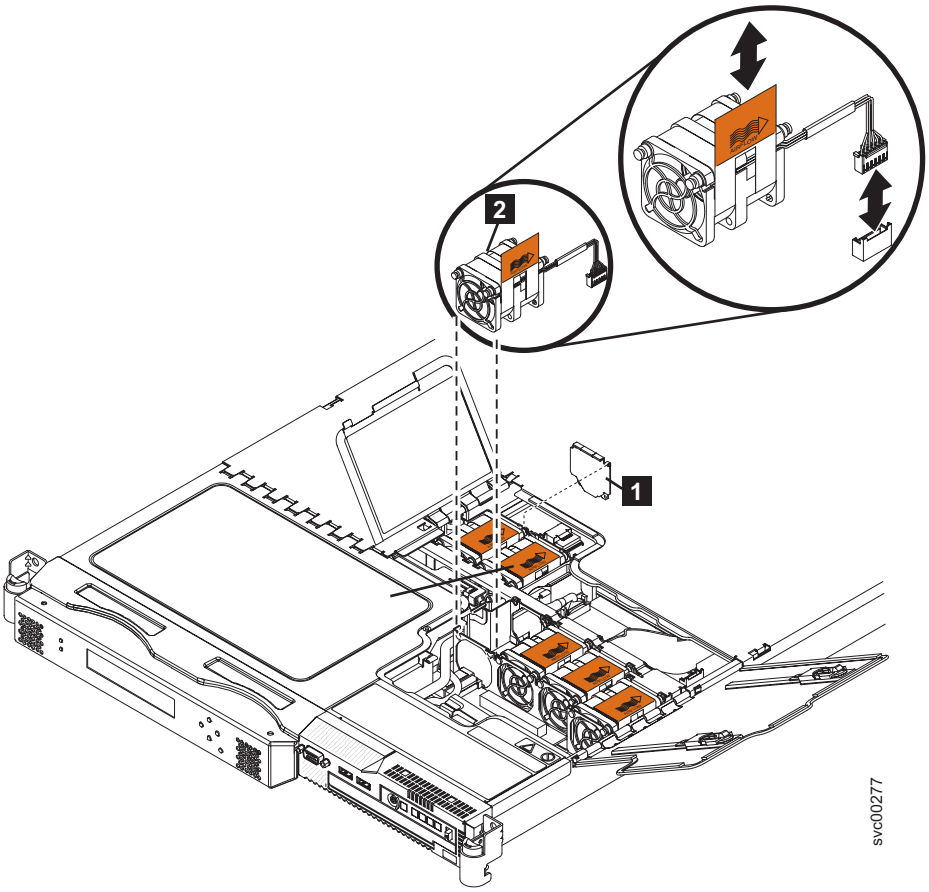


Figure 205. Removing fan 3

1 Air baffle

2 Fan 3

6. Remove the air baffle (**2** in Figure 206 on page 536).

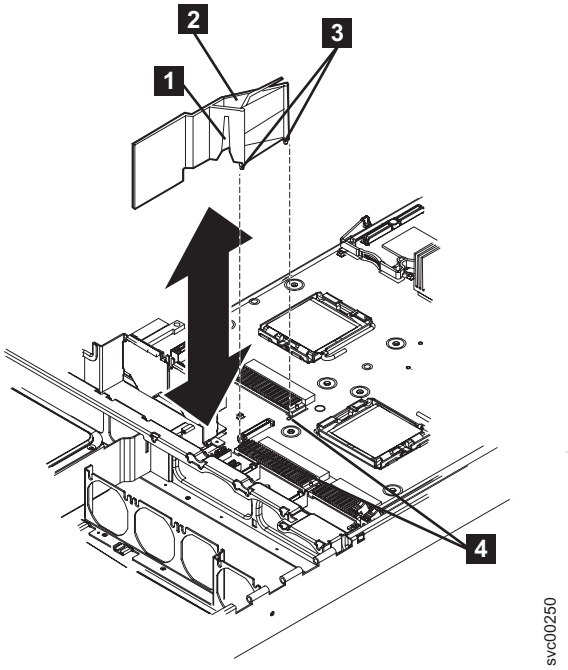


Figure 206. Removing the air baffle

1 Cable routing slot

2 Air baffle

3 Baffle pins

4 Baffle mounting holes

7. Unplug the video cable 8, the USB cable 7 and the CD/DVD cable 9 from the system board. There is no need to completely remove these cables. Unplugging them makes it easier to maneuvre the light path ribbon cable 4. In Figure 207 on page 537, the front of the node is at the bottom of the illustration.

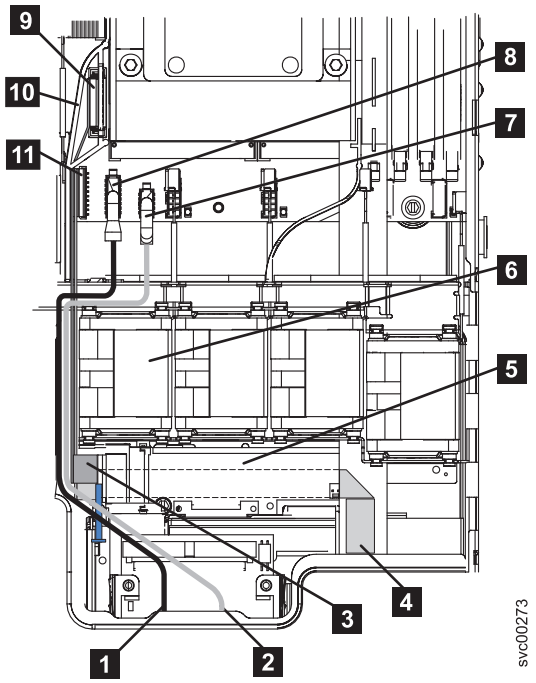


Figure 207. Unplugging the video, USB, and the CD/DVD cables

1. Video cable
2. USB cable
3. CD-RW cable
4. Lightpath cable
5. Interposer card
6. Fan 3
7. USB cable connector
8. Video cable connector
9. CD-RW connector
10. Air baffle
11. Lightpath cable connector

8. Unplug the light path ribbon cable 4 from the system board connector 11 and completely unthread the cable removing it from the three retaining brackets. Also release it from any tape holding it in place. The cable should be free to move forward with the light path assembly.
9. Release the light path assembly 2, using the release button (1 in Figure 208 on page 538) on the front, and pull forward until it locks in place.

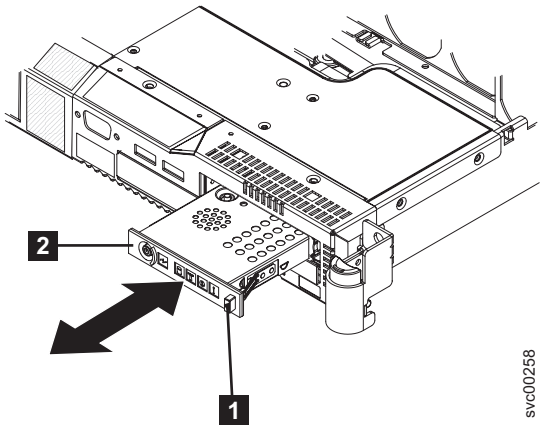


Figure 208. Releasing the light path assembly

10. Press the two release buttons (**2** in Figure 209) that are visible through the top of the node and pull the light path assembly **3** completely out of the node. Carefully pull the ribbon cable **1** through after the light path assembly.

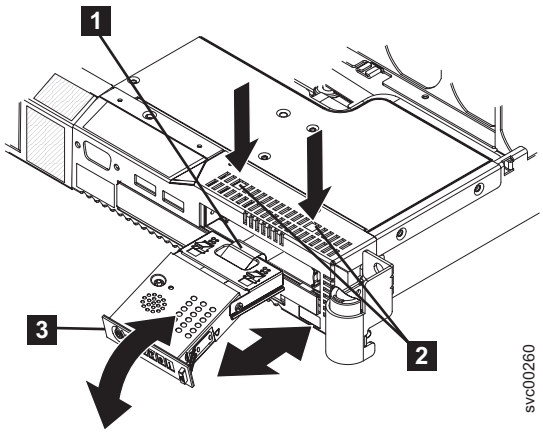


Figure 209. Removing the light path assembly

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 operator information panel

You might have to replace the operator panel on a SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 due to required maintenance.

Perform the following steps to remove the operator information panel:

1. Turn off the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Disconnect all power cords and external cables from the back of the server.
3. Remove the top cover. If necessary, you might have to remove the node from the rack.
4. Press the operator panel release latch (**2** in Figure 210 on page 539) and slide the operator information panel away from the SAN Volume Controller 2145-8F2.

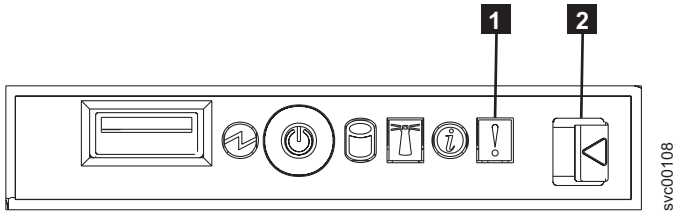


Figure 210. SAN Volume Controller 2145-8F4 operator information panel

5. Use a small screwdriver to push in the retention springs (**1** in Figure 211) on the sides of the operator information panel assembly.

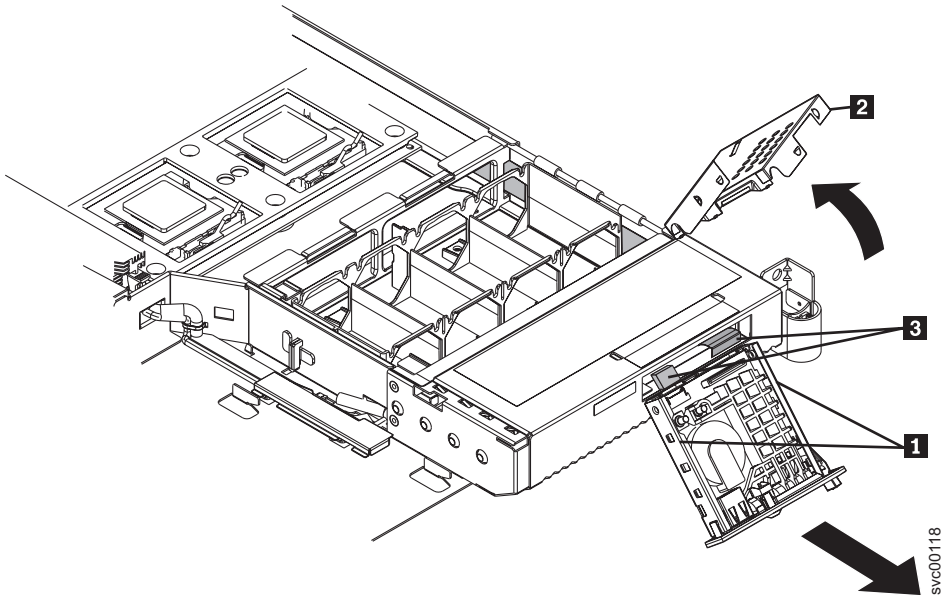


Figure 211. SAN Volume Controller 2145-8F2 with exposed operator information panel

1 Retention springs

2 Operator information panel assembly cover

3 Cables

6. Slide the assembly forward and out of the node.
7. Push out on the two sides of the assembly cover to flare it out.
8. Rotate the assembly cover (**2** in Figure 211) up and off of the operator information panel assembly.
9. Unplug the two cables from the rear of the assembly (**3** in Figure 211).

Replacing the operator information panel assembly

You might be prompted to replace the SAN Volume Controller operator information panel assembly.

Ensure that you are aware of how to handle static-sensitive devices.

Related tasks

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8G4 operator information panel assembly

You might have to replace the operator panel on a SAN Volume Controller 2145-8G4 due to required maintenance.

Perform the following steps to replace the operator information panel:

1. Thread the light path assembly ribbon cable into the light path assembly cage and out through the back of it.
2. Slide the light path assembly back into its cage until it locks in place (in the In position); gently pull the cable through at the back as you do this.

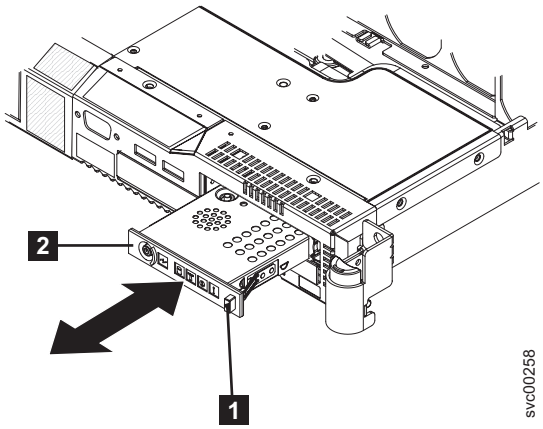


Figure 212. Installing the light path assembly

1 Release button

2 Light path assembly

3. Carefully thread the light path assembly ribbon cable 4 back under its retaining brackets and replace the tape securing it in place.
4. Thread the light path assembly ribbon cable 4 back to the system board.

   Reconnect the cable to the system board socket 11. In Figure 213 on page 541, the front of the node is shown at the bottom of the illustration. The connectors on the cable plug go towards the center of the node and the blue side is towards the outside of the node.

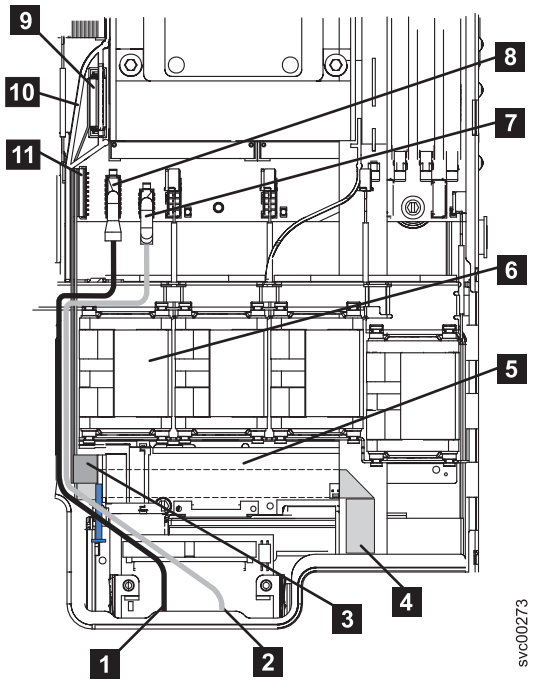


Figure 213. Threading the video, USB, and the CD/DVD cables

1. Video cable
2. USB cable
3. CD-RW cable
4. Lightpath cable
5. Interposer card
6. Fan 3
7. USB cable connector
8. Video cable connector
9. CD-RW connector
10. Air baffle
11. Lightpath cable connector

5. 5. Reconnect the video cable 8, the USB cable 7 and the CD/DVD cable 9 to the system board.
6. Replace the air baffle 2. It is easier to do this if you remove fan 2. Ensure that all the cables are routed correctly and not obstructing the fan doors.

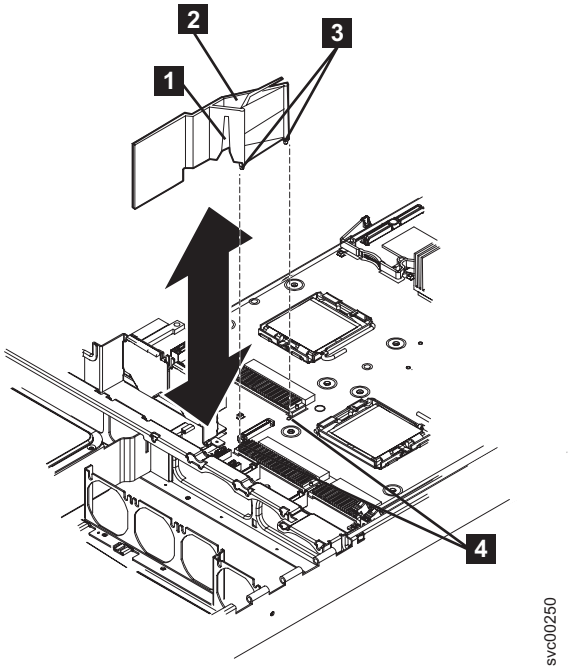


Figure 214. Replacing the air baffle

1 Cable routing slot

2 Air baffle

3 Baffle pins

4 Baffle mounting holes

7. Reconnect the CD cable to the interposer card, locating the pins on the right hand side; then, mount the card to the server with the screw that you removed.
8. Push the dummy CD/DVD drive 2 back into its enclosure.

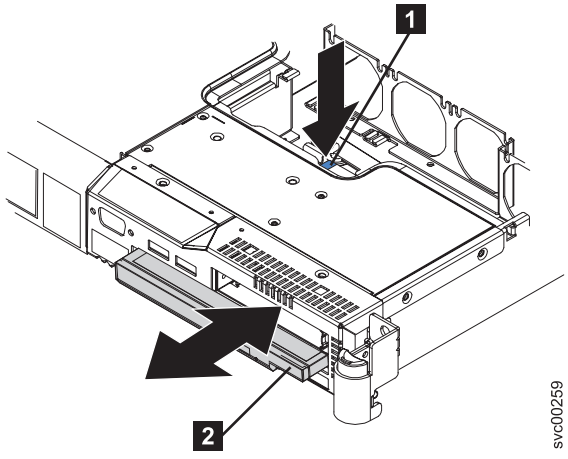


Figure 215. Replacing the dummy CD/DVD drive

1 Release button

2 Dummy CD/DVD drive

9. Replace fan 3.

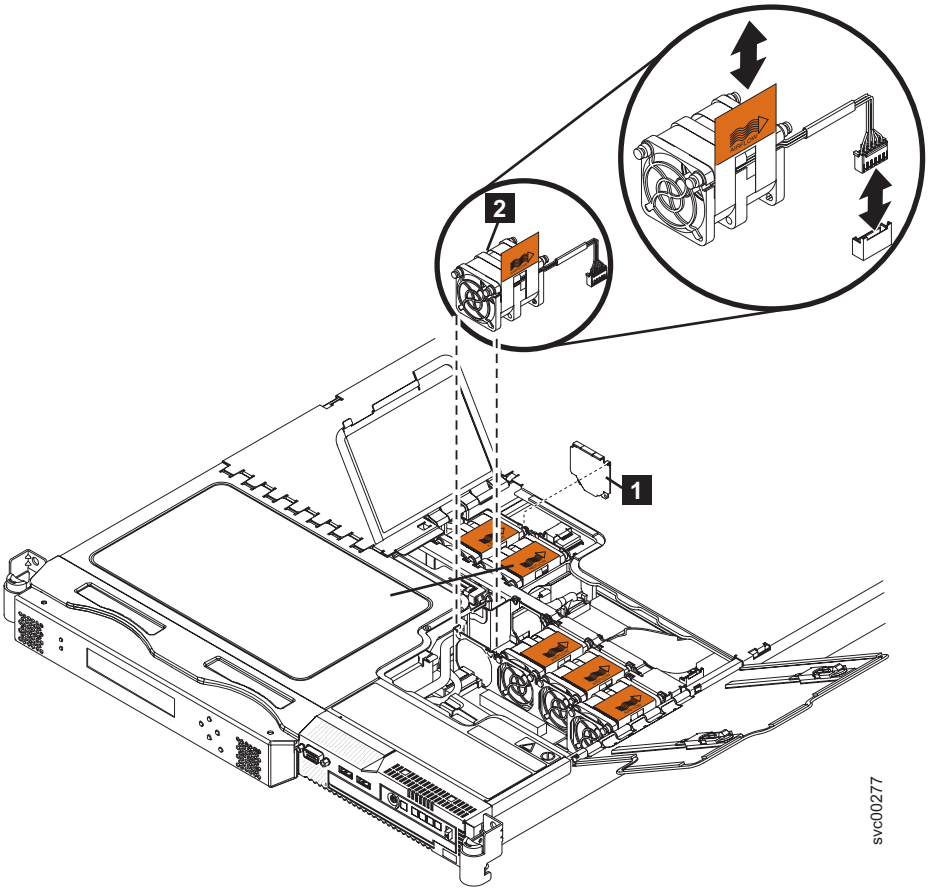


Figure 216. Replacing fan 3

1 Air baffle

2 Fan 3

10. Ensure that the fan door still closes; realign the cable if it does not.
11. Reopen the fan door and replace the cover; close all doors.
12. Replace the node in the rack, reconnect all cables, and power on the node.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 operator information panel

You might have to replace the operator panel on a SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 due to required maintenance.

Perform the following steps to replace the operator information panel:

1. Plug in the two cables on the rear of the assembly 1 . See Figure 217 on page 544.

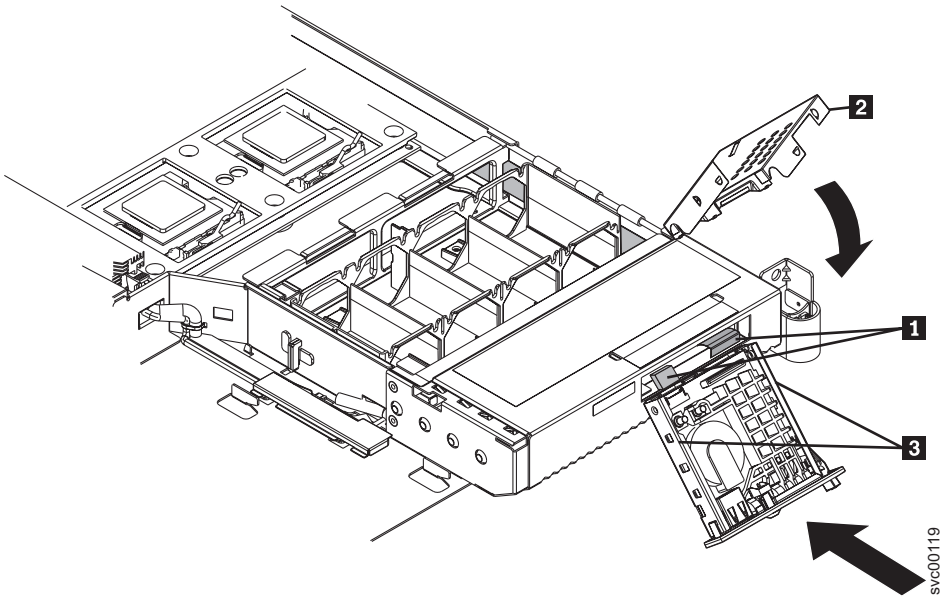


Figure 217. Replacing the operator information panel

1 Cables

2 Operator information panel assembly cover

2. Replace the assembly cover **2** onto the operator information panel assembly.
3. Slide the assembly into the node until it is firmly anchored.
4. Replace the top cover and replace the node in the rack, if necessary.
5. Connect all power cords and external cables to the back of the server.
6. Power on the node.

Removing the fans

The SAN Volume Controller fans might have to be replaced due to failure.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Replacing the fans" on page 548
The SAN Volume Controller fans might have to be replaced due to failure.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 VRM" on page 560
You might remove the voltage regulator module (VRM) to perform maintenance on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8G4 fans

This topic describes how to remove the SAN Volume Controller 2145-8G4 fans.

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8G4 fans.

Perform the following steps to remove a failed fan:

1. Power off the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Slide the node forward to gain access to the fan doors (**1** in Figure 218 on page 546).
3. Open the fan door for the failing fan. The LED near the connector of the failing fan assembly is lit, unless you remove the power cable.

   Note: The node has six fan positions that are numbered left to right under the two fan doors.

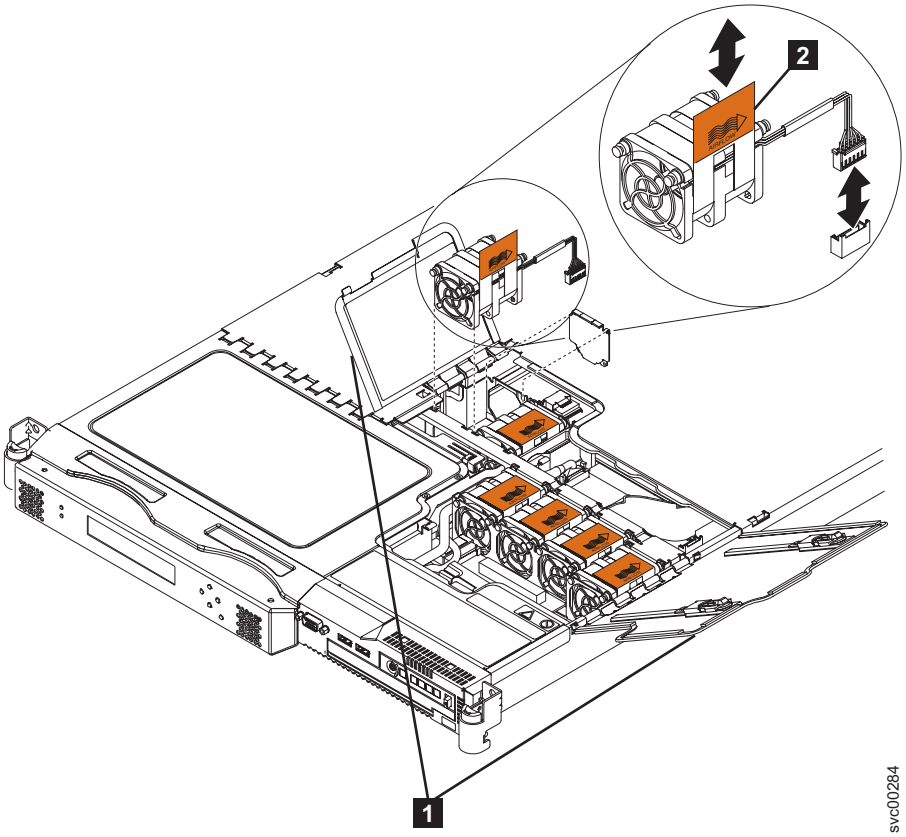


Figure 218. SAN Volume Controller 2145-8G4 fan doors, locations, and connectors

4. Disconnect the cable of the failing fan from the connector on the system board by pressing the release latch on the plug at the end of the cable.
5. Pull up on the orange tab (**2** in Figure 218) of the failing fan to lift the fan out of the node.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 fans

Ensure that you are aware of the procedures for handling static-sensitive devices before you remove the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fans.

Perform the following steps to remove a failed fan:

1. Remove all power from the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack.
3. Open the fan door where the failed fan resides. Fans 1, 2, and 3 are under fan door A **1**. Fans 4 through 7 are under fan door B **2**, as shown in Figure 219 on page 547.

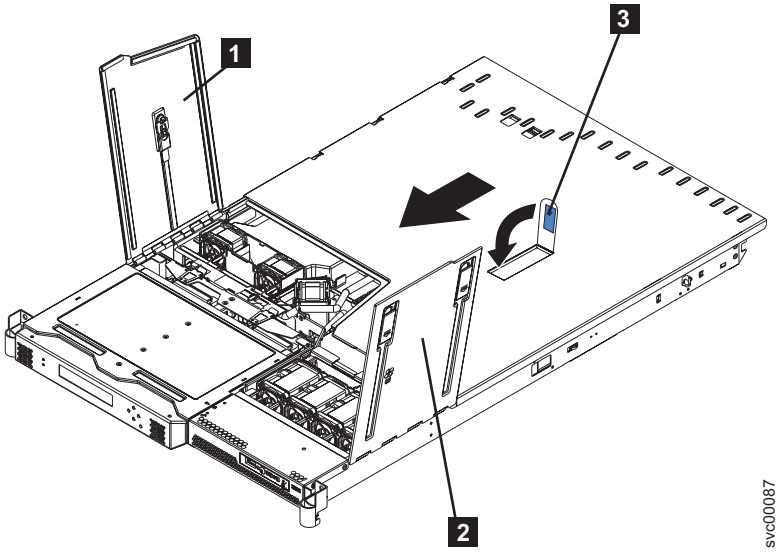


Figure 219. The SAN Volume Controller 2145-8F2 with the fan doors open

1. Fan door A
2. Fan door B

4. Disconnect the cable of the failing fan from the connector.

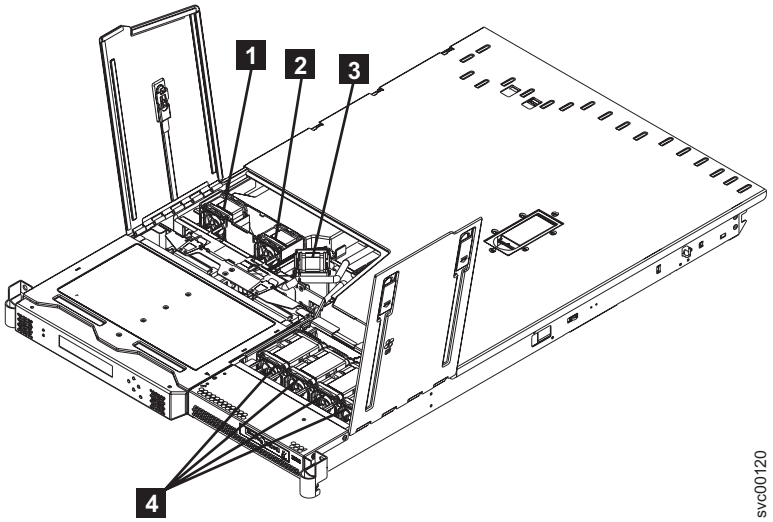


Figure 220. SAN Volume Controller 2145-8F2 with open fan doors

1. Fan 1
2. Fan 2
3. Fan 3
4. Fans 4, 5, 6, and 7

5. Pull up on the orange tab on the side of the failing fan.
6. Lift the fan out of the node.

You can now replace the failed fan.

Removing the SAN Volume Controller 2145-4F2 microprocessor fan

Perform the following steps to remove the microprocessor fan:

1. Remove all power from the SAN Volume Controller 2145-4F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the SAN Volume Controller 2145-4F2 from the rack.
3. Remove the top cover from the SAN Volume Controller 2145-4F2.
4. Disconnect the fan cable from the system board.

   Note: The fans are numbered from one to four, from left to right. See Figure 221.
5. Lift the fan upward out of the retaining clip.

   Note: To remove the fourth fan, first remove the third fan, then move the fourth fan to the left before lifting it.

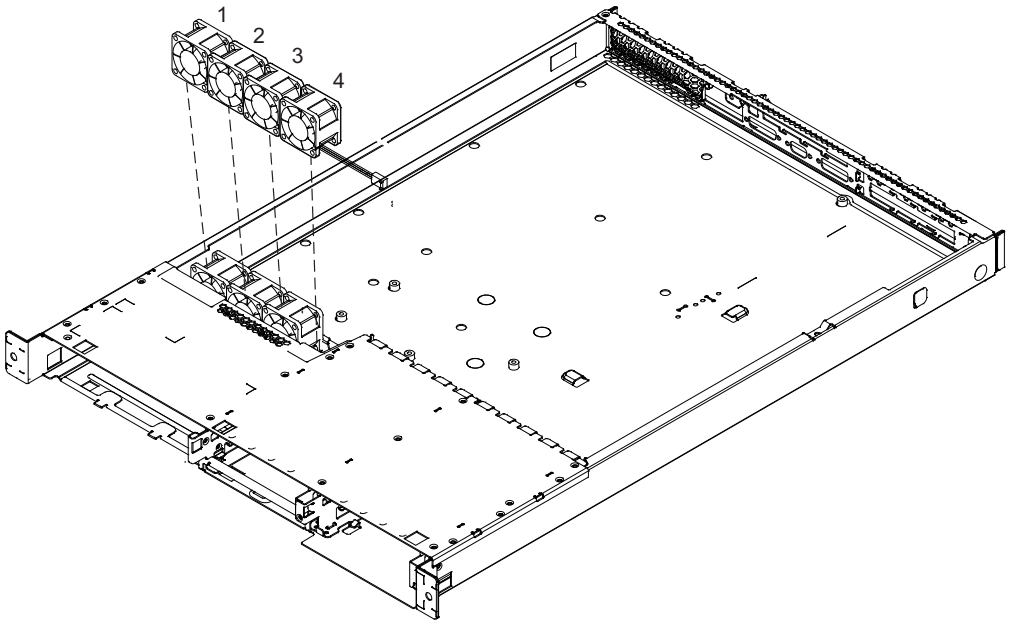


Figure 221. SAN Volume Controller 2145-4F2 microprocessor fan locations

6. If you have any other tasks to do inside the SAN Volume Controller 2145-4F2, do those tasks now.

Replacing the fans

The SAN Volume Controller fans might have to be replaced due to failure.

Related tasks

"Removing the fans" on page 544
The SAN Volume Controller fans might have to be replaced due to failure.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8G4 fans

This topic describes how to replace the SAN Volume Controller 2145-8G4 fans.

Ensure that you are aware of the procedures for handling static-sensitive devices before you replace the SAN Volume Controller 2145-8G4 fans. The replacement procedures in this topic assume that the following are true:

- The failed fan is removed
- The node power is turned off
- The node is removed from the rack

Perform the following steps to replace a failed fan:

1. Orient the new fan in the same position as the fan that you removed. Make sure that the airflow indicator on the orange tab, (**2** in Figure 222) is pointing to the rear of the node.

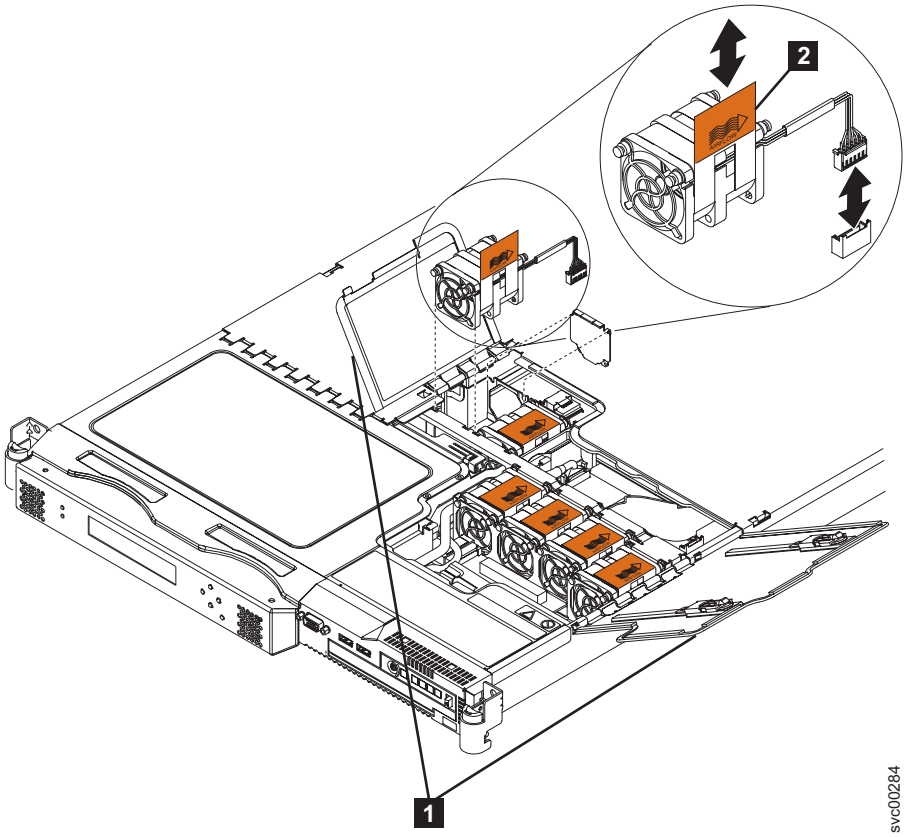


Figure 222. SAN Volume Controller 2145-8G4 fan doors, locations, and connectors

2. Push the fan assembly down into the server until the blue mounting grommets are correctly seated.
3. Connect the cable of the replacement fan into the system board connector.
4. Close the fan door. **1**

5. Replace the node in the rack.
6. Restore power to the node.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 fans

Ensure that you are aware of the procedures for handling static-sensitive devices before you replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 fans. The replacement procedures in this topic assume that the following are true:

- The failed fan is removed
- The node power is turned off
- The node is removed from the rack

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 fans:

1. Orient the new fan in the same position as the fan you removed. Make sure that the airflow indicator, on top of the fan, is pointing to the rear of the server.
2. Push the fan assembly down into the server until the blue grommets are correctly seated.
3. Connect the cable of the replacement fan into the connector.
4. Close the fan door.
5. Replace the top cover.
6. Return the node to the rack.
7. Reconnect the cables and power cords.
8. Restore power to the node.

Replacing the SAN Volume Controller 2145-4F2 microprocessor fans

Note:

- The airflow is from the front to the back of the SAN Volume Controller 2145-4F2 node.
- The fan cable comes out of the back of the fan. When you install the fan, ensure that the back of the fan is facing the back of the SAN Volume Controller 2145-4F2 node.
- If you are installing a microprocessor fan, orient the fan in the retaining clip so that the cable can reach the connector on the system board.

Perform the following steps to remove the microprocessor fan:

1. Push the fan downward into the retaining clip. Figure 223 on page 551 shows the location of the fans and the retaining clips.

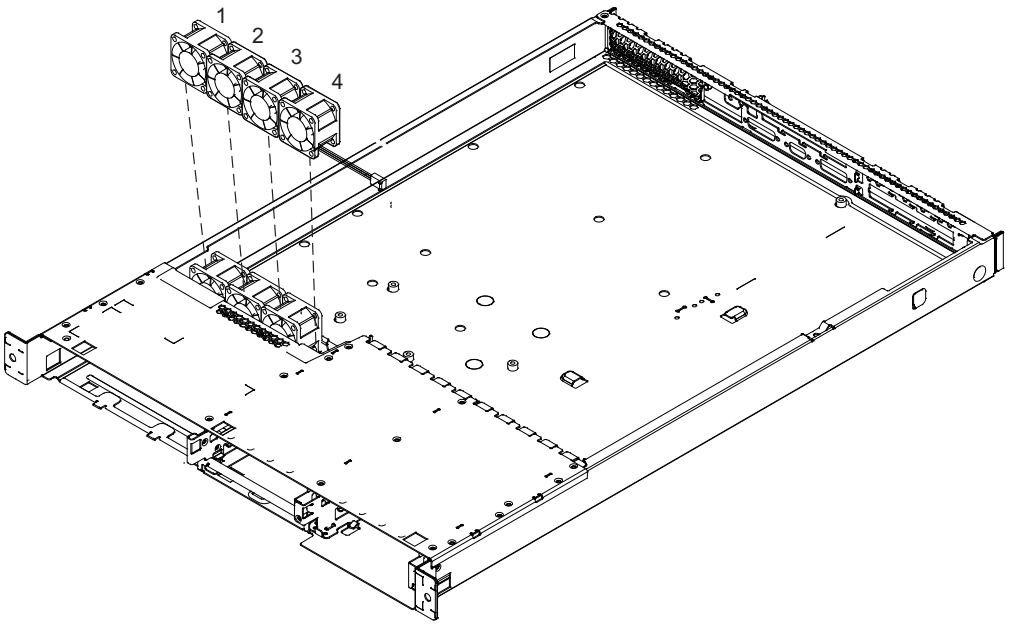


Figure 223. SAN Volume Controller 2145-4F2 microprocessor fan locations

2. Connect the fan cable to the system board.

   Note: The fans are numbered from one to four, from left to right.
3. Replace the top cover on the node.
4. Place the node in the rack.
5. Power up the node.

Removing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fan holder and fan backplanes

The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

Perform the following steps to remove the fan holder with fan backplane:

1. Turn off the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Disconnect all power cords and external cables from the back of the node.
3. Remove the node from the rack.
4. Remove the top cover.
5. Unplug the fans from the fan backplane.
6. Remove the screws and set them in a safe place.
7. Disconnect the fan cable.
8. Pull the fan bracket out of the node.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 fan holder and fan backplanes

The fan holder with fan backplanes field replaceable unit (FRU) is supplied as a kit of parts. Replace only the failed assembly and discard any unused part.

Perform the following steps to replace the fan holder with fan backplane:

1. Place the fan bracket into the node.
2. Connect the fan cable.
3. Replace the screws that you had set aside.
4. Plug the fans into the fan backplane.
5. Replace the top cover.
6. Replace the node in the rack.
7. Connect all power cords and external cables into the back of the node.
8. Turn on the node.

Tip: When reinstalling the fan brackets on the front right side of the node, remove the cage assembly that holds the disk drive and service controller and remove the fan cable cover. Pull the cable loose before plugging it into the fan backplane, then install the fan holder and backplane assembly in the node.

Related tasks

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the microprocessor

You can remove the microprocessor that is used in the SAN Volume Controller nodes.

Before you remove the microprocessor, ensure that you are aware of handling static-sensitive devices.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 VRM" on page 560
You might remove the voltage regulator module (VRM) to perform maintenance on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

"Replacing the microprocessor" on page 556
Use this topic when you are required to replace a microprocessor.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the SAN Volume Controller 2145-8G4 microprocessor

Attention:

- Do not allow the thermal grease on the microprocessor and heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease and the microprocessor socket.
- Use great care when handling microprocessors. Dropping the microprocessor during installation or removal can damage the contacts.
- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.

To remove a microprocessor and heat sink, complete the following steps:

1. Power off the node and disconnect the power cord. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the cover. See "Removing the top cover" on page 459.
3. Remove the heat sink (**1** in Figure 224 on page 554). Loosen two captive screws on alternate sides of the heat sink fully before loosening the other two captive screws. (This helps to break the bond between the heat sink and the microprocessor.) After the captive screws are loosened, remove the heat sink.

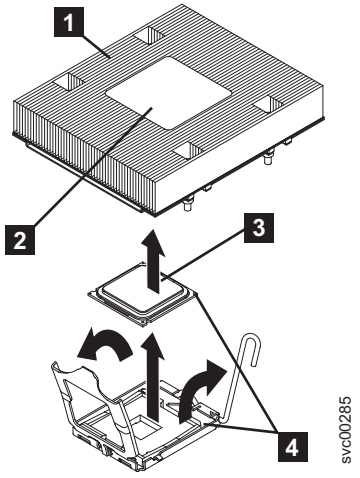


Figure 224. Removing the heat sink from the microprocessor

1. Heat sink
2. Heat sink installation label
3. Microprocessor
4. Alignment indicator

4. Open the microprocessor release lever (1 in Figure 225) to the fully open position.

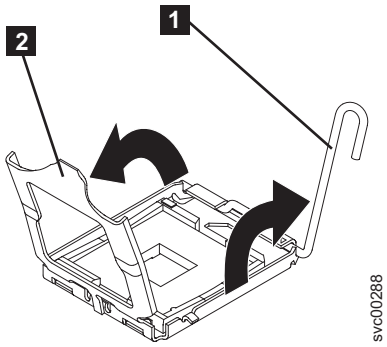


Figure 225. The microprocessor release lever and bracket frame fully opened

1. Microprocessor release lever
2. Microprocessor bracket frame

5. Open the microprocessor bracket frame (2 in Figure 225).
6. Carefully remove the microprocessor from the socket. Be careful to only touch the edges of the microprocessor.
7. If you are instructed to return the microprocessor, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 microprocessor

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 must always be fitted with both microprocessors to function correctly.

Figure 226 shows the microprocessors and voltage regulator modules (VRMs).

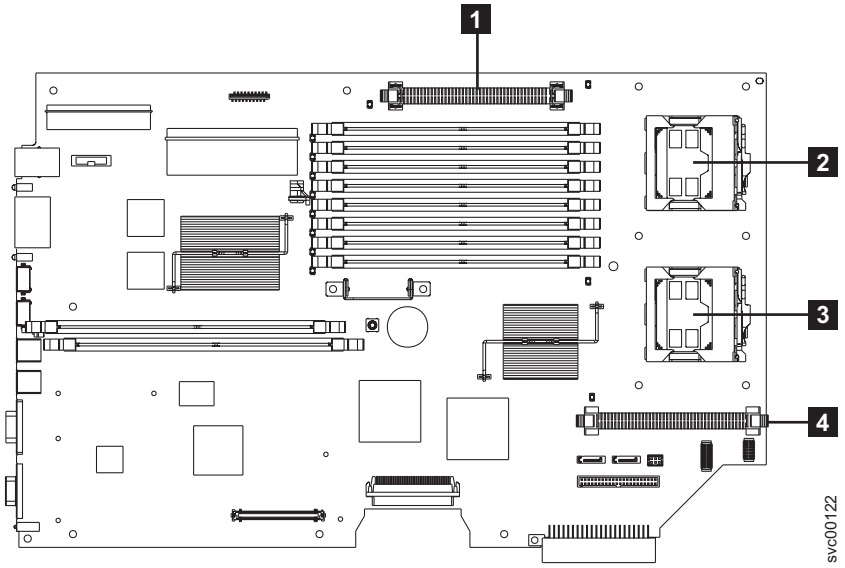


Figure 226. Location of the microprocessor and VRM sockets

1. VRM 1
2. Microprocessor 1
3. Microprocessor 2
4. VRM 2

Each microprocessor is matched with a VRM and a heat sink. When removing the microprocessor, you must first remove the heat sink.

Perform the following steps to remove a microprocessor:

1. Turn off all power to the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Disconnect all power cords and external cables.
3. Remove the node from the rack.
4. Remove the top cover.
5. Fully loosen one captive screw before loosening the other captive screw. This helps to break the bond between the heat sink and the microprocessor.
6. Remove the heat sink.

   Important: Be careful when handling the microprocessor and heat sink. If you wish to reuse the thermal grease between the heat sink and the microprocessor, do not contaminate it. If thermal grease is supplied with your replacement microprocessor, remove all traces of the used thermal grease before applying the new grease.
7. Rotate the microprocessor socket lever arm upward to its maximum vertical position.
8. Remove the microprocessor from the socket.

Replacing the microprocessor

Use this topic when you are required to replace a microprocessor.

Before you replace the microprocessor, ensure that you are aware of handling static-sensitive devices.

Related tasks

"Replacing the top cover" on page 463
You must replace the top cover on the SAN Volume Controller after maintenance is completed.

"Replacing the SAN Volume Controller in a rack" on page 442
You must use caution when you replace the SAN Volume Controller in a rack.

"Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 VRM" on page 562
Before you replace the microprocessor, you must replace the voltage regulator module (VRM).

"Removing the microprocessor" on page 552
You can remove the microprocessor that is used in the SAN Volume Controller nodes.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8G4 microprocessor

This topic describes how to replace the microprocessor.

The documented steps to replace the SAN Volume Controller 2145-8G4 microprocessor assume that you:

- Removed all power from the node
- Removed the node from the rack
- Removed the top cover of the node
- Removed the microprocessor that is being replaced

Perform the following steps to replace the SAN Volume Controller 2145-8G4 microprocessor:

1. Rotate the release lever from the closed and locked position to the open position.
2. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface on the node.
3. Remove the microprocessor from the package.

   Attention: Be careful how you handle the microprocessor. Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Dropping the microprocessor during installation or removal can damage the contacts. Also, contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
4. Position the microprocessor **1** over the microprocessor socket, as shown in Figure 227 on page 557. Use the triangular alignment cutout on the microprocessor socket and the triangular alignment mark **2** on the microprocessor to assist you in aligning the microprocessor to the socket. Then, carefully place the microprocessor onto the socket. Do not force the

microprocessor. It only fits one way onto the socket.

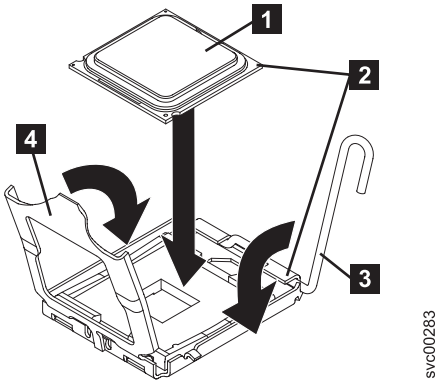


Figure 227. Aligning the microprocessor with the socket

1 Microprocessor

2 Alignment marks

3 Microprocessor release lever

4 Microprocessor bracket frame

5. Place the microprocessor bracket frame 4 down over the microprocessor and the microprocessor socket to secure the microprocessor position in the socket.
6. Rotate the microprocessor release lever 3 into a closed position.
7. Place the heat sink 1 on top of the microprocessor 3 with the thermal grease 2 side down, as shown in Figure 228 on page 558. Tighten the captive screws to secure the heat sink to the system board. Alternate among the screws on either side of the heat sink until they are snug, and then alternate again until they are tight, making sure that you do not overtighten any of them.

   Attention: Do not touch the thermal grease on the bottom of the heat sink after you remove the plastic cover. Touching the thermal grease will contaminate it.

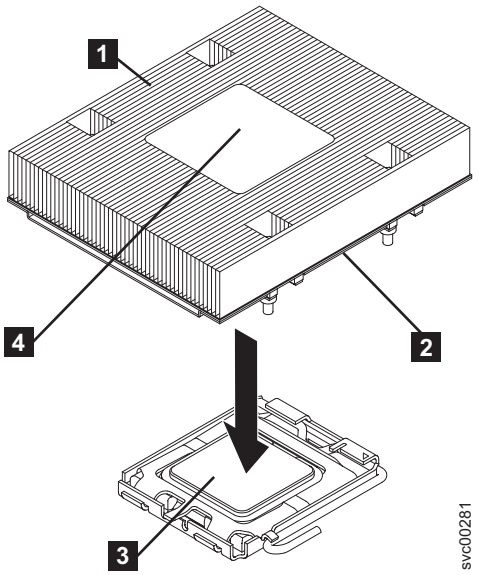


Figure 228. Installing the heat sink

1. Heat sink
2. Thermal grease
3. Microprocessor
4. Heat sink installation label

8. Replace the cover.
9. Replace the node in the rack.
10. Reconnect the power cords and any cables that were removed.
11. Power on the node.

Replacing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 microprocessor

The SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 must always be fitted with both microprocessors in order to function correctly.

The documented steps to replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 microprocessor assume that you:

- Removed all power from the node
- Removed the node from the rack
- Removed the top cover of the node
- Removed the microprocessor that is being replaced

Perform the following steps to replace the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 microprocessor:

1. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface on the node.
2. Remove the microprocessor from the package.
3. Rotate the locking lever 3 from the closed position to the open position, as shown in Figure 229 on page 559.

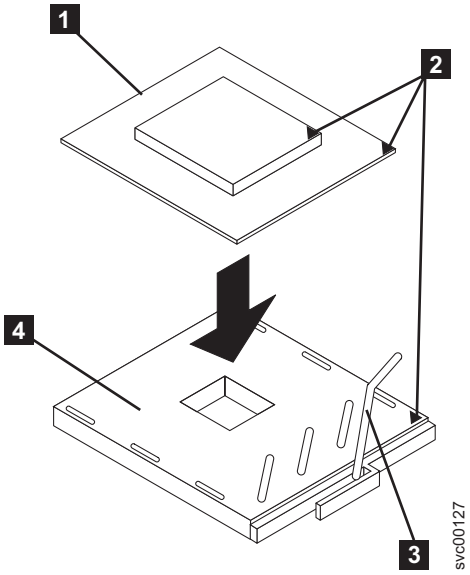


Figure 229. Microprocessor locking lever in open position

1 Microprocessor

2 Corner marks

3 Locking lever

4 Microprocessor socket

4. Center the microprocessor 1 over the microprocessor socket 4.
5. Align the triangle 2 on the corner of the microprocessor with the triangle on the corner of the socket and carefully press the microprocessor into the socket.

   Attention: Do not use excessive force when pressing the microprocessor into the socket.
6. Close the lever.

   Note: A voltage regulator module (VRM) and a heat sink are included in the microprocessor package.
   - Do not set the heat sink down after removing it from the package.
   - Do not touch or contaminate the thermal grease on the bottom of the heat sink. Doing so damages its heat-conducting capability and exposes the microprocessor to overheating.
   - If you must remove the heat sink after installing it, note that the thermal grease might have formed a strong bond between the heat sink and the microprocessor. Do not force the heat sink and microprocessor apart; doing so causes damage to the microprocessor pins. Loosen one captive screw fully before loosening the other captive screw to help break the bond between the components without damaging them.
7. Install the heat sink 2 on top of the microprocessor 3, as shown in Figure 230 on page 560.

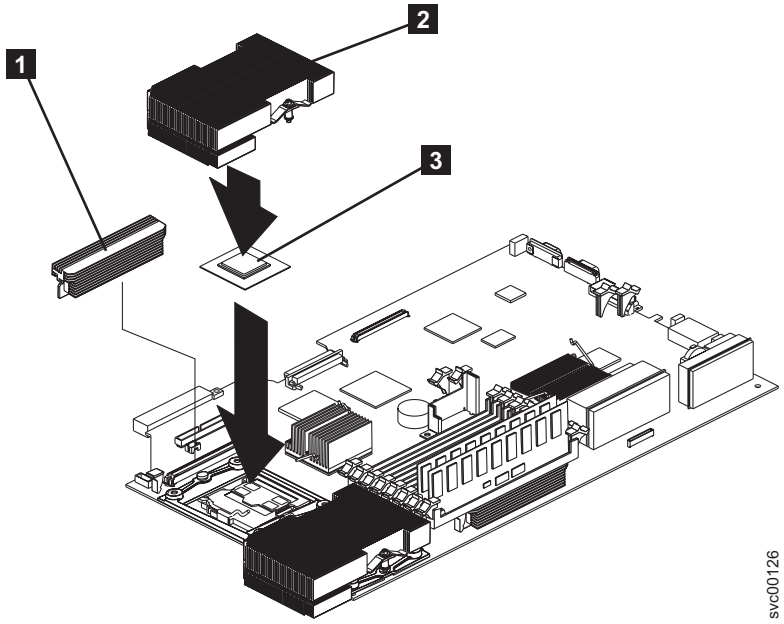


Figure 230. Microprocessor and heat sink locations

1 VRM

2 Heat sink

3 Microprocessor

8. Tighten the captive screws. Alternate between the screws until they are all tightened. Do not overtighten.
9. Replace the cover.
10. Replace the node in the rack.
11. Reconnect the power cords and any cables that were removed.
12. Power on the node.

Removing the SAN Volume Controller 2145-8F4 or SAN Volume Controller 2145-8F2 VRM

You might remove the voltage regulator module (VRM) to perform maintenance on the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4.

Before you remove the VRM, ensure that you are aware of handling static-sensitive devices. Figure 231 on page 561 shows the microprocessors and VRMs.

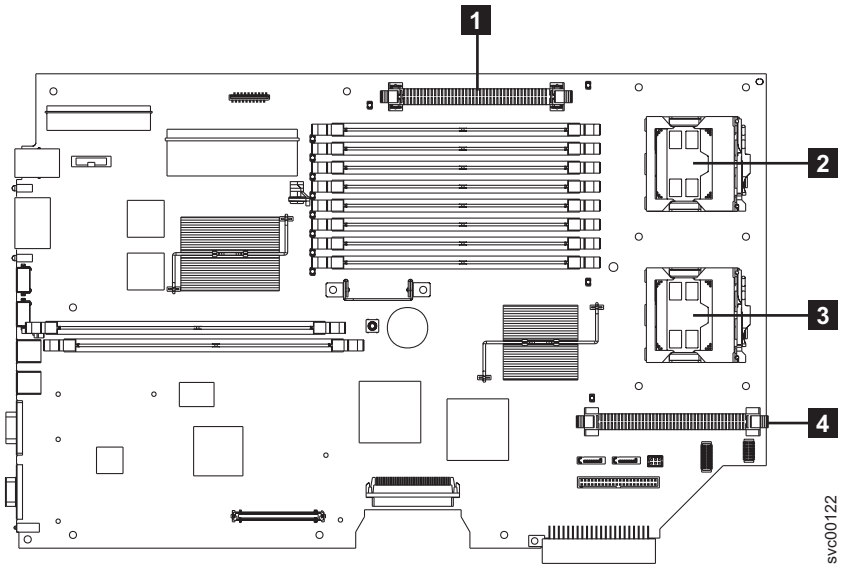


Figure 231. Location of the microprocessor and VRM sockets

1. VRM 1
2. Microprocessor 1
3. Microprocessor 2
4. VRM 2

Perform the following steps to remove the VRM:

1. Remove all power from the node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack.
3. Remove the node top cover.
4. Press the latches on both sides of the VRM downward and outward.

The VRM is pulled out of the node and you can now replace the VRM.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 VRM" on page 562
Before you replace the microprocessor, you must replace the voltage regulator module (VRM).

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 VRM

Before you replace the microprocessor, you must replace the voltage regulator module (VRM).

Before you replace the VRM, ensure that you are aware of handling static-sensitive devices. These instructions assume the following:

- The power to the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 is turned off.
- The node is removed from the rack.
- The node top cover is removed.
- The old VRM is removed from the node.

Perform the following steps to replace the VRM:

1. Align the VRM in the connector.
2. Press both sides of the VRM downward until the latches click into place.
3. If you are replacing the microprocessor, perform the steps required to do so. If not, replace the SAN Volume Controller 2145-8F2 or SAN Volume Controller 2145-8F4 top cover.
4. Place the node in the rack.
5. Power up the node.

Removing the front panel from the SAN Volume Controller 2145-4F2

You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

Perform the following steps to remove the front panel from the SAN Volume Controller 2145-4F2:

1. Verify that all operations between the SAN Volume Controller 2145-4F2 and the host system have stopped.
2. Remove all power from the SAN Volume Controller 2145-4F2. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
3. Slide the SAN Volume Controller 2145-4F2 out from the rack approximately 5 cm (2 in).
4. Press the seven latches that are on the top, sides, and bottom of the front panel to release the assembly.
5. Carefully pull the assembly and its attached cable away from the SAN Volume Controller 2145-4F2. First pull one end of the assembly, and then clear the other latches one by one by slowly pulling the end of the front panel toward you.

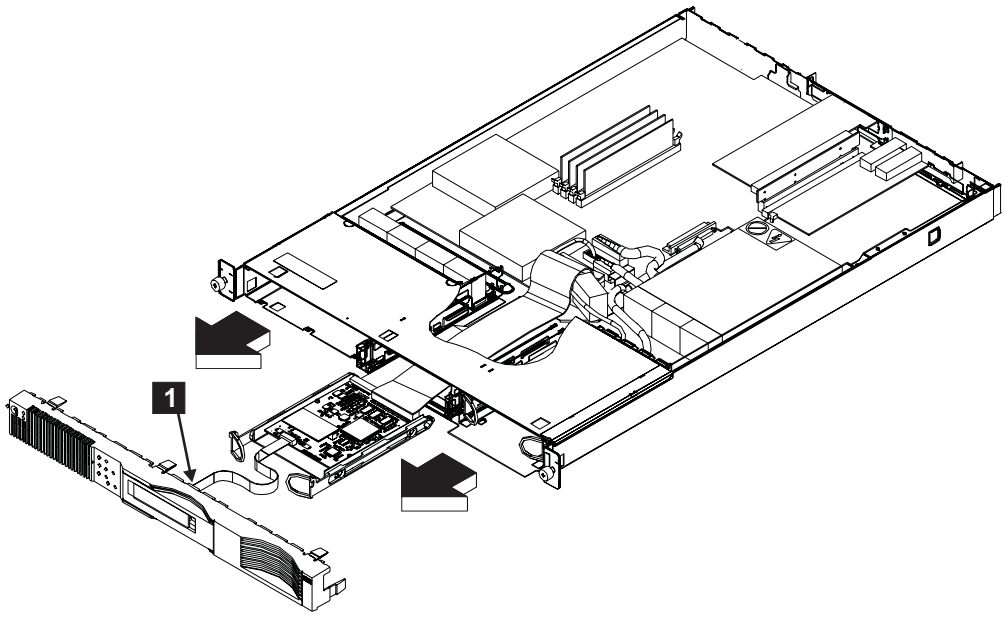


Figure 232. Removing the front panel of the SAN Volume Controller 2145-4F2

6. Disconnect the connector (**1** in Figure 232).

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Replacing the front panel on the SAN Volume Controller 2145-4F2"
You can remove the front panel of the SAN Volume Controller 2145-4F2 in order to replace it.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the power cable from the 2145 uninterruptible power supply" on page 624
You can replace the power cable from the 2145 uninterruptible power supply if you are having problems with the power supply and suspect that the power cable is defective.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

Replacing the front panel on the SAN Volume Controller 2145-4F2

You can remove the front panel of the SAN Volume Controller 2145-4F2 in order to replace it.

Perform the following steps to remove the SAN Volume Controller 2145-4F2 front panel:

1. Connect the cable **1** to the front panel. See Figure 233.

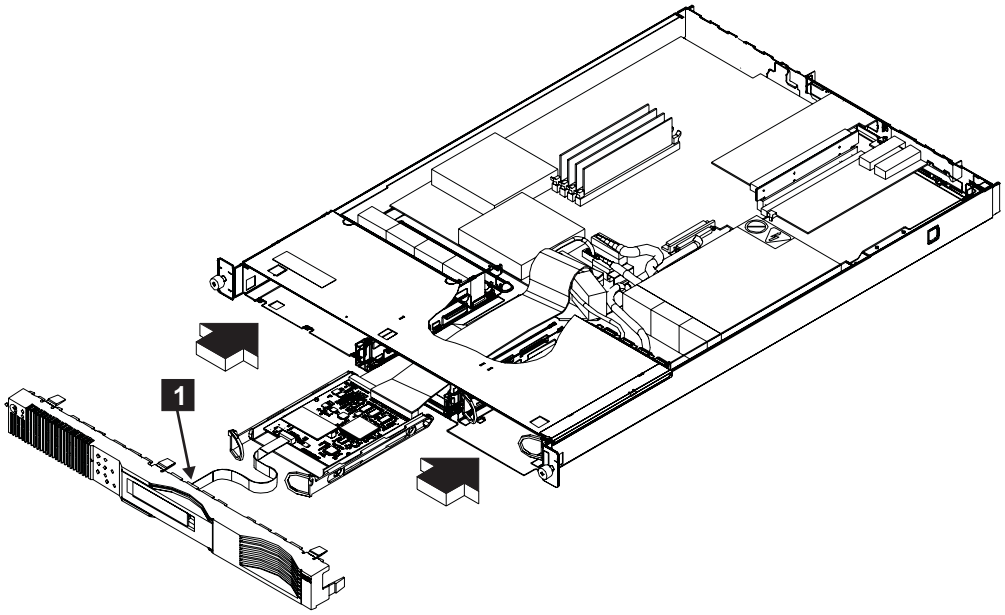


Figure 233. Replacing the front panel

2. Fold the cable into the front of the SAN Volume Controller 2145-4F2.
3. Insert the assembly and its attached cable into the front of the SAN Volume Controller 2145-4F2.
4. Align the front panel with the front of the SAN Volume Controller 2145-4F2 and ensure that the latches enter the frame of the SAN Volume Controller 2145-4F2. Push the front panel until you hear the latches click into place.

   Note: If you replaced the front panel field replaceable unit (FRU) with a new FRU, go to the front panel maintenance analysis procedure (MAP) to perform the steps for the replacement of the front panel.

Related tasks

"MAP 5400: Front panel" on page 402
MAP 5400: Front panel helps you to solve problems that have occurred on the SAN Volume Controller front panel.

"Removing the front panel from the SAN Volume Controller 2145-4F2" on page 562
You can remove the front panel to perform maintenance on the SAN Volume Controller 2145-4F2.

Removing the SAN Volume Controller 2145-8G4 system board

You must remove the system board if you are instructed to replace the SAN Volume Controller 2145-8G4 system board FRU.

The system board field replaceable unit (FRU) is a kit that includes the following parts:

- Planar
- Thermal grease
- Alcohol wipes

Before you proceed with the system board removal, ensure that you do the following:

- Identify and label all the cables that are attached to the SAN Volume Controller 2145-8G4 node so they can be replaced in the same port.
- Have a static-protected surface available to hold the components that you removed from the old system board.

You must follow all standard safety and handling instructions. The components that you will be handling are electrostatic-discharge sensitive. Take precautions when you remove and replace them to avoid damage from static electricity. Wear an anti-static wrist strap and use a static-protected mat or surface.

Notes:

1. All left or right observations are when you are looking at the front of the unit.
2. You must remove a number of components before you can remove and replace the system board. You will reuse all the components that are removed with the new system board. Therefore, take care when you remove and store these components.

Perform the following steps to remove the system board:

1. Ensure that the node is powered off. If the node is an active member of a cluster, you must take care not to power off the only node servicing one or more VDisks, because the host applications will lose access to their data. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the node from the rack and remove the top cover. See "Removing the SAN Volume Controller from a rack" on page 435 and "Removing the top cover" on page 459.
3. Remove the fibre-channel adapter and riser card in slot 1. Set the adapter and riser card aside on the static-protected surface. See "Removing the fibre-channel adapter assembly" on page 524.
4. Remove the riser card in slot 2.
5. Disconnect the first set of cables from the system board, which are shown in Figure 234 on page 566. .From the left front side of the system board, remove the following:
   a. The right disk signal cable connector **1**.
   b. The left disk signal cable connector **2**.
   c. The fan 1 connector **3**. To remove the fan connectors, press the release latch in the center and then pull up.
   d. The fan 2 connector **4**.

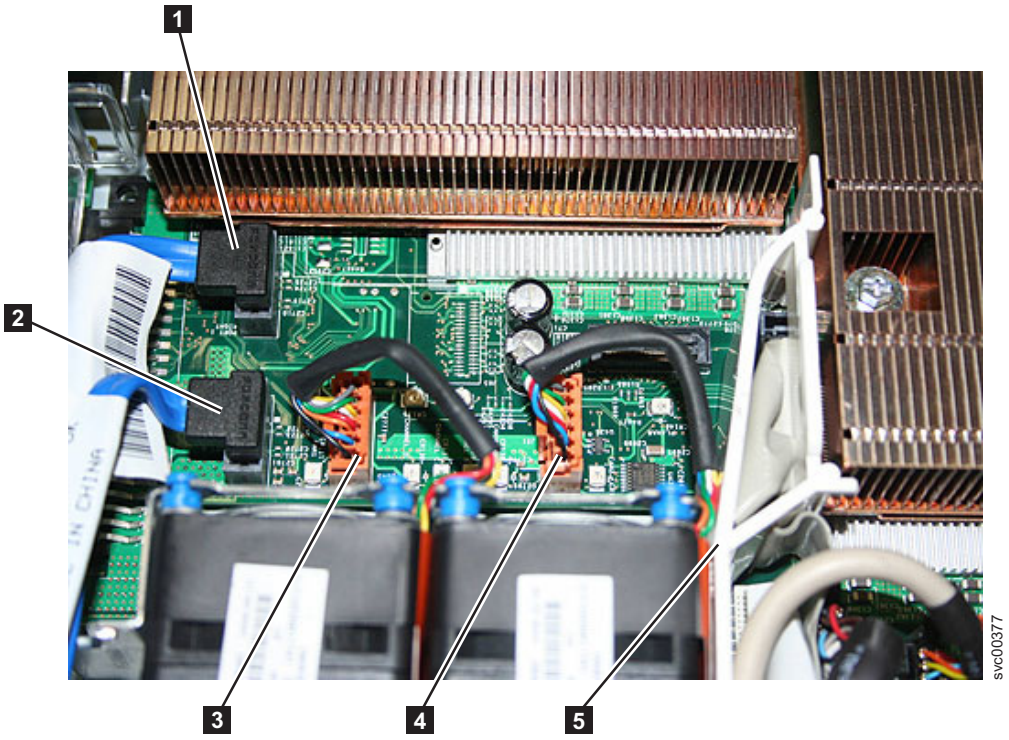


Figure 234. Connectors on the SAN Volume Controller 2145-8G4 system board

6. To ease other tasks, remove fan 2.
7. Notice how the cables are arranged within and beside the left air baffle **5** . Then remove the left air baffle by pulling up gently.

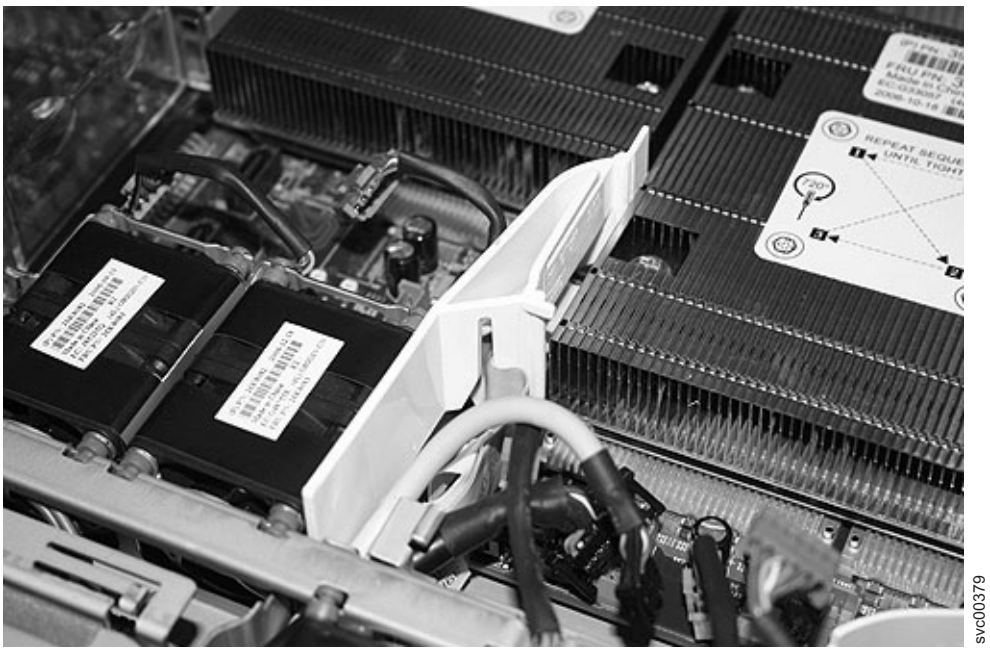


Figure 235. Left air baffle on the SAN Volume Controller 2145-8G4

8. Disconnect the connectors from the system board, which are shown in Figure 236. From the right front side of the system board, remove the following:
   a. The fan 3 connector **5** by pressing the release latch in the center and then pulling up.
   b. The fan 4 connector **6** by pressing the release latch in the center and then pulling up.
   c. The fan 5 connector **7** by pressing the release latch in the center and then pulling up.
   d. The fan 6 connector **8** by pressing the release latch in the center and then pulling up.
   e. The uninterruptible power supply cable connector **4**.
   f. The video cable connector **3**.

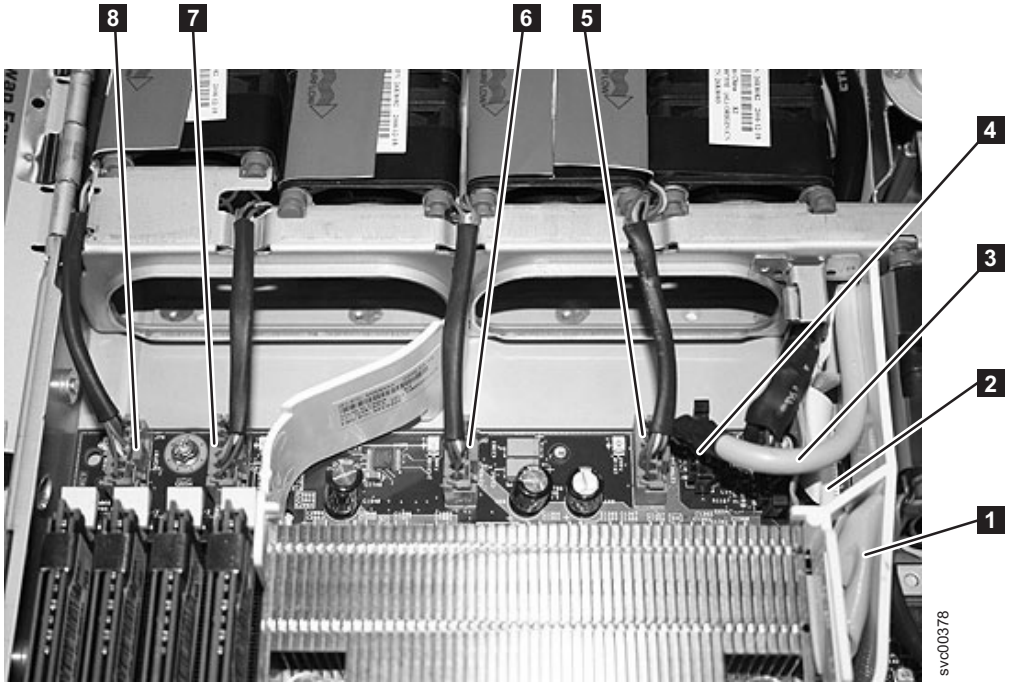


Figure 236. Connectors on the right front side of the SAN Volume Controller 2145-8G4 system board

9. Remove the remaining cables from the system board:
   a. The CD-RW ribbon cable connector **1** by gently pulling the connector upward.
   b. The light path ribbon cable connector **2** by gently pulling the connector upward.

   All cables should now have been removed from the system board. You do not need to disconnect the disk power cable connector **1** on the power backplane **2**, which are shown in Figure 237 on page 568.

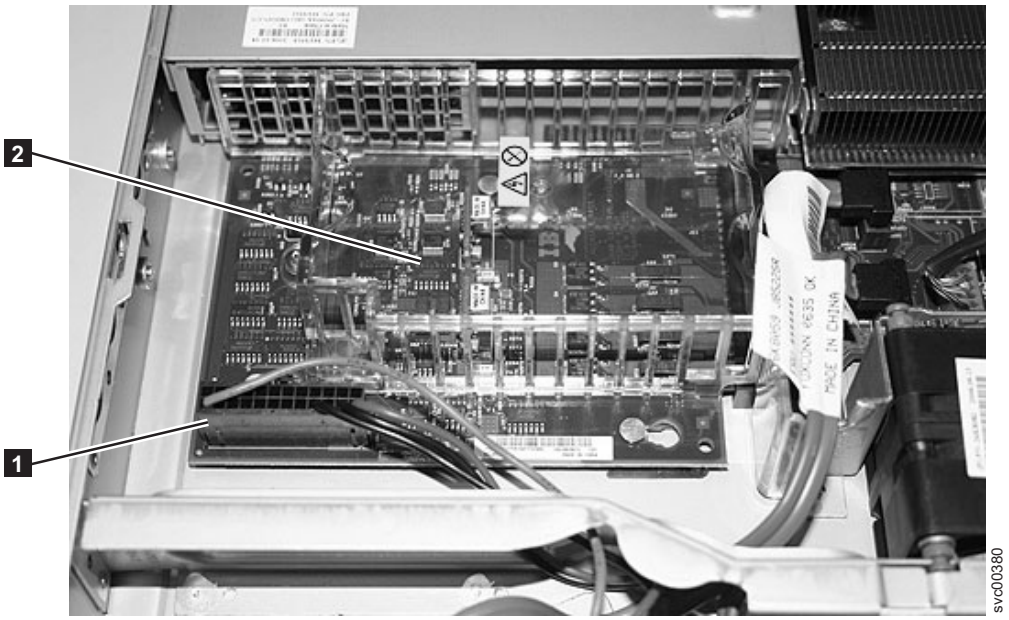


Figure 237. Disk power cable connector and power backplane on the SAN Volume Controller 2145-8G4 system board

10. Remove the right air baffle, which is shown in Figure 238. First, pull the air baffle to the right and then push the connector towards the back of the unit to release it from the support rail. Next, pull the baffle forward and then upward to release the clip from the system board. Finally, lift the baffle free.

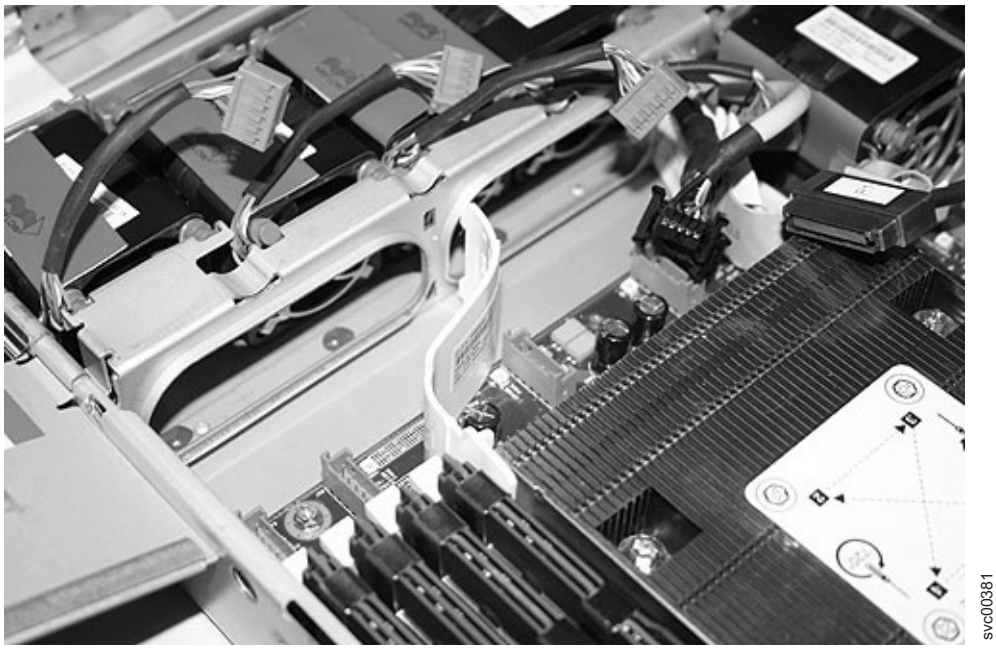


Figure 238. Right air baffle on the SAN Volume Controller 2145-8G4 system board

11. Carefully remove the eight memory modules and set them aside on the static-protected surface. See "Removing the memory modules (DIMM)" on page 482.

12. Remove the two heat sinks, remove the thermal grease from them, and set them aside on the static-protected surface.

    Tip: Fully loosen both screws from one side of the heat sink before you loosen either screw on the other side to help break the thermal grease seal between the microprocessor and the heat sink.

    Remove the thermal grease from each heat sink using one of the alcohol wipes that was supplied with the FRU assembly.

13. Clean the thermal grease from the top of each microprocessor, as shown in Figure 239, using one of the alcohol wipes that was supplied with the FRU assembly. Cleaning the microprocessor before it is removed reduces the amount of handling it is subjected to.

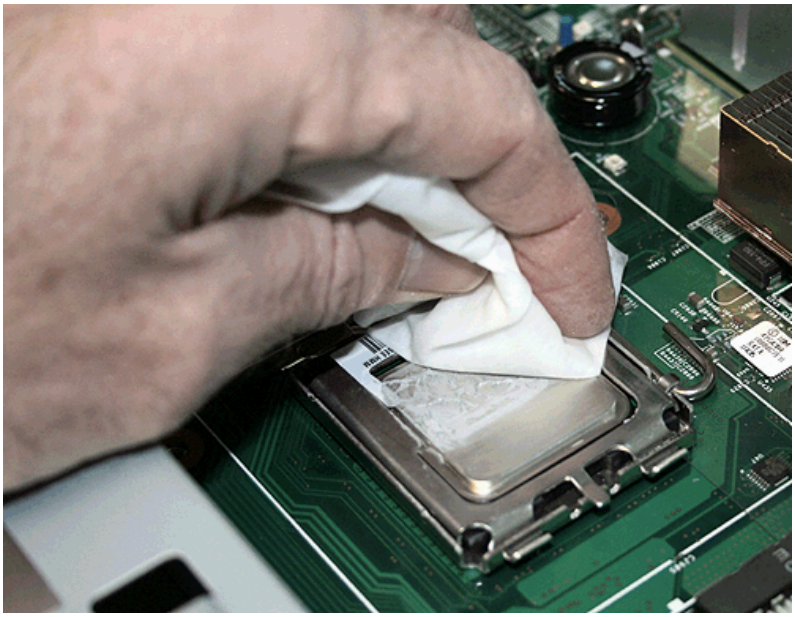


Figure 239. Removing thermal grease from the SAN Volume Controller 2145-8G4 microprocessor

14. Remove the microprocessors.
    a. Open the microprocessor release lever and then open the bracket frame.
    b. Carefully remove the microprocessor from the socket. Be careful to touch only the edges of the microprocessor.
    c. Set the microprocessors aside on a static-protected surface.
15. Push down the orange clip and pull the power supply approximately two inches out of the chassis so it disconnects with the power backplane.
16. Disconnect the power backplane from the system board by sliding it to the left. Move it far enough to the side so it does not obstruct the system board removal. See "Removing the power backplane" on page 516.
17. Remove the four stand-off screws from by the serial and video I/O ports at the rear of the node. Figure 240 on page 570 shows the location of the stand-off screws.

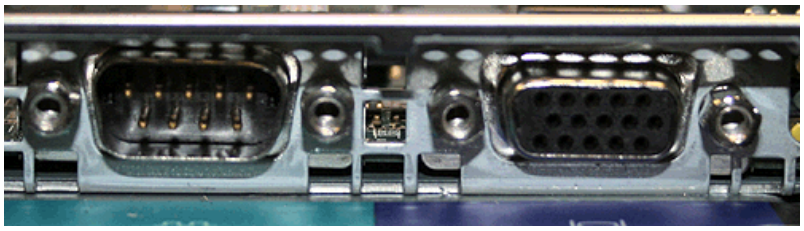


Figure 240. Serial and video ports on the SAN Volume Controller 2145-8G4

18. Remove the six screws on the system board, as shown in Figure 241, that secure the system board to the chassis.

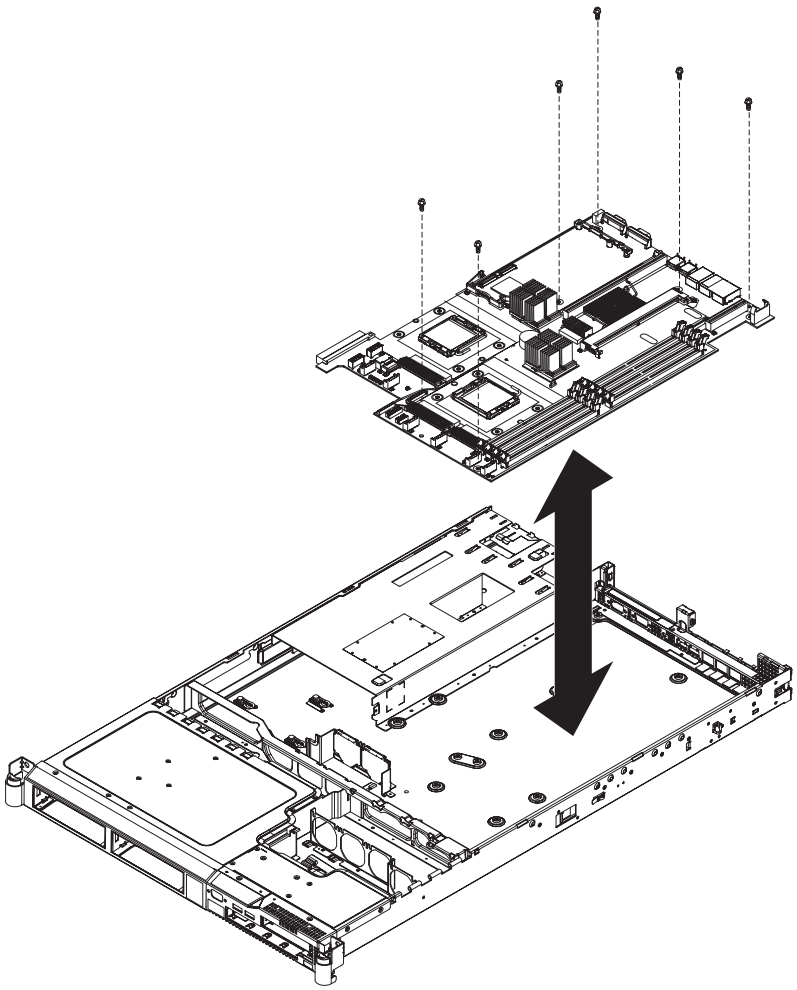


Figure 241. The placement of the screws that secure the SAN Volume Controller 2145-8G4 system board

19. Lift up the front edge of the system board slightly so that it disengages from the locator pin. Slide the system board slightly toward the front of the node so that the I/O ports are free of the chassis.
20. Lift up the left side of the system board.
21. Lift up the rest of the system board and carefully remove it from the node, being careful not to disturb any surrounding components.

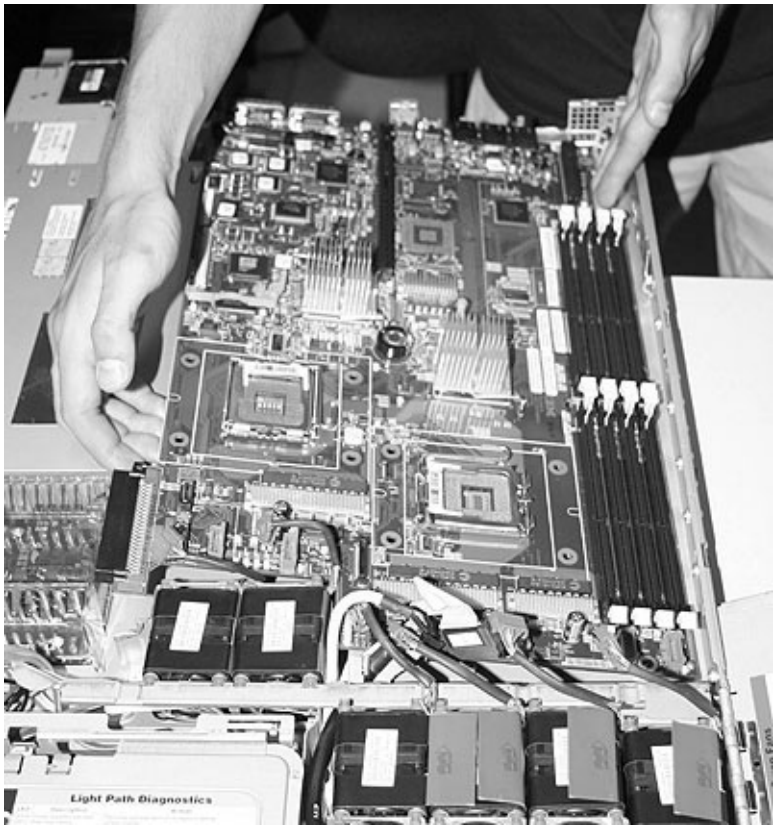


Figure 242. Removing the SAN Volume Controller 2145-8G4 system board from the node

Related tasks

"Removing the microprocessor" on page 552
You can remove the microprocessor that is used in the SAN Volume Controller nodes.

"Replacing the SAN Volume Controller 2145-8G4 system board"
All the components that were removed when you removed the system board are reused during the installation of the new system board.

Replacing the SAN Volume Controller 2145-8G4 system board

All the components that were removed when you removed the system board are reused during the installation of the new system board.

Perform the following steps to install the system board:

1. Lower the right side into place with the system board positioned slightly towards the front of the box. Lower the left edge of the system board into place and then push the system board towards the back of the box until it engages in place and the screw holes line up. Take care to ensure that the Ethernet ports on the rear of the system board engage in the frame cutouts.

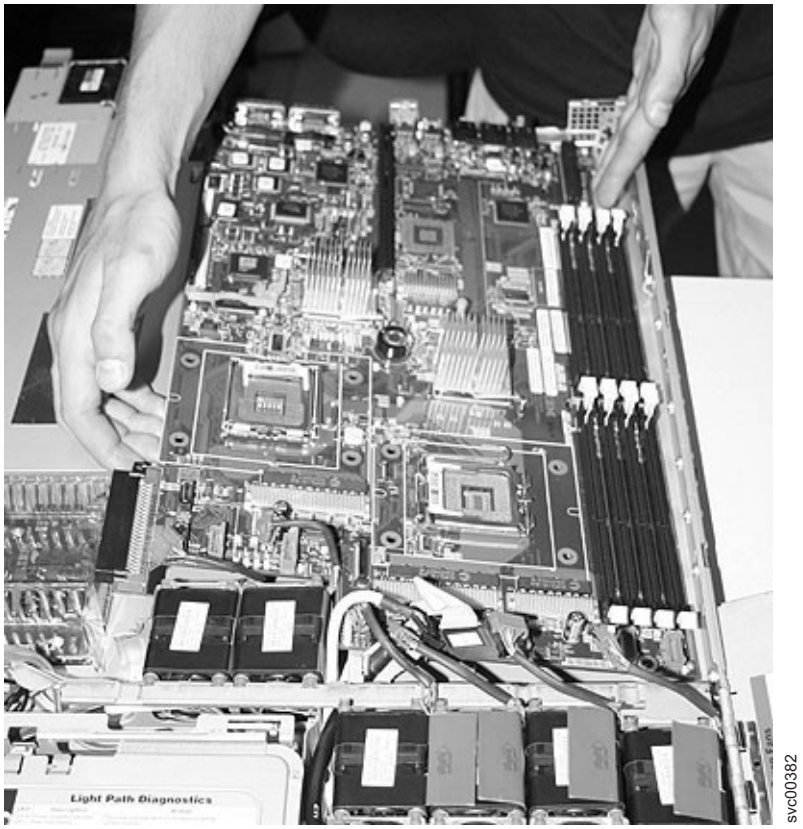


Figure 243. Removing the SAN Volume Controller 2145-8G4 system board from the node

2. Replace the six screws on the system board, as shown in Figure 244 on page 573, to secure the system board to the chassis.

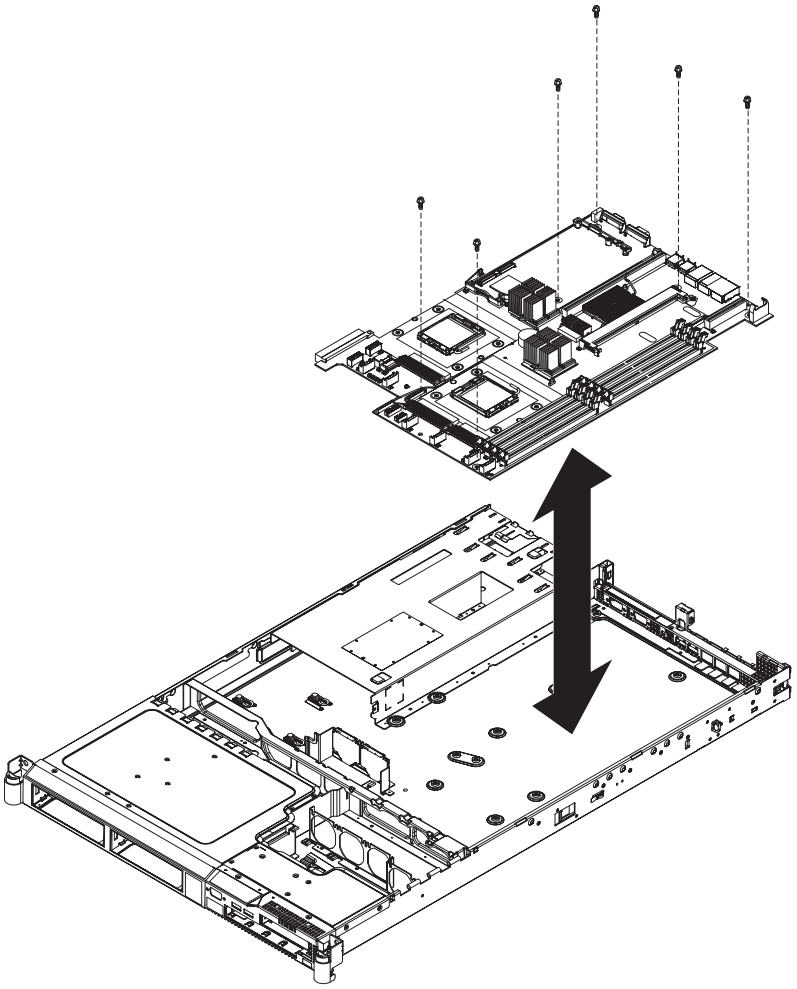


Figure 244. The placement of the screws that secure the SAN Volume Controller 2145-8G4 system board

3. Replace the four stand-off screws from beside the I/O ports at the rear of the server. Figure 245 shows the location of the stand-off screws.

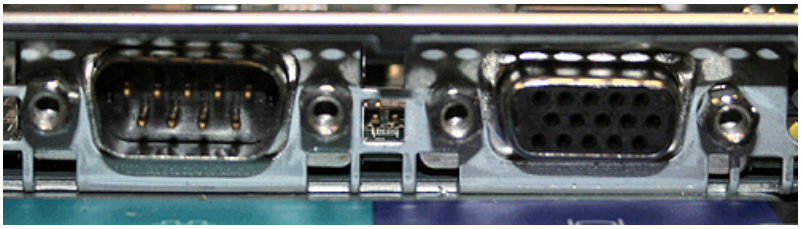


Figure 245. Serial and video ports on the SAN Volume Controller 2145-8G4

4. Replace the power backplane by pushing it right to connect it to the system board and pushing the power supply back in to connect to it. See "Replacing the power backplane" on page 518.
5. Install one of the microprocessors while carefully checking the orientation and remembering to close the release lever, which is shown in Figure 246 on page 574.

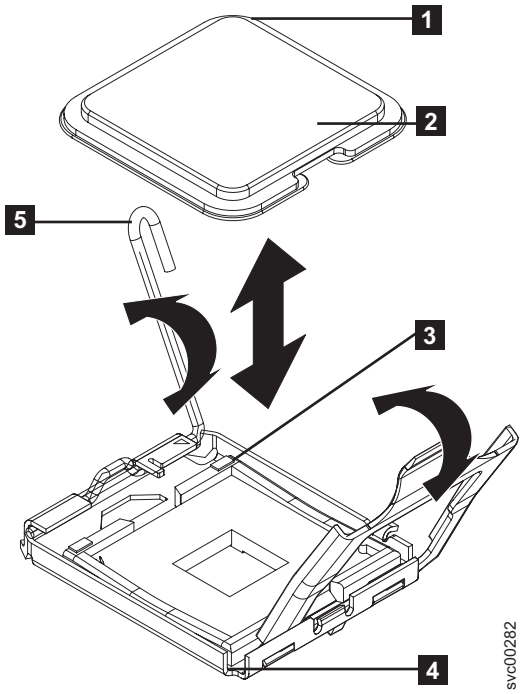


Figure 246. Installing the microprocessor

1. Microprocessor orientation indicator
2. Microprocessor
3. Microprocessor orientation indicator
4. Microprocessor connector
5. Microprocessor release lever

6. Install one of the heat sinks.
   a. Apply thermal grease to the top of the heat sink. Apply nine dots of thermal grease in three rows of three dots each with the outer rows approximately 5 mm from the edge of the heat sink. The diameter of the cap from the thermal grease syringe is 5 mm, so you can use it to judge the required position of the dots of thermal grease, as shown in Figure 247 on page 575.

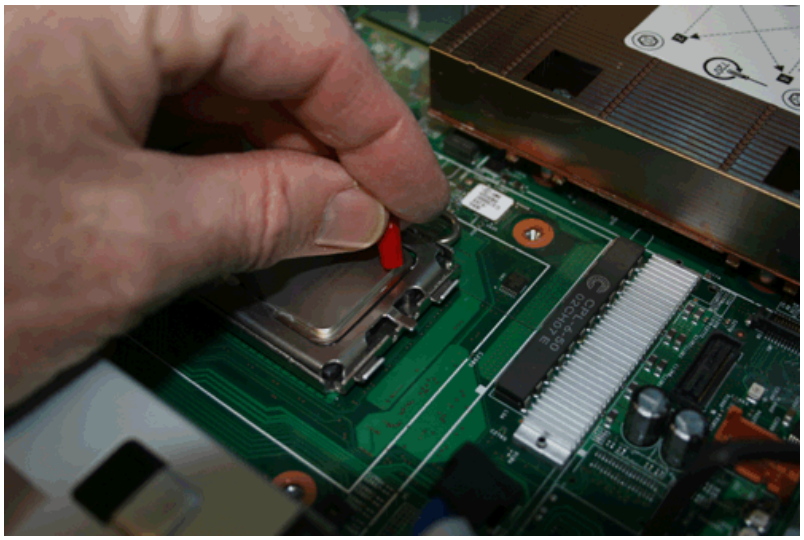


Figure 247. Estimating the position of the thermal grease dots

b. For each dot of thermal grease, use two divisions on the syringe scale, which is 0.02 ml of grease. You will use about half the syringe contents for the nine dots. Figure 248 shows how the heat sink appears with the nine dots of grease.

Figure 248. Complete set of nine thermal grease dots on the microprocessor

c. Install the heat sink by gently squeezing it down onto the thermal grease and then tightening the four retaining screws alternately and evenly.

7. Repeat steps 5 on page 573 and 6 on page 574 for the second microprocessor and heat sink.
8. Replace the eight memory modules. See "Replacing the memory modules (DIMM)" on page 485.
9. Replace the right air baffle, which is shown in Figure 249 on page 576.
   a. Locate the pin on the bottom of the air baffle in the locating hole on the system board.

b. Push the baffle backwards to locate it in place.
c. Pull the baffle slightly to the right to locate the two clips in the support rail.

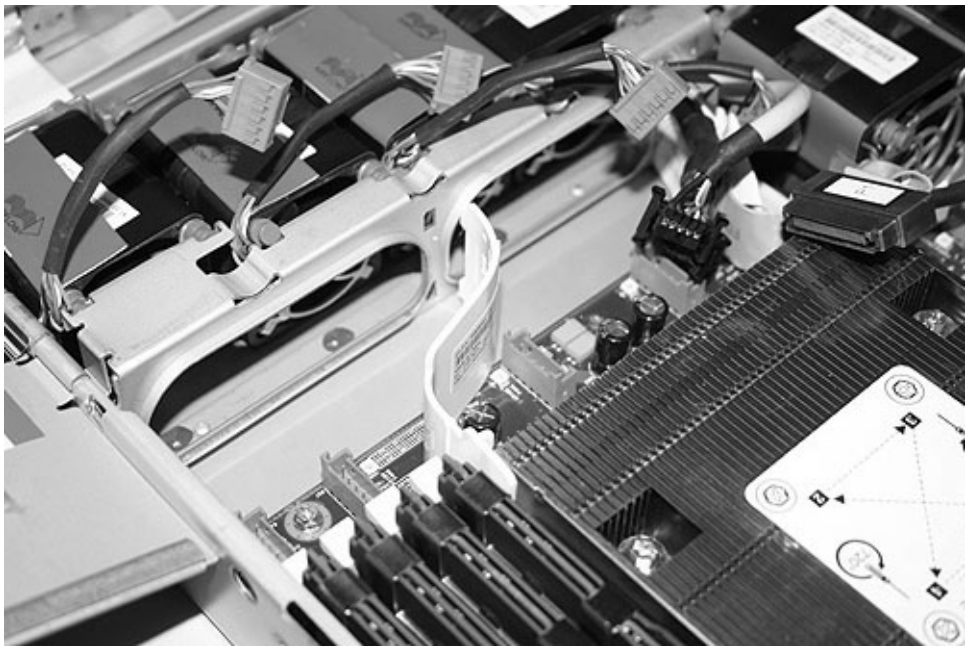


Figure 249. Right air baffle on the SAN Volume Controller 2145-8G4 system board

10. Reconnect the light path ribbon cable connector and the CD-RW ribbon cable connector, as shown in Figure 250 on page 577.
    a. Replace the video cable connector and the USB cable connector.
    b. Replace the cable connectors for fans 6, 5, 4 and 3.

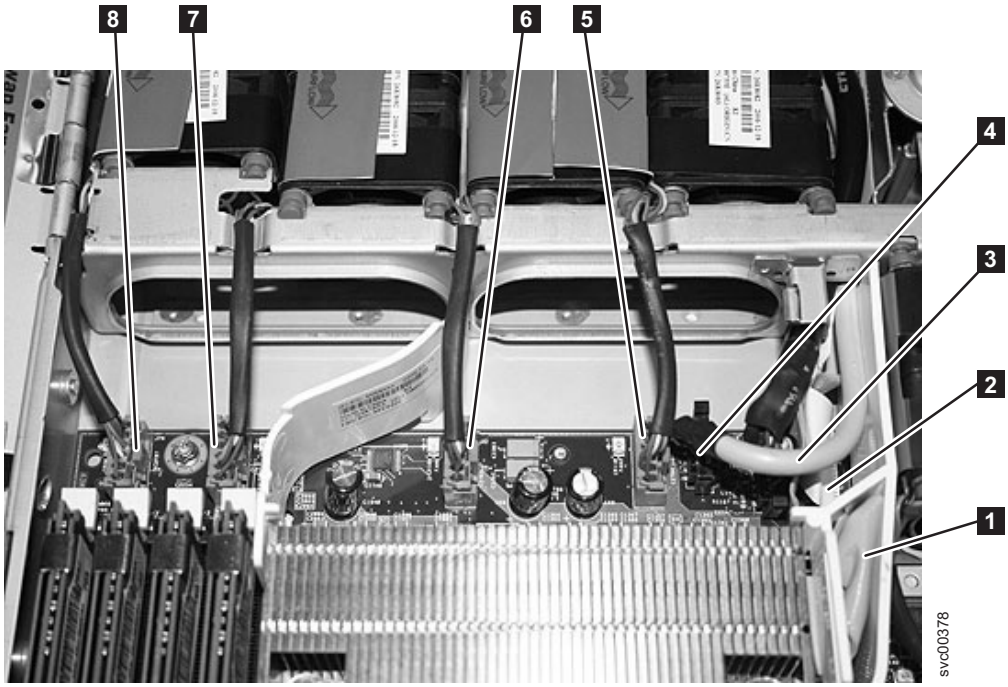


Figure 250. Connectors on the right front side of the SAN Volume Controller 2145-8G4 system board

1. CD-RW connector
2. Light path cable connector
3. Video cable connector
4. USB cable connector
5. Fan 3 connector
6. Fan 4 connector
7. Fan 5 connector
8. Fan 6 connector

11. Replace the left air baffle, which is shown in Figure 251 on page 578. You must position the CD-RW cable within the baffle.

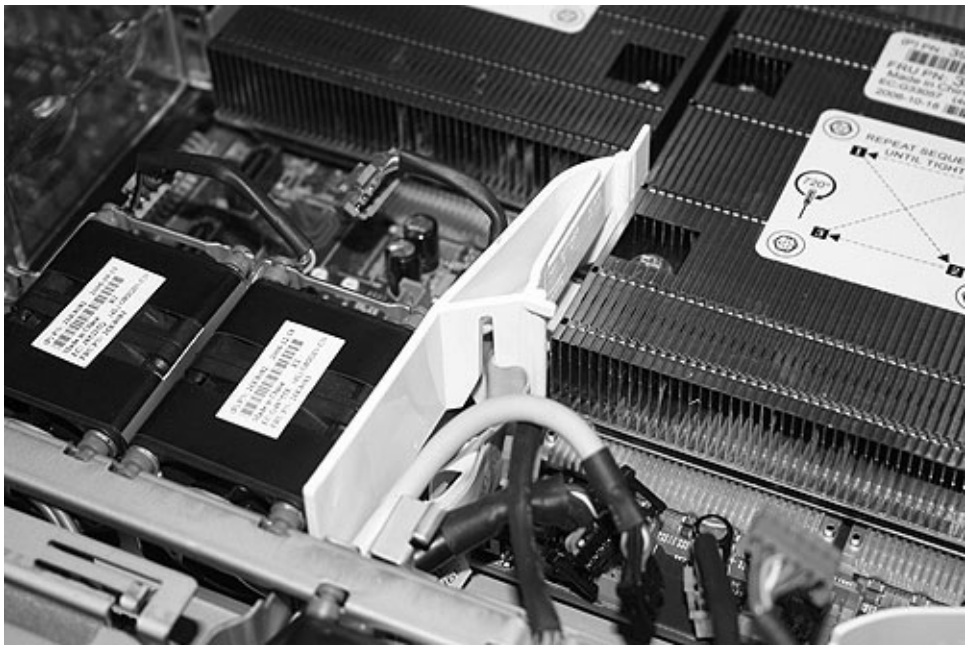


Figure 251. Left air baffle on the SAN Volume Controller 2145-8G4

12. Replace fan 2.
13. Replace the cable connectors for fans 2 and 1, as shown in Figure 252.

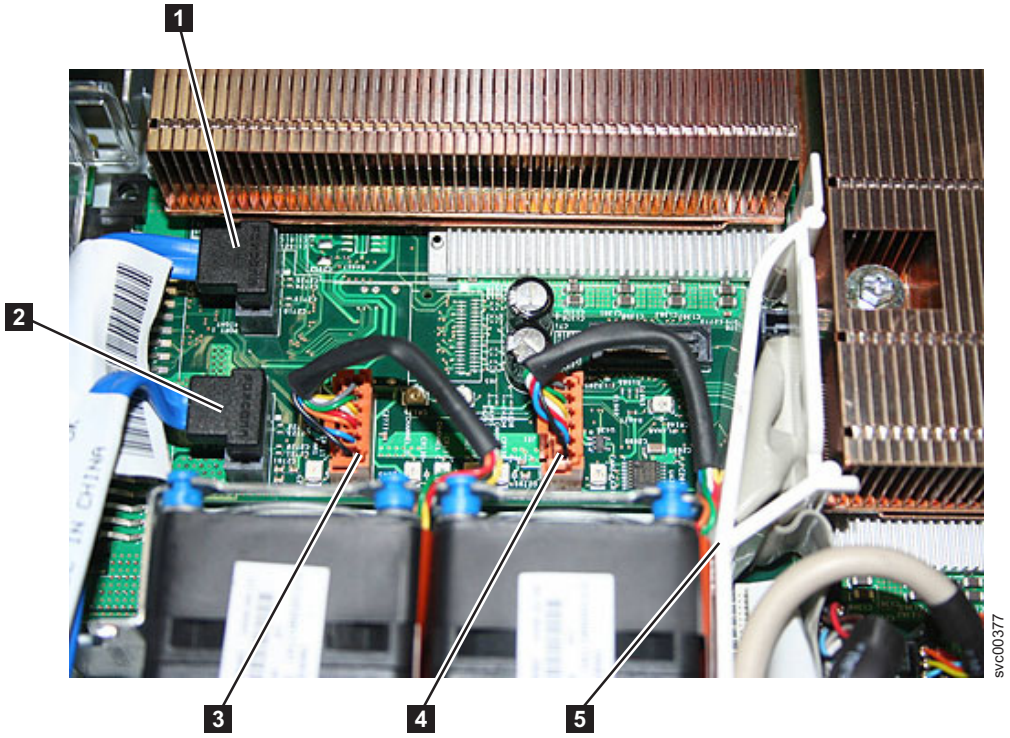


Figure 252. Connectors on the SAN Volume Controller 2145-8G4 system board

1. Right disk signal cable connector
2. Left disk signal cable connector

3 Fan 1 connector

4 Fan 2 connector

14. Replace the left disk drive cable in the front socket and the right disk drive cable in the rear socket.
15. Replace the riser card that you removed from adapter slot 2. Push it into its connector.
16. Replace the fibre-channel adapter and riser card. See "Replacing the fibre-channel adapter assembly" on page 529.
17. Replace the top cover. See "Replacing the top cover" on page 463.
18. Place the node in the rack. See "Replacing the SAN Volume Controller in a rack" on page 442.
19. Power on the node and allow it to start. Wait for the front panel display to remain stable for at least five minutes before taking any further action.
    - If the repair has been successful and if the node was able to save its state data before shutting down, the node starts and rejoins the cluster. The front panel displays `Cluster:` and a cluster name if the node has rejoined a cluster.
    - If the repair has been successful but the node was not able to save its state data before shutting down, the node displays node error 578. Follow the procedures in "Deleting a node from the cluster" on page 77 to delete the node from the cluster and then add it back into the cluster. If more than one node has failed, ensure that the node is added back into its original I/O group. See "Adding a node to a cluster" on page 78 for more information.
    - If any other message is shown on the front panel, use "MAP 5000: Start" on page 362 to resolve the problem.

    Note: It is essential that you perform all the stages of the following step to ensure that the original machine serial number is restored on the new system board. Failure to do this might invalidate the customer's warranty or service agreement.
20. After you make sure that the node is operating as part of the cluster, perform the following steps to restore the original machine serial number to the new system board:
    a. Start the command-line interface (CLI). See "Accessing the SAN Volume Controller CLI" on page 72.
    b. Write down the seven-character serial number from the serial number label that is on the front of the node. Ignore any hyphens (-) in the serial number.
    c. From the front panel, press and release the down button until the display shows `Node:` on the top line. Write down the node name that is shown on the bottom line.
    d. Issue the following command on the CLI, substituting the values for *nodeserialnumber* and *nodename* that you wrote in the previous steps:

       `svcservicetask writesernum -sernum nodeserialnumber nodename`

       For example, if the serial number on the front of the node is "13-FEDCB" and the node name is "ZYXW3", you would issue the following command:

       The `svcservicetask writesernum –sernum 13FEDCBZYXW3` command writes the machine serial number to the SAN Volume Controller 2145-8G4 system board.

Note: The node will restart as soon as the serial number has been written to it.

Removing the SAN Volume Controller 2145-4F2 system board

During routine maintenance, you may be required to remove and replace the system board.

The system board field replaceable unit (FRU) is a kit that includes the following parts:

- PCI riser card
- Two microprocessors
- Microprocessor voltage regulator module (VRM)
- Planar

Use all the parts in the kit when you replace the system board FRU.

The system board is electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity.

For information about working with static-sensitive devices, see the documentation about handling static-sensitive devices at the end of this topic.

Perform the following steps to remove the system board:

1. Remove all power from the SAN Volume Controller. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove the SAN Volume Controller from the rack.
3. Remove the top cover from the SAN Volume Controller (**1** in Figure 253 on page 581).

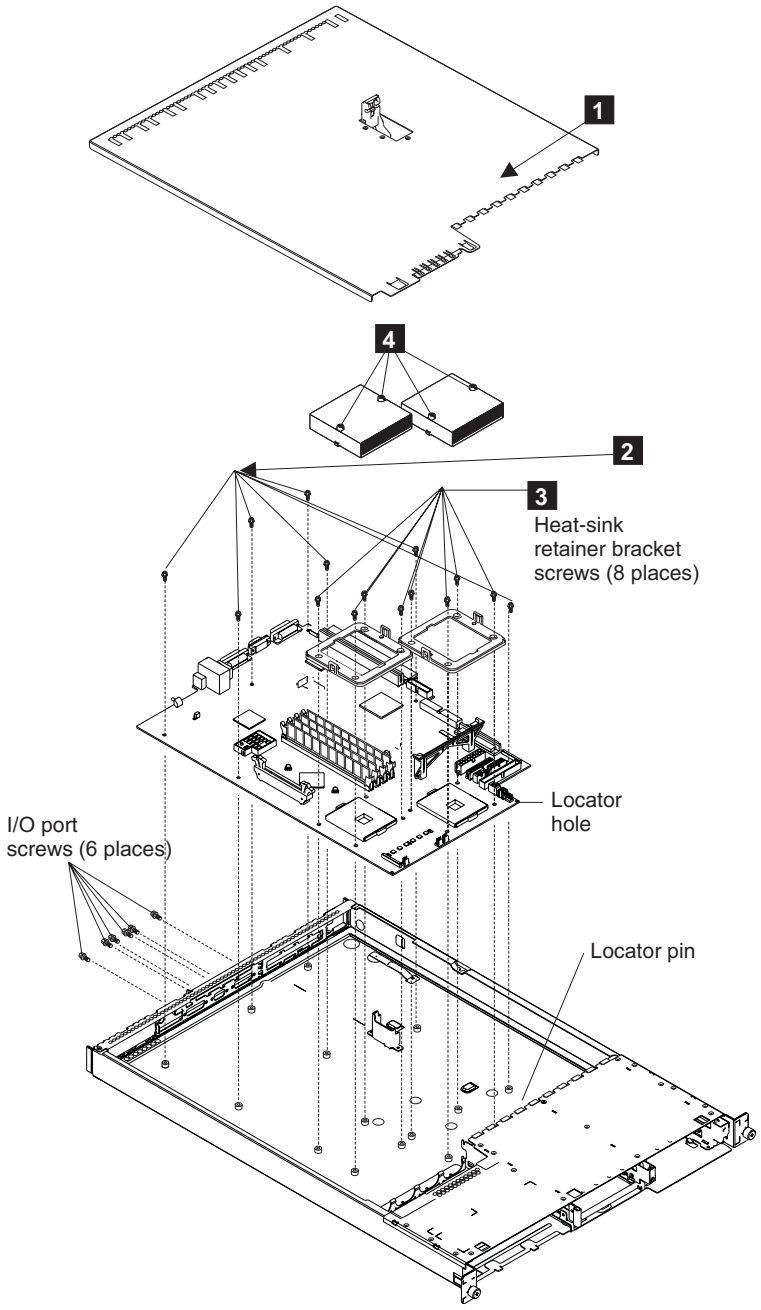


Figure 253. SAN Volume Controller 2145-4F2 system board

If you are going to exchange the system board for another system board, go to step 4. Otherwise, go to step 6.

4. Remove the adapter assemblies; however, keep the adapter assemblies—they must be installed onto the replacement system board.
5. Remove the memory modules; however, keep the memory modules—they must be installed onto the replacement system board.
6. Disconnect the following:
   - All fan connectors
   - Power connectors P1 and P2
   - SCSI power connector

- ATA connector
- Disk drive connectors
- Service Controller connector

7. Lift out the air baffle.
8. Unscrew the heat sink captive screws (4 in Figure 253 on page 581).
9. Move the heat sinks gently from side to side to break the seal formed by the thermal compound and then pull them off the processors.
10. Remove the screws from each of the heat sink retainer brackets (3 in Figure 253 on page 581).
11. Remove the retainer brackets.
12. Remove the two screws from each of the three connectors.
13. Remove the seven screws (2 in Figure 253 on page 581).
14. Remove the system board.

    At this time, if you have any tasks to do while the system board is removed, do them.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

"Removing the SAN Volume Controller from a rack" on page 435
During some service procedures, you might need to remove the SAN Volume Controller from a rack.

"Removing the top cover" on page 459
You can remove the SAN Volume Controller's top cover if maintenance is necessary.

"Removing the fibre-channel adapter assembly" on page 524
Use the information in this topic when you need to remove a fibre channel adapter or fibre channel adapter assemblies.

"Removing the memory modules (DIMM)" on page 482
You might need to remove one or more faulty memory modules.

Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Replacing the SAN Volume Controller 2145-4F2 system board

During routine maintenance, you may be required to replace the system board.

The system board field replaceable unit (FRU) is a kit that includes the following parts:

- PCI riser card
- Two microprocessors
- Microprocessor voltage regulator module (VRM)
- Planar

Note:

1. Use all the parts in the system board FRU kit (system board, processors [2], VRM, riser card). If you removed the system board and are replacing it, reuse only the four memory modules and the two adapter assemblies that you removed. See "Removing the SAN Volume Controller 2145-4F2 system board" on page 580.
2. Before you install the new system board, check whether the old system board has any jumpers installed. If it has, install matching jumpers onto the new system board.
3. Before you install the processors on the system board, remove the dust covers from the processor socket.
4. If you were not sent here from the directed maintenance procedures, rewrite the SAN Volume Controller 2145-4F2 serial number. If you were sent here from directed maintenance procedures, this step is performed from within the procedure.
5. The system board is electrostatic-discharge sensitive. Take precautions to avoid damage from static electricity. For information about working with static-sensitive devices, see "Handling static-sensitive devices" on page xlvi.
6. To force-restore the system board flash memory, you must run the node rescue procedure after all external cables are reconnected to the node and the node is first powered on.

Perform the following steps to replace the system board:

1. Replace the seven screws **2** shown in Figure 254 on page 584.
2. Replace the two screws from each of the three connectors.
3. Replace the retainer brackets.
4. Replace the screws from each of the heat sink retainer brackets **3** shown in Figure 254 on page 584.
5. Screw in the heat sink captive screws **4**.
6. Return the air baffle to its place.
7. Connect the following:
   - All fan connectors
   - Power connectors P1 and P2
   - SCSI power connector
   - ATA connector
   - Disk drive connectors
   - Service controller connector
8. Replace the memory modules onto the replacement system board.
9. Replace the adapter assemblies onto the replacement system board.
10. Replace the top cover **1** of the node.

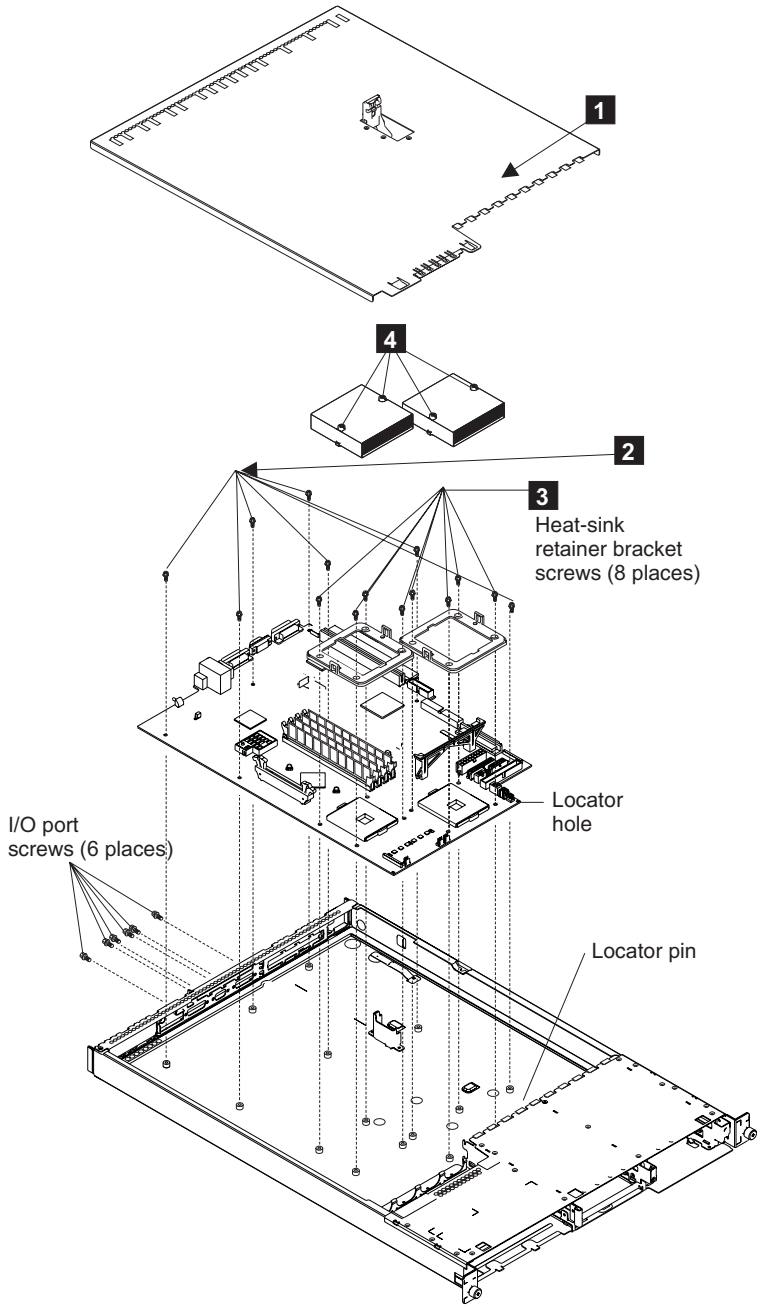


Figure 254. SAN Volume Controller 2145-4F2 system board

1. Top cover
2. Screws
3. Heat sink retainer brackets
4. Heat sink captive screws

11. Place the node in the rack.
12. *Carefully* install the end of the ribbon cable (marked `System Planar`) to the system board, being sure to install the cable straight in, as shown in Figure 255 on page 585. Be sure to verify that the blue line on the cable connector end is not visible.

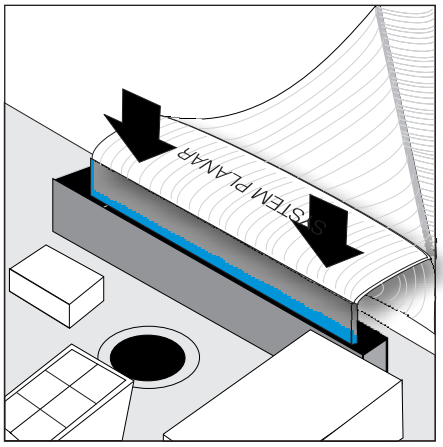


Figure 255. Installing the service controller cable into the system board

13. Return all power to the SAN Volume Controller.
14. If you are performing this repair as part of a directed maintenance procedure, you will be prompted to type the machine serial number. Otherwise, perform the following steps:
    a. Delete the failed node from the cluster.
    b. Add the repaired node to the cluster.
    c. Start the command-line interface.
    d. Issue the following command:

       `svcservicetask writesernum -sernum` *`nodeserialnumber nodename`*

       where *nodeserialnumber* is the serial number on the node frame and *nodename* is the name of the repaired node that you added in this step.

       The `svcservicetask writesernum -sernum` *`nodeserialnumber nodename`* command writes the machine serial number to the SAN Volume Controller system board.

       Note: The node will restart as soon as the serial number has been written to it.

Related tasks

"Removing the SAN Volume Controller 2145-4F2 system board" on page 580
During routine maintenance, you may be required to remove and replace the system board.

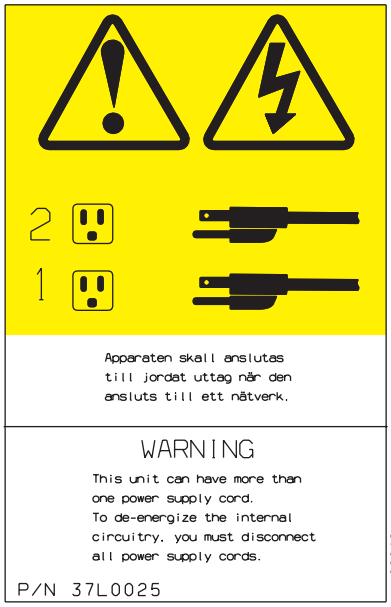
Related reference

"Handling static-sensitive devices" on page xlvi
Ensure that you understand how to handle devices that are sensitive to static electricity.

Removing the redundant ac power switch

Use this topic when you need to remove a redundant ac power switch.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.



To remove a redundant ac power switch, complete the following steps:

1. Power off each SAN Volume Controller node connected, via a uninterruptible power supply, to the redundant ac power switch. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
   a. There might be one or two nodes connected to the redundant ac power switch. If two nodes are connected to the redundant ac power switch, before powering off the nodes you must ensure that both nodes are not in the same I/O group. If they are in the same I/O group, the customer will lose access to the data managed by that I/O group if they are both powered off.
   b. If both nodes powered by the redundant ac power switch are in the same I/O group, power off one node, disconnect it from the redundant ac power switch, and connect it to a different power source. Then power the node back on. When it has recovered and rejoined the I/O group, it can maintain the I/O access when the other node is powered off and when the redundant ac power switch is removed. If you have had to perform this operation, pay particular attention to checking when it is safe to power off the second node. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.
2. Remove both the redundant ac power switch input power cables from the site power distribution unit and un-thread them in the rack, so they will slide out when the redundant ac power switch is removed. There might be enough access to disconnect them from the redundant ac power switch while it is in the rack, but often it is more convenient to leave them attached and remove them with the redundant ac power switch.
3. Remove the one or two redundant ac power switches to 2145-1U uninterruptible power supply power cables from the redundant ac power switch. There is no need to disconnect them from the 2145-1U uninterruptible power supply.
4. Unscrew the four screws holding the redundant ac power switch into the rack. Be careful to support the redundant ac power switch during this procedure since the screws are the only support for the unit.
5. The redundant ac power switch can be slid out of the rack along with the input power cables if they are still attached.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

Replacing the redundant ac power switch

Use this topic when you need to replace a redundant ac power switch.

The redundant ac power switch FRU assembly includes the redundant ac power switch and the input power cables. They should all be replaced together.

These instructions assume that a redundant ac power switch has been removed and the one or two nodes that were connected to it are powered off.

To replace a redundant ac power switch, complete the following steps:

1. Attach each of the two mounting plates to the redundant ac power switch using three M3 Torx T8 head screws. Position the mounting face, as shown in Figure 256, on the side of the redundant ac power switch that contains the output power sockets.

Figure 256. Attaching the mounting plates

2. Using the labels provided, label each end of the two redundant ac power switch input power cables. Unless the configuration is changing, the labels are the same as those on the cables removed with the old redundant ac power switch. Label the rack power distribution end "Power source <*name*>, outlet <*id*>" to redundant ac power switch <*location*> `<MAIN | BACKUP>` input. For example: "Power source D2, outlet 4 to redundant ac power switch pos 7 MAIN input".
3. Label the redundant ac power switch end" redundant ac power switch <*location*> `<MAIN | BACKUP>` input from Power source <*name*>, outlet <*id*>".
4. Connect the input power cables to the redundant ac power switch. You want to connect the cables now, because it is difficult to access the input power sockets on the redundant ac power switch when it is installed in a rack.
5. Connect the main input power cable to the redundant ac power switch.
6. Connect the backup input power cable to the redundant ac power switch.
7. Secure both the redundant ac power switch input cables, as shown in Figure 257 on page 588, using the clips of the redundant ac power switch.

Figure 257. Power cable clips

8. Install the redundant ac power switch in the rack. The four "C" clips for mounting the unit should already be positioned in the rack mounting bar.
9. Position the redundant ac power switch in the rack, pushing the cables through to the front of the rack. Mount in place using the four M6 screws.
10. Connect the redundant ac power switch power input cables to the site power.
    a. Determine a suitable cable route from the redundant ac power switch to the power distribution units.
    b. Route the main input power cable of the redundant ac power switch to the specified power distribution unit, and connect it.
    c. Route the backup input power cable of the redundant ac power switch to the specified power distribution unit, and connect it.
    d. Verify that the redundant ac power switch power cables are tidy. Ensure that they do not obstruct other equipment and are tied in place where necessary.
11. Test the redundant ac power switch before connecting it to the 2145-1U uninterruptible power supply, using "MAP 5340: Redundant ac power verification" on page 393.
12. Connect the one or two 2145-1U uninterruptible power supply units that are powered by this redundant ac power switch. The power cables should still be plugged into the 2145-1U uninterruptible power supply units.
    a. Connect the other end into the output power sockets on the front of the redundant ac power switch.
    b. Check the labels on the cables to see which socket they should be connected to.
    c. If the uninterruptible power supply units do not power on automatically, power them on by pressing the power button for five seconds.
13. Power on the one or two SAN Volume Controller nodes connected to this redundant ac power switch.

Removing and replacing 2145-1U uninterruptible power supply parts

The remove and replace procedures for the 2145-1U uninterruptible power supply field replaceable units are described in the topics which follow.

Removing and replacing the 2145-1U uninterruptible power supply power cable retention bracket

The 2145-1U uninterruptible power supply power cable retention bracket prevents accidental removal of the power cable that connects the 2145-1U uninterruptible power supply to the SAN Volume Controller node.

Note: The 2145-1U uninterruptible power supply power cable retention bracket (shown in Figure 258) can be attached only to the most recent versions of the 2145-1U uninterruptible power supply. Older versions do not have the correct mounting holes.

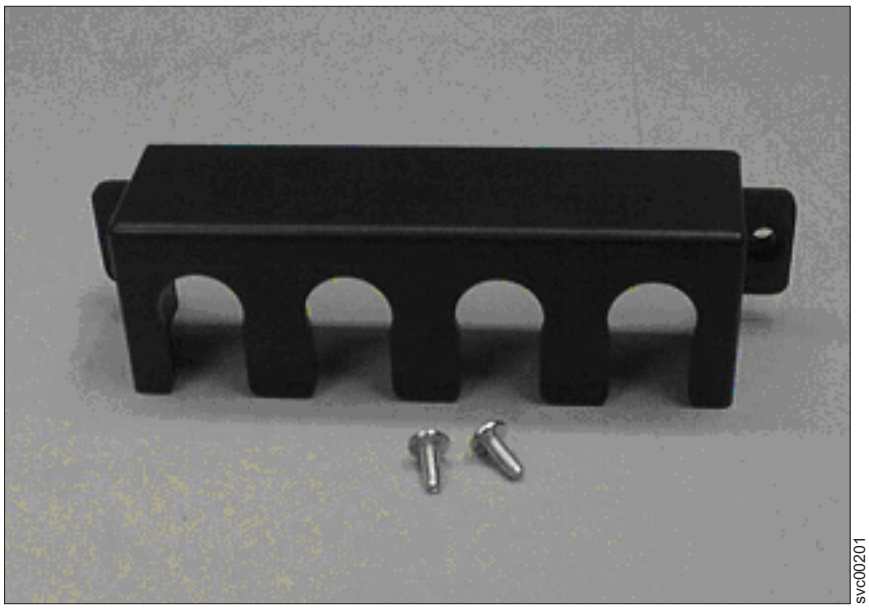


Figure 258. 2145-1U uninterruptible power supply power cable retention bracket hardware

Removing the 2145-1U uninterruptible power supply power cable retention bracket

Perform the following steps to remove the 2145-1U uninterruptible power supply power cable retention bracket:

1. Remove the retaining screw from each side of the bracket.

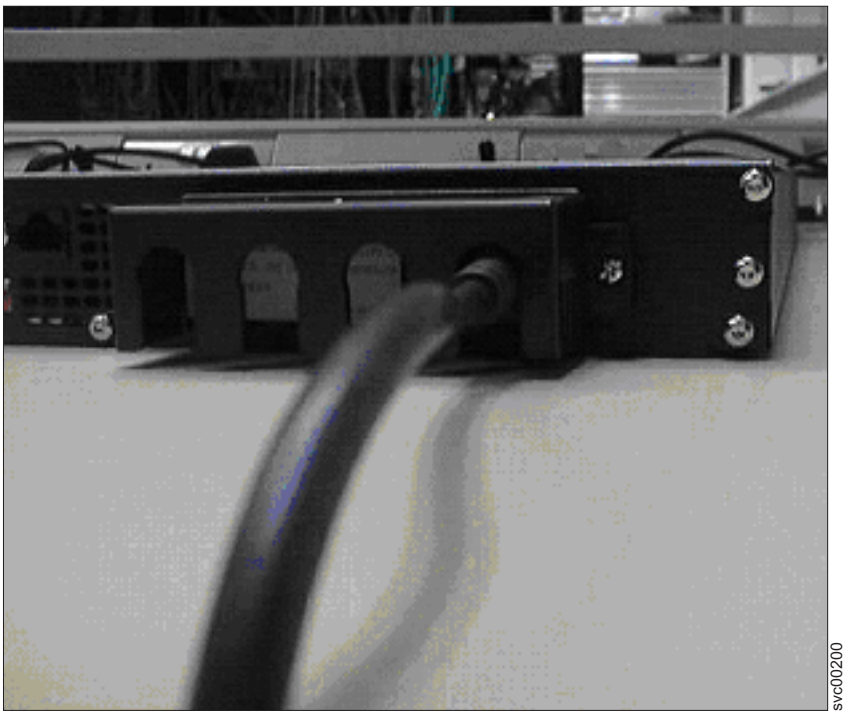


Figure 259. 2145-1U uninterruptible power supply power cable retention bracket

2. Lift the bracket off the cable.

Replacing the 2145-1U uninterruptible power supply power cable retention bracket:

Perform the following steps to replace the 2145-1U uninterruptible power supply power cable retention bracket:

1. Ensure that the output power cable is securely in place.
2. Place the bracket over the power supply inlets on the right rear of the 2145-1U uninterruptible power supply, so that the two screw holes line up.
3. Ensure that the power cable runs through the rightmost slot in the bracket.
4. Secure the bracket in place with one screw on each side, as shown in Figure 260 on page 591.

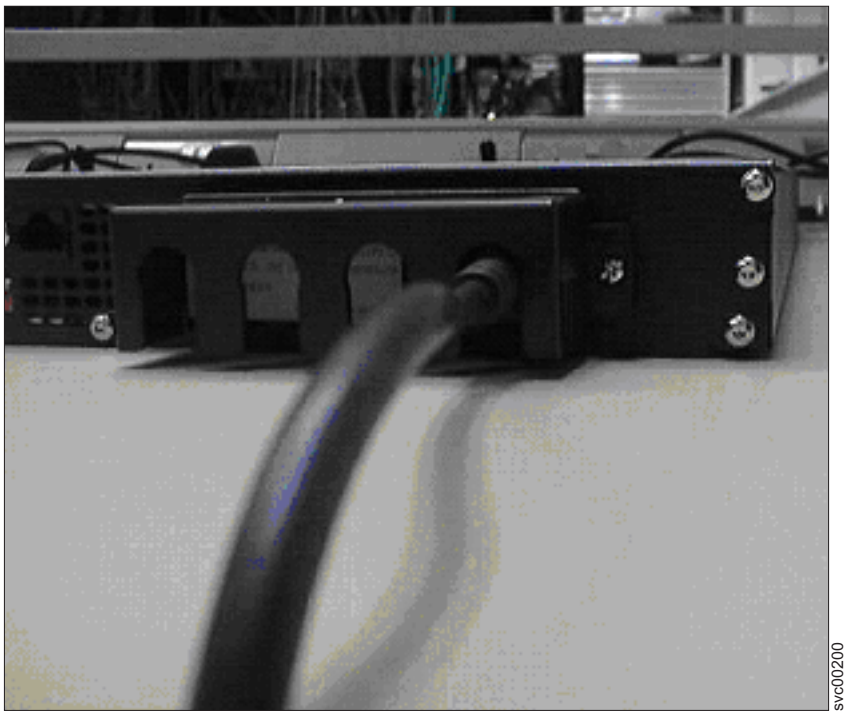


Figure 260. 2145-1U uninterruptible power supply power cable retention bracket

Removing the 2145-1U uninterruptible power supply

Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

CAUTION:
This part or unit is heavy but has a weight smaller than 18 kg (39.7 lb). Use care when lifting, removing, or installing this part or unit. (C008)

Perform the following steps to remove the 2145-1U uninterruptible power supply:

Attention: Check to make sure that the SAN Volume Controller that is powered by this 2145-1U uninterruptible power supply is shut down and powered off, prior to step 1. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

1. At the front of the 2145-1U uninterruptible power supply, press and hold the on/off button (**1** in Figure 261 on page 593) until the power light is extinguished (approximately five seconds). On some versions of the 2145-1U uninterruptible power supply, you need a pointed device, such as a screwdriver, to press the on/off button. The 2145-1U uninterruptible power supply enters standby mode.

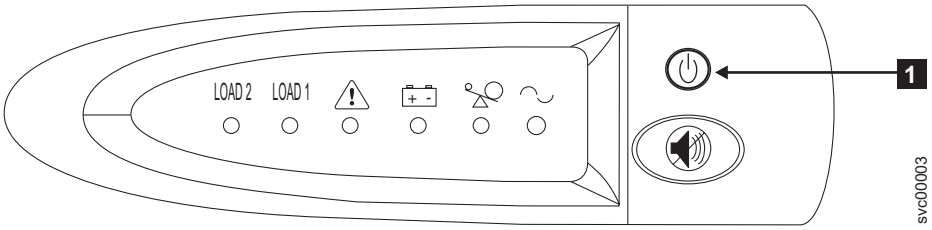


Figure 261. The 2145-1U uninterruptible power supply front panel assembly

2. At the back of the 2145-1U uninterruptible power supply, remove the power cable retainer before disconnecting the SAN Volume Controller power cable from load segment receptacle 2 (**3** in Figure 262).
3. Disconnect the signal cable from the communication port (**2** in Figure 262).
4. Disconnect the main power cable from the main power source (**1** in Figure 262).

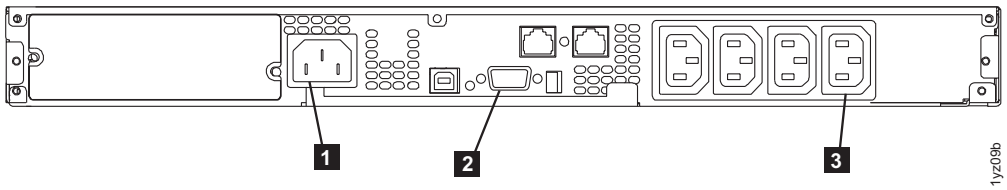


Figure 262. 2145-1U uninterruptible power supply (rear view)

5. Remove the 2145-1U uninterruptible power supply front panel, as shown in Figure 263 on page 594.

   Note: If you are having difficulty pulling the right side of the panel free from the 2145-1U uninterruptible power supply, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.

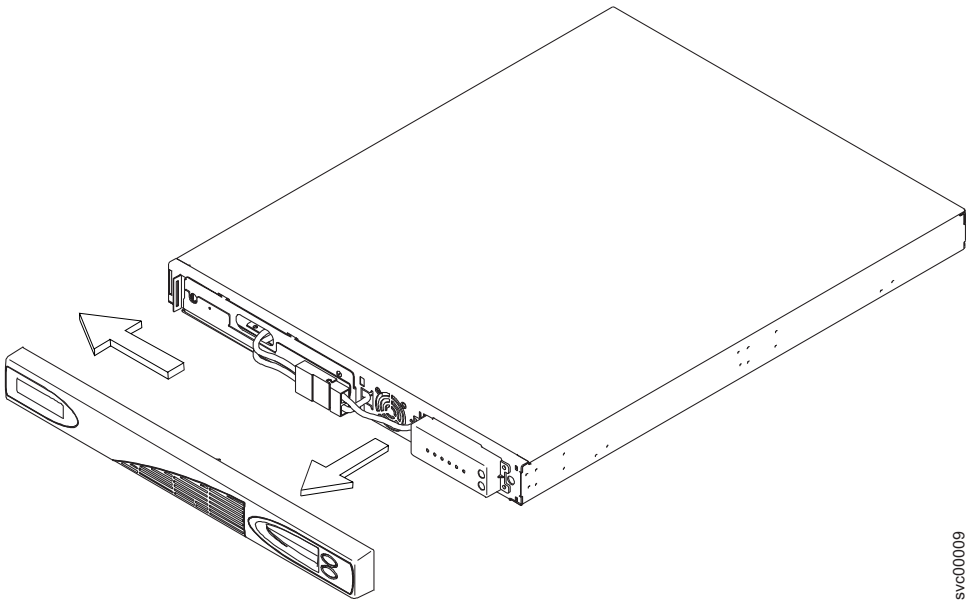


Figure 263. Removing the 2145-1U uninterruptible power supply front panel

6. Disconnect the internal battery connector, which is circled in Figure 264.

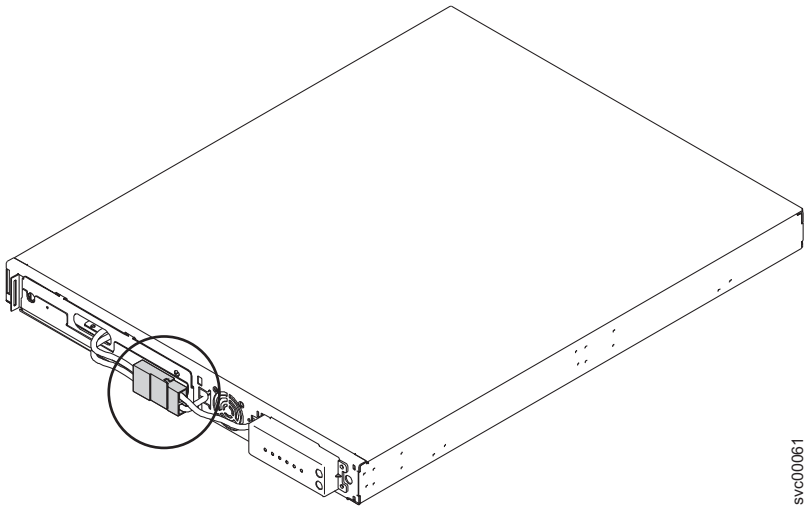


Figure 264. The 2145-1U uninterruptible power supply internal battery connector

7. After pulling the two connectors apart, cover the exposed battery connector (shown in Figure 265 on page 595) with adhesive tape.

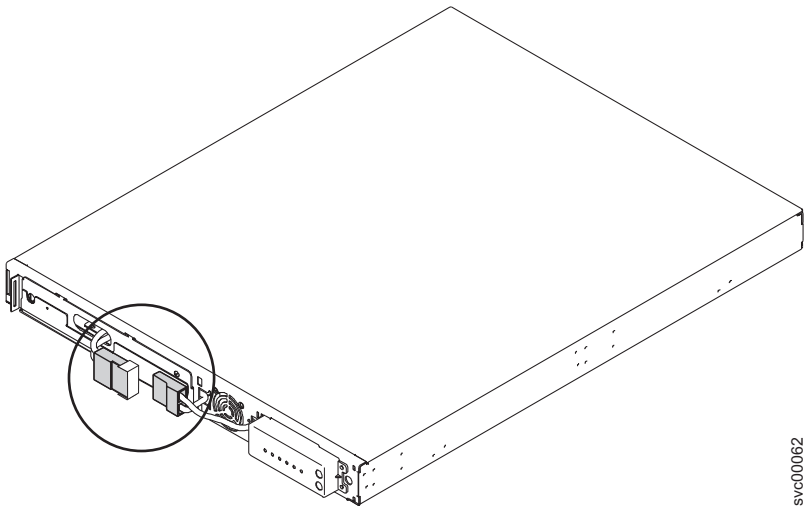


Figure 265. The 2145-1U uninterruptible power supply internal battery connector with protective tape

8. Reinstall the front panel.
9. At the front of the 2145-1U uninterruptible power supply, unscrew the two mounting screws **1** , as shown in Figure 266.

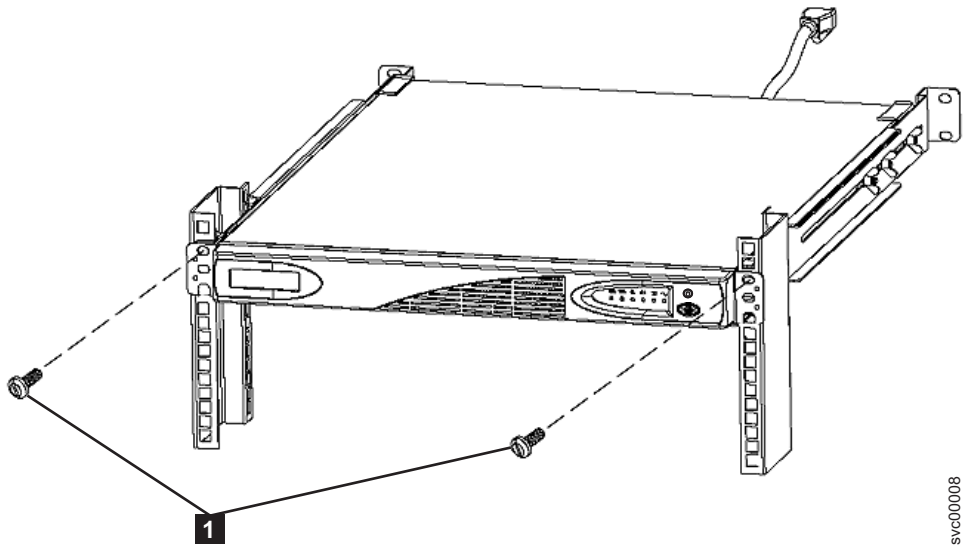


Figure 266. Mounting screws for the 2145-1U uninterruptible power supply

10. From the back of the rack, push the 2145-1U uninterruptible power supply forward approximately 5 cm (2 in) to enable you to pull it from the rack.
11. Go to the front of the rack.
12. Pull the 2145-1U uninterruptible power supply forward and remove it from the rack.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the 2145-1U uninterruptible power supply battery" on page 606
Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

"Replacing the 2145-1U uninterruptible power supply"
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

Replacing the 2145-1U uninterruptible power supply

You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

CAUTION:
This part or unit is heavy but has a weight smaller than 18 kg (39.7 lb). Use care when lifting, removing, or installing this part or unit. (C008)

Perform the following steps to replace the 2145-1U uninterruptible power supply:

1. Place the 2145-1U uninterruptible power supply on a flat, stable surface with the front of the 2145-1U uninterruptible power supply facing toward you.
2. On each side of the 2145-1U uninterruptible power supply, attach the long end of a mounting bracket to the 2145-1U uninterruptible power supply using four

of the supplied M3 × 6 screws (2 in Figure 267).

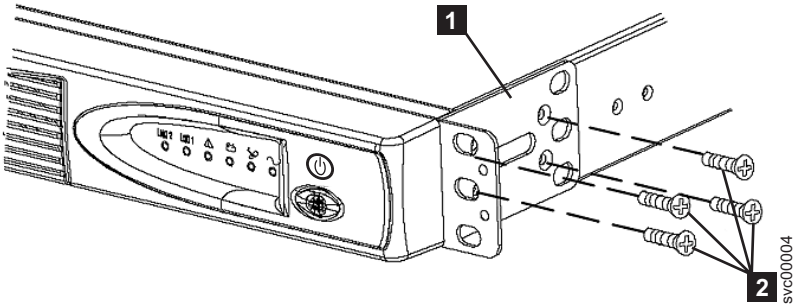


Figure 267. Installing the support rails for a 2145-1U uninterruptible power supply into the rack

3. Stand at the front of the rack and place the back of the 2145-1U uninterruptible power supply onto the support rails, and then slide the 2145-1U uninterruptible power supply into the rack.
4. At the front of the 2145-1U uninterruptible power supply, install the two mounting screws (1 in Figure 268).

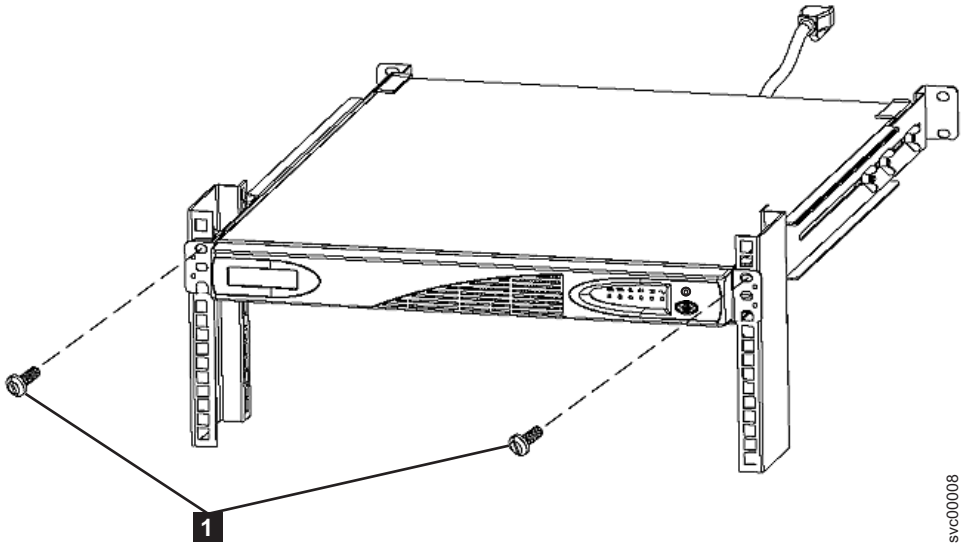


Figure 268. Mounting screws for the 2145-1U uninterruptible power supply

5. Remove the 2145-1U uninterruptible power supply front panel by pulling it towards you and to the left, as shown in Figure 269 on page 598.

   Note: If you are having difficulty pulling the right side of the panel free from the 2145-1U uninterruptible power supply, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.

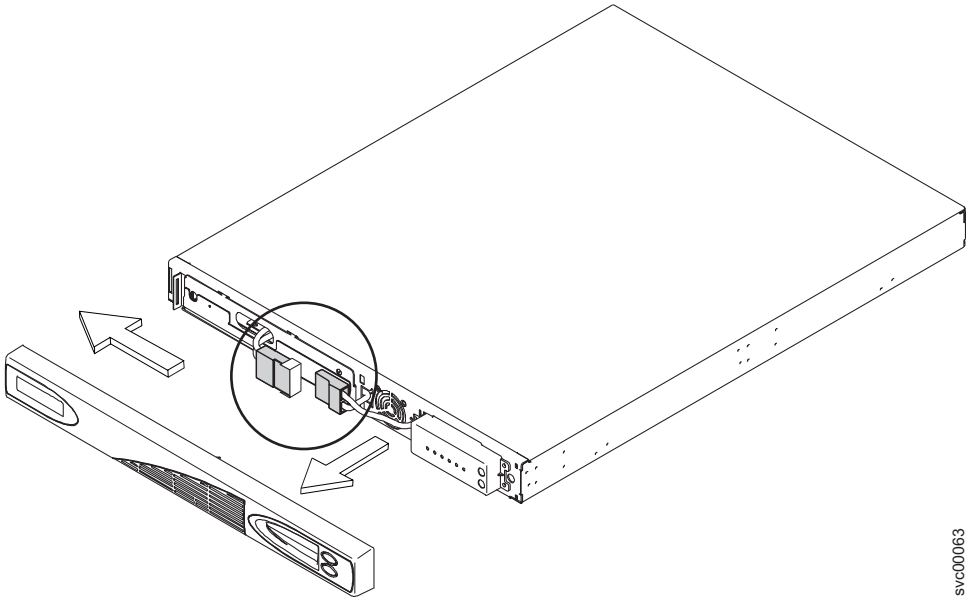


Figure 269. Removing the 2145-1U uninterruptible power supply front panel

6. Remove the protective tape from the internal battery connector (circled in Figure 270).

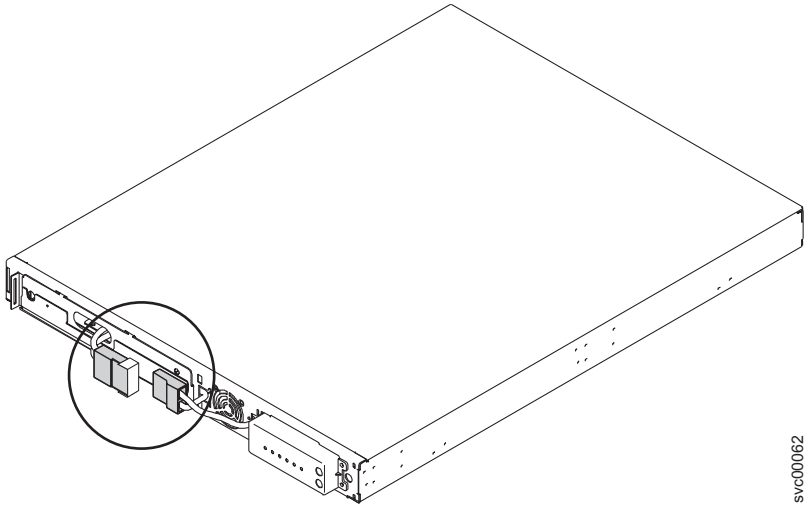


Figure 270. The 2145-1U uninterruptible power supply internal battery connector with protective tape

7. Connect the internal battery connector (circled in Figure 271 on page 599).

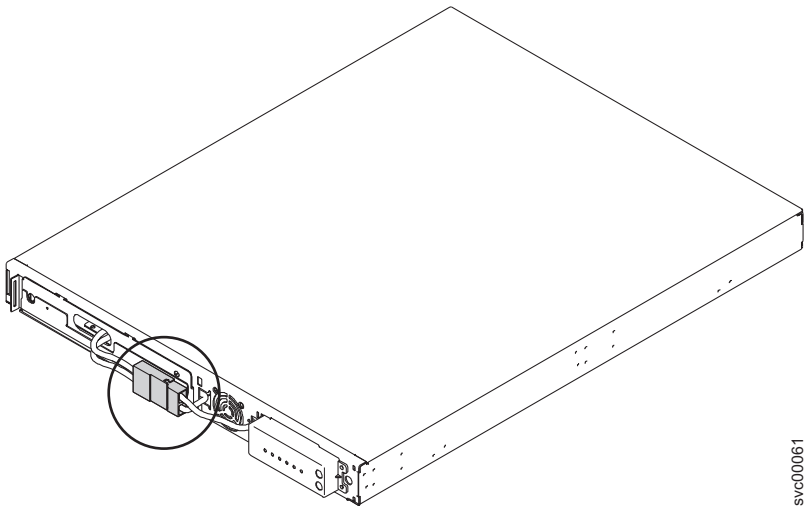


Figure 271. The 2145-1U uninterruptible power supply with internal battery connectors in place

Note: A small amount of arcing may occur when connecting the batteries. This is normal and does not damage the unit or present any safety concerns.

8. Reinstall the front panel.
9. At the back of the 2145-1U uninterruptible power supply, connect the SAN Volume Controller power cable to load segment 2 receptacle (**3** in Figure 273 on page 600). If applicable, install the power cable retention bracket (shown in Figure 272 on page 600).

   Note: The 2145-1U uninterruptible power supply is intended to maintain power on a single SAN Volume Controller node until data can be saved to the local hard disk drive. Only SAN Volume Controller nodes can be plugged in to the 2145-1U uninterruptible power supply or else the SAN Volume Controller cluster malfunctions. You must attach only one SAN Volume Controller to the 2145-1U uninterruptible power supply, and nothing else.

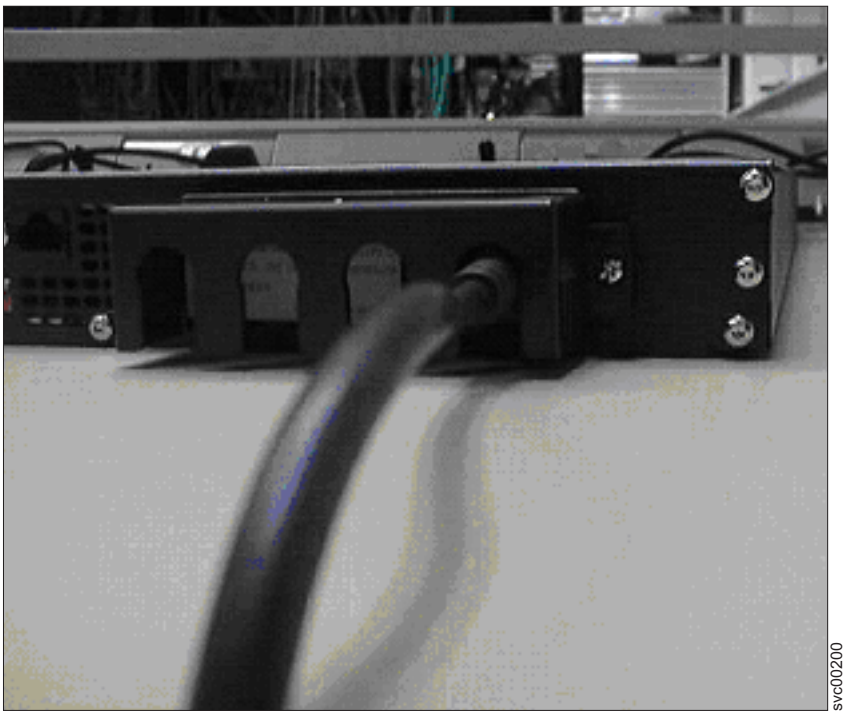


Figure 272. The 2145-1U uninterruptible power supply cable retention bracket connected to the 2145-1U uninterruptible power supply

10. Reconnect the SAN Volume Controller signal cable to the communication port (**2** in Figure 273).
11. Reconnect the 2145-1U uninterruptible power supply main power cable, from either the power distribution unit or from the redundant ac power switch, into the input connector (**1** in Figure 273).

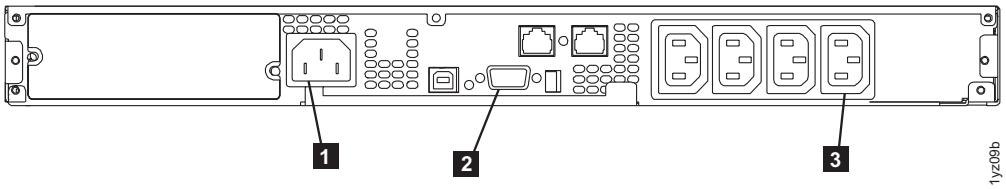


Figure 273. 2145-1U uninterruptible power supply (rear view)

The 2145-1U uninterruptible power supply is now in standby mode with the SAN Volume Controller offline. All indicators that are shown in Figure 273 are off.

12. To turn on the 2145-1U uninterruptible power supply, press and hold the on/off button (**2** in Figure 274 on page 601). On some versions of the 2145-1U uninterruptible power supply, you need a pointed device, such as a screwdriver, to press the on/off button. The 2145-1U uninterruptible power supply undergoes a self-test, taking approximately five seconds, before the power-on indicator **1** and the load indicators (**7** and **8**) light up permanently to indicate that the 2145-1U uninterruptible power supply is supplying power to the SAN Volume Controller. The 2145-1U uninterruptible power supply begins to charge its battery while in normal mode.

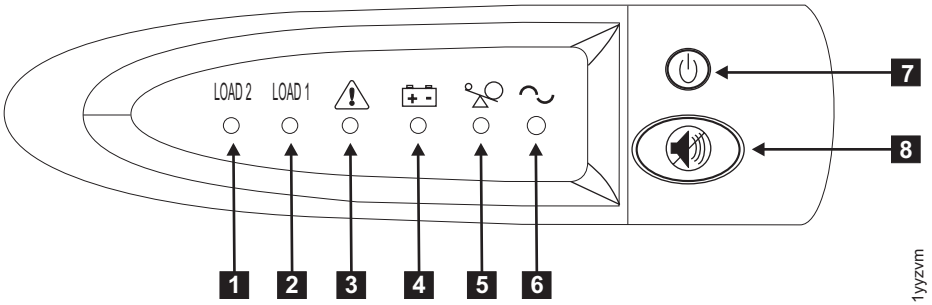


Figure 274. 2145-1U uninterruptible power supply front panel assembly

Note: If the 2145-1U uninterruptible power supply battery is not sufficiently charged, the SAN Volume Controller node will not be able to join the cluster. The node will display `Charging` on its front panel until the 2145-1U uninterruptible power supply battery has reached sufficient charge, which could take an hour. When the SAN Volume Controller node rejoins the cluster, it might display `Recovering` on its front panel while the 2145-1U uninterruptible power supply battery finalizes its charge.

Related tasks

"Removing the 2145-1U uninterruptible power supply battery" on page 606
Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

Removing the support rails for a 2145-1U uninterruptible power supply

You can remove the support rails for the 2145-1U uninterruptible power supply.

Perform the following steps to remove the support rails:

1. Loosen and remove the two M6 × 10 screws from each side of the 2145-1U uninterruptible power supply. See **1** in Figure 275.

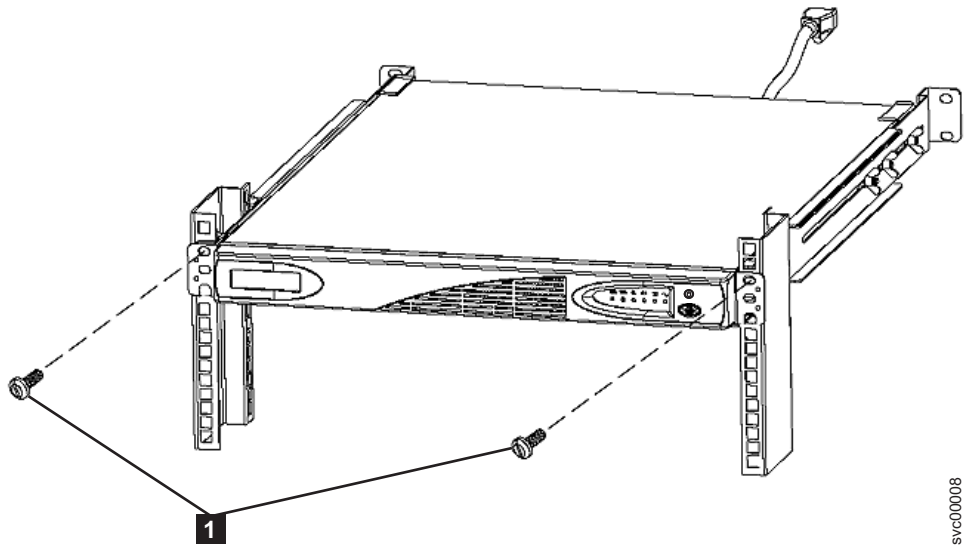


Figure 275. Removing the front screws from the 2145-1U uninterruptible power supply

2. Remove the 2145-1U uninterruptible power supply from the rack.
3. Remove the clip nut from the top hole of the rail (3 in Figure 276).

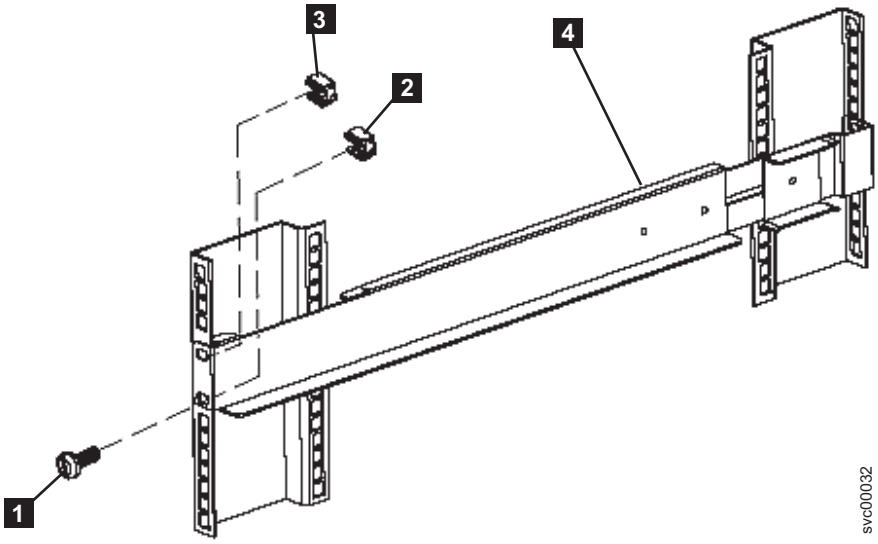


Figure 276. Removing the front rail on the 2145-1U uninterruptible power supply

4. Detach the M6 × 10 screw 1 from the clip nut 2 in the bottom hole of the rail.
5. Remove the two M6 × 10 screws from the rear side of the rail (1 in Figure 277) and the two clip nuts (2).

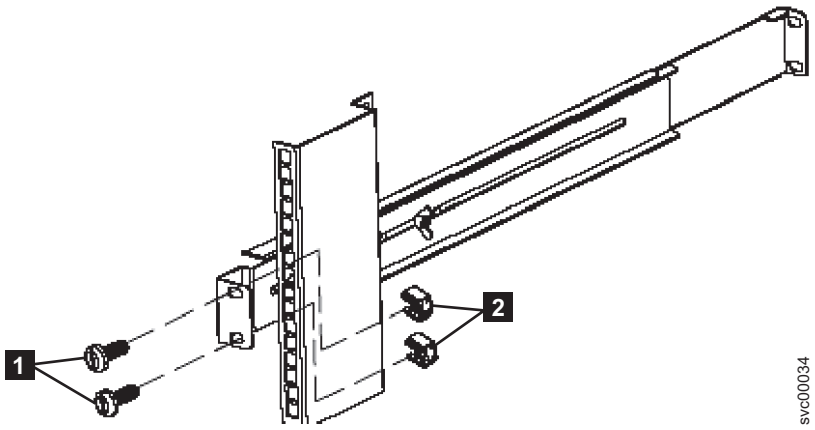


Figure 277. Removing the rear rail on the 2145-1U uninterruptible power supply

6. Remove the rail from the rack.
7. Repeat step 3 through step 6 to remove the other rail from the rack.

Installing the support rails for the 2145-1U uninterruptible power supply

You must install the support rails in the rack before installing the 2145-1U uninterruptible power supply.

Complete the following prerequisites before installing the support rails:

1. Use the user's hardware location chart to determine where in the rack that the 2145-1U uninterruptible power supply is to be installed.
2. At the back of the rack, observe the Electronic Industries Alliance (EIA) positions and determine where you are going to install the 2145-1U uninterruptible power supply. Because of its weight, position the 2145-1U uninterruptible power supply where it is easy to handle in one of the lower positions in the rack.

Perform the following steps to install the support rails for the 2145-1U uninterruptible power supply:

1. Open the top of the 2145-1U uninterruptible power supply shipping carton. Grip the flaps on either side of the 2145-1U uninterruptible power supply.
2. Lift the 2145-1U uninterruptible power supply clear of the shipping carton and place it on a flat, stable surface with the front facing you.
3. Attach the long side of a mounting bracket **1** to each side of the 2145-1U uninterruptible power supply using four M3 × 6 screws **2** for each bracket, as shown in Figure 278.

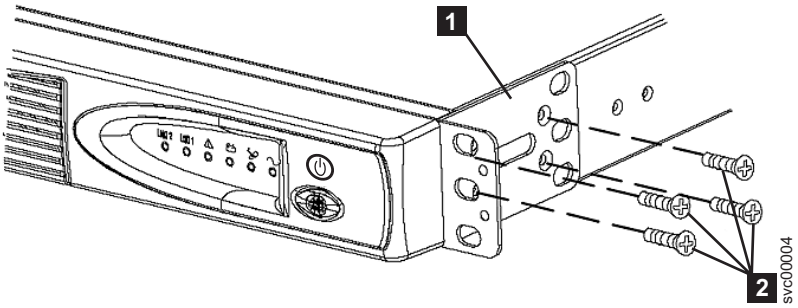


Figure 278. Installing the support rails for a 2145-1U uninterruptible power supply into the rack

4. Loosen the assembly wing nuts (**1** in Figure 279) on both rail assemblies and adjust the rail size to the depth of your rack.

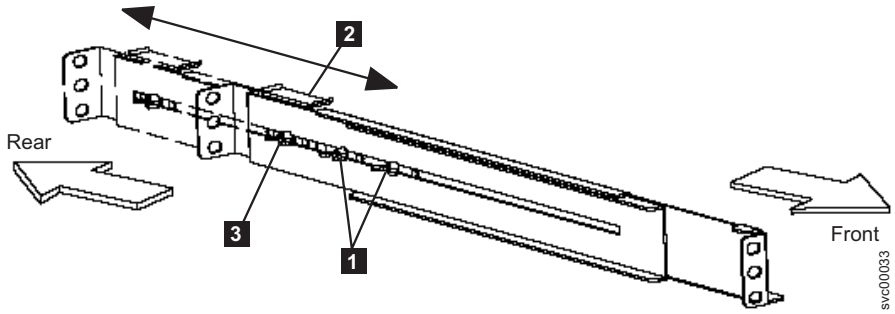


Figure 279. Adjusting the rail depth on the 2145-1U uninterruptible power supply

1 Assembly wing nuts

2 Hold-down bracket

3 Wing nut

5. Position the rear, hold-down bracket (2 in Figure 279 on page 603) towards the end of the rail assemblies and tighten the wing nut (3 in Figure 279 on page 603).
6. Select the holes in the rail where you want to position the 2145-1U uninterruptible power supply.

   Note: The bottom flange of the support rail must align with the EIA mark on the rack.
7. Using two M6 × 10 screws (1 in Figure 280) and two clip nuts 2, attach the rail to the rear of the rack. The customer's rack might be different than the one shown here, and if so, might require different clip nuts or fasteners.

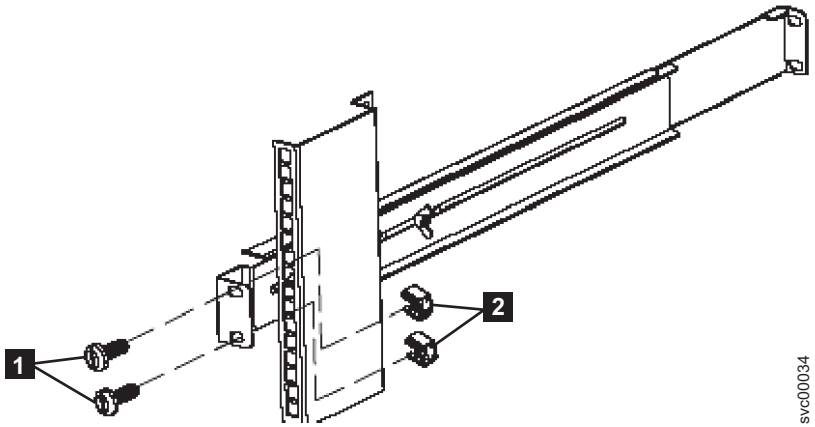


Figure 280. Securing the rear rail on the 2145-1U uninterruptible power supply

8. Attach only the bottom hole of the rail to the front of the rack with one M6 × 10 screw and one clip nut (1 in Figure 281 on page 605).

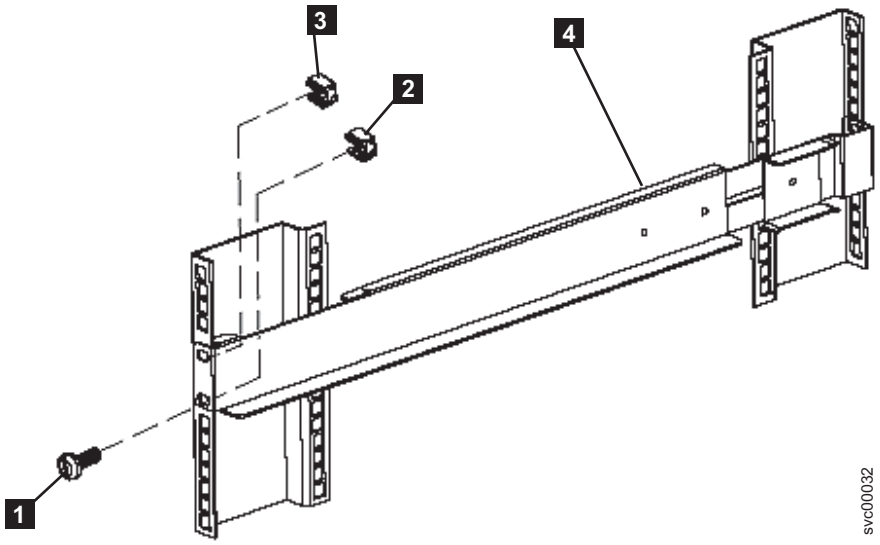


Figure 281. Securing the front rail on the 2145-1U uninterruptible power supply

9. Install a clip nut in the top hole of the rail **3** .
10. Repeat step 7 on page 604 through step 9 for the other rail.
11. Tighten the assembly wing nuts on both rail assemblies.

Removing the power cable from the 2145-1U uninterruptible power supply

You can remove the power cable from the 2145-1U uninterruptible power supply if you are having problems with the power supply and suspect that the power cable is defective.

Perform the following steps to remove the power cable:

1. Remove the power from each SAN Volume Controller. See MAP 5350 for information about removing the power cable from the SAN Volume Controller.
2. Press and hold the on/off button **2** until the power light **1** is extinguished (approximately five seconds). On some versions of the 2145-1U uninterruptible power supply, you need a pointed device, such as a screwdriver, to press the on/off button. The 2145-1U uninterruptible power supply enters standby mode, with all indicators off. Figure 282 on page 606 illustrates the front and rear views of the 2145-1U uninterruptible power supply.

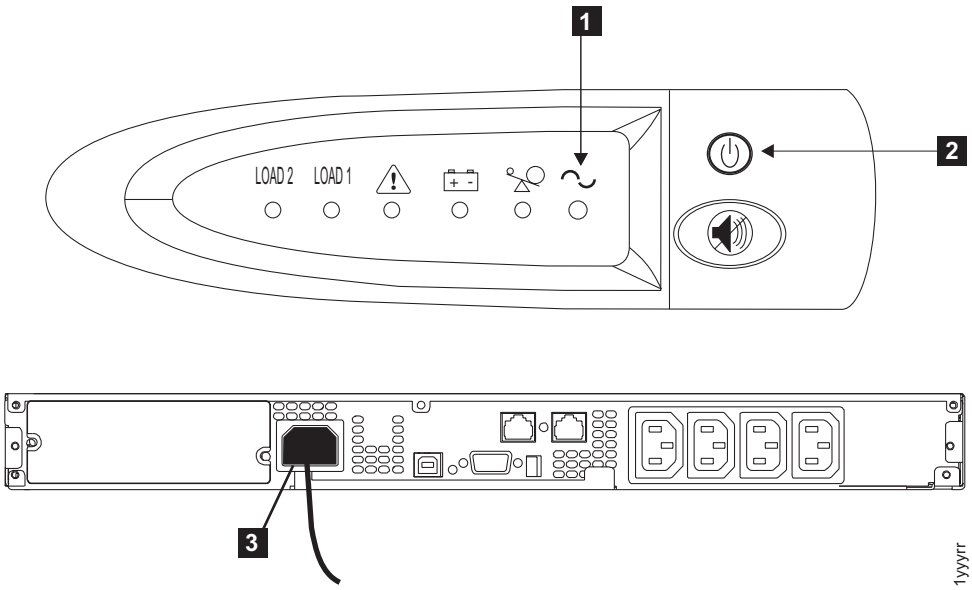


Figure 282. Front and back panels for the 2145-1U uninterruptible power supply

1 Power-on indicator

2 On/off button

3 Power cable

3. Disconnect the power cable from the main power source **3** .
4. Replace the power cable and make sure it is seated. The 2145-1U uninterruptible power supply enters standby mode. All indicators are off and power is not available to the SAN Volume Controller. The battery recharges when necessary.
5. To turn the 2145-1U uninterruptible power supply on, press and hold the on/off button **2** until the 2145-1U uninterruptible power supply power button **1** is illuminated (approximately five seconds). On some versions of the 2145-1U uninterruptible power supply, you need a pointed device, such as a screwdriver, to press the on/off button. The front panel indicators then cycle through a startup sequence while the 2145-1U uninterruptible power supply conducts a self-test. When the self-test completes, the power-on indicator and the load indicators illuminate to show that the 2145-1U uninterruptible power supply is supplying power. The 2145-1U uninterruptible power supply resumes service in normal mode.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Removing the 2145-1U uninterruptible power supply battery

Follow all safety notices when you are removing the 2145-1U uninterruptible power supply battery.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

Perform the following steps to remove the 2145-1U uninterruptible power supply battery:

1. Ensure the SAN Volume Controller connected to the 2145-1U uninterruptible power supply is powered off. Use the instructions in "MAP 5350: Powering off a SAN Volume Controller node" on page 394 to power off the node if it is not already off.

   Note: There is no need to power off the 2145-1U uninterruptible power supply or remove it from the rack.

2. Pull the front panel from the right side until the panel is released from the right and middle sections of the 2145-1U uninterruptible power supply. Push the front panel to the left to release the catch on the left end of the panel, as shown in Figure 283.

   Note: If you are having difficulty pulling the right side of the panel free from the 2145-1U uninterruptible power supply, insert a flat-blade screwdriver between the right side of the cover and the frame and gently pry it free.

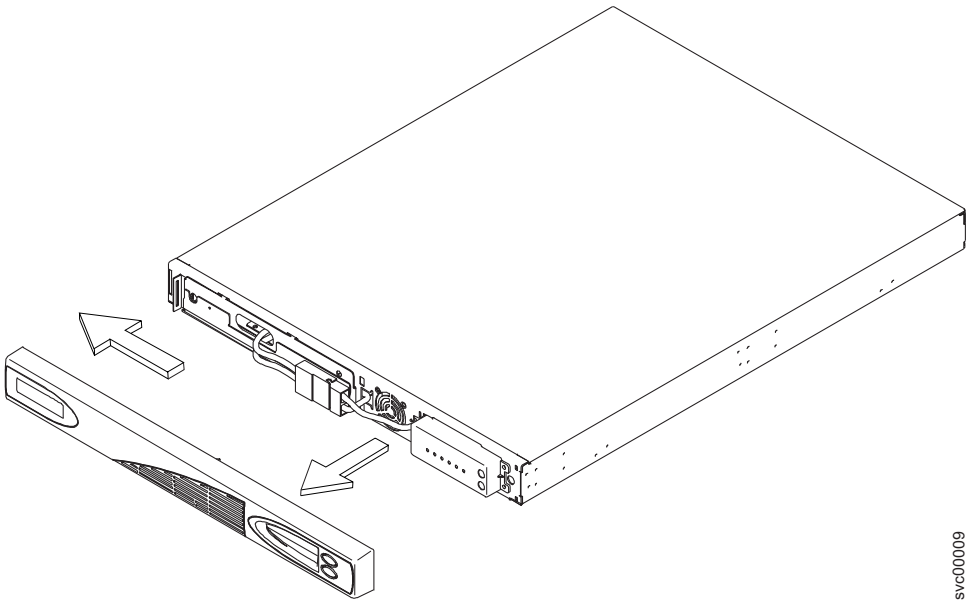


Figure 283. Removing the 2145-1U uninterruptible power supply front panel

3. Disconnect the internal battery connector, circled in Figure 284 on page 608.

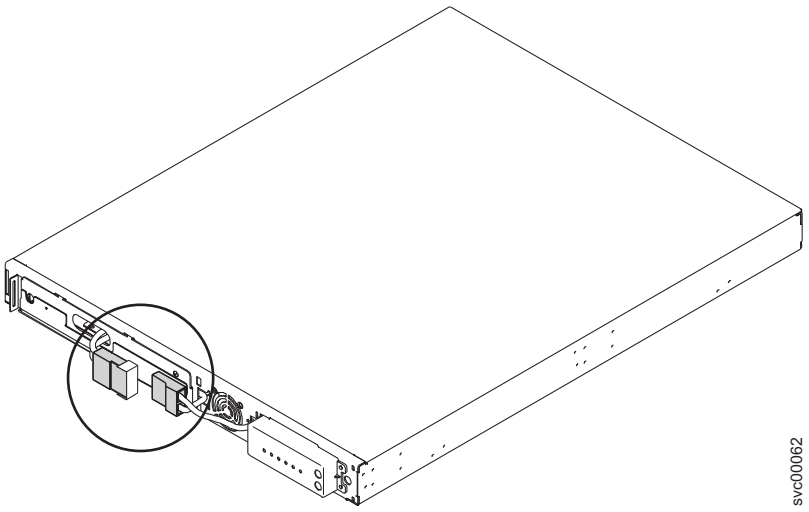


Figure 284. The 2145-1U uninterruptible power supply internal battery connector with protective tape

4. Slide the battery cover to the right and remove it.
5. Slide the battery out of the 2145-1U uninterruptible power supply, as shown in Figure 285, and remove it, laying it on a flat surface.

   CAUTION:
   Lead-acid batteries can present a risk of electrical burn from high, short-circuit current. Avoid battery contact with metal materials; remove watches, rings, or other metal objects, and use tools with insulated handles. To avoid possible explosion, do not burn.

   Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C004)

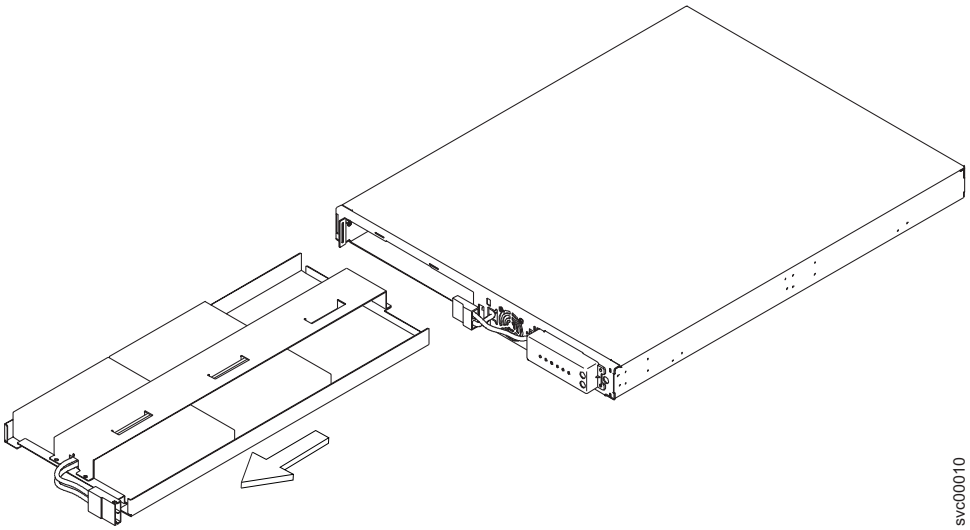
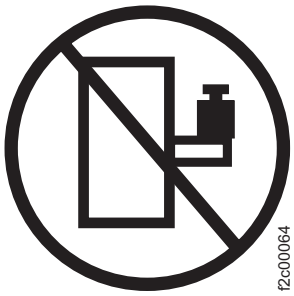


Figure 285. Removing the 2145-1U uninterruptible power supply battery

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Related tasks

"Removing the 2145-1U uninterruptible power supply" on page 591
Before you remove the 2145-1U uninterruptible power supply, read all safety notices.

"Replacing the 2145-1U uninterruptible power supply" on page 596
You can replace the 2145-1U uninterruptible power supply only after you remove the previous uninterruptible power supply.

Related reference

"Controls and indicators for the 2145-1U uninterruptible power supply" on page 53
All controls and indicators for the 2145-1U uninterruptible power supply are located on the front panel assembly.

Replacing the 2145-1U uninterruptible power supply battery

Follow all safety notices when you are replacing the 2145-1U uninterruptible power supply battery.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

This task assumes that you have disconnected the 2145-1U uninterruptible power supply battery and have powered off the SAN Volume Controller. Perform the following steps to replace the 2145-1U uninterruptible power supply battery:

1. Slide the battery into the 2145-1U uninterruptible power supply, as shown in Figure 286.

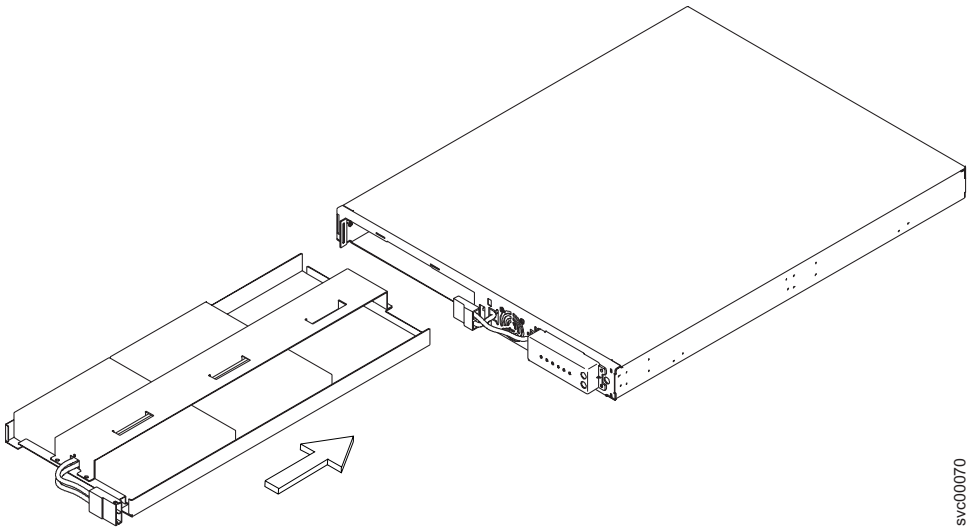


Figure 286. Replacing the 2145-1U uninterruptible power supply battery

DANGER

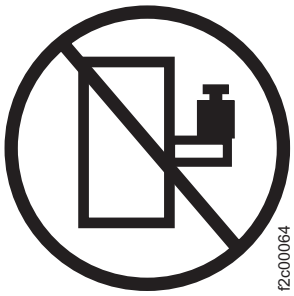
- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

2. Thread the battery connector through the battery cover. Position the battery cover in place and slide it to the left to secure it.
3. Connect the internal battery connector, as shown in Figure 288 on page 614. Each end of the keyed connector has two wires: one red (+) and one black (–). Join the black wires and the red wires together.

   Note: A small amount of arcing might occur when connecting the batteries. This is normal and does not damage the unit or present any safety concerns.

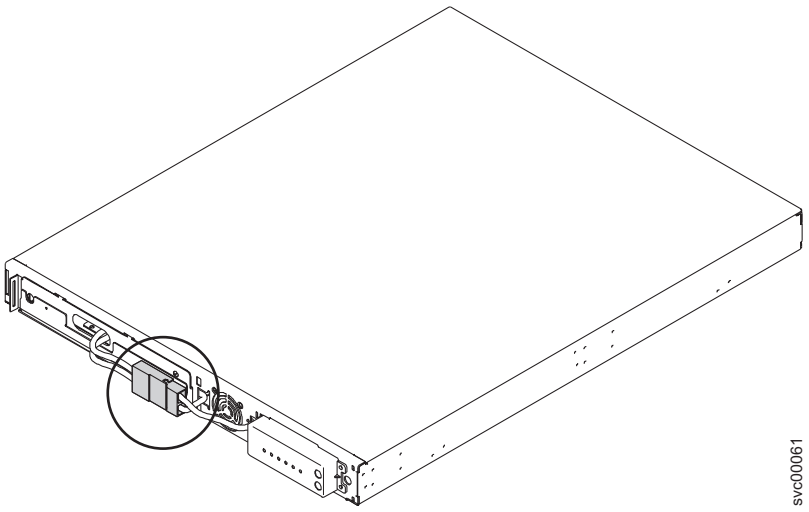


Figure 287. The 2145-1U uninterruptible power supply internal battery connector

4. Push the front panel to the right to catch on the left end of the panel. Push the front panel forward until the panel snaps into the right and middle sections of the 2145-1U uninterruptible power supply, as shown in Figure 288.

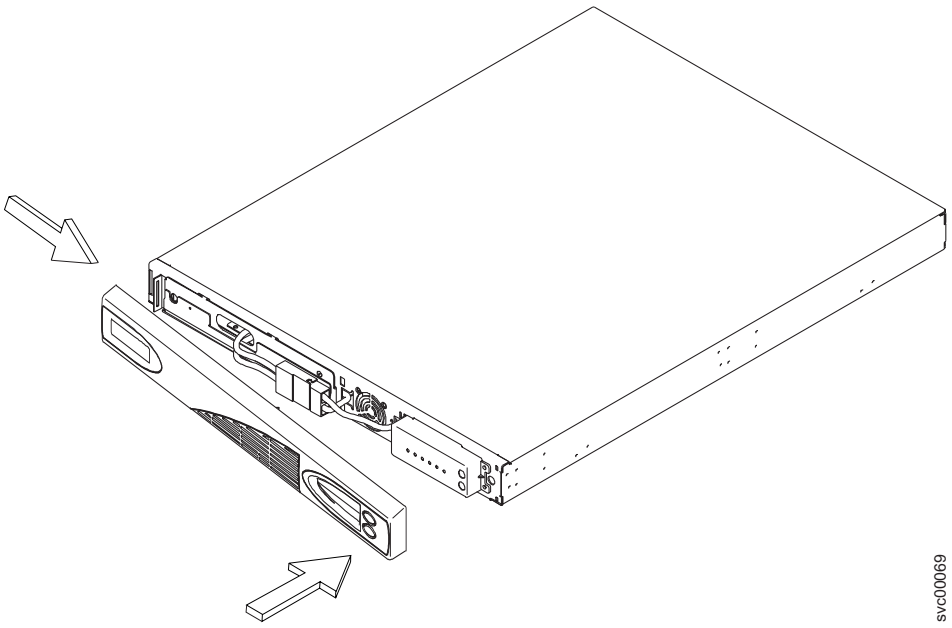


Figure 288. Replacing the 2145-1U uninterruptible power supply front panel

5. Ensure the 2145-1U uninterruptible power supply is powered on. Power on the SAN Volume Controller.

   Note: If the new battery does not have enough charge to support the actions required during a power failure, the SAN Volume Controller node will pause with `Charging` displayed on its front panel until sufficient charge is available. If there is sufficient charge to support the actions required during a single power failure, but not sufficient charge to support two power failures, the node will start and join the cluster but will display `Recovering` on its front panel.

Removing and replacing 2145 uninterruptible power supply parts

The remove and replace procedures for the 2145 uninterruptible power supply field replaceable units are described in the topics which follow.

Removing the 2145 uninterruptible power supply

Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

CAUTION:

The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

Perform the following steps to remove the 2145 uninterruptible power supply:

Attention: Check to make sure that any SAN Volume Controller that is powered by this 2145 uninterruptible power supply is shut down and powered off, prior to step 1. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

1. At the front of the 2145 uninterruptible power supply, press and hold the off button (**1** in Figure 289) for approximately five seconds or until the long beep stops.

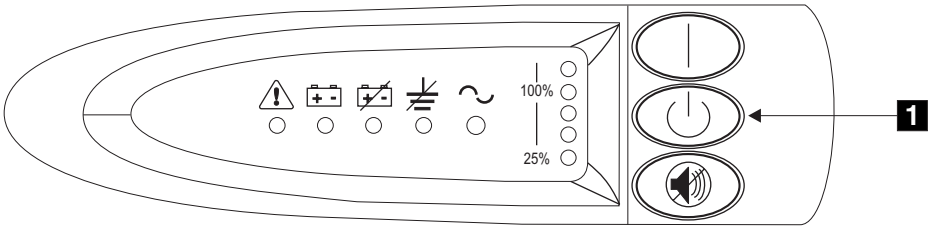


Figure 289. 2145 uninterruptible power supply front panel assembly

2. At the back of the 2145 uninterruptible power supply (Figure 290), disconnect the power cables of the SAN Volume Controller **3**.
3. Disconnect the signal cables (**1** in Figure 290).
4. Disconnect the main power cable (**2** in Figure 290).

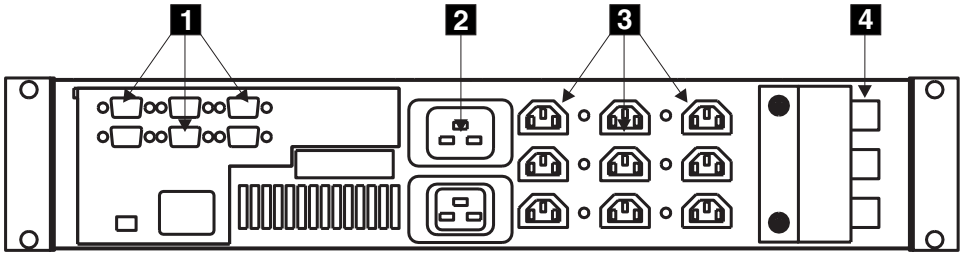


Figure 290. 2145 uninterruptible power supply (rear view)

5. Remove the battery from the 2145 uninterruptible power supply. See "Removing the 2145 uninterruptible power supply battery" on page 628.
6. Remove the electronics assembly from the 2145 uninterruptible power supply. See "Removing the 2145 uninterruptible power supply electronics" on page 625.
7. At the front of the 2145 uninterruptible power supply, unscrew the mounting screws (**1** in Figure 291 on page 617).

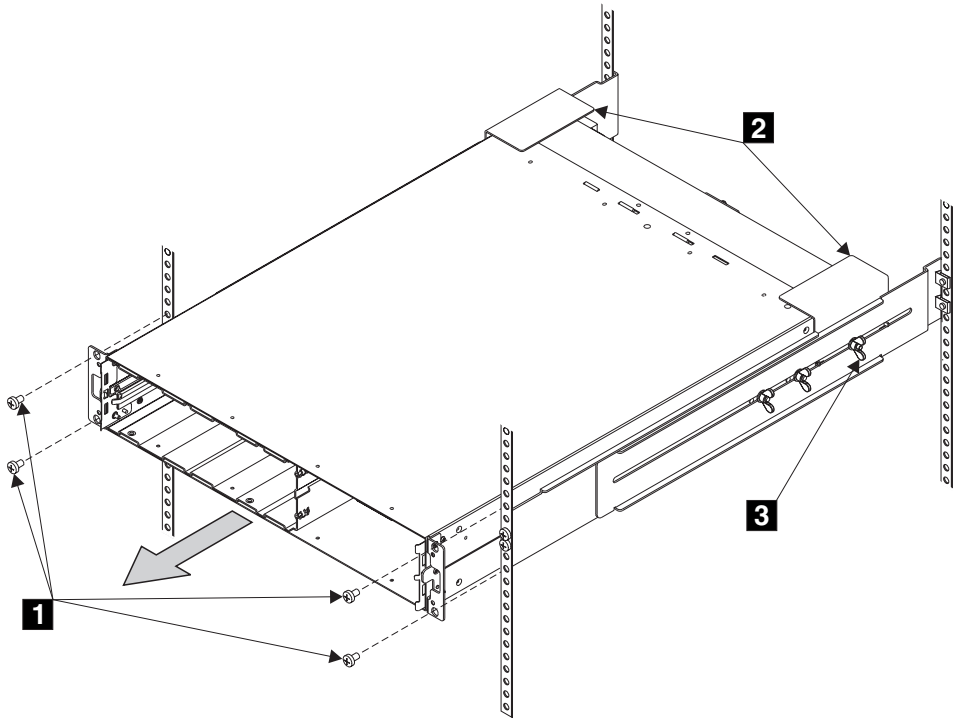


Figure 291. Removing the 2145 uninterruptible power supply

8. At the back of the rack, push the 2145 uninterruptible power supply forward approximately 5 cm (2 in) to enable you to pull it from the rack.
9. Go to the front of the rack.
10. With aid from another service representative, pull the 2145 uninterruptible power supply forward and remove it from the rack.
11. Replace the 2145 uninterruptible power supply. See "Replacing the 2145 uninterruptible power supply."

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

"Replacing the 2145 uninterruptible power supply"
You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

Replacing the 2145 uninterruptible power supply

You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

Perform the following steps to replace the 2145 uninterruptible power supply:

1. Reduce the weight of the 2145 uninterruptible power supply by removing the battery assembly first before removing the unit from the shipping carton. Perform the following steps to remove the battery assembly:
   a. Open the top of the shipping carton and then, with the assistance of another service representative, grip the flaps on either side of the 2145 uninterruptible power supply. See Figure 292 on page 619.

Figure 292. Two persons unboxing a 2145 uninterruptible power supply

b. Slide the 2145 uninterruptible power supply to the end of the carton and rest its front edge on the edge of the carton as shown. See Figure 293.

Figure 293. Slide the 2145 uninterruptible power supply to the edge of the carton

c. Remove the two bolts **1** and additional nut **2** on the left side of the bracket. See Figure 294 on page 620.

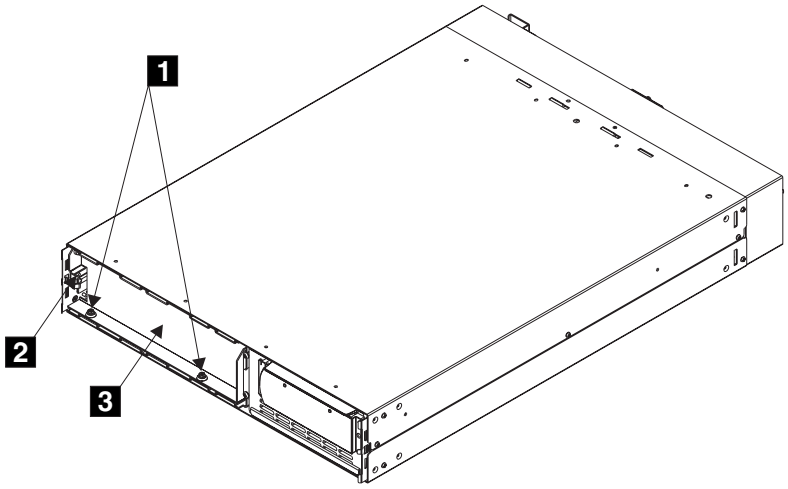


Figure 294. Remove the battery retaining bracket

d. Remove the battery retaining bracket **3** .

e. Grip the tab on the front of the battery and pull the battery forward until it can be accessed by two service representatives.

f. With the assistance of another service representative, lift the battery assembly clear of the 2145 uninterruptible power supply and place it to one side.

Note: The cover for the 2145 uninterruptible power supply is not installed: it is included in the box with the 2145 uninterruptible power supply. Install the front cover after you have completed the other installation steps.

2. With the assistance of another service representative, lift the 2145 uninterruptible power supply onto a flat, stable surface.
3. Remove the electronic assembly from the 2145 uninterruptible power supply:

   a. Remove the two screws **1** (see Figure 295 on page 621).

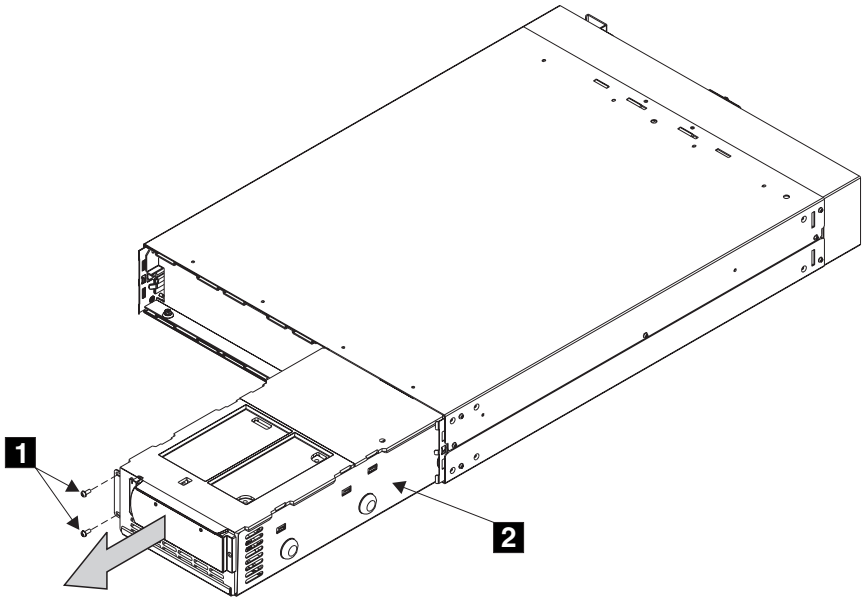


Figure 295. Removing the 2145 uninterruptible power supply electronics assembly

b. Pull the electronics assembly **2** out of the 2145 uninterruptible power supply, and put it to one side.

4. Stand at the front of the rack and, with aid from another service representative, place the back of the 2145 uninterruptible power supply onto the support rails, and then slide the 2145 uninterruptible power supply into the rack.
5. Install the front flathead screws **1** (see Figure 296 on page 622).

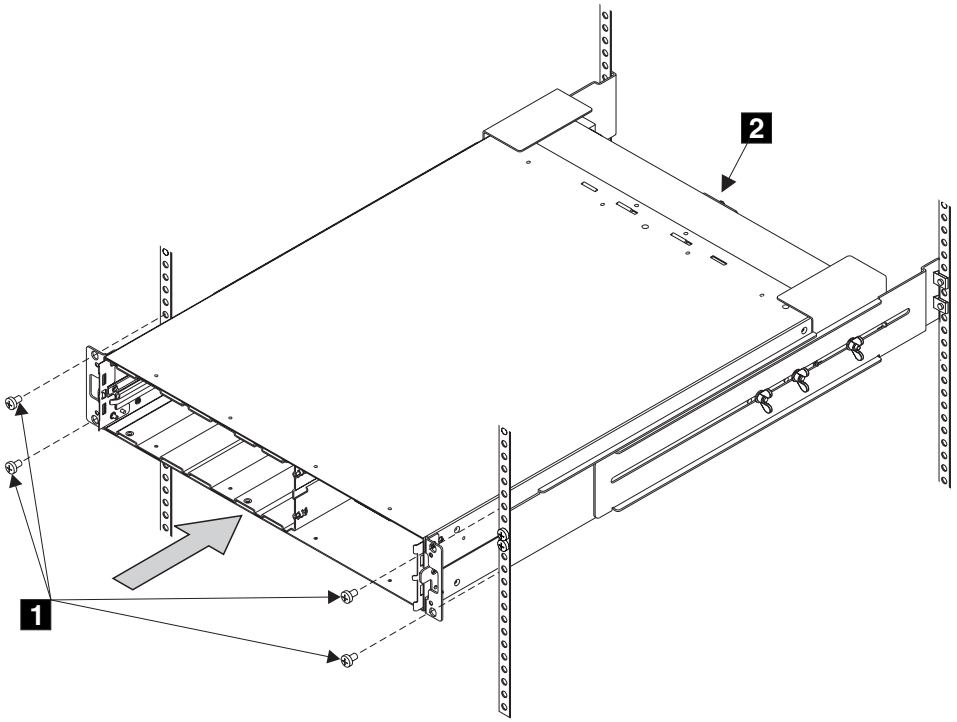


Figure 296. Replacing the 2145 uninterruptible power supply into a rack

6. With aid from another service representative, perform the following steps:
   a. Install the battery.
   b. Install the electronics assembly.

   Note: A grounding screw feature is provided on the back of the 2145 uninterruptible power supply so that you can attach a ground bonding wire if required by local wiring codes. Since the safety of the 2145 uninterruptible power supply chassis is maintained through the input line power cord, you are usually not required to use this additional grounding screw feature.
7. Reconnect the signal cables.

   Attention: When reinstalling the signal cables, use only the top row of serial connectors. Installing signal cables in the bottom row of serial connectors causes the 2145 uninterruptible power supply to malfunction.
8. Install the front panel.
9. At the back of the 2145 uninterruptible power supply, plug the 2145 uninterruptible power supply main power cable into the power socket, **1** in Figure 297 on page 623.

   Note: The 2145 uninterruptible power supply is intended to maintain power on SAN Volume Controller nodes until data can be saved to the local hard disk drive. Only SAN Volume Controller nodes can be plugged in to the 2145 uninterruptible power supply, or the SAN Volume Controller cluster malfunctions.

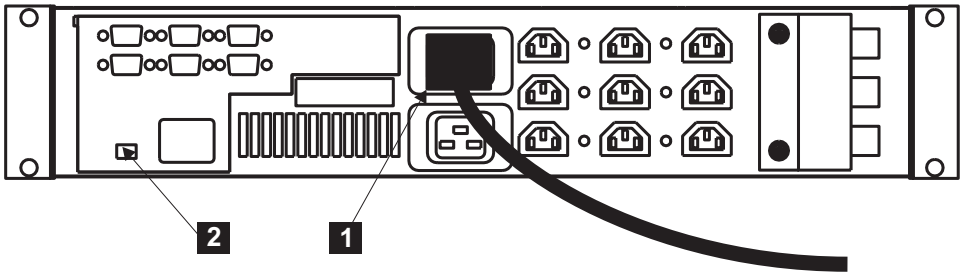


Figure 297. Installing the 2145 uninterruptible power supply power cable

Attention: If possible, ensure that the two uninterruptible power supply unis are not connected to the same power source.

Note: The 2145 uninterruptible power supply requires a dedicated branch circuit that meets the following specifications:

- One 15 A circuit breaker in each branch circuit supplies the power to a 2145 uninterruptible power supply
- Single-phase
- 50 or 60 Hz
- 200 – 240 Volt

10. All the front panel indicators (see Figure 298) flash for a short time while the 2145 uninterruptible power supply runs a self test. When the test is complete, the mode indicator flashes to show that the 2145 uninterruptible power supply is in standby mode.

    Press and hold the on button until you hear the 2145 uninterruptible power supply beep (approximately one second). The mode indicator stops flashing and the load level indicators display the percentage of load that is being supplied by the 2145 uninterruptible power supply. The 2145 uninterruptible power supply is now in normal mode and is charging its battery.

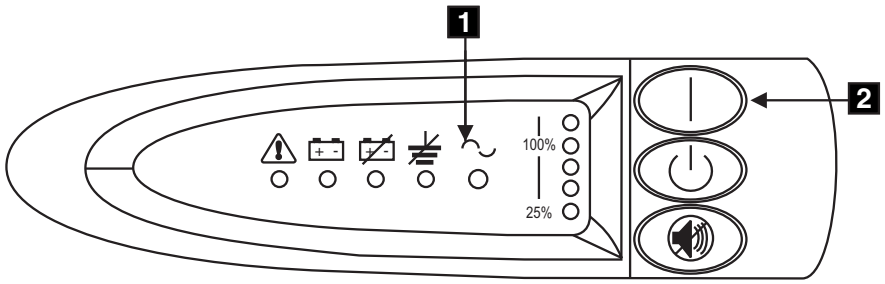


Figure 298. Power switch and indicators of the 2145 uninterruptible power supply

1 Mode indicator

2 On button

11. Install the front cover.

Related tasks

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Removing the 2145 uninterruptible power supply battery" on page 628
Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

Removing the power cable from the 2145 uninterruptible power supply

You can replace the power cable from the 2145 uninterruptible power supply if you are having problems with the power supply and suspect that the power cable is defective.

Perform the following steps to remove the power cable:

1. Remove the power from each SAN Volume Controller. See MAP 5350 for information about removing the power cable from the SAN Volume Controller.
2. Press and hold the off switch **2**. A long beep sounds for approximately five seconds. When the beep stops, release the switch. The mode indicator **1** flashes and the 2145 uninterruptible power supply enters standby mode.

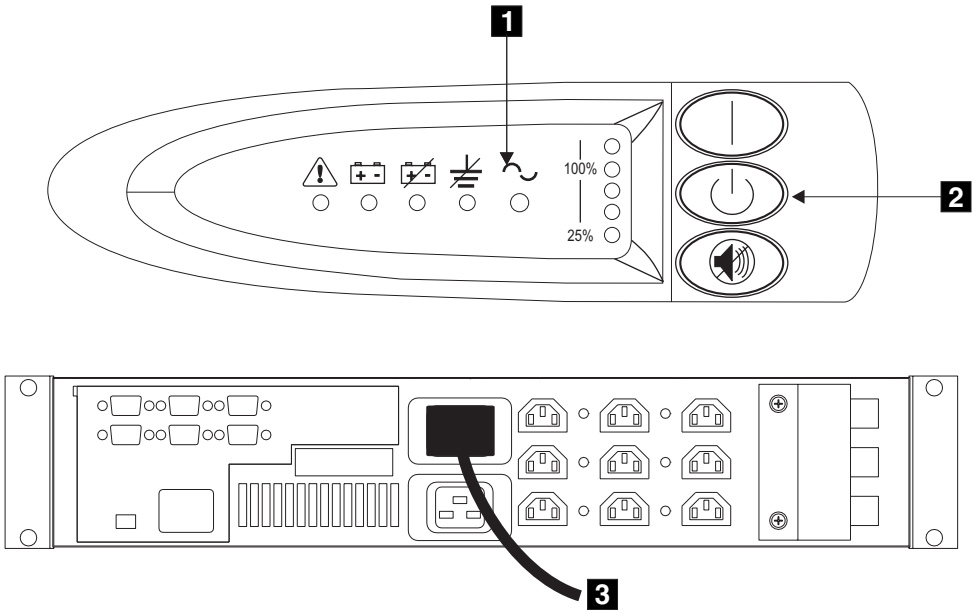


Figure 299. Front and back view of the 2145 uninterruptible power supply

1 Mode indicator

2 Off switch

3 Power cable

3. Unplug the power cable **3** from the main power source.
4. Reinstall the power cable (or replace it) to return power to the 2145 uninterruptible power supply. The 2145 uninterruptible power supply runs a self-test and enters standby mode.
5. Press and hold the on switch until, after approximately one second, the 2145 uninterruptible power supply beeps. The mode indicator stops flashing and the load-level indicators show the percentage of load that the 2145 uninterruptible power supply supplies.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing and replacing the SAN Volume Controller power cable assembly" on page 480
Make sure that power to the SAN Volume Controller is turned off before you remove the power cable assembly.

Removing the 2145 uninterruptible power supply electronics

During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

Follow all safety notices when removing the 2145 uninterruptible power supply electronics assembly.

Important: Check to make sure that any SAN Volume Controller that is powered by this 2145 uninterruptible power supply is shut down and powered off, prior to step 1. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

Perform the following steps to remove the 2145 uninterruptible power supply electronic assembly:

1. At the front of the 2145 uninterruptible power supply, press and hold the off button for approximately five seconds, or until the long beep stops. See the related documentation for removing the 2145 uninterruptible power supply.
2. At the back of the 2145 uninterruptible power supply, disconnect the signal cables **1**, which are shown in Figure 300.

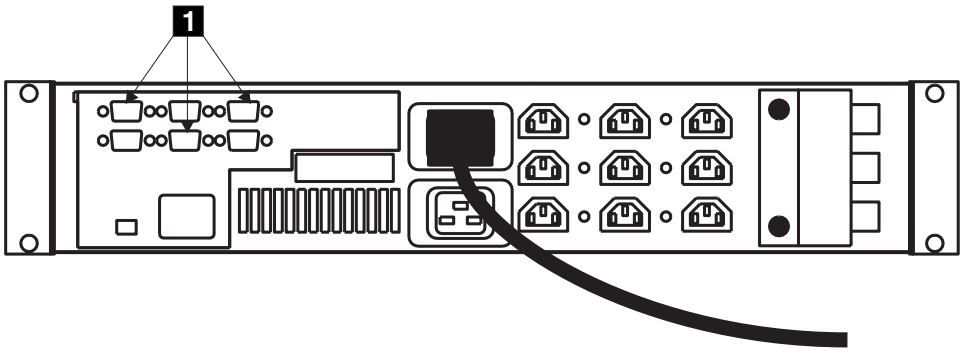


Figure 300. Disconnecting the 2145 uninterruptible power supply signal cables

3. Remove the front panel by pressing the sides inward and pulling both ends towards you, as shown in Figure 301 on page 626.

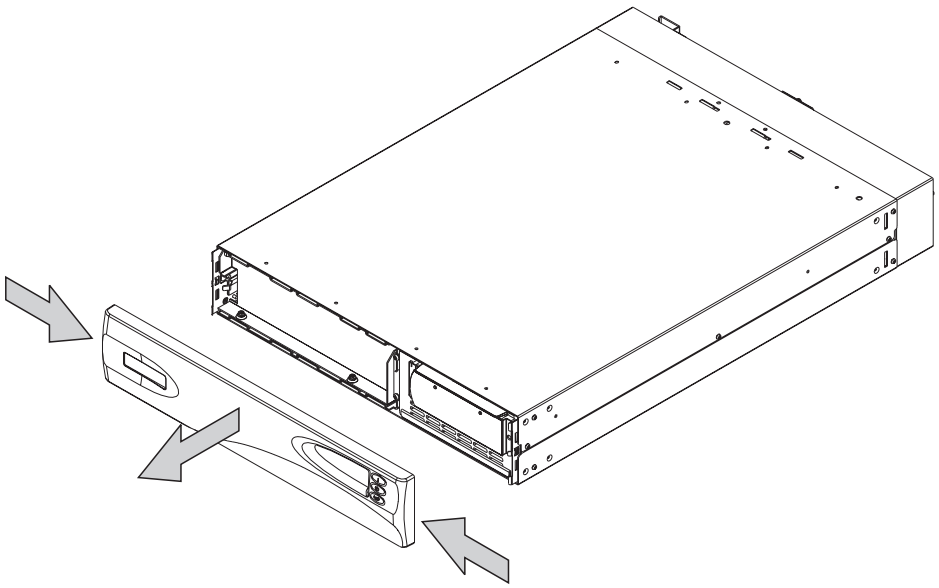


Figure 301. Removing the front panel of the 2145 uninterruptible power supply

4. Remove the two screws (**1** in Figure 302).

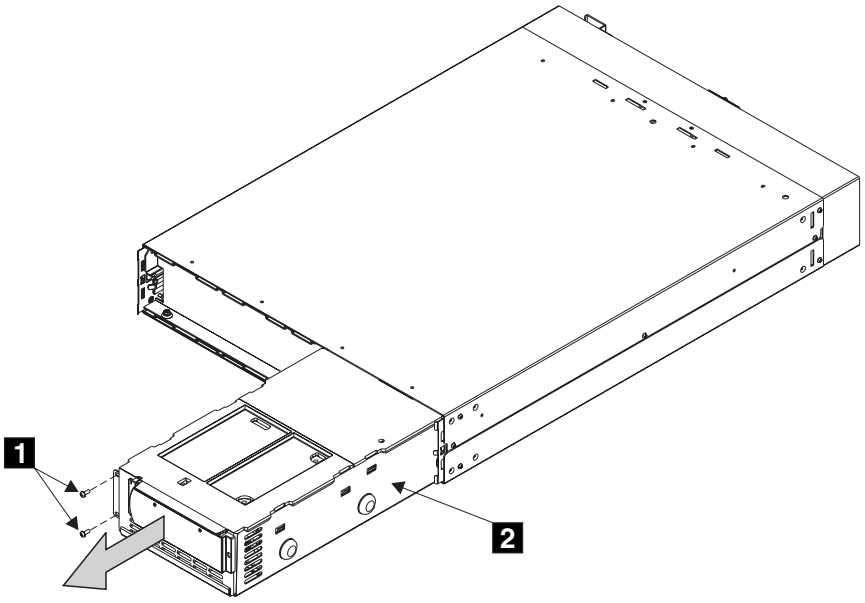


Figure 302. Removing the electronics unit from the 2145 uninterruptible power supply

5. Pull the electronics assembly (**2** in Figure 302) out from the 2145 uninterruptible power supply.

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the 2145 uninterruptible power supply" on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

Related reference

"Controls and indicators for the 2145 uninterruptible power supply" on page 60
All controls and indicators for the 2145 uninterruptible power supply are located on the front panel assembly.

Replacing the 2145 uninterruptible power supply electronics

During routine maintenance, you might have to replace the 2145 uninterruptible power supply electronics assembly.

Follow all safety notices when replacing the 2145 uninterruptible power supply electronics assembly.

Attention: When reinstalling the signal cables, use only the top row of serial connectors. Installing signal cables in the bottom row of serial connectors causes the 2145 uninterruptible power supply to malfunction.

Important: Check to make sure that any SAN Volume Controller that is powered by this 2145 uninterruptible power supply is shut down and powered off, prior to step 1.

Perform the following steps to replace the 2145 uninterruptible power supply electronic assembly:

1. Replace the two screws in the front of the 2145 uninterruptible power supply. (**1** in Figure 303).

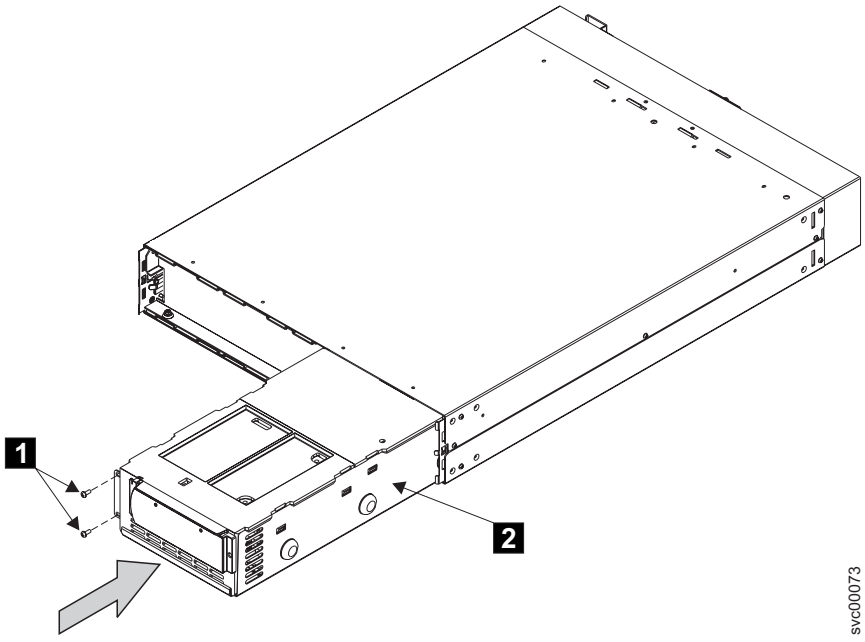


Figure 303. Replacing the electronics unit from the 2145 uninterruptible power supply

2. Insert the electronics assembly (**2** in Figure 303) into the 2145 uninterruptible power supply.
3. Replace the front panel by pressing the sides inward and pushing both ends towards the 2145 uninterruptible power supply, as shown in Figure 304 on page 628.

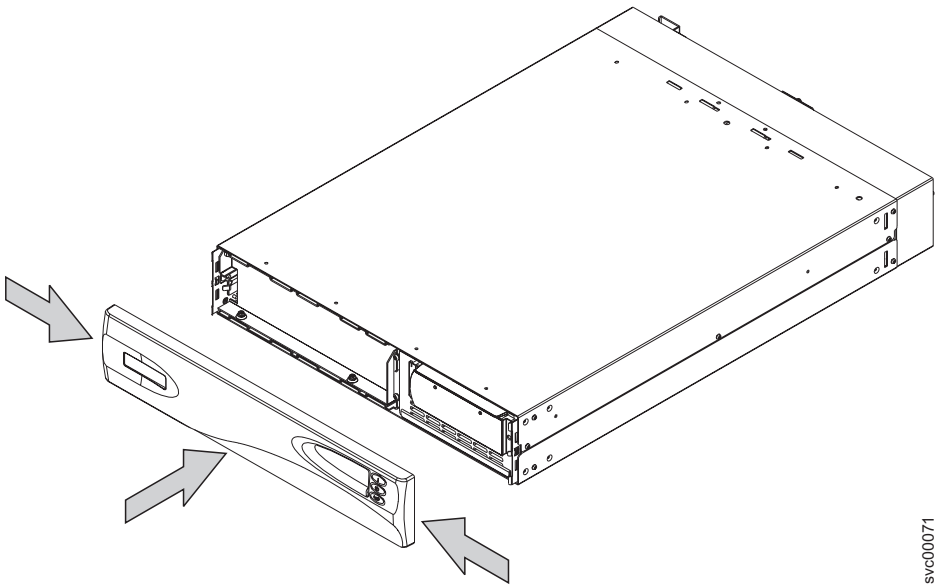


Figure 304. Replacing the 2145 uninterruptible power supply front panel

4. At the back of the 2145 uninterruptible power supply, connect the signal cables (**1** in Figure 305).

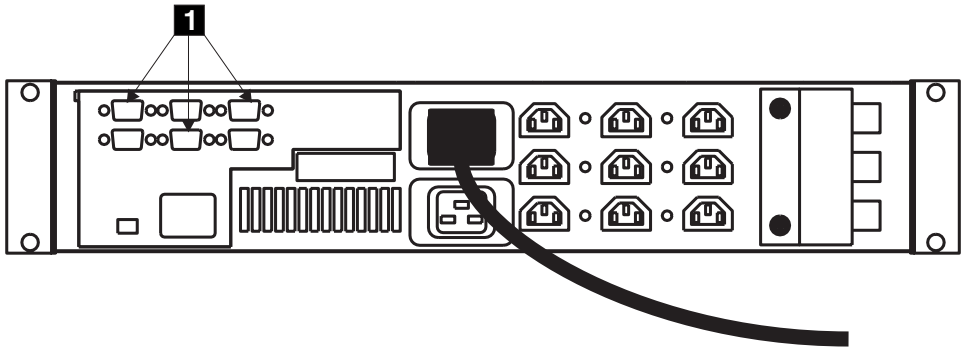


Figure 305. Connecting the 2145 uninterruptible power supply signal cables

5. At the front of the 2145 uninterruptible power supply, press and hold the on button until you hear a beep (approximately one second). The mode indicator stops flashing, and the load-level indicators display the percentage of load that is being applied to the 2145 uninterruptible power supply. See the related documentation at the end of this topic for information about the 2145 uninterruptible power supply controls and indicators.

Related reference

"Controls and indicators for the 2145 uninterruptible power supply" on page 60
All controls and indicators for the 2145 uninterruptible power supply are located on the front panel assembly.

Removing the 2145 uninterruptible power supply battery

Follow all safety notices when you are removing the 2145 uninterruptible power supply battery.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

Important: Check to make sure that any SAN Volume Controller that is powered by this 2145 uninterruptible power supply is shut down and powered off, prior to step 1. See "MAP 5350: Powering off a SAN Volume Controller node" on page 394.

Perform the following steps to remove the 2145 uninterruptible power supply battery assembly:

1. At the front of the 2145 uninterruptible power supply, press and hold the off button (**1** in Figure 306) for approximately five seconds or until the long beep stops.

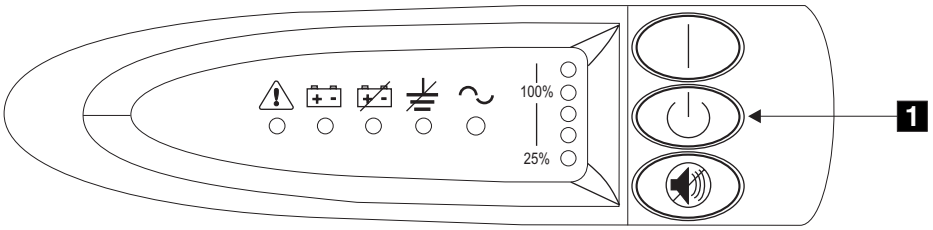


Figure 306. 2145 uninterruptible power supply front panel assembly

2. Remove the front panel by pressing the sides inward, and pulling on both ends towards you, as shown in Figure 307.

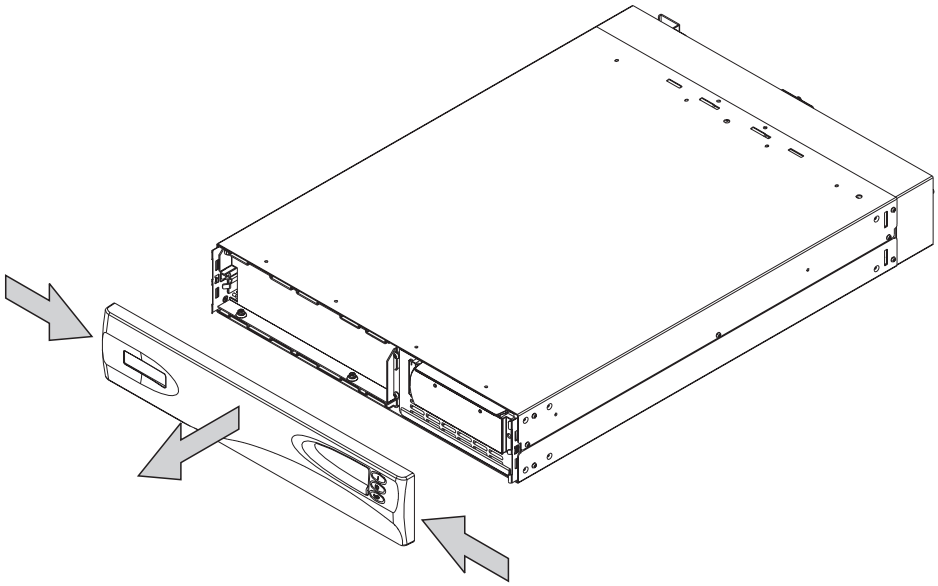


Figure 307. Removing the 2145 uninterruptible power supply front panel

3. Perform the following steps to remove the battery retaining bracket:
   a. Remove the two bolts (**1** in Figure 308 on page 630).
   b. Remove the hex nut (**2** in Figure 308 on page 630).
   c. Remove the battery retaining bracket (**3** in Figure 308 on page 630).

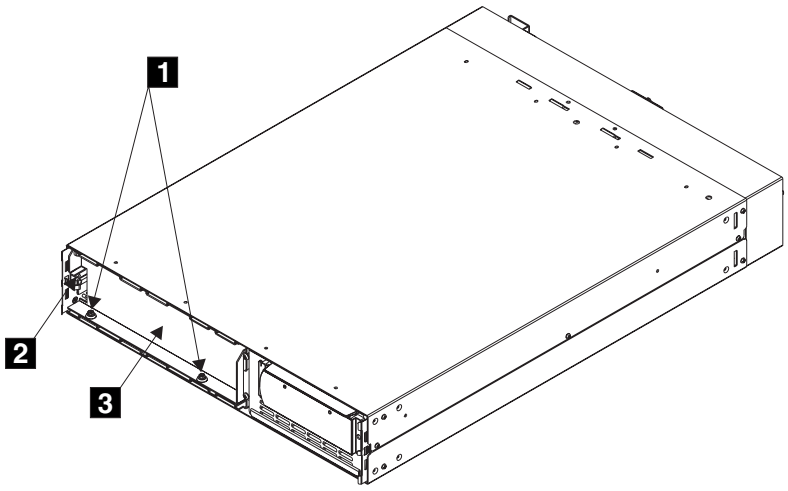


Figure 308. Fastening the battery retaining bracket

4. Remove the battery plate, to access to the battery, as shown in Figure 309.

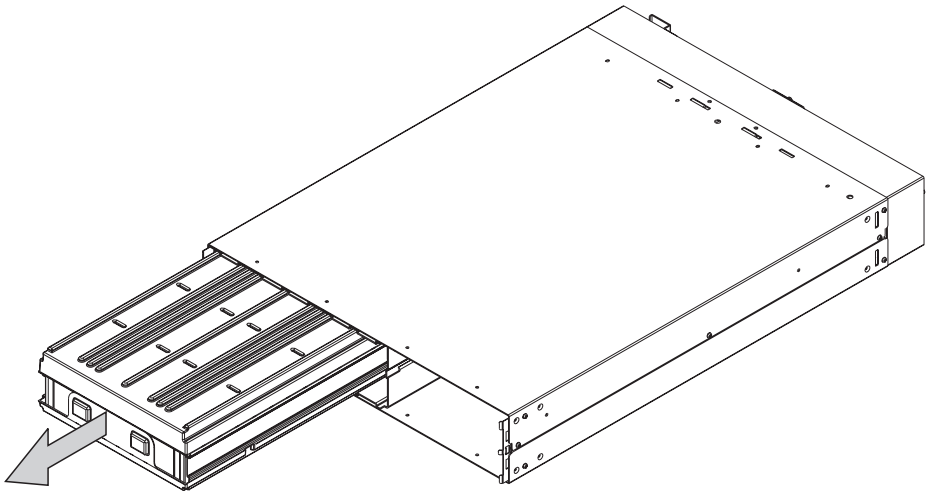


Figure 309. Removing the 2145 uninterruptible power supply battery

5. Grab the tabs on the battery assembly and pull the battery outward to allow two people to access it for removal.

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

CAUTION:

The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

6. With the help from another service support representative, pull the battery out onto a flat, stable surface.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**

- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

CAUTION:
The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

Related tasks

"MAP 5350: Powering off a SAN Volume Controller node" on page 394
MAP 5350: Powering off a SAN Volume Controller node helps you power off a single SAN Volume Controller node to perform a service action without disrupting the host's access to disks.

"Removing the 2145 uninterruptible power supply" on page 615
Before you begin to remove the 2145 uninterruptible power supply, read all safety notices.

"Removing the 2145 uninterruptible power supply electronics" on page 625
During routine maintenance, you might have to remove the 2145 uninterruptible power supply electronics assembly.

"Replacing the 2145 uninterruptible power supply" on page 617
You can replace the 2145 uninterruptible power supply after first removing the current 2145 uninterruptible power supply.

Related reference

"Controls and indicators for the 2145 uninterruptible power supply" on page 60
All controls and indicators for the 2145 uninterruptible power supply are located on the front panel assembly.

Replacing the 2145 uninterruptible power supply battery

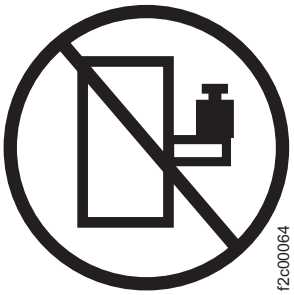
Follow all safety notices when you are replacing the 2145 uninterruptible power supply battery.

For all danger, caution, attention notices, see *IBM Systems Safety Notices*. Use the reference numbers in parentheses; for example (1), at the end of each notice to find the matching translated notice.

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment–personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**



- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2)

DANGER

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- **(For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- **(For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

DANGER

Uninterruptible power supply units contain specific hazardous materials. Observe the following precautions if your product contains an uninterruptible power supply:

- **The uninterruptible power supply contains lethal voltages. All repairs and service must be performed only by an authorized service support representative. There are no user serviceable parts inside the uninterruptible power supply.**
- **The uninterruptible power supply contains its own energy source (batteries). The output receptacles might carry live voltage even when the uninterruptible power supply is not connected to an ac supply.**
- **Do not remove or unplug the input cord when the uninterruptible power supply is turned on. This removes the safety ground from the uninterruptible power supply and the equipment connected to the uninterruptible power supply.**
- **The uninterruptible power supply is heavy because of the electronics and batteries that are required. To avoid injury, observe the following precautions:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for assistance.**
  - **Remove the battery, electronics assembly, or both from the uninterruptible power supply before removing the uninterruptible power supply from the shipping carton or installing or removing the uninterruptible power supply in the rack.**

(D007)

Perform the following steps to replace the 2145 uninterruptible power supply battery assembly:

1. Make sure that the 2145 uninterruptible power supply is powered off and unplugged.
2. With the help from another service support representative, grab the tabs on the battery assembly and gently push the battery in to the 2145 uninterruptible power supply.
3. Replace the battery plate, as shown in Figure 310.

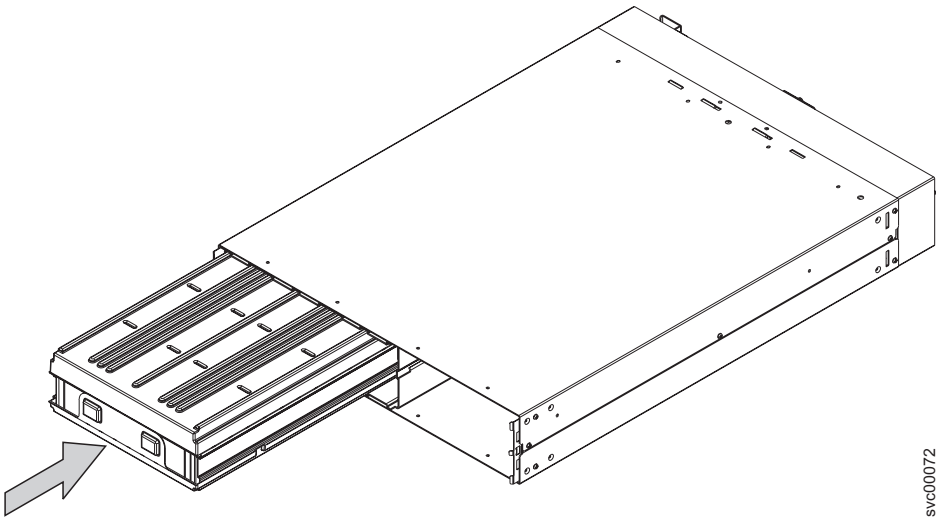


Figure 310. Replacing the 2145 uninterruptible power supply battery plate

4. Perform the following steps to replace the battery retaining bracket:
   a. Replace the battery retaining bracket (**3** in Figure 311).
   b. Replace the hex nut **2**.
   c. Replace the two bolts **1**.

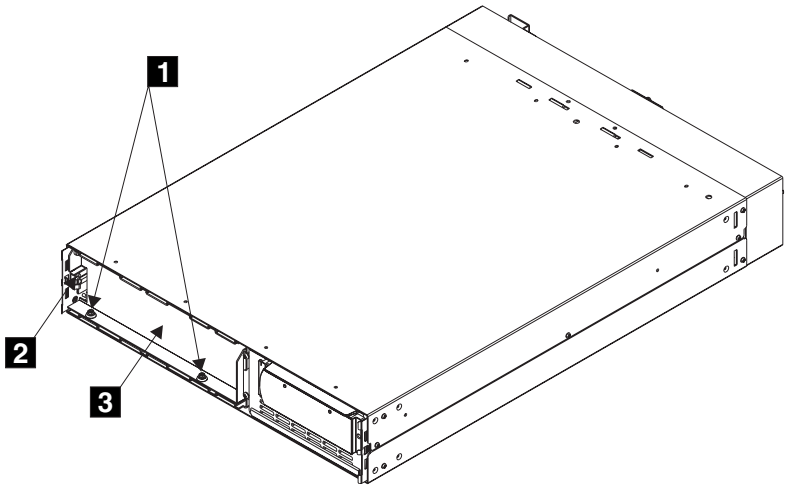


Figure 311. Fastening the battery retaining bracket

5. If the battery has two red cables that are disconnected, perform the following steps to connect the internal battery connector:

a. Remove the protective tape from the internal battery connector (shown in Figure 312).

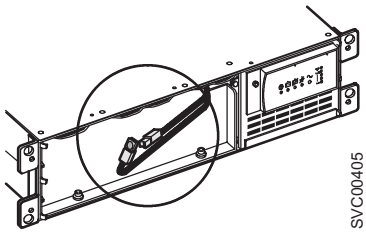


Figure 312. The 2145 uninterruptible power supply internal battery connector with protective tape

b. Connect the internal battery connector (shown in Figure 313).

Note: A small amount of arcing might occur when connecting the batteries. This is normal and does not damage the unit or present any safety concerns.

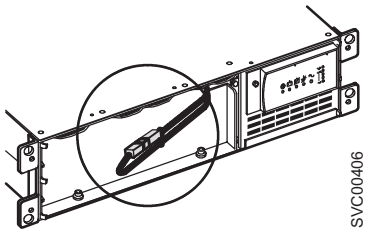


Figure 313. Connecting the 2145 uninterruptible power supply internal battery connectors

6. Replace the front panel by pressing the sides inward, and pushing on both ends towards the 2145 uninterruptible power supply, as shown in Figure 314).

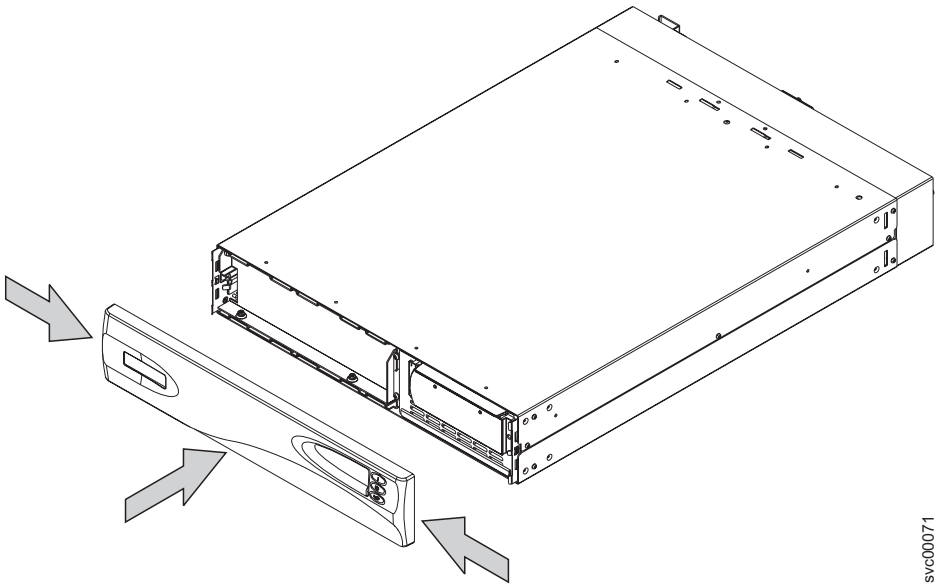


Figure 314. Replacing the 2145 uninterruptible power supply front panel

7. At the front of the 2145 uninterruptible power supply, press and hold the on button until you hear a beep (approximately one second). The mode indicator stops flashing, and the load-level indicators display the percentage of load that is being applied to the 2145 uninterruptible power supply. See “Controls and indicators for the 2145 uninterruptible power supply” on page 60the related documentation for more information about the 2145 uninterruptible power supply controls and indicators.

Related reference

“Controls and indicators for the 2145 uninterruptible power supply” on page 60
All controls and indicators for the 2145 uninterruptible power supply are located on the front panel assembly.

Removing the support rails for a 2145 uninterruptible power supply

You may be required to remove the support rails for the 2145 uninterruptible power supply.

The support rails for a 2145 uninterruptible power supply can be removed by performing the following steps:

1. Go to the left-hand support rail.
2. Loosen the two adjustment wing nuts **2** (Figure 315 on page 639).

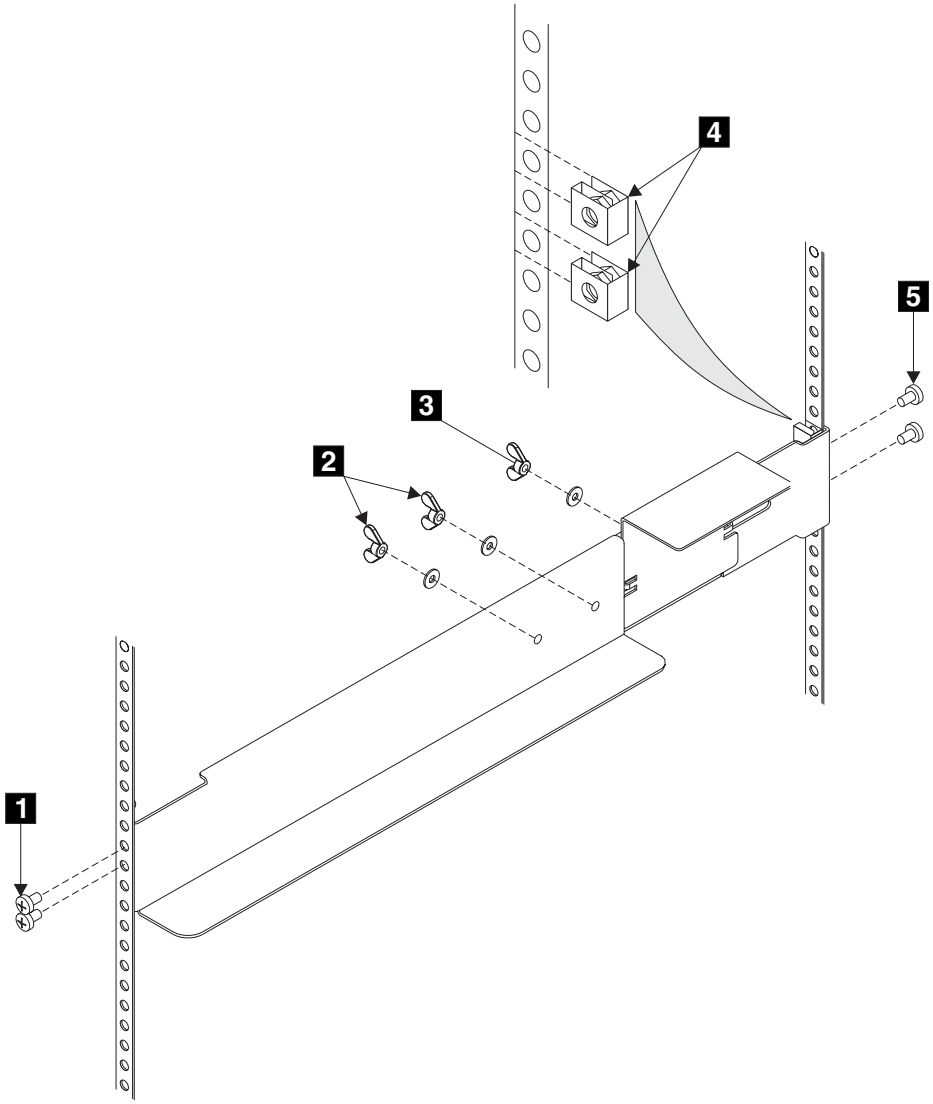


Figure 315. Removing support rails for a 2145 uninterruptible power supply from the rack

3. Remove the back screws **5**.
4. Remove the front screws **1**.
5. Remove the rail from the rack.
6. Remove the two clip nuts **4**.

Related tasks

"Installing the support rails for a 2145 uninterruptible power supply"
You must install the support rails in the rack before installing the 2145 uninterruptible power supply.

Installing the support rails for a 2145 uninterruptible power supply

You must install the support rails in the rack before installing the 2145 uninterruptible power supply.

Before you install the support rails, determine where the 2145 uninterruptible power supply units are to be installed in the rack. Complete the following prerequisites before you install the support rails:

- Use the user's hardware location chart, which you downloaded from http://www.ibm.com/storage/support/2145, to determine where in the rack that you want to install the 2145 uninterruptible power supply.
- Discard the two handles and their associated nuts that are shipped with the support rails.
- At the back of the rack, observe the Electronic Industries Alliance (EIA) positions and determine where you are going to install the 2145 uninterruptible power supply. Always install the 2145 uninterruptible power supply into the lowest available position in the rack. The only device that can be beneath a 2145 uninterruptible power supply is another uninterruptible power supply. The bottom of the flange of the support rail must align with the EIA mark on the rack.

Note: The user can already have installed in the rack a 2145 uninterruptible power supply with available spare capacity. Therefore, the SAN Volume Controller 2145-4F2 might be delivered without a 2145 uninterruptible power supply.

Perform the following steps for each rail:

1. Attach nut clips **4** to the rack (see Figure 316 on page 641). These nut clips must align with the second and fourth holes of the support rail flange.

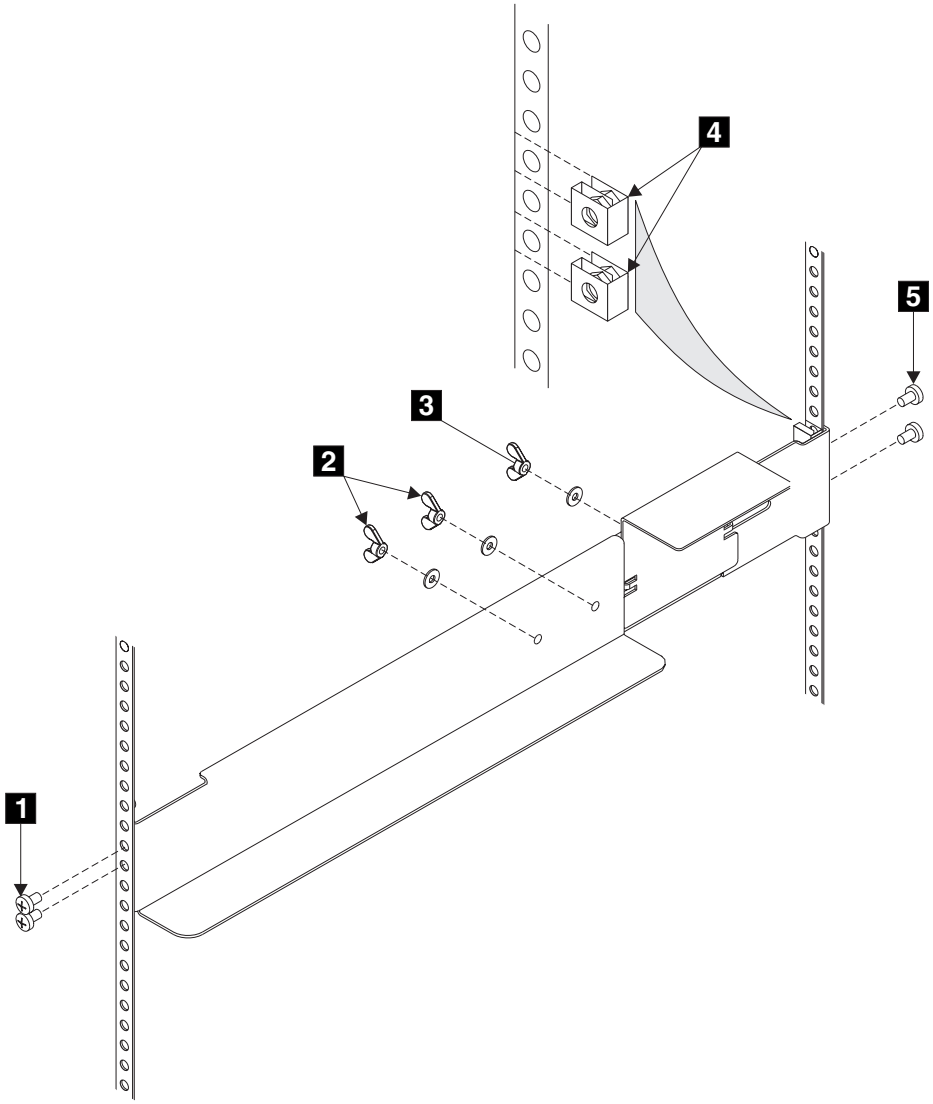


Figure 316. Installing support rails for a 2145 uninterruptible power supply into the rack

2. Loosen the two wing nuts **2**.
3. Loosen the wing nut **3** and slide the bracket toward the back of the rail.
4. Remain at the back of the rack holding the support rail in position in the rack, and then install and fully tighten the two mounting screws **5**.
5. Go to the front of the rack.
6. Extend the support rail toward the front of the rack.

   Note: Hold the support rail in position until you have completed step 8.
7. Ensure that the support rail is horizontal (a level might be useful here).
8. Install the two mounting screws **1** into the third and fourth holes of the support rail flange. Fully tighten the screws.
9. Fully tighten the two wing nuts **2**.

10. Loosen the wing nut 3 and slide the bracket toward the front of the rail as far as it will go, with the front edge of the bracket against the back-end of the front support rail.
11. Fully tighten the wing nut 3.

Note: You must perform all of the previous steps for each rail.

Related tasks

"Removing the support rails for a 2145 uninterruptible power supply" on page 638
You may be required to remove the support rails for the 2145 uninterruptible power supply.

Appendix A. Parts catalog

Part numbers are available for the different parts and field replaceable units (FRUs) of the SAN Volume Controller and the uninterruptible power supply.

Assembly 1: SAN Volume Controller 2145-8G4

You may need to replace a SAN Volume Controller 2145-8G4 field replaceable unit (FRU).

Figure 317 on page 644 shows the different parts that make up the SAN Volume Controller 2145-8G4.

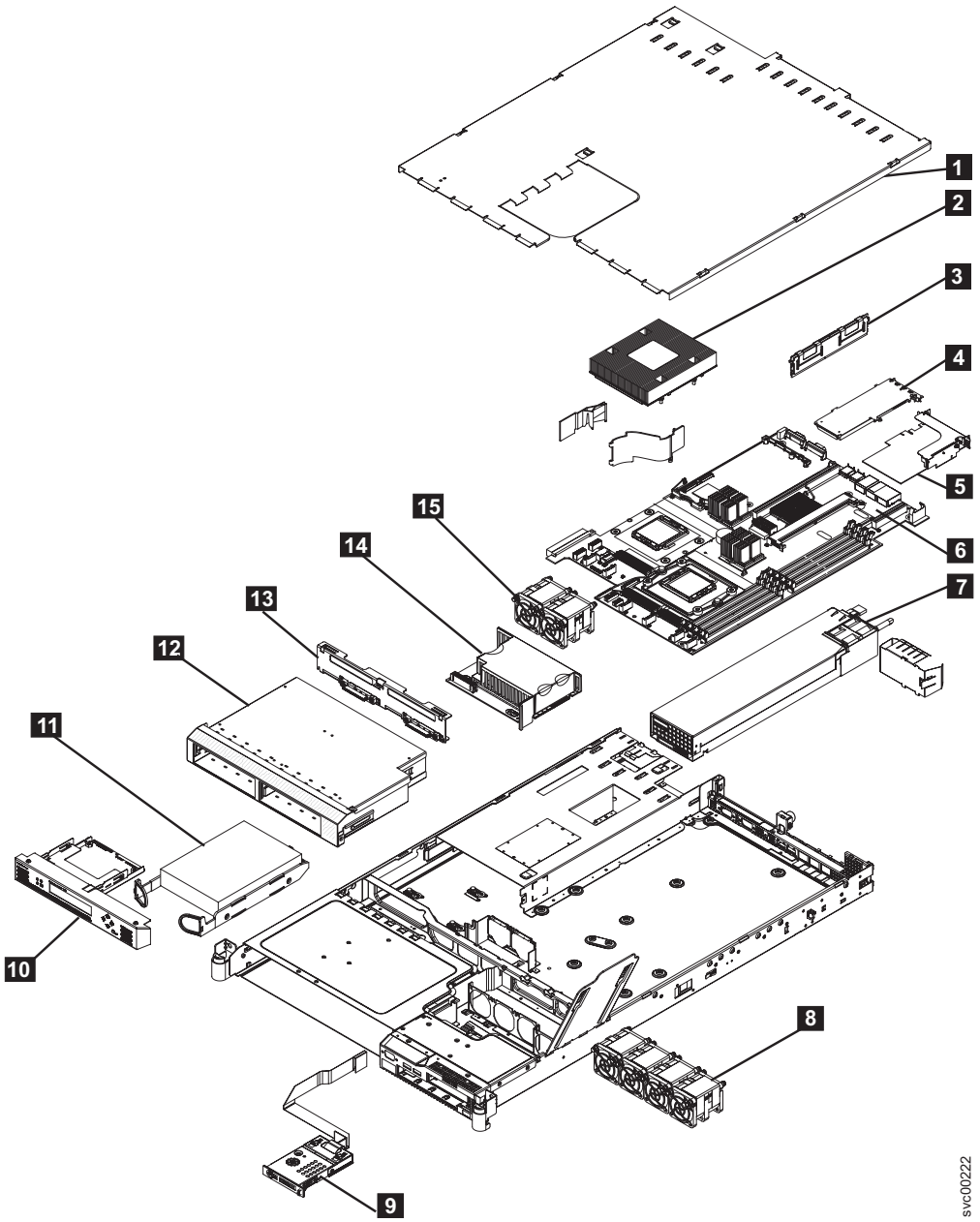


Figure 317. Exploded view of the SAN Volume Controller 2145-8G4 hardware

- Table 31 provides the part numbers and a brief description of the frame assembly parts that are labeled in Figure 317.
- The frame assembly comprises all of the parts except for the service controller and fibre-channel cards. These parts are listed in Table 32 on page 645.
- There are a number of FRUs available that are not referenced by any SAN Volume Controller 2145-8G4 service procedures. Those FRUs are listed in Table 33 on page 646.

Table 31. Assembly 1: SAN Volume Controller 2145-8G4 frame assembly

Assembly index	Part number	Units	Description
–	31P0906	1	Frame assembly
-1	43W0609	1	Top cover

Table 31. Assembly 1: SAN Volume Controller 2145-8G4 frame assembly (continued)

Assembly index	Part number	Units	Description
-2	42C4228	2	Microprocessor, 2.33 GHz Woodcrest with heatsink
-3	39M5784	8	Memory, 1 GB ECC DRR2
-5	32R2883	1	Riser card, PCI Express (Slot 1)
-6	31P1090	1	System board assembly
-7	39Y7189	1	Power supply, 670 watt
-8 and -15	26K8083	6	Fan assembly
-	33F8354	1	Battery, 3.0V
-9	43W0625	1	Operator information panel
-11	31P0994	1	160 GB SATA disk drive in a simple swap carrier
-12	32R2823	1	Simple-swap SATA disk drive cage
-13	26K8060	1	SATA cable assembly, with backplate
-14	39Y6972	1	Power backplane

Table 32. Items not included in the SAN Volume Controller 2145-8G4 frame assembly

Assembly index	Part number	Units	Description
-	39Y9510	1	Kit, toolless rail
-4	31P0937	1	4-port fibre-channel host bus adapter
-	23R2770	1	Fibre-channel SFP connector
-10	31P0908	1	Service controller
-	31P1063	1	Power cable assembly (SAN Volume Controller to 2145-1U uninterruptible power supply)
-	31P1045	1	Cable retainer assembly
-	39M5700		External fibre-channel cable, LC–LC, 5.0 m (16.4 ft)
-	39M5701		External fibre-channel cable, LC–LC, 25.0 m (82 ft)

Table 33. FRUs that are not referenced by SAN Volume Controller 2145-8G4 service procedures

Part number	Quantity	Description
26K8058	2	Front panel USB cable
32R2820	1	3.5 in. SATA service label
39Y9420	1	Air flow parts
39Y9423	2	Heat sink assembly
39Y9507	1	Media bezel assembly
43W0610	1	Service labels assembly
39Y9522	1	Main panel weldment
42C3983	1	Optical interposer card
43V4869	1	CRU/FRU label
39Y9507	1	Media bezel assembly
32R2823	1	3.5 in. SATA cartridge assembly

Assembly 2: SAN Volume Controller 2145-8F4

You may need to replace a SAN Volume Controller 2145-8F4 field replaceable unit (FRU).

Figure 318 on page 647 shows the different parts that make up the SAN Volume Controller 2145-8F4.

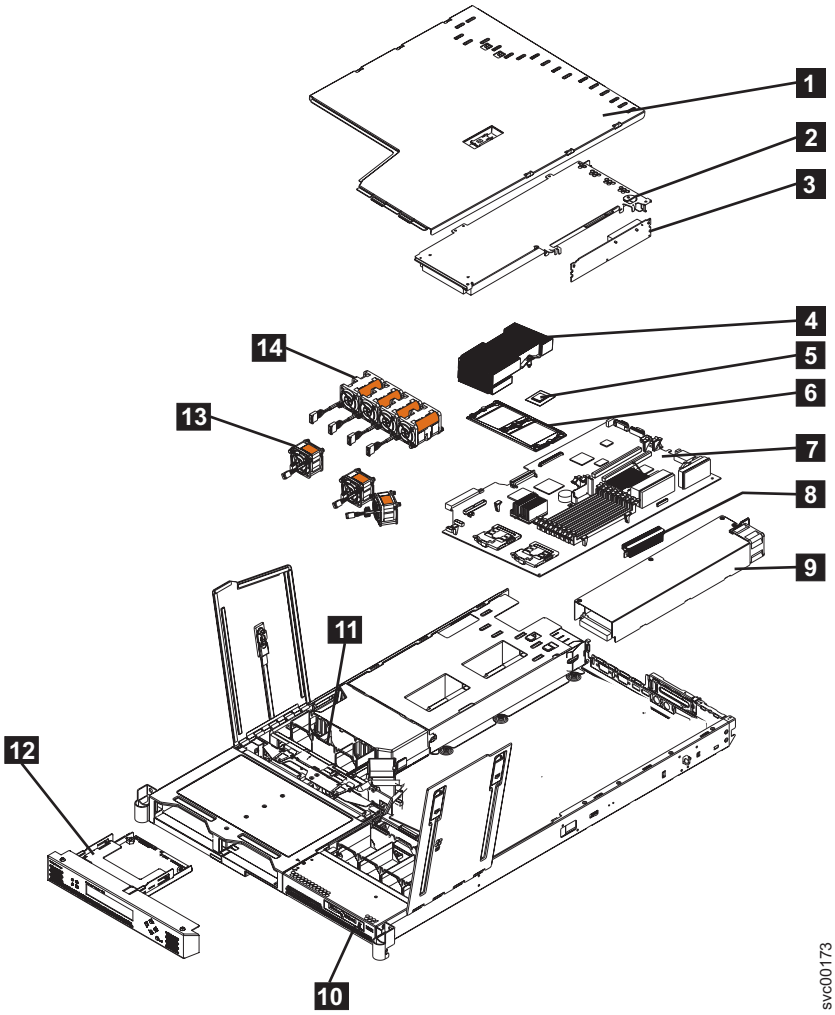


Figure 318. Exploded view of the SAN Volume Controller 2145-8F4 hardware

Table 34 provides the part numbers and a brief description of the frame assembly parts that are labeled in Figure 318. The frame assembly comprises all the parts except the service controller and fibre-channel cards. These parts are listed in Table 35 on page 648.

Table 34. Assembly 2: SAN Volume Controller 2145-8F4 frame assembly

Assembly index	Part number	Units	Description
1–	31P0705	1	Frame assembly
-	31P0769	1	80GB SATA HDD
-1	23K4219	1	Top cover
-3	90P1956	1	Riser card, PCI Express
-4	39R9058	2	Heat sink
-5	13M8293	2	Microprocessor, 3.0 GHz
-6	90P5282	1	Heat sink retention module
-	90P5284	1	Chassis

Table 34. Assembly 2: SAN Volume Controller 2145-8F4 frame assembly (continued)

Assembly index	Part number	Units	Description
-	23K4209	1	Cage assembly
-7	39Y6958	1	System board
-8	39Y7261	2	Voltage regulator module (VRM), 1U/75A
-9	39Y7169	1	Power supply, 585 watt
-	40K8157	1	Power backplane
-	33F8354	1	Battery, 3.0V
-	40K8160	1	Cable, fan power
-	40K8159	1	Cable, signal, front panel
-10	42C9719	1	Operator information panel
-11	40K8156	1	Fan holder with fan backplanes
-13	40K8139	3	Fan, 40×40×28
-14	40K8140	4	Fan, 40×40×56
-	73P2870	8	Memory, 1 GB ECC DRR2

Table 35. Items not included in the SAN Volume Controller 2145-8F4 frame assembly

Assembly index	Part number	Units	Description
-2	31P0714	1	4-port fibre-channel host bus adapter
-	23R2770	1	Fibre-channel SFP connector
-12	31P0708	1	Service controller
-	23K4218	1	Kit, toolless rail
-	31P1063	1	Power cable assembly (SAN Volume Controller to the 2145-1U uninterruptible power supply)
-	31P0715	1	Cable retainer
-	39M5699		External Fibre Channel cable, LC–LC, 1.0 m (3.3 ft)
-	39M5700		External Fibre Channel cable, LC–LC, 5.0 m (16.4 ft)
-	39M5701		External Fibre Channel cable, LC–LC, 25.0 m (82 ft)

Table 35. Items not included in the SAN Volume Controller 2145-8F4 frame assembly (continued)

Assembly index	Part number	Units	Description
-	12R9321		External Fibre Channel cable, LC–SC/LC, 1.0 m (3.3 ft)

Assembly 3: SAN Volume Controller 2145-8F2

You may need to replace a SAN Volume Controller 2145-8F2 field replaceable unit (FRU).

Figure 319 shows the different parts that make up the SAN Volume Controller 2145-8F2.

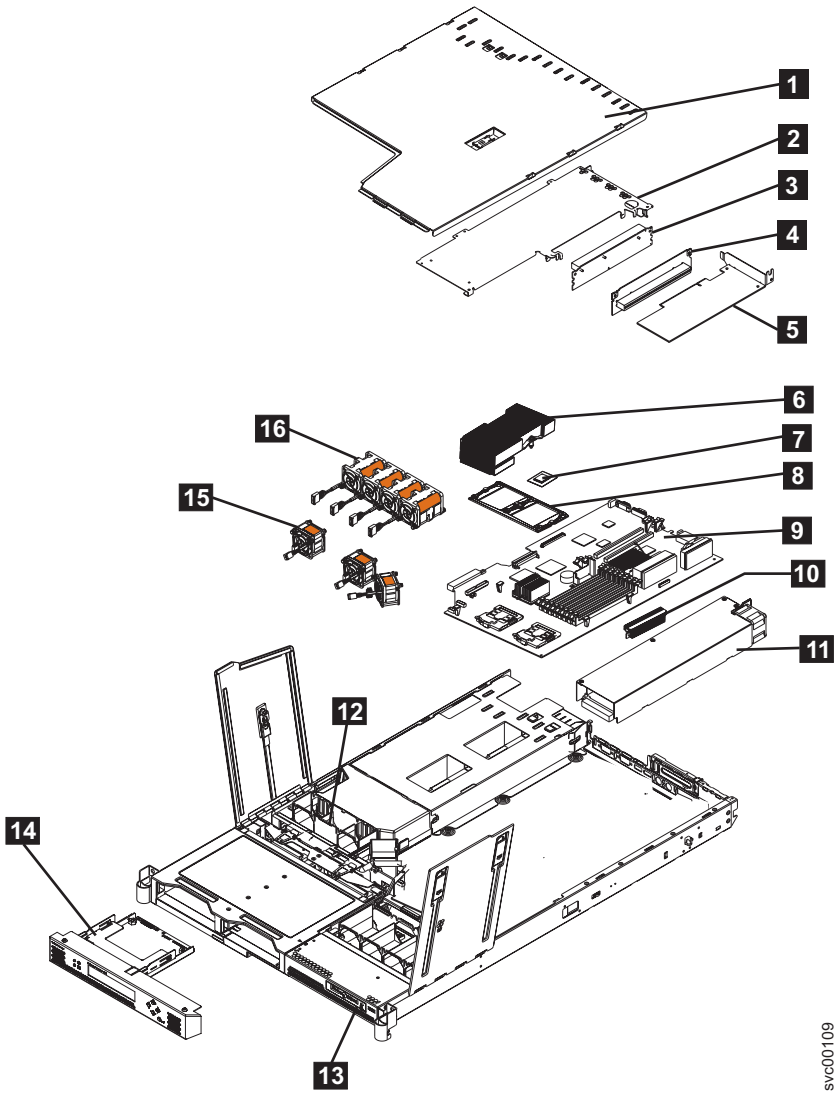


Figure 319. Exploded view of the SAN Volume Controller 2145-8F2 hardware

Table 36 provides the part numbers and a brief description of the frame assembly parts that are labeled in Figure 319 on page 649. The frame assembly comprises all of the parts except the service controller and fibre-channel cards. These parts are listed in Table 37.

Table 36. Assembly 3: SAN Volume Controller 2145-8F2 frame assembly

Assembly index	Part number	Units	Description
1–	64P7934	1	Frame assembly
-1	23K4219	1	Top cover
-	64P8332	1	80GB SATA HDD
-3	23K4211	1	Riser card, PCI (full height)
-4	90P1957	1	Riser card, PCI (low profile)
-6	90P5281	2	Heat sink
-7	13M8293	2	Microprocessor, 3.0 GHz
-8	90P5282	1	Heat sink retention module
-	90P5284	1	Chassis
-	23K4209	1	Cage assembly
-9	32R1730	1	System board
-10	24R2698	2	VRM, 1U/75A
-11	24R2640	1	Power supply assembly
-	23K4515	1	Power backplane
-	33F8354	1	Battery, 3.0V
-	33P2352	1	Cable, fan power
-	25R4052	1	Cable, signal, front panel
-12	23K4992	1	Fan holder with fan backplanes
-13	23K4490	1	Operator information panel
-15	23K4217	3	Fan, 40×40×28
-16	33P2335	4	Fan, 40×40×56
-	73P2870	8	Memory, 1 GB ECC DRR2

Table 37. Items not included in the SAN Volume Controller 2145-8F2 frame assembly

Assembly index	Part number	Units	Description
-2	64P7783	1	Fibre-channel HBA (full height)
-5	64P7813	1	Fibre-channel HBA (low profile)
-	23R2770	1	Fibre-channel SFP connector

Table 37. Items not included in the SAN Volume Controller 2145-8F2 frame assembly (continued)

Assembly index	Part number	Units	Description
-14	64P7874	1	Service controller
-	64P7940	1	Input power cable assembly, (SAN Volume Controller 2145-8F2 to 2145-1U uninterruptible power supply)
-	23K4218	1	Kit, toolless rail
-	39M5699		External Fibre Channel cable, LC–LC, 1.0 m (3.3 ft)
-	39M5700		External Fibre Channel cable, LC–LC, 5.0 m (16.4 ft)
-	39M5701		External Fibre Channel cable, LC–LC, 25.0 m (82 ft)
-	12R9321		External Fibre Channel cable, LC–SC/LC, 1.0 m (3.3 ft)

Assembly 4: SAN Volume Controller 2145-4F2

You may need to replace a SAN Volume Controller 2145-4F2 field replaceable unit (FRU).

Figure 320 on page 652 shows the different parts that make up the SAN Volume Controller 2145-4F2.

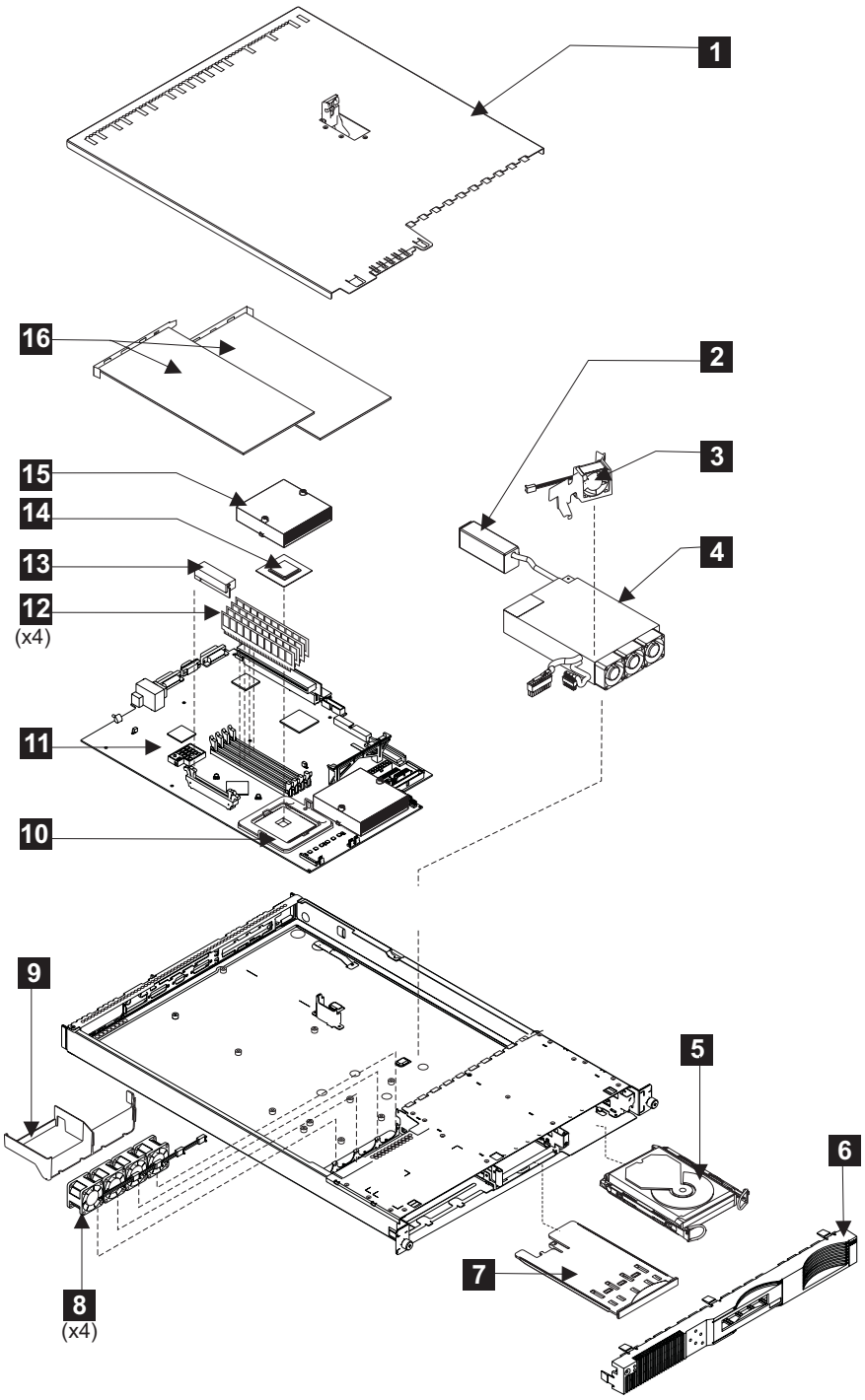


Figure 320. Exploded view of the SAN Volume Controller 2145-4F2 hardware

Table 38 provides the part numbers and a brief description for each part labeled in Figure 320.

Table 38. Assembly 4: SAN Volume Controller 2145-4F2

Assembly index	Part number	Units	Description
2–	64P7793	1	Frame assembly
-1	40K9765	1	Top cover

Table 38. Assembly 4: SAN Volume Controller 2145-4F2 (continued)

Assembly index	Part number	Units	Description
-9	24P0742	1	Baffle
–6	64P7858	1	Front panel assembly
–7	64P7785	1	Service controller
-5	24P3704	1	36 GB disk drive assembly
-	18P6414	1	Cable, SCSI power
-	27H0776	1	Cable, SCSI signal
-	32P1928	1	Rail kit for disk drive assembly (contains rails with screws)
-8	24P1118	4	Microprocessor fan assembly
-3	00N6991	1	Disk drive fan and bracket assembly
-11	64P7826*	1	System board assembly kit
-12	09N4308	4	Memory module
-	33F8354	1	CMOS battery
-16	64P7783	2	Fibre-channel adapter assembly
-	23R2770	1	Fibre-channel SFP connector
-4	49P2090	1	Power supply assembly
-	24P1121	1	SAN Volume Controller support rail kit
-	64P7940	1	Power cable assembly, SAN Volume Controller to uninterruptible power supply
-	39M5699	AR	External Fibre Channel cable, LC–LC, 1.0 m (3.3 ft)
-	19K1268	AR	External Fibre Channel cable, LC–SC/LC, 1.0 m (3.3 ft)
-	39M5700	AR	External Fibre Channel cable, LC–LC, 5.0 m (16.4 ft)
-	39M5701	AR	External Fibre Channel cable, LC–LC, 25.0 m (82 ft)
-	18P5055	AR	Ethernet cable, 2 m (6.5 ft)

Table 38. Assembly 4: SAN Volume Controller 2145-4F2 (continued)

Assembly index	Part number	Units	Description
-	18P5056	AR	Ethernet cable, 13 m (42 ft)

* If you need to order a system board assembly kit, first check the system board part number in the vital product data for the failed node. Perform the following steps to find the system board part number:

1. Start the SAN Volume Controller 2145-4F2.
2. Display the vital product data for the failed node. See the topic for viewing the vital product data.
3. Note the system board part number.
   - If the part number is 64P7826, order "System Board Assembly kit part number 64P7826."
   - If this part number is not available, you can use part number 64P7994 as a substitute.
   - If you order part number 64P7994, order the "System Board Assembly kit part number 64P7994."

Assembly 5: Redundant ac power switch

There is a single FRU assembly for the redundant ac power feature. It consists of the switch and two input power cables

The following graphic shows the redundant ac power switch.

Table 39 lists the part numbers for the redundant ac power switch.

Table 39. Assembly 5: Redundant ac power switch

Part number	Units	Description
31P0896	1	Redundant ac power switch assembly

Assembly 6: 2145-1U uninterruptible power supply

The 2145-1U uninterruptible power supply is constructed from four separate parts.

The following graphic shows the parts that make up the 2145-1U uninterruptible power supply.

Table 40 describes the different part numbers in reference to the previous graphic.

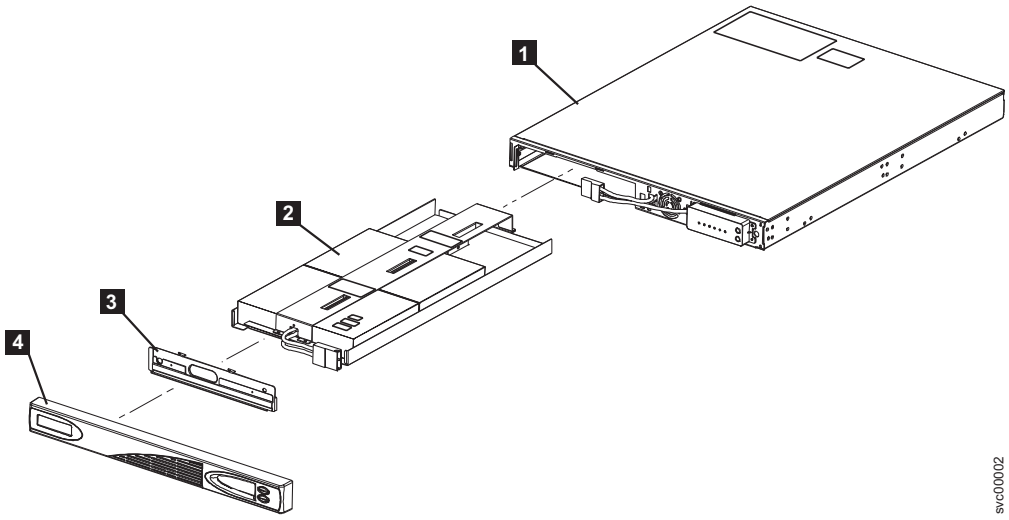


Table 40. Assembly 6: 2145-1U uninterruptible power supply

Assembly index	Part number	Units	Description
3–	31P0875	1	Uninterruptible power supply assembly
-1	Not available (this item cannot be ordered and is supplied as part of the uninterruptible power supply assembly)	1	Chassis assembly
-2	31P0710	1	Battery pack assembly
-3	Not available (this item cannot be ordered and is supplied as part of the uninterruptible power supply assembly)	1	Battery plate
-4	31P0709	1	Front panel
-	31P1060	1	Uninterruptible power supply cable retention bracket kit
-	31P0711	1	Support rail kit, contains rails, nut clips, and screws

Table 40. Assembly 6: 2145-1U uninterruptible power supply (continued)

Assembly index	Part number	Units	Description
-	39M5376	1	Input power cable, power distribution unit to uninterruptible power supply.
-	39M5116	1	Main power cable for the United States.

Power cables for the 2145-1U uninterruptible power supply

If you do not connect the 2145-1U uninterruptible power supply to a rack power distribution unit (PDU) or redundant ac power switch, you must follow your country or region's power requirements to choose the appropriate power cable for the 2145-1U uninterruptible power supply.

The 2145-1U uninterruptible power supply is supplied with an IEC 320-C13 to C14 jumper to connect it to a rack PDU. You can also use this cable to connect the 2145-1U uninterruptible power supply to the redundant ac power switch.

The following table lists the power cable requirements for your country or region:

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
United States of America (Chicago), Canada, Mexico	1.8 m (6 ft)	NEMA L6-15P	39M5115
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela	2.8 m (9 ft)	NEMA L6-15P	39M5116

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macao S.A.R. of China, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe	2.8 m (9 ft)	CEE 7-VII	39M5123
Antigua, Bahrain, Brunei, Channel Islands, Hong Kong S.A.R. of China, Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	2.8 m (9 ft)	BS 1363/A	39M5151
Argentina	2.8 m (9 ft)	IRAM 2073	39M5068
Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.8 m (9 ft)	AS/NZS 3112/2000	39M5102
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	2.8 m (9 ft)	SABS 164	39M5144
Chile, Ethiopia, Italy, Libya, Somalia	2.8 m (9 ft)	CEI 23-16	39M5165
People's Republic of China	2.8 m (9 ft)	GB 2099.1	39M5206
Denmark	2.8 m (9 ft)	DK2-5a	39M5130
Israel	2.8 m (9 ft)	SI 32	39M5172
Liechtenstein, Switzerland	2.8 m (9 ft)	IEC 60884 Stnd. Sheet 416534?2 (CH Type 12)	39M5158
Thailand	2.8 m (9 ft)	NEMA 6-15P	39M5095

Assembly 7: 2145 uninterruptible power supply

The 2145 uninterruptible power supply is constructed from four separate parts.

The following graphic displays the different parts that make up the 2145 uninterruptible power supply.

Table 41 describes the different part numbers in reference to the previous graphic.

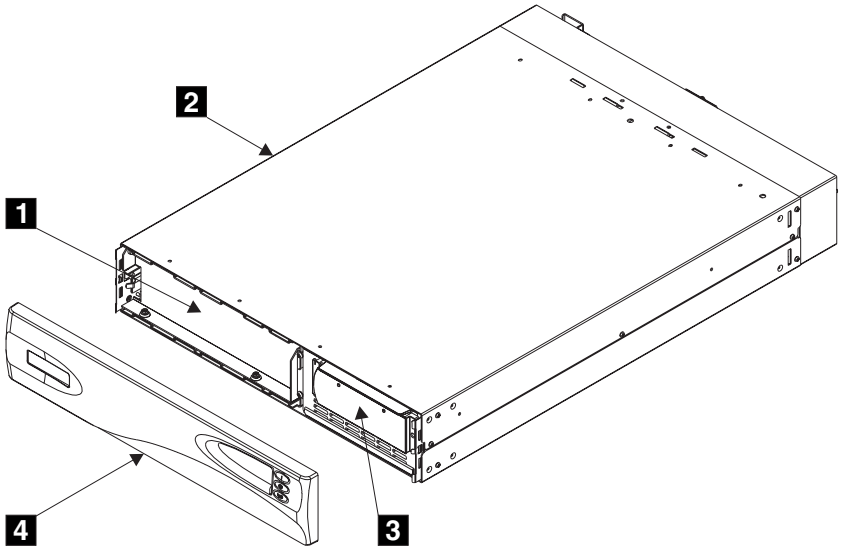


Table 41. Assembly 7: 2145 uninterruptible power supply

Assembly index	Part number	Units	Description
4–	64P8103	1	Uninterruptible power supply assembly
-4	18P5865	1	Front panel
-3	64P8104	1	Electronics assembly
-1	18P5880	1	Battery assembly
-	21P7220	1	Support rail kit, contains rails, nut clips, and screws
-	18P5138	1	Input power cable, power distribution unit to uninterruptible power supply.
-	12J5119	1	Main power cable for the United States.

Power cables for the 2145 uninterruptible power supply

You must follow the power requirements of your country or region to choose the appropriate power cable for the 2145 uninterruptible power supply.

The following table lists the power cable requirements for your country or region:

Country or region	Length	Connection type (attached plug designed for 200 - 240 V ac input)	Part number
Afghanistan, Albania, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe	2.5 m (8 ft)	CEE7	55H6643
Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Denmark, Dubai, Fiji, Ghana, Hong Kong S.A.R. of the PRC, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia	2.5 m (8 ft)	IEC 309	36L8822
Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa	2.5 m (8 ft)	L6-20P	12J5118
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela	2.5 m (8 ft)	NEMA L6-15P	12J5119
Bangladesh, Burma, Pakistan, South Africa, Sri Lanka	2.5 m (8 ft)	SABS 164	12J5124
Thailand	2.5 m (8 ft)	NEMA 6-15P	12J5120
United States of America (Chicago), Canada, Mexico	1.8 m (6 ft)	NEMA L6-15P	14F1549

Appendix B. Websphere and CIM Logging

You can obtain log files for the Websphere Application Server and the Common Information Model (CIM). Instructions are supplied in the following topics.

Websphere Application Server logging

The Websphere Application Server (WAS) produces log files from the IBM System Storage Productivity Center or master console that can help with problem determination.

The WAS collects trace data and writes the information to log files that are stored in the `svcconsole\console\embeddedWAS\profiles\SVCProfile\logs\server1` directory. The default installation directory is `Program Files\IBM\svcconsole`.

Enabling Websphere Application Server logging

You can enable WAS logging and create the trace.log file by performing the following steps:

1. Open the command-line application.
2. Issue the following command:

   enableConsoleTrace

   You can run the enableConsoleTrace command from any directory as long as *svcconsole\console\embeddedWAS*\bin is in your path.

A successfully enabled logging session is indicated by an entry in the trace.log file that is similar to the following:

```
[5/21/03 14:31:13:874 PDT] 2ff3581b ManagerAdmin I TRAS0018I: The trace
state has changed. The new trace state is ConsoleTrace=all=enabled.
```

Disabling Websphere Application Server logging

You can disable the WAS logging by following these steps:

1. Open the command-line application and change to the WAS bin directory:

   `cd svcconsole\console\embeddedWAS\bin`
2. Issue either one of the following commands:
   - disableConsoleTrace.bat
   - wsadmin -connType NONE -c "$AdminControl setAttribute [$AdminControl completeObjectName type=TraceService,process=server1,*] traceSpecification ConsoleTrace=event=disabled:ConsoleTrace=debug=disabled"

A successfully disabled logging session is indicated with an entry in the SystemOut.log file similar to the following:

```
[5/21/03 14:38:57:400 PDT] 2ff3581b ManagerAdmin  I TRAS0018I: The trace
state has changed. The new trace state is *=all=disabled
```

Note: Logging has minimal impact on the performance of the graphical user interface application.

Common information model provider logging

The Common Information Model (CIM) can produce log files that can help with problem determination.

Collecting CIM log files

The SAN Volume Controller CIM agent command-line utility allows you to gather CIM agent logging information for maintenance and diagnostic reporting to the IBM Support Center.

Note: The command-line utility recognizes the authority from the superuser user name and the initial default password that was configured for superuser. If you changed the password for superuser from the initial default password (passw0rd), enter the current superuser password when you invoke the svcutil commands as in the following example:

```
svcutil setloglevel info CimomUser=superuser
 CimomPassword=current_superuser_password
```

To collect your debug log files, follow these steps:

1. Increase the tracing levels by running the following commands:
   a. `svcutil setloglevel info`
   b. `svcutil settracecomponents all`
   c. `svcutil settracecategories all`
2. Increase the SAN Volume Controller Console tracing levels by running the following command:
   `svcconsole/console/embeddedWAS/profiles/SVCProfile/bin/enableConsoleTrace.bat`
3. Reproduce the error.
4. Enter the `svcutil collectlogs` command to collect the logs. This gathers all the required trace logs and puts them into a ZIP file in the current directory. Use this ZIP file and other defect information to report the problem.
5. After you collect the information you need, run the following commands to decrease the tracing levels and return the server to its normal performance:
   a. `svcutil setloglevel error`
   b. `svcutil settracecomponents cim`
   c. `svcutil settracecategories entryexit`

Table 42 describes the commands that are used to log and trace CIM agent activity.

Table 42. Commands for logging and tracing CIM agent

Command	Description
collectlogs	Collects the SVC CIM Agent logs
lsloglevel - [-allValid]	Lists the current/valid logging level
setloglevel	Sets the current logging level
lstracecomponents [-allValid]	Lists the current/valid trace components
lstracecategories - [-allValid]	Lists the current/valid trace categories
settracecomponents []	Sets the current trace components
setslpregip []	Sets the preferred Service Location Protocol (SLP) registered IPs for multinetwork environments

Appendix C. Fitting the service controller ATA cable

You must position the ATA (Advanced Technology Attachment) cable correctly when you fit it in the SAN Volume Controller 2145-4F2 to avoid damaging the cable.

The ATA cable connects the service controller to the SAN Volume Controller 2145-4F2 system board. If you place the ATA cable incorrectly when installing, the disk drive fan rests against the ATA cable and, subsequently, damages the cable (see Figure 321).

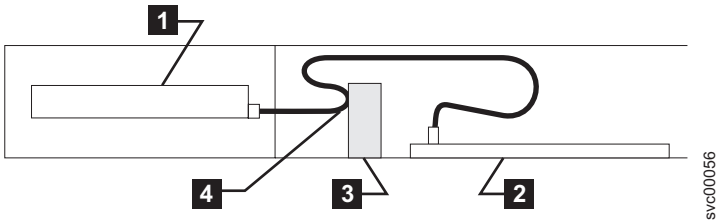


Figure 321. Incorrect placement of the ATA cable in the SAN Volume Controller 2145-4F2

1. Service controller
2. System board
3. Disk fan
4. ATA cable pushed into disk fan

To avoid damaging the ATA cable, ensure that it is routed in a loop under the service controller (see Figure 322). This allows the excess cable to be positioned correctly when the service controller is pushed into position.

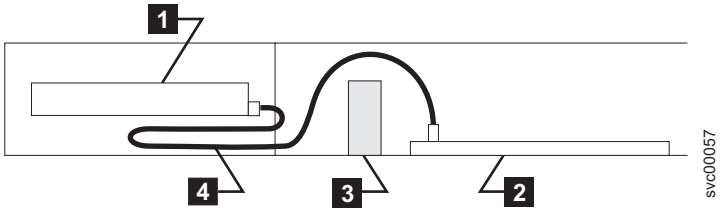


Figure 322. Proper placement of the ATA cable in the SAN Volume Controller 2145-4F2

1. Service controller
2. System board
3. Disk fan
4. ATA cable correctly positioned

Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully.

Features

These are the major accessibility features in the SAN Volume Controller Console :

- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. The following screen readers have been tested: WebKing v5.5 and Window-Eyes v5.5.
- You can operate all features using the keyboard instead of the mouse.
- You can change the initial delay and repeat rate of the up and down buttons to two seconds when you use the front panel of the SAN Volume Controller to set or change an IPv4 address. This feature is documented in the applicable sections of the SAN Volume Controller publications.

Navigating by keyboard

You can use keys or key combinations to perform operations and initiate many menu actions that can also be done through mouse actions. You can navigate the SAN Volume Controller Console and help system from the keyboard by using the following key combinations:

- To traverse to the next link, button, or topic, press Tab inside a frame (page).
- To expand or collapse a tree node, press → or ←, respectively.
- To move to the next topic node, press V or Tab.
- To move to the previous topic node, press ^ or Shift+Tab.
- To scroll all the way up or down, press Home or End, respectively.
- To go back, press Alt+←.
- To go forward, press Alt+→.
- To go to the next frame, press Ctrl+Tab.
- To move to the previous frame, press Shift+Ctrl+Tab.
- To print the current page or active frame, press Ctrl+P.
- To select, press Enter.

Accessing the publications

You can view the publications for the SAN Volume Controller in Adobe Portable Document Format (PDF) using the Adobe Acrobat Reader. The PDFs are provided at the following Web site:

http://www.ibm.com/storage/support/2145

Related reference

"SAN Volume Controller library and related publications" on page xviii
A list of other publications that are related to this product are provided to you for your reference.

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Glossary

This glossary includes terms for the IBM System Storage SAN Volume Controller.

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See Refers the reader to one of two kinds of related information:

- A term that is the expanded form of an abbreviation or acronym. This expanded form of the term contains the full definition.
- A synonym or more preferred term.

See also
Refers the reader to one or more related terms.

Contrast with
Refers the reader to a term that has an opposite or substantively different meaning.

Numerics

2145 A hardware machine type for the IBM System Storage SAN Volume Controller. Models of the SAN Volume Controller are expressed as the number 2145 followed by "-xxx", such as 2145-8G4. Hardware models for the 2145 include 2145-4F2, 2145-8F2, 2145-8F4, and 2145-8G4.

A

access mode
One of three different modes in which a logical unit (LU) in a disk controller system can operate. See also *image mode*, *managed space mode*, and *unconfigured mode*.

Address Resolution Protocol (ARP)
A protocol that dynamically maps an IP address to a network adapter address in a local area network.

agent code
An open-systems standard that interprets Common Information Model (CIM) requests and responses as they transfer between the client application and the device.

application server
A host that is attached to the storage area network (SAN) and that runs applications.

ARP See *Address Resolution Protocol*.

array An ordered collection, or group, of physical storage devices that are used to define logical volumes or devices.

association
A class that contains two references that define a relationship between two referenced objects.

asymmetric virtualization
A virtualization technique in which the virtualization engine is outside the data path and performs a metadata-style service. The metadata server contains all the mapping and locking tables while the storage devices contain only data. See also *symmetric virtualization*.

auxiliary virtual disk
The virtual disk that contains a backup copy of the data and that is used in disaster recovery scenarios. See also *master virtual disk*.

availability
The ability of a system to continue working, with perhaps a decrease in performance, after individual components fail.

B

bandwidth
The range of frequencies an electronic system can transmit or receive. The greater the bandwidth of a system, the more information the system can transfer in a given period of time.

bitmap
A coded representation in which each bit, or group of bits, represents or corresponds to an item; for example, a configuration of bits in main storage in which each bit indicates whether a peripheral device or a storage block is available or in which each group of bits corresponds to one pixel of a display image.

blade One component in a system that is designed to accept some number of components (blades). Blades could be individual servers that plug into a multiprocessing system or individual port cards that add connectivity to a switch. A blade is typically a hot-swappable hardware device.

block A unit of data storage on a disk drive.

block virtualization
The act of applying virtualization to one or more block-based (storage) services for the purpose of providing a new aggregated, higher-level, richer, simpler, or secure block service to clients. Block virtualization functions can be nested. A disk drive, RAID system, or volume manager all perform some form of block-address to (different) block-address mapping or aggregation. See also *virtualization*.

Boolean
Pertaining to the processes used in the algebra formulated by George Boole.

C

cache A high-speed memory or storage device used to reduce the effective time required to read data from or write data to lower-speed memory or a device. Read cache holds data in anticipation that it will be requested by a client. Write cache holds data written by a client until it can be safely stored on more permanent storage media such as disk or tape.

Call Home
In SAN Volume Controller, a communication service that sends data and

event notifications to a service provider. The machine can use this link to place a call to IBM or to another service provider when service is required.

cascading
The process of connecting two or more fibre-channel hubs or switches together to increase the number of ports or extend distances.

CIM See *Common Information Model*.

CIM object manager (CIMOM)
The common conceptual framework for data management that receives, validates, and authenticates the CIM requests from the client application. It then directs the requests to the appropriate component or service provider.

CIMOM
See *CIM object manager*.

class The definition of an object within a specific hierarchy. A class can have properties and methods and can serve as the target of an association.

CLI See *command line interface*.

client A computer system or process that requests a service of another computer system or process that is typically referred to as a server. Multiple clients can share access to a common server.

client application
A storage management program that initiates Common Information Model (CIM) requests to the CIM agent for the device.

cluster
In SAN Volume Controller, up to four pairs of nodes that provide a single configuration and service interface.

command line-interface (CLI)
A type of computer interface in which the input command is a string of text characters.

Common Information Model (CIM)
A set of standards developed by the Distributed Management Task Force (DMTF). CIM provides a conceptual framework for storage management and an open approach to the design and implementation of storage systems, applications, databases, networks, and devices.

concurrent maintenance
Service that is performed on a unit while it is operational.

In SAN Volume Controller, the ability for one node in the cluster to be turned off for maintenance without interrupting access to the VDisk data provided by the cluster.

configuration node
A node that acts as the focal point for configuration commands and manages the data that describes the cluster configuration.

connected
In a Global Mirror relationship, pertaining to the status condition that occurs when two clusters can communicate.

consistency group
A group of copy relationships between virtual disks that are managed as a single entity.

consistent copy
In a Metro or Global Mirror relationship, a copy of a secondary virtual disk (VDisk) that is identical to the primary VDisk from the viewpoint of a host system, even if a power failure occurred while I/O activity was in progress.

consistent-stopped
In a Global Mirror relationship, the state that occurs when the secondary virtual disk (VDisk) contains a consistent image, but the image might be out-of-date with respect to the primary VDisk. This state can happen when a relationship was in the consistent-synchronized state when an error occurred that forced a freeze of the consistency group. This state can also happen when a relationship is created with the create-consistent flag set to `TRUE`.

consistent-synchronized
In a Global Mirror relationship, the status condition that occurs when the primary virtual disk (VDisk) is accessible for read and write I/O operations. The secondary VDisk is accessible for read-only I/O operations. See also *primary virtual disk* and *secondary virtual disk*.

container
A data storage location; for example, a file, directory, or device.

A software object that holds or organizes other software objects or entities.

contingency capacity
Initially, a fixed amount of unused real capacity that is maintained on a space-efficient virtual disk that is configured to automatically expand its real capacity. It is also the difference between the used capacity and the new real capacity when the real capacity is changed manually.

copied
In a FlashCopy mapping, a state that indicates that a copy has been started after the copy relationship was created. The copy process is complete and the target disk has no further dependence on the source disk.

copying
A status condition that describes the state of a pair of virtual disks (VDisks) that have a copy relationship. The copy process has been started but the two virtual disks are not yet synchronized.

Copy Services
The services that enable you to copy virtual disks (VDisks): FlashCopy, Metro, and Global Mirror.

counterpart SAN
A nonredundant portion of a redundant storage area network (SAN). A counterpart SAN provides all the connectivity of the redundant SAN but without the redundancy. Each counterpart SANs provides an alternate path for each SAN-attached device. See also *redundant SAN*.

cross-volume consistency
In SAN Volume Controller, a consistency group property that guarantees consistency between virtual disks when an application issues dependent write operations that span multiple virtual disks.

D

data migration
The movement of data from one physical location to another without disrupting I/O operations.

degraded
Pertaining to a valid configuration that has suffered a failure but continues to be supported and legal. Typically, a repair action can be performed on a degraded configuration to restore it to a valid configuration.

dense wavelength division multiplexing (DWDM)
A technology that places many optical signals onto one single-mode fiber using slightly different optical frequencies. DWDM enables many data streams to be transferred in parallel.

dependent write operations
A set of write operations that must be applied in the correct order to maintain cross-volume consistency.

destage
A write command initiated by the cache to flush data to disk storage.

device In the CIM Agent, the storage server that processes and hosts client application requests.

IBM definition: A piece of equipment that is used with the computer and does not generally interact directly with the system, but is controlled by a controller.

HP definition: In its physical form, a magnetic disk that can be attached to a SCSI bus. The term is also used to indicate a physical device that has been made part of a controller configuration; that is, a physical device that is known to the controller. Units (virtual disks) can be created from devices after the devices have been made known to the controller.

device provider
A device-specific handler that serves as a plug-in for the Common Information Model (CIM); that is, the CIM object manager (CIMOM) uses the handler to interface with the device.

directed maintenance procedures
The set of maintenance procedures that can be run for a cluster. These procedures are run from within the SAN Volume Controller application and are documented in the *IBM System Storage SAN Volume Controller: Service Guide*.

disconnected
In a Metro or Global Mirror relationship, pertains to two clusters when they cannot communicate.

discovery
The automatic detection of a network topology change, for example, new and deleted nodes or links.

disk controller
A device that coordinates and controls the operation of one or more disk drives and synchronizes the operation of the drives with the operation of the system as a whole. Disk controllers provide the storage that the cluster detects as managed disks (MDisks).

disk drive
A disk-based, nonvolatile, storage medium.

disk zone
A zone defined in the storage area network (SAN) fabric in which the SAN Volume Controller can detect and address the logical units that the disk controllers present.

Distributed Management Task Force (DMTF)
An organization that defines standards for the management of distributed systems. See also *Common Information Model*.

DMP See *directed maintenance procedures*.

DMTF
See *Distributed Management Task Force*.

domain name server
In the Internet suite of protocols, a server program that supplies name-to-address conversion by mapping domain names to IP addresses.

DRAM
See *dynamic random access memory*.

DWDM
See *dense wavelength division multiplexing*.

dynamic random access memory (DRAM)
A storage in which the cells require repetitive application of control signals to retain stored data.

E

EC See *engineering change.*

EIA See *Electronic Industries Alliance*.

Electronic Industries Alliance (EIA)
An alliance of four trade associations: The Electronic Components, Assemblies & Materials Association (ECA); the Government Electronics and Information Technology Association (GEIA); the JEDEC Solid State Technology Association (JEDEC); and the Telecommunications Industry Association (TIA). Prior to 1998, EIA was the Electronic Industries Association and the group dates back to 1924.

empty In a Global Mirror relationship, a status condition that exists when the consistency group contains no relationships.

engineering change (EC)
A correction for a defect of hardware or software that is applied to a product.

error code
A value that identifies an error condition.

ESS See *IBM TotalStorage® Enterprise Storage Server®*.

exclude
To remove a managed disk (MDisk) from a cluster because of certain error conditions.

excluded
In SAN Volume Controller, the status of a managed disk that the cluster has removed from use after repeated access errors.

extent A unit of data that manages the mapping of data between managed disks and virtual disks.

F

fabric In fibre-channel technology, a routing structure, such as a switch, that receives addressed information and routes it to the appropriate destination. A fabric can consist of more than one switch. When multiple fibre-channel switches are interconnected, they are described as cascading. See also *cascading*.

fabric port (F_port)
A port that is part of a fibre-channel fabric. An F_port on a fibre-channel fabric connects to the node port (N_port) on a node.

failover
In SAN Volume Controller, the function that occurs when one redundant part of the system takes over the workload of another part of the system that has failed.

FCIP See *Fibre Channel over IP*.

fibre channel
A technology for transmitting data between computer devices at a data rate of up to 4 Gbps. It is especially suited for attaching computer servers to shared storage devices and for interconnecting storage controllers and drives.

fibre-channel extender
A device that extends a fibre-channel link over a greater distance than is supported by the standard, usually a number of miles or kilometers. Devices must be deployed in pairs at each end of a link.

Fibre Channel over IP (FCIP)
A network storage technology that combines the features of the Fibre Channel Protocol and the Internet Protocol (IP) to connect distributed SANs over large distances.

Fibre Channel Protocol (FCP)
A protocol that is used in fibre-channel communications with five layers that define how fibre-channel ports interact through their physical links to communicate with other ports.

field replaceable unit (FRU)
An assembly that is replaced in its entirety when any one of its components fails. An IBM service representative performs the replacement. In some cases, a field replaceable unit might contain other field replaceable units.

FlashCopy mapping
A relationship between two virtual disks.

FlashCopy relationship
See *FlashCopy mapping*.

FlashCopy service
In SAN Volume Controller, a copy service that duplicates the contents of a source virtual disk (VDisk) to a target VDisk. In the process, the original contents of the target VDisk are lost. See also *point-in-time copy.*

F_port See *fabric port*.

FRU See *field replaceable unit*.

G

gateway
An entity that operates above the link layer and translates, when required, the interface and protocol used by one network into those used by another distinct network.

GB See *gigabyte*.

GBIC See *gigabit interface converter*.

gigabit interface converter (GBIC)
An interface module that converts the light stream from a fibre-channel cable into electronic signals for use by the network interface card.

gigabyte (GB)
In decimal notation, 1 073 741 824 bytes.

Global Mirror
An asynchronous copy service that enables host data on a particular source virtual disk (VDisk) to be copied to the target VDisk that is designated in the relationship.

grain In a FlashCopy bitmap, the unit of data represented by a single bit.

graphical user interface (GUI)
A type of computer interface that presents a visual metaphor of a real-world scene, often of a desktop, by combining high-resolution graphics, pointing devices, menu bars and other menus, overlapping windows, icons and the object-action relationship.

GUI See *graphical user interface*.

H

hardcoded
Pertaining to software instructions that are statically encoded and not intended to be altered.

HBA See *host bus adapter*.

HLUN
See *virtual disk*.

hop One segment of a transmission path between adjacent nodes in a routed network.

host An open-systems computer that is connected to the SAN Volume Controller through a fibre-channel interface.

host bus adapter (HBA)
In SAN Volume Controller, an interface card that connects a host bus, such as a peripheral component interconnect (PCI) bus, to the storage area network.

host ID
In SAN Volume Controller, a numeric identifier assigned to a group of host fibre-channel ports for the purpose of logical unit number (LUN) mapping. For each host ID, there is a separate mapping of Small Computer System Interface (SCSI) IDs to virtual disks (VDisks).

host zone
A zone defined in the storage area network (SAN) fabric in which the hosts can address the SAN Volume Controllers.

hub A fibre-channel device that connects nodes into a logical loop by using a physical star topology. Hubs will automatically recognize an active node and insert the node into the loop. A node that fails or is powered off is automatically removed from the loop.

A communications infrastructure device to which nodes on a multi-point bus or loop are physically connected. Commonly used in Ethernet and fibre-channel networks to improve the manageability of physical cables. Hubs maintain the logical loop topology of the network of which they are a part, while creating a "hub and spoke" physical star layout. Unlike switches, hubs do not aggregate bandwidth. Hubs typically support the addition or removal of nodes from the bus while it is operating. (S) Contrast with *switch*.

I

IBM System Storage Productivity Center (SSPC)
An integrated hardware and software solution that provides a single point of entry for managing SAN Volume Controller clusters, IBM System Storage DS8000 systems, and other components of a data storage infrastructure.

IBM TotalStorage Enterprise Storage Server (ESS)
An IBM product that provides an intelligent disk-storage subsystem across an enterprise.

ID See *identifier*.

identifier (ID)
A sequence of bits or characters that identifies a user, program device, or system to another user, program device, or system.

idle In a FlashCopy mapping, the state that occurs when the source and target virtual disks (VDisks) act as independent VDisks even if a mapping exists between the two. Read and write caching is enabled for both the source and the target.

idling The status of a pair of virtual disks (VDisks) that have a defined copy relationship for which no copy activity has yet been started.

In a Metro or Global Mirror relationship, the state that indicates that the master virtual disks (VDisks) and auxiliary VDisks are operating in the primary role. Consequently, both VDisks are accessible for write I/O operations.

idling-disconnected
In a Global Mirror relationship, the state that occurs when the virtual disks (VDisks) in this half of the consistency group are all operating in the primary role and can accept read or write I/O operations.

illegal configuration
A configuration that will not operate and will generate an error code to indicate the cause of the problem.

image mode
An access mode that establishes a one-to-one mapping of extents in the managed disk (MDisk) with the extents in the virtual disk (VDisk). See also *managed space mode* and *unconfigured mode*.

image VDisk
A virtual disk (VDisk) in which there is a direct block-for-block translation from the managed disk (MDisk) to the VDisk.

IML See *initial microcode load*.

inconsistent
In a Metro or Global Mirror relationship, pertaining to a secondary virtual disk (VDisk) that is being synchronized with the primary VDisk.

inconsistent-copying
In a Global Mirror relationship, the state that occurs when the primary virtual disk (VDisk) is accessible for read and write input/output (I/O) operations, but the secondary VDisk is not accessible for either. This state occurs after a **start** command is issued to a consistency group that is in the inconsistent-stopped state. This state also occurs when a **start** command is issued, with the force option, to a consistency group that is in the idling or consistent-stopped state.

inconsistent-disconnected
In a Global Mirror relationship, a state that occurs when the virtual disks (VDisks) in the half of the consistency group that is operating in the secondary role are not accessible for either read or write I/O operations.

inconsistent-stopped
In a Global Mirror relationship, the state that occurs when the primary virtual disk (VDisk) is accessible for read and write input/output (I/O) operations, but the secondary VDisk is not accessible for either read or write I/O operations.

indication
An object representation of an event.

initial microcode load (IML)
In SAN Volume Controller, the process by which the run-time code and data for a node are loaded into memory and initialized.

initiator
The system component that originates an I/O command over an I/O bus or network. I/O adapters, network interface cards, and intelligent controller device I/O bus control ASICs are typical initiators. (S) See also *logical unit number*.

input/output (I/O)
Pertaining to a functional unit or communication path involved in an input process, an output process, or both, concurrently or not, and to the data involved in such a process.

instance
An individual object that is a member of some class. In object-oriented programming, an object is created by instantiating a class.

integrity
The ability of a system to either return only correct data or respond that it cannot return correct data.

Internet Protocol (IP)
In the Internet suite of protocols, a connectionless protocol that routes data through a network or interconnected networks and acts as an intermediary between the higher protocol layers and the physical network. IPv4 is the dominant network layer protocol on the Internet, and IPv6 is designated as its successor. IPv6 provides a much larger address space, which enables greater flexibility in assigning addresses and simplifies routing and renumbering.

interswitch link (ISL)
The physical connection that carries a protocol for interconnecting multiple routers and switches in a storage area network.

I/O See *input/output.*

I/O group
A collection of virtual disks (VDisks) and node relationships that present a common interface to host systems.

I/O throttling rate
The maximum rate at which an I/O transaction is accepted for this virtual disk (VDisk).

IP See *Internet Protocol*.

IP address
The unique 32-bit address that specifies the location of each device or workstation in the Internet. For example, 9.67.97.103 is an IP address.

ISL See *interswitch link*.

ISL hop
A hop on an interswitch link (ISL). Considering all pairs of node ports (N-ports) in a fabric and measuring distance only in terms of interswitch links (ISLs) in the fabric, the number of ISLs traversed is the number of ISL hops on the shortest route between the pair of nodes that are farthest apart in the fabric.

J

JBOD (just a bunch of disks)
IBM definition: See *non-RAID*.

HP definition: A group of single-device logical units not configured into any other container type.

L

LBA See *logical block address*.

least recently used (LRU)
An algorithm used to identify and make available the cache space that contains the least-recently used data.

line card
See *blade.*

local fabric
In SAN Volume Controller, those storage area network (SAN) components (such as switches and cables) that connect the components (nodes, hosts, switches) of the local cluster together.

local/remote fabric interconnect
The storage area network (SAN) components that are used to connect the local and remote fabrics together.

logical block address (LBA)
The block number on a disk.

logical unit (LU)
An entity to which Small Computer System Interface (SCSI) commands are addressed, such as a virtual disk (VDisk) or managed disk (MDisk).

logical unit number (LUN)
The SCSI identifier of a logical unit within a target. (S)

longitudinal redundancy check (LRC)
A method of error checking during data transfer that involves checking parity.

LRC See *longitudinal redundancy check*.

LRU See *least recently used*.

LU See *logical unit*.

LUN See *logical unit number*.

LUN masking
A process that allows or prevents I/O to the disk drives through the host-bus-adapter (HBA) device or operating-system device driver.

M

managed disk (MDisk)
A Small Computer System Interface (SCSI) logical unit that a redundant array of independent disks (RAID) controller provides and a cluster manages. The MDisk is not visible to host systems on the storage area network (SAN).

managed disk group
A collection of managed disks (MDisks) that, as a unit, contain all the data for a specified set of virtual disks (VDisks).

managed space mode
An access mode that enables virtualization functions to be performed. See also *image mode* and *unconfigured mode*.

Management Information Base (MIB)
Simple Network Management Protocol (SNMP) units of managed information that specifically describe an aspect of a system, such as the system name, hardware number, or communications configuration. A collection of related MIB objects is defined as a MIB.

mapping
See *FlashCopy mapping*.

master console
A single point from which to manage the IBM System Storage SAN Volume Controller. For SAN Volume Controller version 4.2.1 and earlier, the master console was purchased either as software that was installed and configured on a server or as a hardware platform with preinstalled operating system and master console software. See *IBM System Storage Productivity Center*.

master virtual disk
The virtual disk (VDisk) that contains a production copy of the data and that an application accesses. See also *auxiliary virtual disk.*

MB See *megabyte*.

MDisk
See *managed disk*.

megabyte (MB)
In decimal notation, 1 048 576 bytes.

mesh configuration
A network that contains a number of small SAN switches configured to create a larger switched network. With this configuration, four or more switches are connected together in a loop with some of the paths short circuiting the loop. An example of this configuration is to have four switches connected together in a loop with ISLs for one of the diagonals.

method
A way to implement a function on a class.

Metro Mirror
A synchronous copy service that enables host data on a particular source virtual disk (VDisk) to be copied to the target VDisk that is designated in the relationship.

MIB See *Management Information Base*.

migration
See *data migration*.

mirrored virtual disk
A virtual disk (VDisk) with two VDisk copies.

mirrorset
IBM definition: See *RAID-1*.

HP definition: A RAID storageset of two or more physical disks that maintain a complete and independent copy of the data from the virtual disk. This type of storageset has the advantage of being highly reliable and extremely tolerant of device failure. Raid level 1 storagesets are referred to as mirrorsets.

N

namespace
The scope within which a Common Information Model (CIM) schema applies.

node One SAN Volume Controller. Each node provides virtualization, cache, and Copy Services to the storage area network (SAN).

node name
A name identifier associated with a node. (SNIA)

node port (N_port)
A port that connects a node to a fabric or to another node. N_ports connect to fabric ports (F_ports) or to other N_ports of other nodes. N_ports handle creation, detection, and flow of message units to and from the connected systems. N_ports are end points in point-to-point links.

node rescue
In SAN Volume Controller, the process by which a node that has no valid software installed on its hard disk drive can copy the software from another node connected to the same fibre-channel fabric.

non-RAID
Disks that are not in a redundant array of independent disks (RAID). HP definition: See *JBOD*.

N_port
See *node port*.

O

object In object-oriented design or programming, a concrete realization of a class that consists of data and the operations associated with that data.

object model
A representation, such as a diagram, of objects in a given system. Using symbols similar to standard flowchart symbols, an object model depicts the classes the objects belong to, their associations with each other, the attributes that make them unique, and the operations that the objects can perform and that can be performed on them.

object name
An object that consists of a namespace path and a model path. The namespace path provides access to the Common Information Model (CIM) implementation managed by the CIM Agent, and the model path provides navigation within the implementation.

object path
An object that consists of a namespace path and a model path. The namespace path provides access to the Common Information Model (CIM) implementation managed by the CIM Agent, and the model path provides navigation within the implementation.

offline
Pertaining to the operation of a functional unit or device that is not under the continual control of the system or of a host.

online Pertaining to the operation of a functional unit or device that is under the continual control of the system or of a host.

operating set
In SAN Volume Controller, the set of nodes that are operating together to deliver storage services.

overallocated volume
See *space-efficient virtual disk*.

oversubscription
The ratio of the sum of the traffic that is on the initiator N-node connections to the traffic that is on the most heavily loaded interswitch links (ISLs), where more than one ISL is connected in parallel between these switches. This definition assumes a symmetrical network and a specific workload that is applied equally from all initiators and sent equally to all targets. See also *symmetrical network*.

P

partition
IBM definition: A logical division of storage on a fixed disk.

HP definition: A logical division of a container represented to the host as a logical unit.

partner node
The other node that is in the I/O group to which this node belongs.

partnership
In Metro or Global Mirror operations, the relationship between two clusters. In a cluster partnership, one cluster is defined as the local cluster and the other cluster as the remote cluster.

paused
In SAN Volume Controller, the process by which the cache component quiesces all ongoing I/O activity below the cache layer.

pend To cause to wait for an event.

petabyte (PB)
In decimal notation, 1 125 899 906 842 624 bytes.

PDU See *power distribution unit*.

PLUN See *managed disk*.

point-in-time copy
The instantaneous copy that the FlashCopy service makes of the source virtual disk (VDisk). In some contexts, this copy is known as a T_0 *copy*.

port The physical entity within a host, SAN Volume Controller, or disk controller system that performs the data communication (transmitting and receiving) over the fibre channel.

port ID
An identifier associated with a port.

power distribution unit (PDU)
A device that distributes electrical power to multiple devices in the rack. It typically is rack-mounted and provides circuit breakers and transient voltage suppression.

power-on self-test
A diagnostic test that servers or computers run when they are turned on.

prepared
In a Global Mirror relationship, the state that occurs when the mapping is ready to start. While in this state, the target virtual disk (VDisk) is offline.

preparing
In a Global Mirror relationship, the state that occurs when any changed write data for the source virtual disk (VDisk) is flushed from the cache. Any read or write data for the target VDisk is discarded from the cache.

primary virtual disk
In a Metro or Global Mirror relationship, the target of write operations issued by the host application.

property
In the Common Information Model (CIM), an attribute that is used to characterize instances of a class.

PuTTY
A client program that allows you to run remote sessions on your computer through specific network protocols, such as SSH, Telnet, and Rlogin.

Q

qualifier
A value that provides additional information about a class, association, indication, method, method parameter, instance, property, or reference.

quorum
A set of nodes that operates as a cluster. Each node has a connection to every other node in the cluster. If a connection failure causes the cluster to split into two or more groups of nodes that have full connection within the group, the quorum is the group that is selected to operate as the cluster.

Typically, this is the larger group of nodes, but the quorum disk serves as a tiebreaker if the groups are the same size.

queue depth
The number of I/O operations that can be run in parallel on a device.

quorum disk
A managed disk (MDisk) that contains a reserved area that is used exclusively for cluster management. The quorum disk is accessed in the event that it is necessary to determine which half of the cluster continues to read and write data.

quorum index
A number that can be either: 0, 1 or 2

R

rack A free-standing framework that holds the devices and card enclosure.

RAID See *redundant array of independent disks*.

RAID 0
IBM definition: RAID 0 allows a number of disk drives to be combined and presented as one large disk. RAID 0 does not provide any data redundancy. If one drive fails, all data is lost.

HP definition: A RAID storageset that stripes data across an array of disk drives. A single logical disk spans multiple physical disks, allowing parallel data processing for increased I/O performance. While the performance characteristics of RAID level 0 is excellent, this RAID level is the only one that does not provide redundancy. Raid level 0 storagesets are referred to as stripesets.

RAID 1
SNIA dictionary definition: A form of storage array in which two or more identical copies of data are maintained on separate media. (S)

IBM definition: A form of storage array in which two or more identical copies of data are maintained on separate media. Also known as mirrorset.

HP definition: See *mirrorset*.

RAID 5
SNIA definition: A form of parity RAID in which the disks operate independently, the data strip size is no smaller than the exported block size, and parity check data is distributed across the array's disks. (S)

IBM definition: See the SNIA definition.

HP definition: A specially developed RAID storageset that stripes data and parity across three or more members in a disk array. A RAIDset combines the best characteristics of RAID level 3 and RAID level 5. A RAIDset is the best choice for most applications with small to medium I/O requests, unless the application is write intensive. A RAIDset is sometimes called parity RAID. RAID level 3/5 storagesets are referred to as RAIDsets.

RAID 10
A type of RAID that optimizes high performance while maintaining fault tolerance for up to two failed disk drives by striping volume data across several disk drives and mirroring the first set of disk drives on an identical set.

real capacity
The amount of storage that is allocated to a virtual disk copy from a managed disk group.

redundant ac power switch
A device that provides input power redundancy by attaching a SAN Volume Controller to two independent power sources. If the main source becomes unavailable, the redundant ac power switch automatically provides power from a secondary (backup) source. When power is restored, the redundant ac power switch automatically changes back to the main power source.

redundant array of independent disks (RAID)
A collection of two or more disk drives that present the image of a single disk drive to the system. In the event of a single device failure, the data can be read or regenerated from the other disk drives in the array.

redundant SAN
A storage area network (SAN) configuration in which any one single component might fail, but connectivity between the devices within the SAN is maintained, possibly with degraded performance. This configuration is normally achieved by splitting the SAN into two, independent, counterpart SANs. See also *counterpart SAN.*

reference
A pointer to another instance that defines the role and scope of an object in an association.

rejected
A status condition that describes a node that the cluster software has removed from the working set of nodes in the cluster.

relationship
In Metro or Global Mirror, the association between a master virtual disk (VDisk) and an auxiliary VDisk. These VDisks also have the attributes of a primary or secondary VDisk. See also *auxiliary virtual disk, master virtual disk, primary virtual disk, and secondary virtual disk.*

reliability
The ability of a system to continue to return data even if a component fails.

remote fabric
In Global Mirror, the storage area network (SAN) components (switches and cables) that connect the components (nodes, hosts, and switches) of the remote cluster.

roles Authorization is based on roles that map to the administrator and service roles in an installation. The switch translates these roles into SAN Volume Controller administrator and service user IDs when a connection is made to the node for the SAN Volume Controller.

S

SAN See *storage area network*.

SAN Volume Controller fibre-channel port fan in
The number of hosts that can see any one SAN Volume Controller port.

SATA See *Serial Advanced Technology Attachment*.

schema
A group of object classes defined for and applicable to a single namespace. Within the CIM Agent, the supported schemas are the ones that are loaded through the managed object format (MOF).

SCSI See *Small Computer Systems Interface*.

SCSI back-end layer
The layer in a Small Computer Systems Interface (SCSI) network that performs the following functions: controls access to individual disk controller systems that are managed by the cluster; receives requests from the virtualization layer, processes them, and sends them to managed disks; addresses SCSI-3 commands to the disk controller systems on the storage area network (SAN).

SCSI front-end layer
The layer in a Small Computer Systems Interface (SCSI) network that receives I/O commands sent from hosts and provides the SCSI-3 interface to hosts. SCSI logical unit numbers (LUNs) are mapped to virtual disks (VDisks) in this layer as well. Thus, the layer converts SCSI read and write commands that are addressed to LUNs into commands that are addressed to specific VDisks.

SDD See *subsystem device driver (SDD)*.

secondary virtual disk
In Metro or Global Mirror, the virtual disk (VDisk) in a relationship that contains a copy of data written by the host application to the primary VDisk.

Secure Shell (SSH)
A program to log in to another computer over a network, to run commands in a remote machine, and to move files from one machine to another.

Secure Sockets Layer (SSL)
A security protocol that provides communication privacy. With SSL, client/server applications can communicate in a way that is designed to prevent eavesdropping, tampering, and message forgery.

sequential VDisk
A virtual disk that uses extents from a single managed disk.

Serial Advanced Technology Attachment (SATA)
The evolution of the ATA interface from a parallel bus to serial connection architecture. (S)

Serial ATA
See *Serial Advanced Technology Attachment*.

server In a network, the hardware or software that provides facilities to other stations; for example, a file server, a printer server, a mail server. The station making the request of the server is usually called the client.

Service Location Protocol (SLP)
In the Internet suite of protocols, a protocol that identifies and uses network hosts without having to designate a specific network host name.

fibre-channel SFP connector
See *small form-factor pluggable connector*.

Simple Mail Transfer Protocol (SMTP)
An Internet application protocol for transferring mail among users of the

Internet. SMTP specifies the mail exchange sequences and message format. It assumes that the Transmission Control Protocol (TCP) is the underlying protocol.

Simple Network Management Protocol (SNMP)
In the Internet suite of protocols, a network management protocol that is used to monitor routers and attached networks. SNMP is an application-layer protocol. Information on devices managed is defined and stored in the application's Management Information Base (MIB).

SLP See *Service Location Protocol*.

Small Computer System Interface (SCSI)
A standard hardware interface that enables a variety of peripheral devices to communicate with one another.

small form-factor pluggable (SFP) connector
A compact optical transceiver that provides the optical interface to a fibre-channel cable.

SMI-S See *Storage Management Initiative Specification*.

SMTP See *Simple Mail Transfer Protocol*.

SNIA See *Storage Networking Industry Association*.

SNMP
See *Simple Network Management Protocol*.

space-efficient VDisk
See *space-efficient virtual disk*.

space-efficient virtual disk
A virtual disk that has different virtual capacities and real capacities.

SSH See *Secure Shell*.

SSPC See *IBM System Storage Productivity Center (SSPC)*.

SSL See *Secure Sockets Layer*.

stand-alone relationship
In FlashCopy, Metro Mirror, and Global Mirror, relationships that do not belong to a consistency group and that have a null consistency group attribute.

stop A configuration command that is used to stop the activity for all copy relationships in a consistency group.

stopped
The status of a pair of virtual disks (VDisks) that have a copy relationship that the user has temporarily broken because of a problem.

storage area network (SAN)
A network whose primary purpose is the transfer of data between computer systems and storage elements and among storage elements. A SAN consists of a communication infrastructure, which provides physical connections, and a management layer, which organizes the connections, storage elements, and computer systems so that data transfer is secure and robust. (S)

Storage Management Initiative Specification (SMI-S)
A design specification developed by the Storage Networking Industry Association (SNIA) that specifies a secure and reliable interface that allows storage management systems to identify, classify, monitor, and control

physical and logical resources in a storage area network. The interface is intended as a solution that integrates the various devices to be managed in a storage area network (SAN) and the tools used to manage them.

Storage Networking Industry Association (SNIA)
An association of producers and consumers of storage networking products whose goal is to further storage networking technology and applications. See www.snia.org.

striped
Pertains to a virtual disk (VDisk) that is created from multiple managed disks (MDisks) that are in the MDisk group. Extents are allocated on the MDisks in the order specified.

stripeset
See *RAID 0*.

subsystem device driver (SDD)
An IBM pseudo device driver designed to support the multipath configuration environments in IBM products.

superuser authority
Can issue any command-line interface (CLI) command. A superuser can view and work with the following panels: View users, Add cluster, Remove cluster, Add users, and Modify users. Only one Superuser role is available.

suspended
The status of a pair of virtual disks (VDisks) that have a copy relationship that has been temporarily broken because of a problem.

switch A network infrastructure component to which multiple nodes attach. Unlike hubs, switches typically have internal bandwidth that is a multiple of link bandwidth, and the ability to rapidly switch node connections from one to another. A typical switch can accommodate several simultaneous full link bandwidth transmissions between different pairs of nodes. (S) Contrast with *hub*.

symmetrical network
A network in which all the initiators are connected at the same level and all the controllers are connected at the same level.

symmetric virtualization
A virtualization technique in which the physical storage in the form of Redundant Array of Independent Disks (RAID) is split into smaller chunks of storage known as *extents*. These extents are then concatenated, using various policies, to make virtual disks (VDisks). See also *asymmetric virtualization*.

synchronized
In Metro or Global Mirror, the status condition that exists when both virtual disks (VDisks) of a pair that has a copy relationship contain the same data.

system
A functional unit, consisting of one or more computers and associated software, that uses common storage for all or part of a program and also for all or part of the data necessary for the execution of the program. A computer system can be a stand-alone unit, or it can consist of multiple connected units.

T

terabyte
In decimal notation, 1 099 511 628 000 bytes.

thinly provisioned volume
See *space-efficient virtual disk*.

topology
The logical layout of the components of a computer system or network and their interconnections. Topology deals with questions of what components are directly connected to other components from the standpoint of being able to communicate. It does not deal with questions of physical location of components or interconnecting cables. (S)

trigger
To initiate or reinitiate copying between a pair of virtual disks (VDisks) that have a copy relationship.

U

UID See *unique identifier*.

unconfigured mode
A mode in which I/O operations cannot be performed. See also *image mode* and *managed space mode*.

uninterruptible power supply
A device that is connected between a computer and its power source that protects the computer against blackouts, brownouts, and power surges. The uninterruptible power supply contains a power sensor to monitor the supply and a battery to provide power until an orderly shutdown of the system can be performed.

unique identifier (UID)
An identifier that is assigned to storage system logical units when they are created. It is used to identify the logical unit regardless of the logical unit number (LUN), status of the logical unit, or whether alternate paths exist to the same device. Typically, a UID is only used once.

unmanaged
An access mode that pertains to a managed disk (MDisk) that is not used by the cluster.

V

valid configuration
A configuration that is supported.

VDisk See *virtual disk (VDisk)*.

VDisk copy
See *virtual disk copy*.

virtual capacity
The amount of storage that is available to a server on a virtual disk (VDisk) copy. In a space-efficient virtual disk, the virtual capacity can be different from the real capacity. In a standard virtual disk, the virtual capacity and real capacity are the same.

virtual disk copy
A physical copy of the data that is stored on a virtual disk (VDisk). Mirrored VDisks have two such copies. Nonmirrored VDisks have one copy.

virtual disk (VDisk)
A device that host systems in a storage area network (SAN) recognize as a Small Computer System Interface (SCSI) disk.

virtualization
In the storage industry, a concept in which a pool of storage is created that contains several disk subsystems. The subsystems can be from various vendors. The pool can be split into virtual disks that are visible to the host systems that use them.

virtualized storage
Physical storage that has virtualization techniques applied to it by a virtualization engine.

virtual storage area network (VSAN)
A fabric within the SAN.

vital product data (VPD)
Information that uniquely defines system, hardware, software, and microcode elements of a processing system.

VLUN See *managed disk*.

VPD See *vital product data*.

VSAN See *virtual storage area network*.

W

WBEM
See *Web-Based Enterprise Management*.

Web-Based Enterprise Management (WBEM)
A tiered, enterprise-management architecture that was developed by the Distributed Management Task Force (DMTF). This architecture provides the management design framework that consists of devices, device providers, the object manager, and the messaging protocol for the communication between client applications and the object manager.

worldwide node name (WWNN)
An identifier for an object that is globally unique. WWNNs are used by Fibre Channel and other standards.

worldwide port name (WWPN)
A unique 64-bit identifier that is associated with a fibre-channel adapter port. The WWPN is assigned in an implementation- and protocol-independent manner.

WWNN
See *worldwide node name*.

WWPN
See *worldwide port name*.

Z

zoning
In fibre-channel environments, the grouping of multiple ports to form a

virtual, private, storage network. Ports that are members of a zone can communicate with each other, but are isolated from ports in other zones.

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IBM System Storage SAN Volume Controller
Service Guide
Version 4.3.0

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