IBM TotalStorage Virtualization Family
SAN Volume Controller:

Installation Guide

Version 1 Release 1

SC26-7541-00

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Note
Before using this information and the product it supports, read the information in "Notices" on page 45.

First Edition (June 2003)

Contents

About this guide

This guide provides an overview of the IBM® TotalStorage® Storage Area Network (SAN) Volume Controller and detailed installation instructions. The information is organized as follows:

- Chapter 1, "Overview of the SAN Volume Controller, the uninterruptible power supply, and the master console", on page 1 provides an overview of the SAN Volume Controller, the uninterruptible power supply, and the master console. This chapter also describes the front panel controls and indicators for the SAN Volume Controller and the uninterruptible power supply.
- Chapter 2, "Installing the uninterruptible power supply, the master console, and the SAN Volume Controller", on page 9 describes the steps that you need to perform to install the SAN Volume Controller and the uninterruptible power supply.
- Chapter 3, "Using the front panel display on the SAN Volume Controller", on page 29 provides information about how to use the front panel display which includes status indicators and menu selections.
- The appendix provides information you need to ensure that your physical site meets the installation requirements for the SAN Volume Controller, the uninterruptible power supply, and the master console.

Who should use this guide?

This guide should be read by the IBM Customer Engineer who is responsible for the initial installation of the SAN Volume Controller, the uninterruptible power supply, and the master console at a customer site.

Related information

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

- The publications that make up the library for the IBM® TotalStorage™ Virtualization Family SAN Volume Controller (SAN Volume Controller)
- Other IBM publications that relate to the SAN Volume Controller

SAN Volume Controller library:

Table 1 on page vi 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) on a compact disc (CD) that comes with the SAN Volume Controller. If you need additional copies of this CD, the order number is SK2T-8811. These publications are also available as PDF files from the following Web site:

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

Table 1. Publications in the SAN Volume Controller library

Title	Description	Order number
IBM TotalStorage Virtualization Family SAN Volume Controller: CIM Agent Developer's Reference	This reference guide describes the objects and classes in a Common Information Model (CIM) environment.	SC26-7545
IBM TotalStorage Virtualization Family 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).	SC26-7544
IBM TotalStorage Virtualization Family SAN Volume Controller: Configuration Guide	This guide provides guidelines for configuring your SAN Volume Controller.	SC26-7543
IBM TotalStorage Virtualization Family SAN Volume Controller: Host Attachment Guide	This guide provides guidelines for attaching SAN Volume Controller to your host system.	SC26-7563
IBM TotalStorage Virtualization Family SAN Volume Controller: Installation Guide	This guide includes the instructions the service representative uses to install the SAN Volume Controller.	SC26-7541
IBM TotalStorage Virtualization Family 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.	GA22-1052
IBM TotalStorage Virtualization Family SAN Volume Controller: Service Guide	This guide describes how to maintain the SAN Volume Controller. It also includes a parts listing.	SC26-7542
IBM TotalStorage Virtualization Family SAN Volume Controller: Translated Safety Notices	This guide contains the danger and caution notices for the SAN Volume Controller. The notices are shown in English and in numerous other languages.	SC26-7577

Other IBM publications:

Table 2 on page vii lists and describes other IBM publications that contain additional information that is related to the SAN Volume Controller.

Table 2. Other IBM publications

Title	Description	Order number
IBM TotalStorage: Subsystem Device Driver User's Guide	This guide describes the IBM TotalStorage Subsytem Device Driver and how to use it with the SAN Volume Controller.	SC26-7540

Related topics:

- "Ordering IBM publications"
- "How to send your comments" on page viii

Web sites

Table 3 lists Web sites that have information about SAN Volume Controller or related products or technologies.

Table 3. Web sites

Type of information	Web site
SAN Volume Controller support	http://www.ibm.com/storage/support/2145/
Technical support for storage products	http://www.ibm.com/storage/support/
Virtual network computing	http://www.realvnc.com/download.html

Ordering IBM publications

This topic explains how to order copies of IBM publications and how to set up a profile to receive notifications about new or changed publications.

The IBM publications center:

The 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:

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

Publications notification system:

The IBM publications center Web site offers you a notification system for IBM publications. Register and you can create your own profile of publications that interest you. The publications notification system sends you a daily e-mail that contains information about new or revised publications that are based on your profile.

If you want to subscribe, you can access the publications notification system from the IBM publications center at the following Web site:

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

Related topics:

- "Related information" on page v

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- Enterprise Storage Server
- FlashCopy
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- TotalStorage

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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 SAN Volume Controller 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 or fax

  Fill out the Readers' Comments form (RCF) at the back of this book. Return it by mail or fax (1-800-426-6209), or give it to an IBM representative. If the RCF has been removed, you can address your comments to:

  International Business Machines Corporation
  RCF Processing Department
  M86/050
  5600 Cottle Road
  San Jose, CA 95193-0001
  U.S.A.

Related topics:

- "Related information" on page v

Definitions of danger, caution, and attention notices

The following types of notices are used throughout this library to bring your attention to possible safety concerns:

- A *Danger* notice warns you of conditions or procedures that can result in death or severe personal injury.
- A *Caution* notice warns you of conditions or procedures that can cause personal injury that is neither lethal nor extremely hazardous.
- An *Attention* notice warns you of conditions or procedures that can cause damage to machines, equipment, or programs.

Related topics:

- *IBM TotalStorage Virtualization Family SAN Volume Controller: Translated Safety Notices*

Danger notices for the uninterruptible power supply

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice.

DANGER

An electrical outlet that is not correctly wired could place a hazardous voltage on the metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (1)

DANGER

To prevent possible electrical shock during an electrical storm, do not connect or disconnect cables or station protectors for communications lines, display stations, printers, or telephones. (2)

DANGER

Do not attempt to open the covers of the power supply. Power supplies are not serviceable and are replaced as a unit. (3)

DANGER

To prevent a possible electrical shock when installing the device, ensure that the power cord for that device is unplugged before installing signal cables. (4)

DANGER

The uninterruptible power supply contains lethal voltages. All repairs and service should be performed by an authorized service support representative only. There are no user serviceable parts inside the uninterruptible power supply. (5)

Related topics:

- "Caution notices for the uninterruptible power supply"
- *IBM TotalStorage Virtualization Family SAN Volume Controller: Translated Safety Notices*

Danger notices for the SAN Volume Controller

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice.

DANGER

Do not try to open the covers of the power supply assembly (32).

Related topics:

- *IBM TotalStorage Virtualization Family SAN Volume Controller: Translated Safety Notices*

Caution notices for the uninterruptible power supply

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice.

CAUTION:
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. (11)

CAUTION:
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. (12)

CAUTION:
To reduce the risk of fire or electric shock, install the uninterruptible power supply in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum). (13)

CAUTION:
To comply with international standards and wiring regulations, the total equipment connected to the output of the uninterruptible power supply must not have an earth leakage current greater than 2.5 milliamperes. (14)

CAUTION:

- **To avoid any hazard from the rack tipping forward when boxes are installed, observe all safety precautions for the rack into which you are installing the device.**
- **The uninterruptible power supply weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:**
  - **Do not attempt to lift the uninterruptible power supply by yourself. Ask *TWO* other service representatives for aid.**
  - **Do not attempt to install the uninterruptible power supply into the rack unless the electronics assembly and the battery assembly have been removed.**

CAUTION:
The electronics assembly weighs 6.4 kg (14 lb). Take care when you remove it from the uninterruptible power supply. (16)

CAUTION:
The uninterruptible power supply battery unit weighs 21 kg (45 lb). Do not attempt to lift the uninterruptible power supply battery unit by yourself. Ask another service representative for aid. (18)

CAUTION:
Do not dispose of the battery in a fire. The battery might explode. Correct disposal of the battery is required. Refer to your local regulations for disposal requirements. (20)

Related topics:

- "Danger notices for the uninterruptible power supply" on page ix
- *IBM TotalStorage Virtualization Family SAN Volume Controller: Translated Safety Notices*

Caution notices for the SAN Volume Controller

Use the reference numbers in parentheses, for example (1), at the end of each notice to find the matching translated notice.

CAUTION:
This product contains a registered/certified class 1 laser that complies with the FDA radiation performance standards and is in compliance with the IEC/EN 60825-1 standards (21)

CAUTION:
A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery might present a risk of fire or explosion. The battery connector is polarized; do not attempt to reverse the polarity. Dispose of the battery according to local regulations. (22)

Related topics:

- "Danger notices for the SAN Volume Controller" on page x
- *IBM TotalStorage Virtualization Family SAN Volume Controller: Translated Safety Notices*

Inspecting the SAN Volume Controller for unsafe conditions

Be cautious of potential safety hazards that are not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Prerequisites:

Consider the following conditions and the safety hazards they present:

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.

Steps:

Using the following inspection checklist as a guide, inspect the IBM® TotalStorage™ SAN Volume Controller for unsafe conditions. If necessary, see any suitable safety publications.

1. Turn off the SAN Volume Controller.
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables and ensure that:
   a. 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. The insulation is not worn or damaged.
4. Check for any obvious nonstandard changes. 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, 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 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 topics:

- "Checking the grounding of the SAN Volume Controller and the uninterruptible power supply" on page xiii

External machine checks

This topic describes the checks that you should perform on the outside of the SAN Volume Controller.

Steps:

Perform the following external machine checks before you install the SAN Volume Controller:

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.

Related topics:

- "Inspecting the SAN Volume Controller for unsafe conditions" on page xii

Internal machine checks

This topic describes the checks that you should perform on the inside of the SAN Volume Controller.

Steps:

Perform the following internal machine checks before you install the SAN Volume Controller:

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.

Related topics:

- "Inspecting the SAN Volume Controller for unsafe conditions" on page xii
- "External machine checks" on page xii

Checking the grounding of the SAN Volume Controller and the uninterruptible power supply

This topic tells you how to check the grounding of the SAN Volume Controller. Figure 1 on page xiv shows the connectors for the SAN Volume Controller and the uninterruptible power supply.

Steps:

Perform the following steps to ensure that the SAN Volume Controller is properly grounded:

1. Ensure that all power is removed.
2. Ensure that the power cable **1** is plugged into the uninterruptible power supply. Also ensure that the other ends of the power cable are connected to the power supply in the rack. See Figure 1 on page xiv.

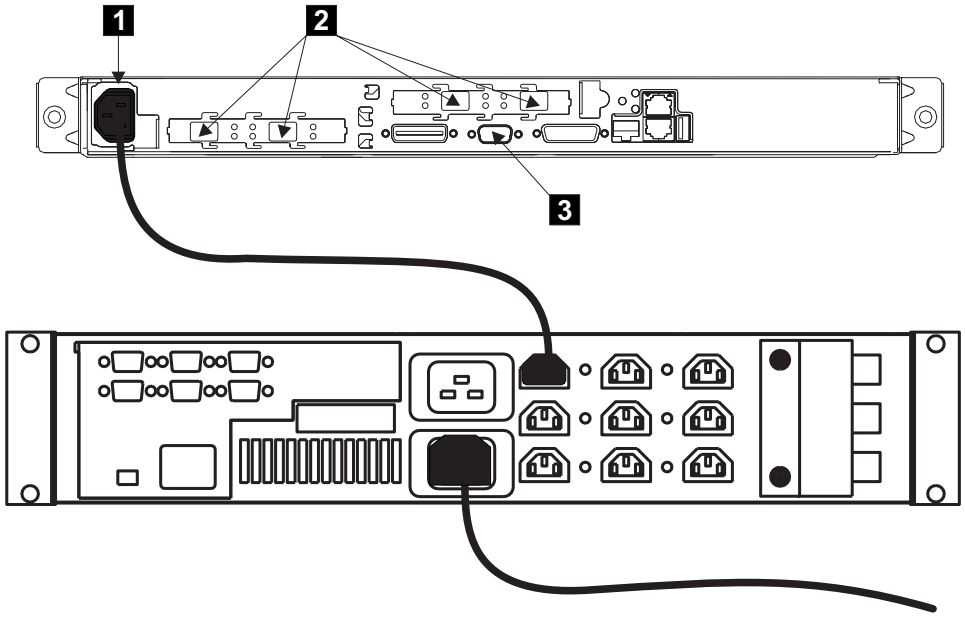


Figure 1. Power cable and signal sockets

3. **Attention:** Some electrical circuits could be damaged if the external signal cables are present at the SAN Volume Controller while the grounding check is being done.

   Ensure that no external cables are present at connectors **2** and **3**.
4. Disconnect and remove the Ethernet cable.
5. Follow your local procedures and check the grounding of the SAN Volume Controller. Any test equipment must be connected to the frame of the SAN Volume Controller.

   If the grounding is correct, go no further with these instructions.

   If the grounding is *not* correct, unplug the power cable **1** from the uninterruptible power supply in the SAN Volume Controller.
6. Check for continuity between the frame of the SAN Volume Controller and the ground pin **1** of each main power connector as shown in Figure 2.

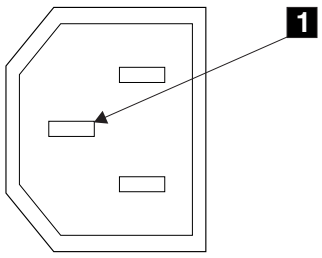


Figure 2. Ground pin

7. If the uninterruptible power supply has no continuity, exchange it for a new one. Then perform a complete grounding check again.

   If the uninterruptible power supply has continuity, you might have a problem with the power cable or with the grounding of the host system.
8. Check the power cable for continuity.

   If the power cable does not have continuity, exchange it for a new one, then perform step 1 on page xiii through step 5 again.

Inspecting the uninterruptible power supply for unsafe conditions

Be cautious of potential safety hazards that are not covered in the safety checks. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Prerequisites:

Consider the following conditions and the safety hazards they present:

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.

Steps:

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. File a claim for shipping damage within fifteen days of receipt of the equipment.

Uninterruptible power supply requirements

This topic lists the requirements for the uninterruptible power supply:

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

There is a feature code that allows you to connect the uninterruptible power supply to a 30 A branch circuit. The feature code consists of a jumper assembly that puts it inline with the uninterruptible power supply and a 15 A, 250 V circuit breaker.

Emergency power-off (EPO) event

In the event of a room emergency power-off (EPO) shutdown, the SAN Volume Controller completes the process of shutting down the output from the uninterruptible power supplies within 5 minutes.

Attention: If an EPO event occurs and the uninterruptible power supply is not connected to at least one operational SAN Volume Controller the output cables of the uninterruptible power supply must be unplugged to remove output power from the uninterruptible power supply.

Checking the safety labels on the SAN Volume Controller

The following topics describe how to check the labels on the SAN Volume Controller.

Steps:

Perform the following label checks:

1. Agency/ratings label. See Figure 3.

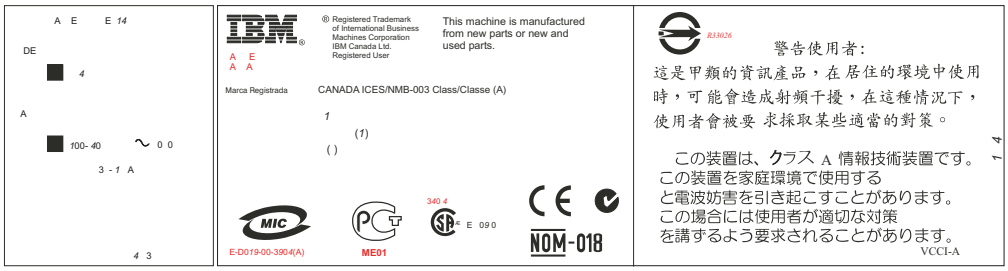


Figure 3. Agency/ratings label for SAN Volume Controller

2. No user access label. See Figure 4.

Figure 4. No user access label for SAN Volume Controller

3. Class 1 laser label. See Figure 5.

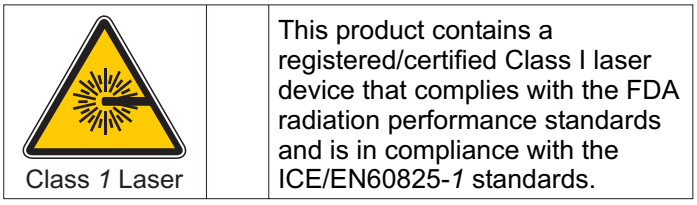


Figure 5. Class 1 laser label

Checking the labels on the outside of the uninterruptible power supply

This topic tells you how to perform the safety label checks for the uninterruptible power supply.

Steps:

Perform the following safety label checks for the uninterruptible power supply:

1. Agency label. See Figure 6 on page xvii.

Figure 6. Agency label for the uninterruptible power supply

2. Rear panel configuration. See Figure 7 is installed on the cover of the power supply of the SAN Volume Controller.

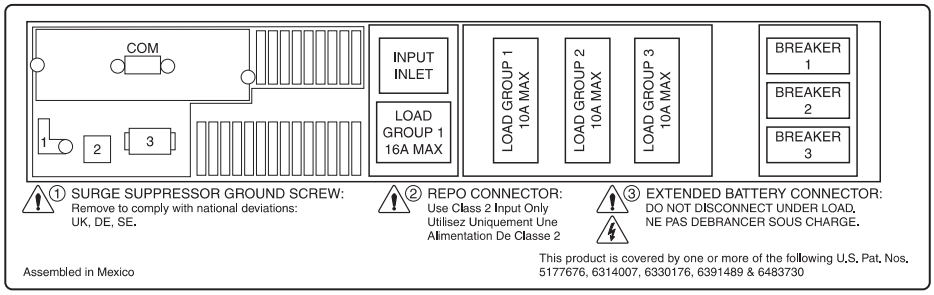


Figure 7. Rear panel configuration label

3. Three-man lift. See Figure 8.

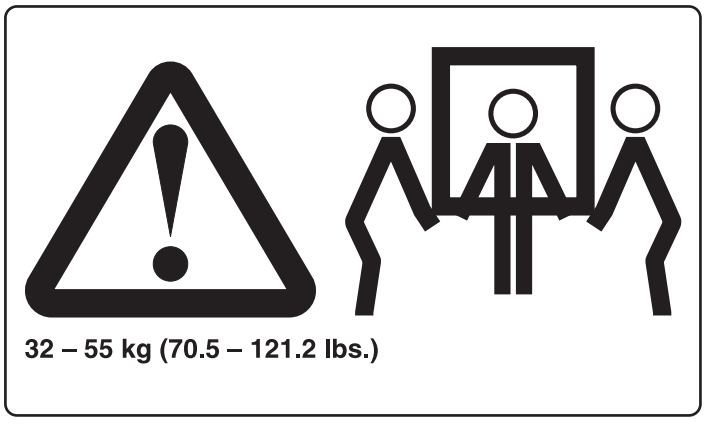


Figure 8. Three-man lift label

4. Weight label. See Figure 9 on page xviii.

Figure 9. Weight label for the uninterruptible power supply

5. IT compatible label. See Figure 10.

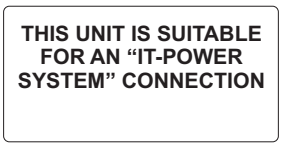


Figure 10. IT compatible label for the uninterruptible power supply

6. No user access label. See Figure 11.

Figure 11. No user access label for the uninterruptible power supply

Environmental notices and statements

These topics describe the environmental notices and statements that are applicable to the SAN Volume Controller.

Product recycling

This unit contains recyclable materials. These materials should be recycled where processing sites are available and according to local regulations. In some areas, IBM provides a product take-back program that ensures proper handling of the product. Contact your IBM representative for more information.

Product disposal

This unit might contain batteries. Remove and discard these batteries, or recycle them, according to local regulations.

Battery disposal

This topic identifies the precautions you need to take when disposing of batteries.

CAUTION:
A lithium battery can cause fire, explosion, or a severe burn. Do not recharge, disassemble, heat above 100°C (212°F), solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace only with the part number specified for your system. Use of another battery might present a risk of fire or explosion. The battery connector is polarized; do not attempt to reverse the polarity. Dispose of the battery according to local regulations. (51)

Related topics:

- "Definitions of danger, caution, and attention notices" on page ix
- *IBM TotalStorage Virtualization Family SAN Volume Controller: Translated Safety Notices*

Handling static-sensitive devices

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 its 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 handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

Chapter 1. Overview of the SAN Volume Controller, the uninterruptible power supply, and the master console

A storage area network (SAN) is a high-speed fibre-channel network that connects host systems and storage devices. A SAN enables host systems to be connected to storage devices 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. For more information about SANs, see *The IBM TotalStorage SAN Volume Controller: What it is and how to use it*. The following figure shows an example of a storage system that is using a IBM TotalStorage Storage Area Network (SAN) Volume Controller.

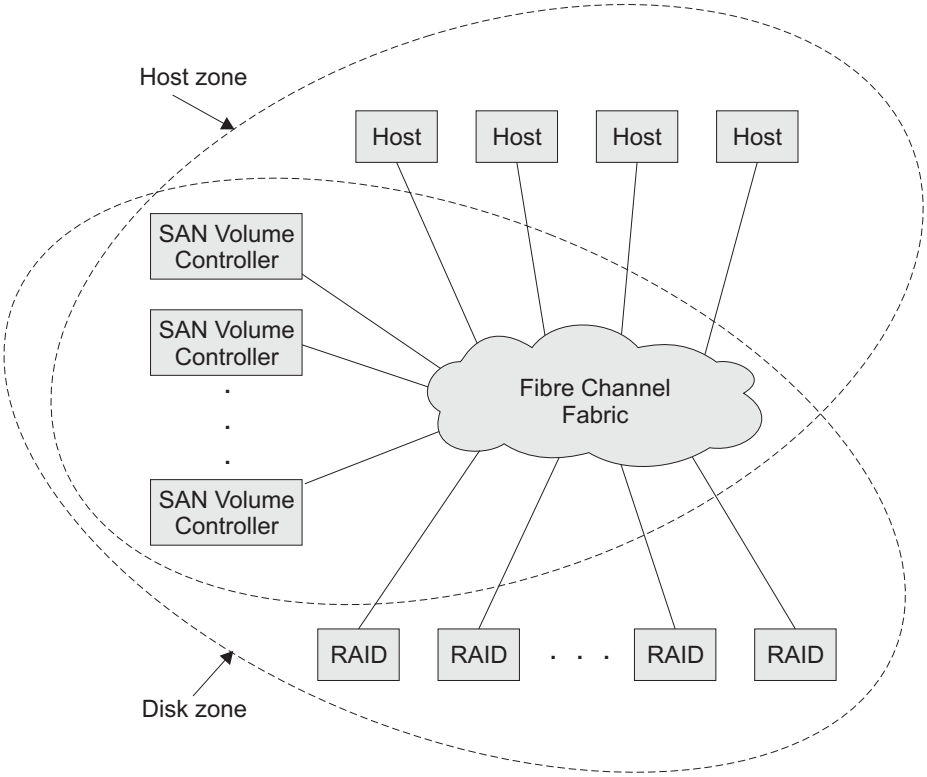


Figure 12. Example of a SAN Volume Controller in a fabric

In a SAN, the SAN Volume Controller is a node; that is, it is either an end point of a link, or it is a junction that is common to two or more links of the SAN

To protect the SAN Volume Controller from power failures problems, each SAN Volume Controller must be connected to an uninterruptible power supply.

The master console is also provided with the SAN Volume Controller. It is used as a single platform for all of the Configuration and Management and Service software required to manage the SAN Volume Controller.

SAN Volume Controller

The SAN Volume Controller is a rack-mounted unit that can be installed in a standard 19-inch rack; each unit is a node in the SAN. Nodes are grouped into clusters that are managed as a set and provide you with a single point of control for configuration and service activities. For I/O operations, the nodes are grouped into pairs. Each pair handles I/O processing on a particular virtual disk. If one SAN Volume Controller of a pair fails or is removed, failover occurs to the other SAN Volume Controller. The clusters are attached to the SAN fabric. Also attached to the fabric are RAID controllers and host systems.

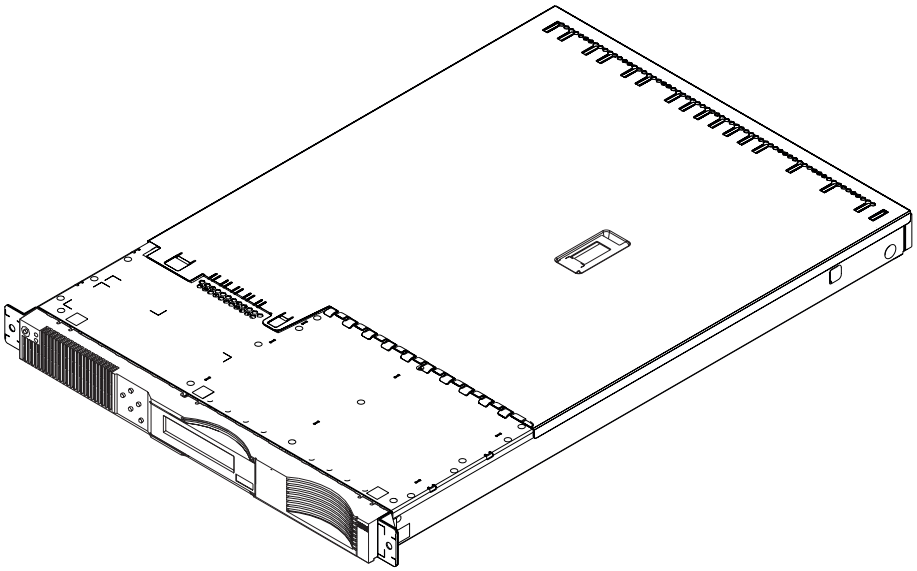


Figure 13. The SAN Volume Controller

The fabric contains two distinct zones: a host zone and a disk zone. In the host zone, the host systems can identify and address the nodes. You can have more than one host zone. Generally, you will create one host zone per operating system type. In the disk zone, the nodes can identify the disk drives. Host systems cannot operate on the disk drives directly; all data transfer occurs through the nodes. As shown in the figure above, several host systems can be connected to a SAN fabric. A cluster of SAN Volume Controllers is connected to the same fabric and presents virtual disks to the host systems. You configure these virtual disks using the disks located on the RAID controllers.

Uninterruptible power supply

The uninterruptible power supply protects the SAN Volume Controller from power failures, power fluctuations, and line noise.

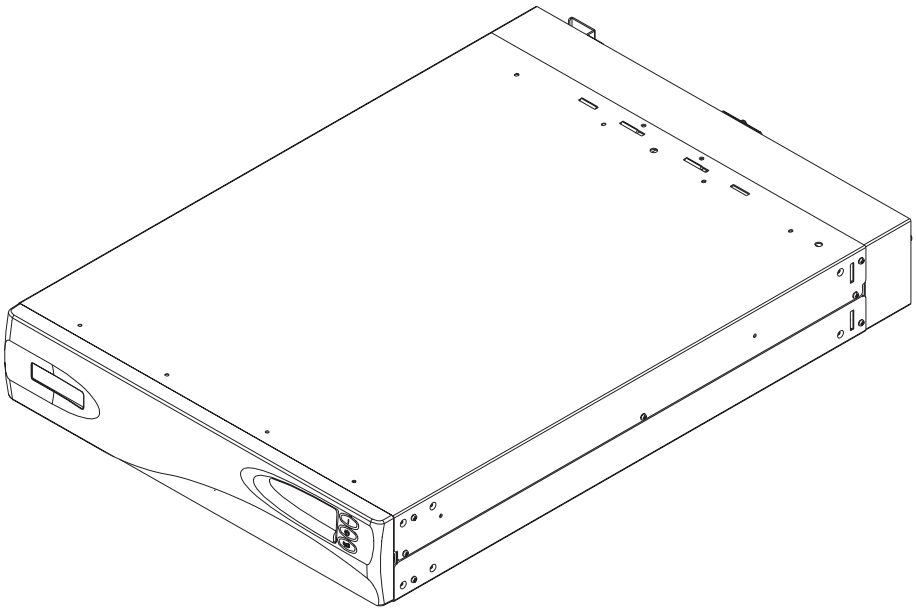


Figure 14. Uninterruptible power supply

To provide redundancy and concurrent maintenance, the SAN Volume Controller must be installed in pairs. Each SAN Volume Controller of a pair must be connected to a different uninterruptible power supply. Each uninterruptible power supply can support four SAN Volume Controllers. Each uninterruptible power supply that supports a pair must be connected to a separate electrical power source, if available, to reduce the chance of input power failure at both uninterruptible power supplies.

Note: The SAN Volume Controller uninterruptible power supply is an integral part of the SAN Volume Controller solution and maintains continuous, SAN Volume Controller specific communications with its attached SAN Volume Controller nodes. The SAN Volume Controller uninterruptible power supply must be used in accordance with documented guidelines and procedures and must not be used for any other purpose.

Master console

The SAN Volume Controller provides a master console that is used as a single platform to configure, manage, and service software required to manage the SAN Volume Controller.

The master console allows a system administrator to rapidly integrate the virtualization controller into their environment. The master console monitors the configuration of the whole system and all of the internal components. It offers a standard and central location for all aspects of the operation, including SAN topology rendering, SNMP trap management, Call Home and Remote Service facilities as well as all the configuration and diagnostic utilities for the components.

Note: VPN connection is required for Remote Service facilities.

The master console also provides the following functions:

- Browser support for:
  - SAN Volume Controller Console

  - Fibre channel switch
- CLI configuration support using Secure Shell (SSH)
- SAN Topology rendering using Tivoli® SAN Manager
- Remote Service capability through VPN
- IBM Director
  - SNMP Trap management
  - Call Home capability using IBM Director
  - E-mail to System Administrator

For information about configuring the software, see "Installing the master console" on page 16.

For specific information about features, specifications, and installation instructions for this device, see *xSeries 305 Installation Guide*.

Controls and indicators for the SAN Volume Controller

All the controls and indicators of the SAN Volume Controller are located on the front panel (see Figure 15).

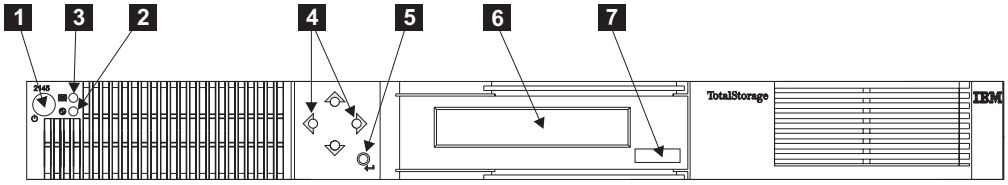


Figure 15. SAN Volume Controller front panel assembly

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

Power button

The power button 1 switches the main power to the SAN Volume Controller on or off.

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

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

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

Power LED

The green power LED **2** indicates the power status of the SAN Volume Controller:

Properties:

Off One or more output voltages from the power supply are not present.

On All the output voltages from the power supply are present.

Blinking
The service controller, which provides the graphics and text for the front panel display, is in standby mode. (The rate of blinking is 0.5 seconds on, 0.5 seconds off.)

Check LED

The amber check LED **3** comes on continuously if a critical failure occurs in the service controller. If the check LED is off and the power LED is on, the service controller is working correctly

The amber check LED also comes on while the service controller code is being re-programmed. For example, when the SAN Volume Controller cluster code is being upgraded, it is normal for the check LED to come on.

Navigation buttons

Four navigational buttons **4** are provided. They are arranged in a circle. You press these directional buttons to move through the menu options. For example, to move up, press the top button in the circle; to move right, press the right button in the circle. The fifth button, which is outside the circle, is the select button.

Select button

The select button **5** enables you to select an item from a menu.

Front panel display

The front panel display **6** shows service, configuration, and navigation information. The information is available in several national languages. The display can show both alphanumeric information and graphical information (progress bars).

Node identification label

The node identification label **7** is a six-digit node identification number that is printed on a label on the front panel. This number is also 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.

Controls and indicators for the uninterruptible power supply

All the controls and indicators of the uninterruptible power supply are contained on the front panel assembly. See Figure 16 on page 6.

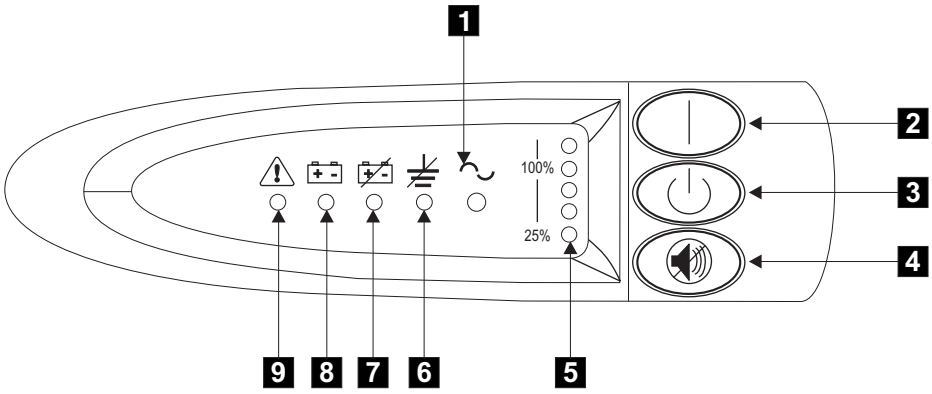


Figure 16. Uninterruptible power supply front panel assembly

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

Mode indicator

The mode indicator **1** shows the mode of the uninterruptible power supply.

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

When the mode indicator is flashing green, the uninterruptible power supply is in standby mode. Standby mode means that the uninterruptible power supply is turned off, but is still connected to the main power source. No power is available from the uninterruptible power supply output sockets.

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

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

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

On button

Use the on button 2 to turn on the main power to the 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 5 display the percentage of load that is being applied to the uninterruptible power supply.

Off button

Use the off button 3 to turn off the main power to the uninterruptible power supply.

Attention: Never use the off button unless you are specifically directed to in the instructions that are given in the publications for the SAN Volume Controller. If you press it at any other time, you might lose data in the cluster if the other 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 uninterruptible power supply remains in standby mode until you disconnect the uninterruptible power supply from the main power outlet.

Test and alarm reset button

Use the test and alarm reset button 4 to start the self-test. To start the self-test, press and hold the button for three seconds. This button also resets the alarm.

Load-level indicators

The load-level indicators 5 show the percentage of uninterruptible power supply capacity that the SAN Volume Controller are using. When all the indicators are lit, the power requirements of the SAN Volume Controller have exceeded the capacity of the uninterruptible power supply.

Site wiring fault indicators

The site wiring fault indicator 6 shows that ether a ground wire connection does not exist or the live and neutral wires are reversed in the input power connection.

Battery service indicator

The battery service indicator 7 shows that the charge in the battery has become low while the 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 uninterruptible power supply shuts down, it automatically restarts when the main power returns.

Battery mode indicator

The battery mode indicator 8 shows that the uninterruptible power supply is operating in battery mode. It comes on when the main power source fails and the uninterruptible power supply is running on battery power. The alarm beeps once every five seconds. When main power returns, the uninterruptible power supply returns to normal mode, and the battery recharges. The battery mode indicator goes out, and the alarm stops.

General alarm indicator

The general alarm indicator **9** , when accompanied by the audio alarm beeping every 5 seconds, shows that the battery is low. When accompanied by a continuous audio alarm, it shows that the internal temperature of the uninterruptible power supply is too high, or there has been a momentary output overload.

Chapter 2. Installing the uninterruptible power supply, the master console, and the SAN Volume Controller

This chapter describes the steps that you need to perform to install the SAN Volume Controller and the uninterruptible power supply including the following:

1. Preparing for the installation
2. Installing the support rails for the uninterruptible power supply
3. Installing the uninterruptible power supply
4. Installing the master console
5. Installing the support rails for the SAN Volume Controller
6. Installing the SAN Volume Controller into the rack
7. Connecting the SAN Volume Controller to the uninterruptible power supply

Attention: Before you begin the installation, ensure that the customer has completed the planning table for the hardware that you are about to install. If you are connecting cables to switches that are currently in use, confirm with the customer that it is safe for you to proceed. Go no further with these instructions until you are satisfied that all the information is correct and valid. Refer to *IBM TotalStorage SAN Volume Controller: Planning Guide* for all of the required tables that customers must complete before you can install this product.

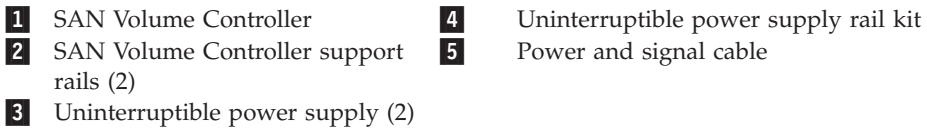
Preparing for installation

Before you start to install the uninterruptible power supply and the SAN Volume Controller, ensure that you have everything that you need, including the customer completed planning tables and charts provided in the *IBM TotalStorage SAN Volume Controller: Planning Guide*. These tables include the location of hardware, cable connection, and configuration data information that you will need to complete the installation procedures.

Steps:

Perform the following steps:

1. Check all the parts and quantities against the items shown in the following figure. If any item is missing, contact your marketing representative.



1 SAN Volume Controller
2 SAN Volume Controller support rails (2)
3 Uninterruptible power supply (2)
4 Uninterruptible power supply rail kit
5 Power and signal cable

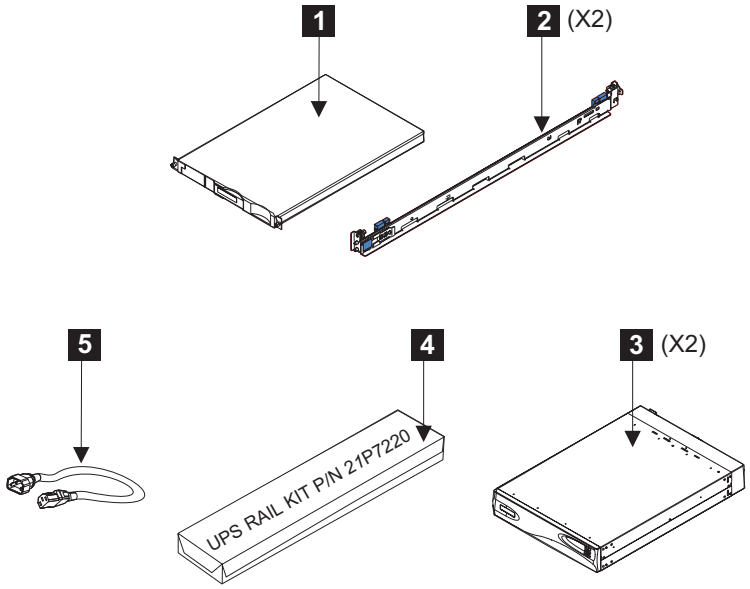


Figure 17. Items for installation into a rack

2. If you are installing uninterruptible power supplies, read through the safety and environmental notices. Then go to"Installing the support rails for the uninterruptible power supply".
3. If you are installing a SAN Volume Controller into a rack, go to "Installing the support rails for the SAN Volume Controller" on page 19.

   Note: If you are installing the SAN Volume Controller into a rack that already contains other SAN Volume Controllers and uninterruptible power supplies, the installed uninterruptible power supplies might have spare capacity. If the customer intends to use that spare capacity, the SAN Volume Controllers that you are going to install might have been delivered without uninterruptible power supplies.

Installing the support rails for the uninterruptible power supply

Before you can install the uninterruptible power supply, you must install the support rails into the rack.

Note: If you are installing the SAN Volume Controller into a rack that already contains other SAN Volume Controllers and uninterruptible power supplies, the installed uninterruptible power supplies might have spare capacity. If the customer intends to use that spare capacity, the SAN Volume Controllers that you are going to install might have been delivered without uninterruptible power supplies.

Steps:

Perform the following steps to install the support rails for the uninterruptible power supply:

1. Refer to the customer's hardware location table to find out where in the rack the uninterruptible power supplies are to be installed.
2. Discard the two handles and their associated nuts that are shipped with the support rails for the uninterruptible power supply.

3. At the back of the rack, observe the Electrical Industries Association (EIA) positions, and determine where you are going to install the uninterruptible power supply (see Figure 18). An uninterruptible power supply must always be installed into the lowest available position in the rack. The only device that can be below a uninterruptible power supply is another uninterruptible power supply.

   Note: The bottom of the flange of the support rail must align with the EIA mark on the rack.

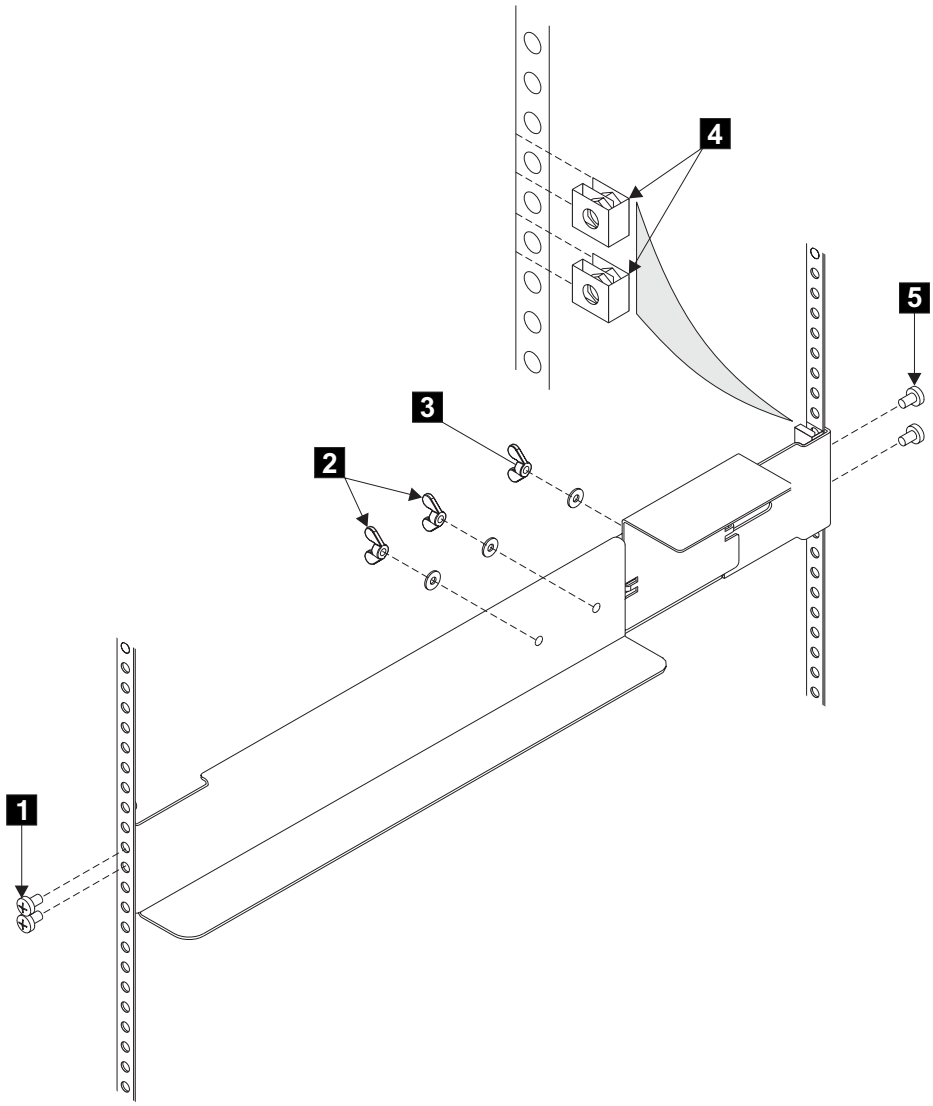


Figure 18. Installing support rails for a uninterruptible power supply into the rack

   Attention: To tighten wing nuts **2** and **3** you will require access from above the rails. Ensure that the support rails are installed before anything is installed in the 8 EIA units above the rails. If any pre-existing devices have been installed in that space it might be necessary to remove those devices before installing the rails.

4. Perform the following steps for each rail:
   a. Attach nut clips **4** to the rack. These nut clips must align with the second and fourth holes of the support rail flange.

b. Loosen the two wing nuts 2 .
c. Loosen the wing nut 3 and slide the bracket toward the back of the rail.
d. Remain at the back of the rack, hold the support rail in position in the rack, then install and fully tighten the two mounting screws 5 .
e. Go to the front of the rack.
f. Extend the support rail toward the front of the rack.

Note: Hold the support rail in position until you have completed step 4.h.

g. Ensure that the support rail is horizontal (a level might be useful here).
h. Install the two mounting screws 1 into the third and fourth holes of the support rail flange. Fully tighten the screws.
i. Fully tighten the two wing nuts 2 .
j. 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. Fully tighten the wing nut 3

Installing the uninterruptible power supply into the rack

After you have completed the preparation procedures for installing the uninterruptible power supply into the rack, you are ready to install the uninterruptible power supply into the rack.

Prerequisites:

Ensure that you have completed the following:

- The pre-installation procedures
- Installing the support rails for the uninterruptible power supply
- Preparing the uninterruptible power supply

Attention: Before you begin to install the uninterruptible power supply, read through the safety and environmental notices.

Steps:

Perform the following steps to install the uninterruptible power supply into the rack:

1. **CAUTION:**
   - **To avoid any hazard from the rack tipping forward when boxes are installed, observe all safety precautions for the rack into which you are installing the device.**
   - **The uninterruptible power supply weighs 39 kg (86 lb) with the electronics assembly and the battery assembly installed:**
     - **Do not attempt to lift the uninterruptible power supply by yourself. Ask *TWO* other service representatives for aid.**
     - **Do not attempt to install the uninterruptible power supply into the rack unless the electronics assembly and the battery assembly have been removed.**

   CAUTION:
   The battery weighs 20.4 kg (45 lb). Do not attempt to lift it by yourself. Ask another service representative for aid.

If the uninterruptible power supply is not in a position where you can work on it easily, ask two other service representatives for help, and go to step 2.

If the uninterruptible power supply is in a position where you can work on it easily, ask another service representative for aid, and go to step 2.

Note: The cover for the uninterruptible power supply is not installed, however, it is included in the box with the uninterruptible power supply. Install the front cover after you have completed the other installation steps.

2. With aid from two other service service representatives, place the uninterruptible power supply onto a flat, stable surface.
3. Remove the two screws **1** , (see Figure 19).

   CAUTION:
   The electronics assembly weighs 6.4 kg (14 lb). Take care when you remove it from the uninterruptible power supply.

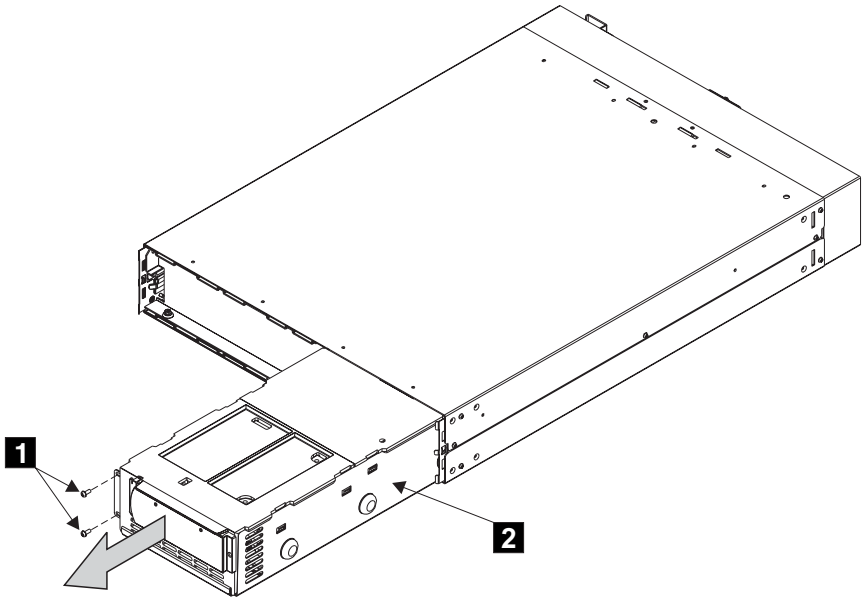


Figure 19. Removing the uninterruptible power supply electronics assembly

4. Pull the electronics assembly **2** out of the uninterruptible power supply, and put it to one side.
5. Remove the two bolts **1** and additional nut **2** on the left side of the bracket (see Figure 20 on page 14) to remove the battery retaining bracket **3** .

   CAUTION:
   The battery assembly weighs 20.4 kg (45 lb). Do not attempt to lift it by yourself. Ask another service representative for aid.

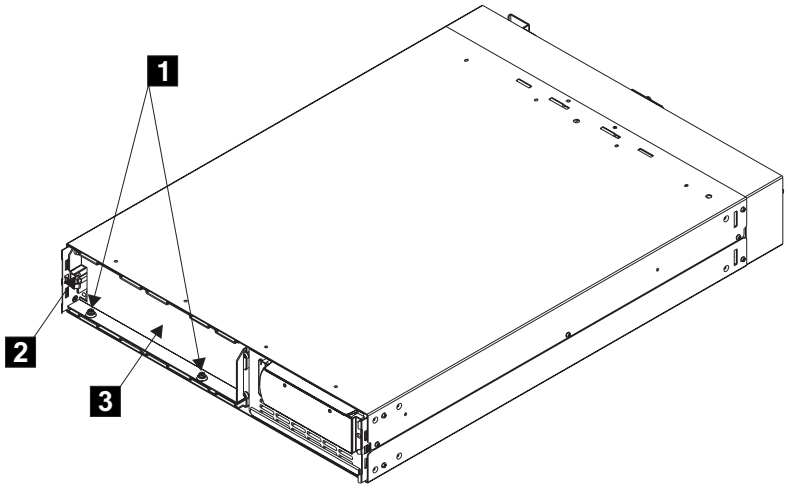


Figure 20. Removing the battery retaining bracket

6. With aid from another service representative, pull the battery assembly out onto a flat, stable surface (see Figure 21). Put the battery assembly to one side.

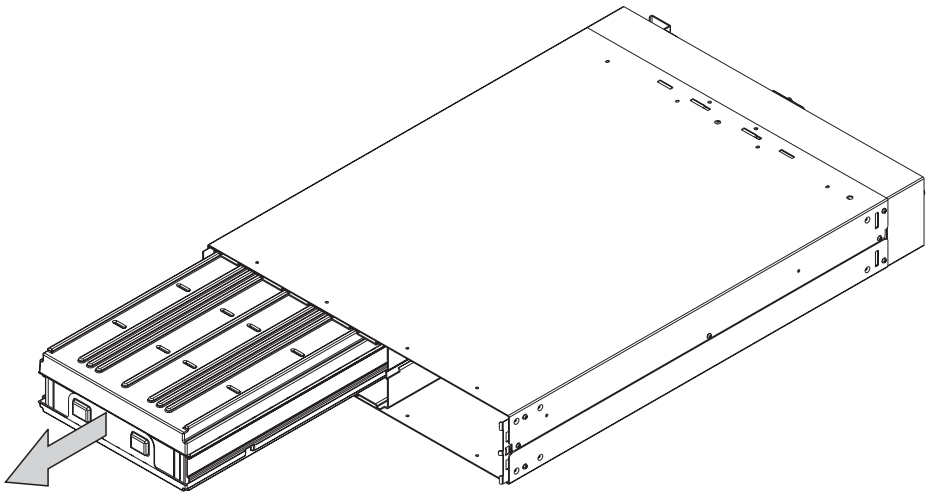


Figure 21. Removing the uninterruptible power supply battery assembly

CAUTION:
The uninterruptible power supply weighs 12.2 kg (27 lb) with the electronics assembly and battery assembly removed. Do not attempt to lift the uninterruptible power supply by yourself. Ask another service representative for aid.

7. Stand at the front of the rack and, with aid from another service representative, place the back of the uninterruptible power supply onto the support rails, then slide the uninterruptible power supply into the rack.
8. Install the front flathead screws **1** (see Figure 22 on page 15).

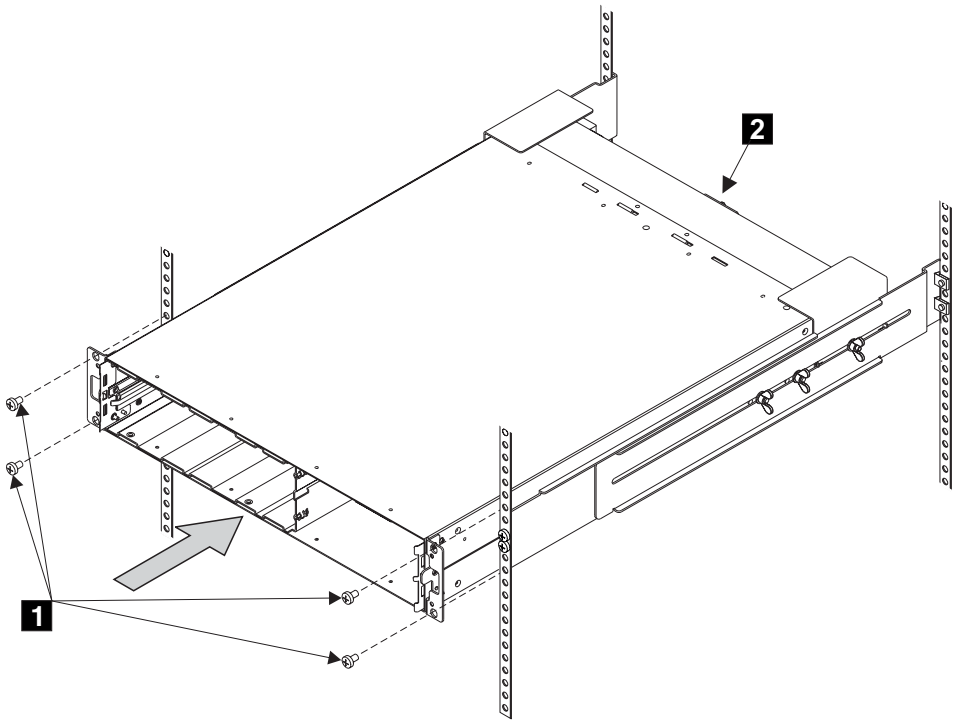


Figure 22. Installing the uninterruptible power supply into a rack

9. With aid from another service representative, reinstall the following:
   a. Battery assembly
   b. Battery retaining bracket
   c. Electronics assembly

   Attention: A grounding screw feature **2** is provided on the back of the uninterruptible power supply so that you can attach a ground bonding wire if required by local wiring codes. Since safety earthing of the uninterruptible power supply chassis is maintained through the input line power cord, you are usually not required to use this additional grounding screw feature.
10. At the back of the uninterruptible power supply, plug the uninterruptible power supply main power cable into the power socket **1** (see Figure 23).

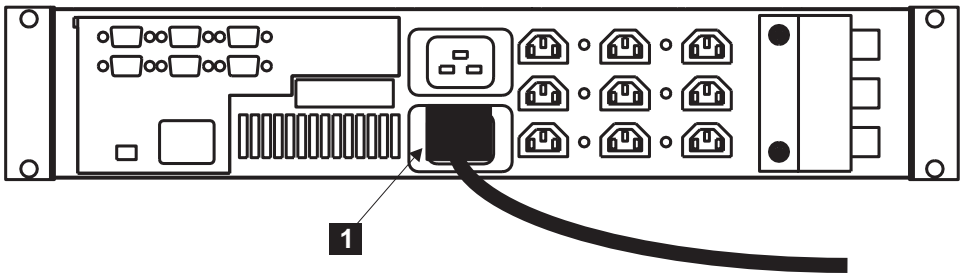


Figure 23. Installing the uninterruptible power supply power cable

11. **Attention:** If possible, ensure that the two uninterruptible power supplies are not both connected to the same power source.
    Plug the uninterruptible power supply main cable into the main power source.

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

- One 15A circuit breaker in each branch circuit supplies the power to a uninterruptible power supply
- Single-phase
- 50 to 60 Hz
- 220 Volt

12. All front panel indicators of the uninterruptible power supply flash for a short time while the uninterruptible power supply runs a self test. When the test is complete, the mode indicator **1** flashes to show that the uninterruptible power supply is in standby mode (see Figure 24).

    Press and hold the uninterruptible power supply on switch **2** until you hear the 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 applied to the uninterruptible power supply. The uninterruptible power supply is now in normal mode, and is charging its battery.

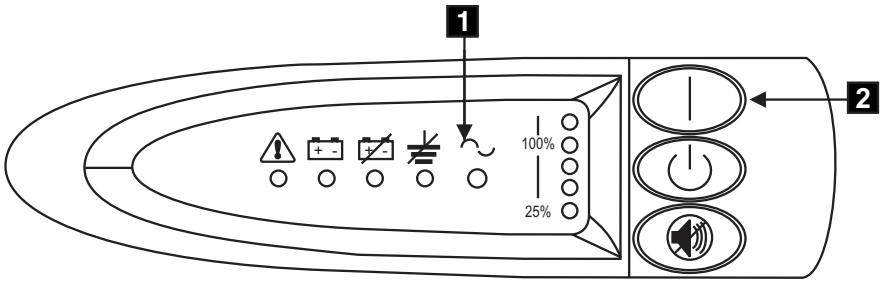


Figure 24. Power switch and indicators of the uninterruptible power supply

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

13. If any of the check indicators are illuminated, refer to the *IBM TotalStorage SAN Volume Controller: Service Guide*. Repeat this entire procedure to install the other uninterruptible power supply.

Attention: The 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 into the uninterruptible power supply or the SAN Volume Controller cluster will malfunction.

Installing the master console

This section provides information on how to install the master console with the San Volume Controller. To install the master console into the rack, follow the instructions provided in the *xSeries 305 Installation Guide* plus those provided with the mounting rails.

Important: Do not perform any of the software instructions; all of the required software is pre-installed on the master console.

Prerequisites:

Attention: Before you begin the installation, ensure that you review and complete all of the safety checks detailed in the documentation for the master console, the keyboard, and the display.

Ensure that the customer has all of the information needed prior to installation. Refer to the *IBM TotalStorage SAN Volume Controller: Planning Guide*, which provides the hardware location chart, the cable connection table, and the configuration data table for the customer to complete prior to installation.

Ask the customer to provide the following information for the master console:

- Name for the master console
- IP address for connection to the customer's network
- IP address for connection to Remote Support

Steps:

To complete the installation of the master console, perform the following steps:

1. Ensure that no cables are connected to the Ethernet ports.
2. Connect a fibre channel cable from one port on the fibre channel host bus adapter (HBA) to the other port to allow for a loopback data test to check that the fibre channel HBA is operational.
3. Turn on the master console.
4. The following message is displayed:

   ```
   Qlogic Corporation
   Q123XX PCI Fibre Channel ROM BIOS version X
   Copyright (C) Qlogic Corporation 1993 2002 all rights reserved
   www.qlogic.com
   Press <Ctrl-Q> for Fast!UTIL
   ```

5. Press Ctrl-Q and a list of I/O address is displayed.
6. Select one of the I/O address and press Enter.
7. A Fast!UTIL Option list is displayed.
8. Select the Loopback data test option and press Enter.
9. Select the Continue with loopback data test option and press Enter. One of the following messages is displayed:
   - `Loopback Data Test failed`

     If this message is displayed, either try a different fibre channel cable or replace the fibre channel HBA to correct this problem.
   - ```
     Press any key to stop the Loopback Data Test
     Press Enter twice to get back to the Fast!UTIL Option List
     Select Exit Fast!UTIL
     ```
10. Remove the fibre channel cable that you installed between the two ports on the fibre channel HBA.
11. Re-boot the machine to start the Windows operating system:
    a. Enter administrator in the User ID field.
    b. Enter passw0rd in the password field; this password applies to all required password fields.
    c. The master console continues booting.
     ```

Note: This process can take several minutes before all services are started and operations are completely responsive.

12. Connect the fibre channel cables from the master console to a switch port that is not part of any existing configuration.

    Note: For steps 12, 13, and 14, refer to the *IBM TotalStorage SAN Volume Controller: Planning Guide*, for customer completed configuration data table for the master console.

13. To enter the master console IP address provided by the customer, complete the following steps:
    a. Right--click on the My Network Places icon and select Properties
    b. Right--click on the Local Area Connection option and select Properties
    c. Select Internet Protocol (TCP/IP) and select Properties
    d. Enter all required information for the IP and DNS addresses.
    e. Re-boot the master console.
14. To enter the master console name provided by the customer, complete the following steps:
    a. Right--click on the My Computer icon and select Properties.
    b. Select the Network Identification tab and select Properties.
    c. Enter the master console name.
    d. Select the More button.
    e. Enter the Full path information in the Primary DNS suffix of this compute field.
    f. Connect Ethernet port-1 to the customer's network.
    g. If the customer requires Remote Support, perform step 13 again for Local Area Connection 2 and connect an Ethernet cable from Ethernet port 2 on the master console to the designated connection (for example, Firewall DMZ Port).
15. Attach a RID tag to the master console using machine type **2145** and the serial number of the SAN Volume Controller that is being installed with the master console.
16. **IMPORTANT**: This step must be the last step you perform on the master console before handing over the machine; it sets up the master console to present a Windows license agreement screen at the next power on and then shuts down the master console.
    a. Select Start –> Run
    b. Enter c:\sysprep\sysprep.exe
    c. Click OK.

    Note: It is important that you do this step; otherwise, the customer will not be presented with the choice to accept or decline Windows registration conditions.

Result:

The master console is installed. Refer the customer to the *IBM TotalStorage Virtualization Family: SAN Volume Controller Configuration Guide* to complete the necessary configuration steps.

Installing the support rails for the SAN Volume Controller

You must install the support rails for the SAN Volume Controller into the rack before you can install the SAN Volume Controller itself.

Prerequisites:

Before you begin the installation of the rails, complete the following prerequisite tasks:

- Refer to the customer's hardware location table, in the *IBM TotalStorage SAN Volume Controller: Planning Guide*, to determine where you are going to install the SAN Volume Controller. If appropriate, allow for possible future installation of other equipment.
- Refer to the EIA markings on the rack and decide where you are going to install the support rails.

Steps:

Perform the following steps to install the support rails for the SAN Volume Controller:

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 finger against the side of the latch lever **1**, and put your thumb against the front of the latch lock **2** (see Figure 25).

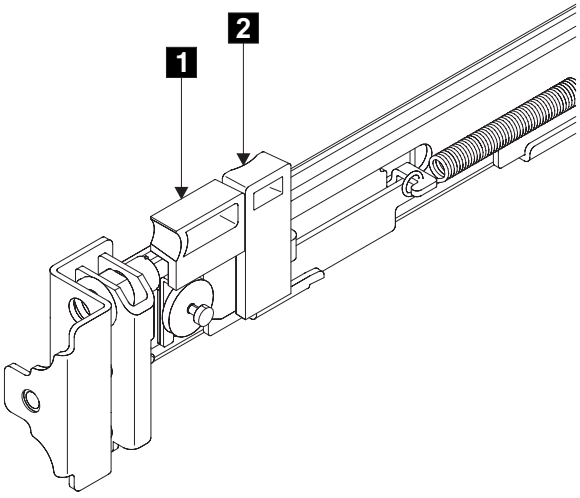


Figure 25. Retracting the latch-lock carrier

3. Gently push the latch lock **2** (see Figure 26 on page 20) away from the rail as you move the latch lever to **1** towards the far end of the rail. The latch-lock carrier assembly slides against the spring tension (see Figure 26 on page 20).

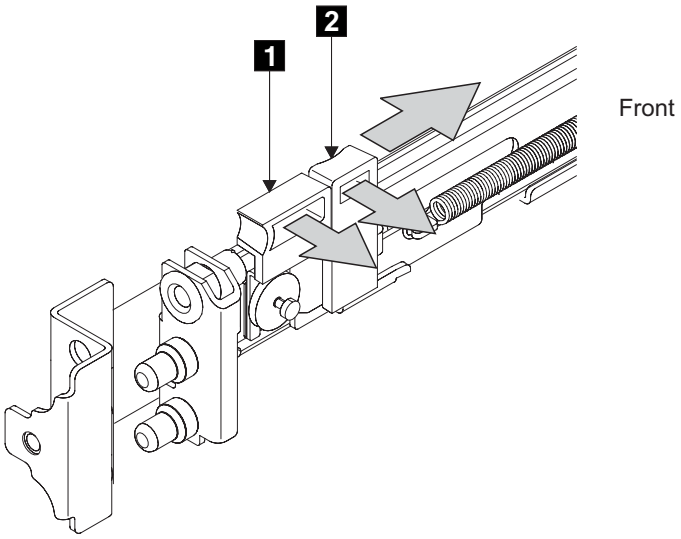


Figure 26. Opening the front latch-lock carrier assembly

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** (see Figure 27) toward the front of the rail until it stops. The rail is now at its shortest adjustment.

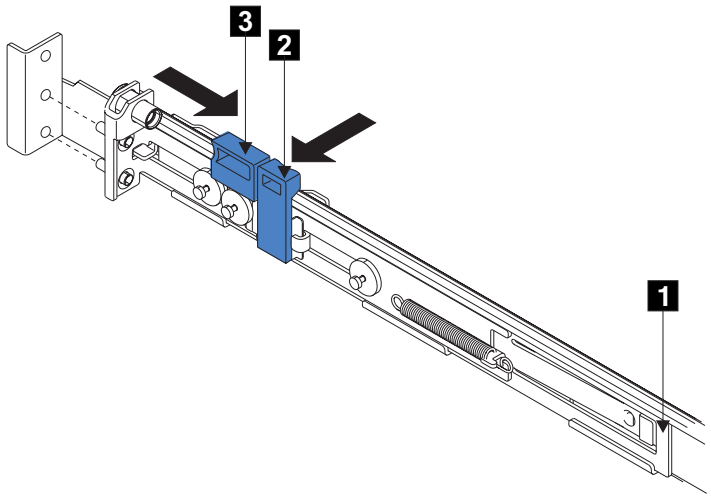


Figure 27. Opening the back latch-lock carrier assembly

6. Put your index finger against the right side of the latch lever **3**, and your thumb against the front of the latch lock **2**.
7. Gently push the latch lock **2** away form the rail as you move the latch lever **3** towards the front of the rail. The latch-lock carrier assembly slides against spring tension.
8. Release the latch lock and continue to slide the latch-lock carrier for approximately 13 mm (0.5 in). The latch lever engages in a hole in the back bracket assembly, and holds the latch-lock carrier in the retracted position.

9. Place the front end of the rail in the rack cabinet. Align the top of the front bracket **1** (see Figure 28) with the required EIA marking that is on the rack.

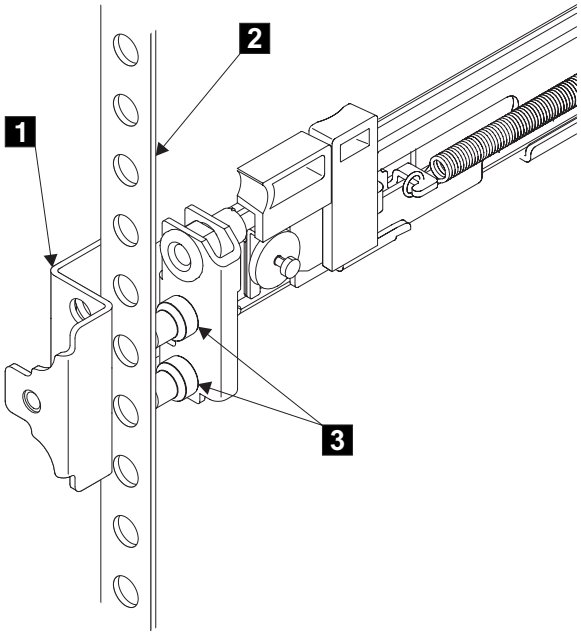


Figure 28. Installing the front end of the rail

10. Align the locating pins **3** with the holes that are in the rack-mounting flange **2**.
11. Push the latch lock **2** (see Figure 29 on page 22) 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.

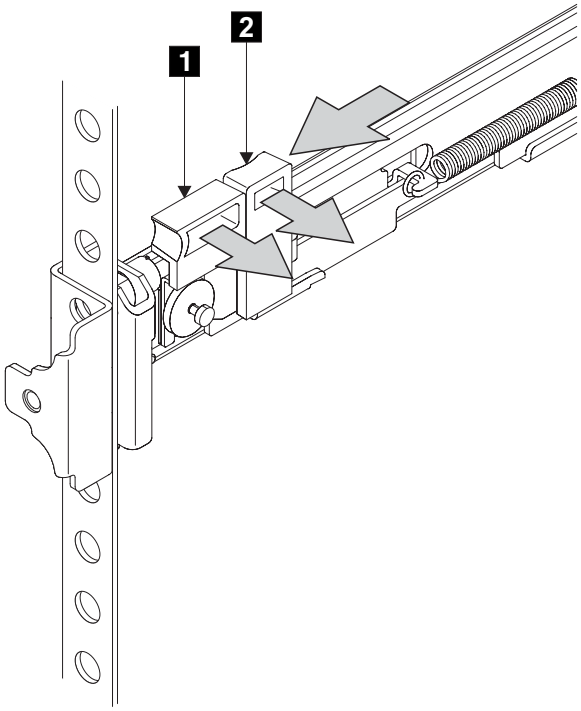


Figure 29. Closing the latch-lock carrier assembly

12. Push the back rail bracket **1** (see Figure 30) toward the rear of the rack and align the locating pins with the rack-mounting flange.

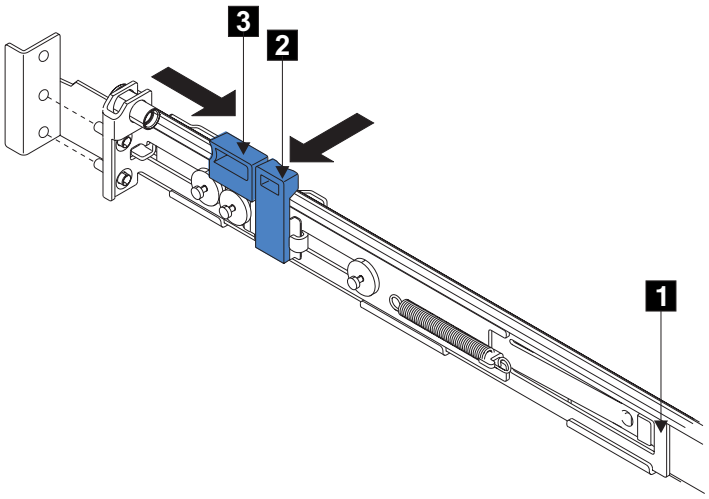


Figure 30. Aligning the rear bracket

13. Push the latch lock **2** (see Figure 30) 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.

14. 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.

Result:

The support rails are installed.

Installing the SAN Volume Controller into the rack

This task includes the steps you must complete to install the SAN Volume Controller into the rack.

Prerequisites:

Before you install the SAN Volume Controller into the rack; review the following caution notice.

CAUTION:
To avoid any hazard from the rack tipping forward when boxes are installed, observe all safety precautions for the rack into which you are installing the device.

Steps:

Perform the following steps to install the SAN Volume Controller into the rack:

1. Stand at the front of the rack and place the back of the SAN Volume Controller onto the support rails; then slide the SAN Volume Controller fully into the rack.
2. Fully tighten the two captive thumbscrews **1** (see Figure 31).

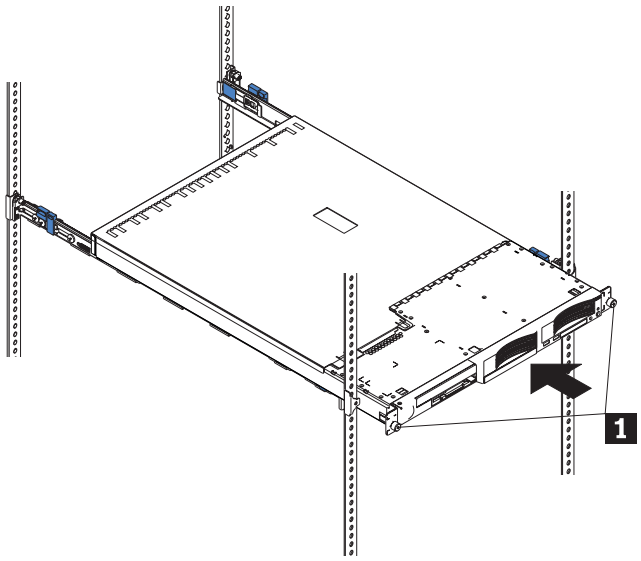


Figure 31. Installing the SAN Volume Controller into a rack

3. Repeat this procedure for each SAN Volume Controller.

Connecting the SAN Volume Controller to the uninterruptible power supply

This task includes the steps you complete to connect the SAN Volume Controller to the uninterruptible power supply.

Prerequisites:

Before you begin this task, refer to the customer's cable connection table in the *IBM TotalStorage SAN Volume Controller: Planning Guide* to identify the uninterruptible power supply to which this SAN Volume Controller is to be connected.

Steps:

Perform the following steps to connect the SAN Volume Controller to the uninterruptible power supply.

1. At the back of the SAN Volume Controller, plug a power cable into the socket **1** (see Figure 32).

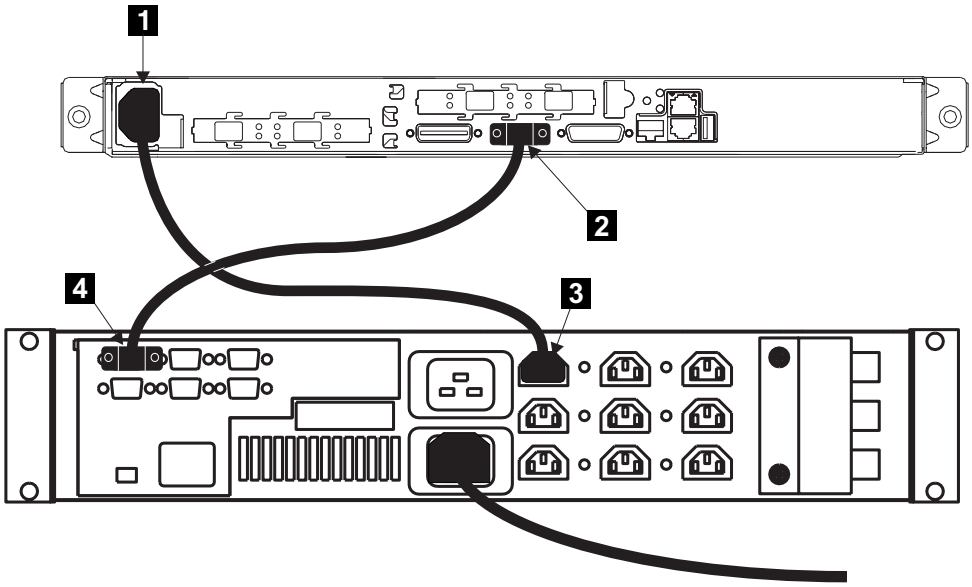


Figure 32. Connecting the SAN Volume Controller power cable to the uninterruptible power supply

2. Plug the serial cable of the power cable assembly into the serial socket **2**.
3. **DANGER**

   You have already switched on the uninterruptible power supply. The output sockets of the uninterruptible power supply are live.

   Plug the free end of the SAN Volume Controller power cable into any vacant output socket **3** on the uninterruptible power supply.
4. Plug the free end of the signal cable into into any vacant position on the top row of serial connectors **4** on the uninterruptible power supply. Do not plug any serial cables into the bottom row of serial connectors or the uninterruptible power supply will malfunction.

Result:

The SAN Volume Controller power is connected to the uninterruptible power supply.

Connecting the SAN Volume Controller to the SAN and to the Ethernet network

This task includes the steps you complete to connect the SAN Volume Controller to the SAN.

Prerequisites:

Before you begin this task, refer to the customer's cable connection table to find out where to connect the fibre channel cables.

Steps:

Perform the following steps to connect the SAN Volume Controller to the SAN.

1. **Attention:** You must use only Ethernet port 1 on the SAN Volume Controller. The software is configured only for Ethernet port 1.

   Connect the Ethernet cable to the Ethernet port 1 connector **5** (see Figure 33).

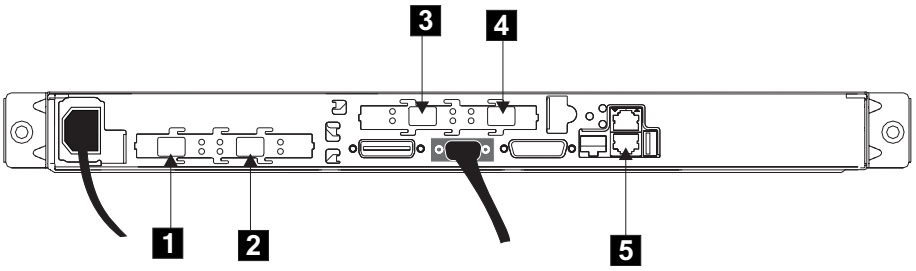


Figure 33. Connectors at the back of the SAN Volume Controller

   Attention: When routing the fibre channel cables, do not tighten the cable straps or bend the cables to a radius smaller than 76 mm (3 in.).

2. Connect the fibre channel cables to the fibre channel connectors as required by the customer's configuration. The connectors are numbered **1**, **2**, **3**, and **4** from left to right, as shown in the figure above. These numbers correspond to the numbers that are shown in the customer's cable connection table.
3. Connect the other end of the Ethernet cable to the designated connector on the Ethernet hub or switch.
4. Connect the other ends of the fibre channel cables to the designated connectors of the fibre channel switches.
5. Press the SAN Volume Controller power switch. Verify that the green power light is on.

   If the light is not on, refer to *IBM TotalStorage SAN Volume Controller: Service Guide*.
6. No software installation is required. The node boots automatically. If the battery is not sufficiently charged to support the node in the event of a power failure the boot process will stop and the `Charging` message is displayed in

line 1 of the front panel display. A progress bar is displayed in line 2 of the front panel display. Battery charging can take up to 3 hours; however, when the battery is sufficiently charged to support the node the boot process will continue. When booting is complete either `Cluster:` is displayed in line 1 of the front panel display or, if the battery is completing its charging process `Recovering` is displayed with a progress bar displayed in line 2.

If the `Charging`, `Recovering` or `Cluster` option: is not displayed, refer to the *IBM TotalStorage SAN Volume Controller: Service Guide*. Otherwise, go to the next step.

7. Press and hold the select button for five seconds (see "Controls and indicators for the SAN Volume Controller" on page 4). The check light comes on and a display test is performed. When the display test is complete the check light goes off and a button test is started. Refer to *IBM TotalStorage SAN Volume Controller: Service Guide* for a description of the correct display.
8. Press the up, down, left, and right buttons to verify that they are working as described in the display test; then press and hold the select button for five seconds to exit the test.

   If the test fails, perform the front panel repair actions that are described in *IBM TotalStorage SAN Volume Controller: Service Guide*. Otherwise, go to the next step.
9. If the `Charging` message is displayed on the front panel display, you must wait until the battery is further charged before you continue. If the `Recovering` message is displayed on the front panel, press the Up button to switch to the menu. The menu continues to be displayed while you press the buttons on the front panel. If you do not press any buttons within 60 seconds, the menu changes to display the recovering progress. You can switch the front panel display to the menu at any time by pressing the Up button again
10. Keep pressing and releasing the up or down button until the `Node:` option is displayed in line 1 of the front panel display. See "SAN Volume Controller menu options" on page 32.
11. Verify that the node number that is displayed in line 2 of the display is the same as the node number that is printed on the front panel of the node (see Figure 34).

Figure 34. Node number

The *XXXXXX* in represents the node number. If the numbers do not match, refer to *IBM TotalStorage SAN Volume Controller: Service Guide*.

12. Keep pressing and releasing the up or down button until the `Ethernet` option is shown on the front panel display. Line 2 of the front panel display shows the message `Inactive`. This message shows that, although an Ethernet connection is available, it cannot yet be used (see Figure 35).

Figure 35. Ethernet mode

If `Inactive` is not displayed, refer to *IBM TotalStorage SAN Volume Controller: Service Guide*.

13. Keep pressing and releasing the up or down button until the `FC Port-1` option shows in the display.
14. Check whether line 2 of the display shows the message `Active`.
15. Keep pressing and releasing the left or right button to display the other port options. Check whether for each port, line 2 of the display shows the message `Active`. If `Active` is not shown for any port, refer to *IBM TotalStorage SAN Volume Controller: Service Guide*.
16. If the configuration data table provided by the customer indicates that the SAN Volume Controller nodes are to be operated at 1Gb, press and hold the down button; press and release the select button. Release the down button. The second line of the display will show the current fibre channel speed setting of the node. Press the up or down button until `1Gb` is displayed and then press the select button. This changes the fibre channel speed for all ports on this node to 1Gb.
17. If the customer wants to have messages displayed on the front panel display in a language other than English, keep pressing and releasing the up or down button until the `Select Language?`option is displayed.
18. Press the select button.
19. Keep pressing and releasing the left or right button until the required language is displayed. The languages are displayed in the following order:
    - English
    - French
    - German
    - Italian
    - Japanese
    - Korean
    - Portuguese
    - Spanish
    - Chinese (simplified)
    - Chinese (traditional)
20. Press the select button.
21. Repeat steps 1 through 20 for each SAN Volume Controller.
22. When the battery is fully charged, the charge progress bar is replaced by the `Cluster` option on the front panel display of the SAN Volume Controller.

    The installation is complete and the customer can begin to create clusters and perform other configuration tasks. Refer to *IBM TotalStorage SAN Volume Controller: Configuration Guide* for detailed instructions.

Chapter 3. Using the front panel display on the SAN Volume Controller

This chapter provides information about how to use the front panel display which includes:

- Status indicators
- Menu selections

Status indicators

Status indicators are shown on the front panel for the following processes:

- Boot progress
- Boot failed
- Hardware boot
- Node rescue request
- Power failure
- Powering off
- Restarting
- Shutting down
- Error codes

Boot progress indicator

Figure 36 shows that the node is starting.

Figure 36. Boot progress display

During the boot operation, boot progress codes are displayed and the progress bar moves to the right while the boot operation proceeds. If the progress bar stops moving before it reaches the end of the indicator unit, and remains stopped for longer than 90 seconds, see the appropropriate section of the service documentation.

Boot failed

Figure 37 shows that the boot operation has failed.

Figure 37. Boot failed display

If the boot operation fails, a boot code is displayed.

See the boot codes in the appropriate section of the service documentation for a description of the failure and the appropriate steps you must perform to correct the failure.

Hardware boot

Figure 38 shows the what is displayed when you first power on the node while the node searches for a disk drive to boot.

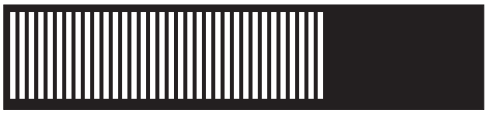


Figure 38. Hardware-boot display

If this display remains active for longer than 3 minutes, there might be a problem.

Node rescue request

Figure 39 shows that a request has been made to exchange the software on this node. Volume Controller Software is pre-installed on all SAN Volume Controller nodes. This software includes the operating system, the application software, and the SAN Volume Controller publications. It is not normally necessary to replace the software on a node but if the software is lost for some reason, for example if the hard disk drive in the node fails, it is possible to copy all the software from another node connected to the same Fibre Channel fabric. This process is known as node rescue.

Figure 39. Node-rescue-request display

Power failure

Figure 40 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 the node cache data to the internal disk drive.When the progress bar reaches zero, the node will power off.

Note: When input power is restored to the uninterruptible power supply, the SAN Volume Controller is turned on without the front panel power button being pressed.

Figure 40. Power failure display

Powering off

Figure 41 shows that the power button has been pressed and the node is powering off.

Figure 41. Powering-off display

The progress bar moves backward when the power is removed. The power-off operation might take several minutes.

Restarting

Figure 42 shows that the software on a node is restarting.

Figure 42. Restarting display

The software is restarting either because:

- An internal error was detected
- A power-off operation was ended when the power button was pressed again while the node was powering off

If a power-off operation was ended, the progress bar continues to move backward until the node finishes saving its data. After the data is saved, the progress bar moves forward during the restart operation.

Shutting down

Figure 43 is an example of what the front panel indicator shows when you issue a shutdown command to the SAN Volume Controller cluster. The progress bar continues to move left until it is safe to be powered off. When the shutdown operation is complete, all power will be removed from the node and the uninterruptible power supply will be shut down.

Figure 43. Shutting down display

Related topics:

For more information about how to shut down a cluster, see the approrpriate section of the service documentation.

Error codes

For descriptions of the error codes that can be displayed on the front panel display, see the error codes in the *IBM TotalStorage Virtualization Family: SAN Volume Controller Service Guide*.

SAN Volume Controller menu options

Menu options are available on the front panel display. These options enable you to review the operational status of the cluster, the node, and the external interfaces. They also provide access to the tools that you need to install and service the node.

Figure 44 shows the sequence of these 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 displayed is the cluster option.

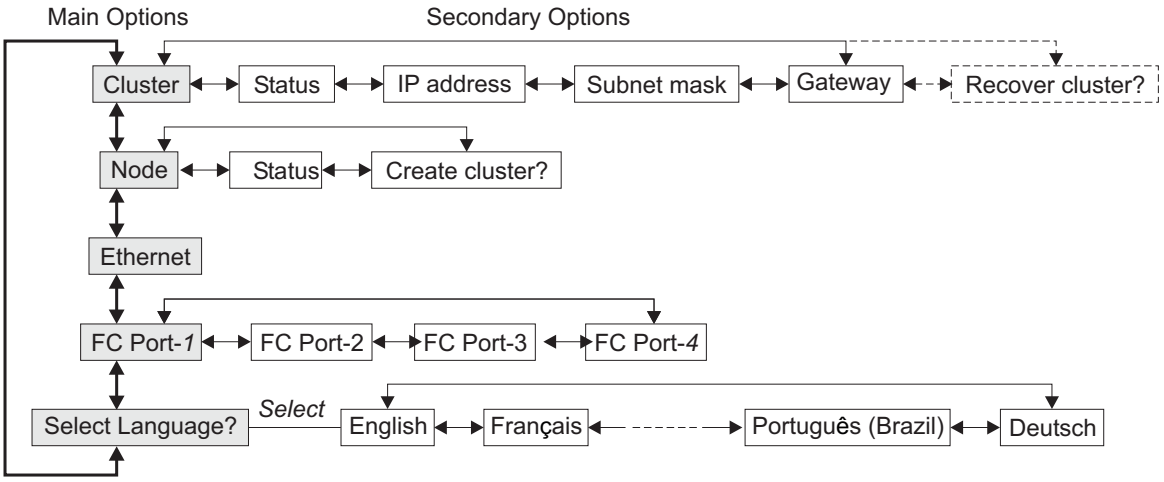


Figure 44. Menu options sequence

Use the navigation buttons on the front panel to navigate through the menu options. Press the left and right buttons to navigate through the secondary options that are associated with some of the main options. When you have navigated to the desired option, press the select button. There are five main options available:

- Cluster
- Node
- Ethernet
- FC port–1 through 4
- Select language

Cluster options

The main cluster option displays the cluster name that the user has assigned. If no name has been assigned, the IP address of the cluster is displayed. If this SAN Volume Controller is not assigned to a cluster, the field is blank.

Cluster status

The status option is blank if this SAN Volume Controller is not a member of a cluster. If this SAN Volume Controller is a member of a cluster, the option indicates the operational status of the cluster.

Cluster status:

The operational status of the cluster can be one of the following:

Active Indicates that this SAN Volume Controller is an active member of the cluster.

Inactive
Indicates that the SAN Volume Controller is a member of a cluster, but is not now operational. It is not operational because of one of the following conditions:

- The other SAN Volume Controllers that are in the cluster cannot be accessed.
- This SAN Volume Controller has been excluded from the cluster.

Degraded
Indicates that the cluster is operational, but one or more of the member SAN Volume Controllers are missing or have failed.

Cluster IP address

The IP address option displays the existing Ethernet IP address of the cluster. You use this address to access the cluster from the command line tools or from a web browser. If this SAN Volume Controller is not a member of a cluster, this field is blank. The customer provides the correct IP address for a cluster.

Attention: If you change the IP address, ensure that you type the correct address. Otherwise, you cannot access the cluster using the command line tools or a web browser.

Cluster subnet mask address

The subnet mask option displays the subnet mask address. It is set during the create-cluster operation. The customer provides the subnet mask address for a cluster.

Attention: If you change the subnet mask address, ensure that you type in the correct address. Otherwise, you cannot access the cluster using the command line tools or a web browser.

Gateway

The gateway option displays the gateway address. It is set during the create-cluster operation. The customer provides the gateway address for a cluster.

Attention: If you change the gateway address, ensure that you type in the correct address. Otherwise, you cannot access the cluster using the command line tools or a web browser.

Recover cluster?

The Recover cluster? options are only displayed when recovery actions are valid. There are two secondary options including the service access? option and the password option. However, none of these options are required during installation. For more information about these options, see *IBM TotalStorage: SAN Volume Controller Service Guide*.

Node options

The main node option displays the identification number of the SAN Volume Controller or the name of the SAN Volume Controller if the user has assigned a

name. For more information about node identification, see *IBM TotalStorage Virtualization Family: SAN Volume Controller Service Guide*.

Status option

The status option is blank if this SAN Volume Controller is not a member of a cluster. If this SAN Volume Controller is a member of a cluster, the option indicates the operational status of the cluster.

The status of the cluster is as follows:

Properties:

Active The SAN Volume Controller is operational and assigned to a cluster. It has access to the fibre channel fabric.

Inactive
The SAN Volume Controller is operational and assigned to a cluster. It does not have access to the fibre channel fabric.

Free The SAN Volume Controller is operational, but it has not been assigned to any cluster. It has access to the fibre channel fabric.

Disconnected
The SAN Volume Controller is operational, but it has not been assigned to any cluster. It has no access to the fibre channel fabric.

Failed The SAN Volume Controller is not operational. A hardware failure is preventing the SAN Volume Controller from being part of a cluster.

Node create cluster? option

The create cluster option enables you to create a new SAN Volume Controller cluster. Before you can create a cluster, the customer must provide the IP address, subnet mask address, and gateway address for the cluster. Figure 45 shows the create cluster menu sequence.

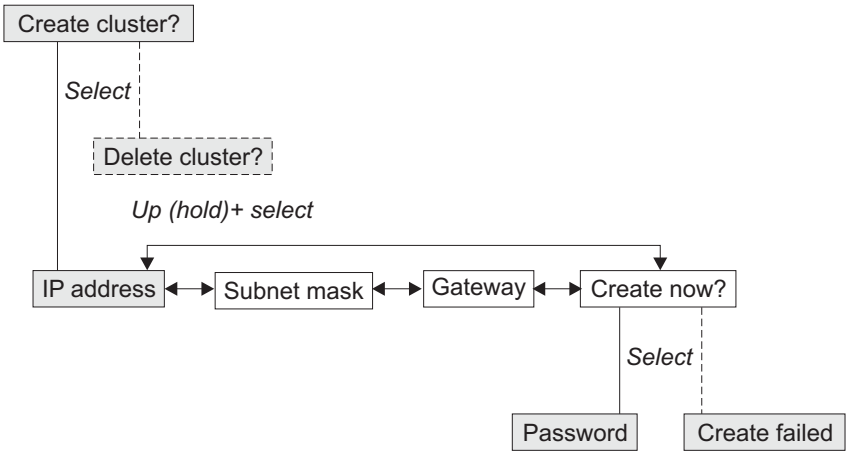


Figure 45. Create cluster? menu sequence

Press the left and right buttons to navigate through the secondary options that are associated the create cluster option. When you have navigated to the desired option, press the select button. The secondary options available include:

- IP address
- Subnet mask

- Gateway
- Create now?

IP address:

The IP address lets you display or change the Ethernet IP address for the cluster that you are going to create. Be sure to verify the correct IP address with the customer before you create a cluster.

Attention: If you change the IP 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 change the IP address:

1. From the create cluster? option, press the select button. The IP address number is displayed.
2. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to quickly increase or decrease the value, hold the up or down button, respectively.
3. Press the right or left buttons to move to the number field that you want to update.
4. Repeat steps 2 and 3 for each number field that you want to update.
5. Press the select button to complete the change.

Press the right button to display the next secondary option or the left button to display the previous options.

Subnet Mask:

This option lets you display or change the subnet mask.

Attention: If you change the 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 change the subnet mask:

1. Press the select button. The first subnet mask number is displayed.
2. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to quickly increase or decrease the value, hold the up or down button, respectively.
3. Press the right or left buttons to move to the number field that you want to update.
4. Repeat steps 2 and 3 for each number field that you want to update.
5. Press the select button to complete the change.

Gateway:

The gateway option lets you display or change the gateway address.

Attention: If you change the gateway address, ensure that you type the correct address. Otherwise, you cannot access the cluster from the Configuration and Service application program.

Perform the following steps to change the gateway address:

1. Press the select button. The first gateway address number is displayed.
2. Press the up button if you want to increase the value that is displayed; press the down button if you want to decrease that value. If you want to quickly increase or decrease the value, hold the up or down button, respectively.
3. Press the right or left buttons to move to the number field that you want to update.
4. Repeat steps 2 and 3 for each number field that you want to update.
5. Press the select button to complete the change.

Create Now?:

This option lets you start an operation to create a cluster. 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.

Attention: The password displays for 60 seconds. Record the password; it is required on the first attempt to access the cluster.

If the create operation fails, `Create Failed:` is displayed in line 1 of the service display screen. An error code is displayed on line 2. See *IBM TotalStorage Virtualization Family: SAN Volume Controller Service Guide* for a description of the error code.

Press the up button to return to the create cluster? option.

Delete Cluster?:

The field for Delete Cluster? is displayed only if you select Create Cluster? on a SAN Volume Controller that is already a member of a cluster. Normally, you can use the command line or the graphical user interface (GUI) to delete a cluster. However, if you cannot use the command line or GUI, you can use Delete Cluster to force the deletion of a node from a cluster. To delete a node from the cluster:

- Press and hold Up
- Press and release Select
- Then release Up

The SAN Volume Controller is deleted from the cluster, and the node is restarted. The display will then return to the default menu. The create cluster option must be selected again to start the create option.

Use the up button to return to the Create Cluster? option.

Password:

The password is displayed for only 60 seconds, or until a front panel button is pressed. The cluster is created only after the password display is cleared.

Attention: The password displays for 60 seconds. Record the password; it is required on the first attempt to access the cluster.

Create Failed:

The create cluster operation has failed. Line 2 of the service displays one of two possible error codes that you can use to isolate the cause of the failure. See the error codes in the *IBM TotalStorage Virtualization Family: SAN Volume Controller Service Guide* for a description of the failure and the appropriate steps you must perform to correct the failure.

Ethernet option

This option displays the operational states of the Ethernet port. When a cluster is created, only one IP address and one Ethernet port in the cluster gain configuration and service access to that cluster. If a loss of access through one port occurs, an alternative port is assigned to manage the configuration and service interface.

The possible states of the Ethernet port are as follows:

Properties:

Active The cluster is accessible through this port.

Inactive
The port is operational, but it is not being used to access the cluster. This port can be used to access the cluster if the cluster active port fails.

Failed The port is not operational.

Fibre channel port–1 through 4 option

The FC port–1 through 4 options display the operational status of the fibre channel ports as follows:

Properties:

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 exists:
- 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, then press the select button, and release the down button. This action also allows you to change the fibre-channel port speed.

Select language? option

The select language option allows you to change the language that is displayed on the menu. Figure 46 on page 38 shows the select language option sequence.

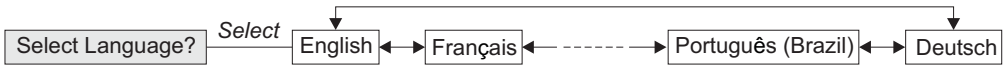


Figure 46. Change-language menu sequence

Press the right button to display the national language that you want. When the required language is displayed, press the select button.

Note: Line 1 of the menu displays an option. For some options, additional data is displayed on line 2. If, the front panel is set to Japanese, Korean, or Chinese, the menu shows only line 1. To display line 2, press the select button. To return to the option on line 1, press the select button again.

The following languages are available:
- English
- French
- German
- Italian
- Japanese
- Korean
- Portuguese
- Spanish
- Chinese (simplified)
- Chinese (traditional)

If you do not understand the language that is displayed, wait for at least 60 seconds until the language option is displayed. To select the required language, perform the following steps:

1. Press the up button once.
2. Press the select button once. If the display changes, go to step 5.
3. Press the up button once.
4. Press the select button once.
5. Press the right button until your required language is displayed.
6. Press the select button.

This procedure will not work if the node is displaying an error.

Appendix. Preparing the physical environment for your SAN Volume Controller

This topic provides information you need to ensure that your physical site meets the installation requirements for the SAN Volume Controller.

Dimensions and weight:

Height	Width	Depth	Approximate Maximum Weight
43 mm	440 mm	660 mm	12.7 kg
(1.7 in.)	(17.3 in.)	(26 in.)	(28 lb)

Additional space requirements:

Location	Additional space required	Reason
Left- and right-hand sides	50 mm (2 in.)	Cooling air flow
Back	100 mm (4 in.) minimum	Cable exit

AC and DC input-voltage requirements:

Power Supply Assembly Type	Voltage	Frequency
220 V	88 to 264 V ac or 240 to 375 V dc	47 to 63 Hz

Environment:

Environment	Temperature	Altitude	Relative humidity	Maximum wet bulb temperature
Operating	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)
	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)	–	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)

Heat output (maximum):

350 watts (1195 Btu per hour)

Related topics:

- "Preparing the physical environment for your uninterruptible power supply"

Preparing the physical environment for your uninterruptible power supply

This topic provides information you need to ensure that your physical site meets the installation requirements for the uninterruptible power supply.

Dimensions and weight:

Height	Width	Depth	Maximum weight
89 mm	483 mm	622 mm	39 kg
(3.5 in.)	(19 in.)	(24.5 in.)	(86 lb)

AC and DC input-voltage requirements:

Power supply assembly type	Voltage	Frequency
220 V	160 to 288 V ac	46 to 64 Hz

Note: The UPS requires a dedicated branch circuit that meets the following specifications:

- A listed 15A circuit breaker must be installed in each branch circuit that supplies the power to a UPS.
- Single-phase.
- 50 to 60 Hz.

Environment:

	Operating environment	Nonoperating environment	Storing environment	Shipping environment
Air temperature	0°C to 40°C (32°F to 104°F)	0°C to 40°C (32°F to 104°F)	0°C to 25°C (32°F to 77°F)	–25°C to 55°C (–13°F to 131°F)
Relative humidity	5% to 95% noncondensing	5% to 95% noncondensing	5% to 95% noncondensing	5% to 95% noncondensing

Altitude:

	Operating environment	Nonoperating environment	Storing environment	Shipping environment
Altitude (from sea level)	0 to 2000 m (0 to 6560 ft)	0 to 2000 m (0 to 6560 ft)	0 to 2000 m (0 to 6560 ft)	0 to 15 000 m (0 to 49 212 ft)

Heat output (maximum):

142 watts (485 Btu per hour) during normal operation.

553 watts (1887 Btu per hour) when power has failed and the uninterruptible power supply is supplying power to the nodes of the SAN Volume Controller.

Related topics:

- "Preparing the physical environment for your SAN Volume Controller", on page 39

Preparing the physical environment for your master console

This topic provides information you need to ensure that your physical site meets the installation requirements for the master console.

Dimensions and weight:

Height	Width	Depth	Approximate Maximum Weight
43 mm	430 mm	424 mm	12.7 kg
(1.75 in.)	(16.69 in.)	(16.54 in.)	(28 lb)
			(depending on your configuration.)

Acoustical noise emissions:

Sound power, idling	Sound power, operating
6.5 bel maximum	6.5 bel maximum

AC and input-voltage requirements:

Power Supply	Electrical input
203 watt (110 or 220 V ac auto-sensing)	Sine-wave input (47–63 Hz) required Input voltage low range: Minimum: 100 V ac Maximum: 127 V ac Input voltage high range: Minimum: 200 V ac Maximum: 240 V ac Input kilovolt-amperes (kVA), approximately: Minimum: 0.0870 kVA Maximum: 0.150 kVA

Environment:

Environment	Temperature	Altitude	Relative humidity
Server on	10° to 35°C (50°F to 95°F)	0 to 914 m (2998.0 ft)	8% to 80%
Server off	Server off: -40°C to 60°C (-104°F to 140°F)	Maximum: 2133 m (6998.0 ft)	8% to 80%

Heat output:

Approximate heat output in British thermal units (Btu) per hour:

- Minimum configuration: 297 Btu (87 watts)
- Maximum configuration: 512 Btu

Related topics:

- "Preparing the physical environment for your uninterruptible power supply" on page 40

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 master 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: JAWS v4.5 and IBM Home Page Reader v3.0.
- You can operate all features using the keyboard instead of the mouse.

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 on a CD that is packaged with the product or you can access them at the following Web site:

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

Related topics:

- “Related information” on page v

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Related topics:

- "Trademarks" on page viii

Electronic emission notices

The following electronic emission statements apply to this product. The statements for other products that are intended for use with this product are included in their accompanying documentation.

Federal Communications Commission (FCC) statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, might cause interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider nor the manufacturer is responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device might not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Japanese Voluntary Control Council for Interference (VCCI) statement

This product is a Class A Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). In a domestic environment, this product might cause radio interference, in which event the user might be required to take adequate measures.

Korean Government Ministry of Communication (MOC) statement

Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you can exchange it for one that is approved for non-business purposes.

New Zealand compliance statement

This is a Class A product. In a domestic environment this product might cause radio interference, in which event the user might be required to take adequate measures.

International Electrotechnical Commission (IEC) statement

This product has been designed and built to comply with (IEC) Standard 950.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Industry Canada compliance statement

This Class A digital apparatus complies with IECS-003.

United Kingdom telecommunications requirements

This apparatus is manufactured to the International Safety Standard EN60950 and as such is approved in the U.K. under approval number NS/G/1234/J/100003 for indirect connection to public telecommunications systems in the United Kingdom.

European Union (EU) statement

This product is in conformity with the protection requirements of EU council directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Neither the provider nor the manufacturer can accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards not supplied by the manufacturer.

Radio protection for Germany

Zulassungsbescheinigung laut Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30, August 1995.

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG das EG–Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Deutschland.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2):

Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.

EN55022 Klasse A Geräte bedürfen folgender Hinweise:

Nach dem EMVG: “Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministeriums für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.” (Auszug aus dem EMVG, Para.3, Abs.4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Nach der EN 55022: “Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Massnahmen durchzuführen und dafür aufzukommen.”

Anmerkung: Um die Einhaltung des EMVG sicherzustellen, sind die Geräte wie in den Handbüchern angegeben zu installieren und zu betreiben.

Taiwan Class A compliance statement

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Glossary

This glossary includes terms for the IBM TotalStorage Virtualization Family SAN Volume Controller. This glossary includes selected terms and definitions from:

A Dictionary of Storage Networking Terminology (http://www.snia.org/education/dictionary), copyrighted 2001 by the Storage Networking Industry Association, 2570 West El Camino Real, Suite 304, Mountain View, California 94040-1313. Definitions derived from this book have the symbol (S) after the definition.

The following cross-references are used in this glossary:

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.

A

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.

C

cache. A high-speed memory or storage device used to reduce the effective time required to read data from or write data to a lower-speed memory or 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.

cluster. In SAN Volume Controller, a pair of nodes that provide a single configuration and service interface.

CIM. See *Common Information Model*.

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.

D

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.

directed maintenance procedures. The set of maintenance procedures that can be run for a cluster. These procedures are documented in the *IBM TotalStorage Virtualization Family SAN Volume Controller: Service Guide*.

disk zone. A zone defined in the SAN fabric in which the SAN Volume Controllers can detect and address the logical units that the disk controllers present.

E

error code. A value that identifies an error condition to a user.

excluded. In SAN Volume Controller, the status of a managed disk that the cluster has excluded from use after repeated access errors.

extent. A unit of data that manages the mapping of data between managed disks and virtual disks.

F

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.

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.

FC. See *fibre channel*.

G

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.

H

HBA. See *host bus adapter*.

host bus adapter (HBA). In SAN Volume Controller, an interface card that connects a host bus, such as a peripheral component interconnect 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 LUN mapping. For each host ID, there is a separate mapping of SCSI IDs to virtual disks.

host zone. A zone defined in the SAN fabric in which the hosts can and address the SAN Volume Controllers.

I

inconsistent. In a Remote Copy relationship, pertains to a secondary virtual disk that is being synchronized with the primary.

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.

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.

IP. See *Internet Protocol*.

I/O. See *input/output*.

I/O group. A collection of virtual disks and node relationships that present a common interface to host systems.

L

local fabric. In SAN Volume Controller, those SAN components (such as switches and cables) that connect the components (nodes, hosts, switches) of the local cluster together.

logical unit (LU). An entity to which SCSI commands are addressed, for example, a virtual disk or managed disk.

logical unit number (LUN). The SCSI identifier of a logical unit within a target. (S)

LU. See *logical unit*.

LUN. See *logical unit number*.

M

managed disk (MDisk). A SCSI logical unit that a RAID controller provides and the cluster manages. The managed disk is not visible to host systems on the SAN.

managed disk group. A collection of managed disks that together contain all the data for a specified set of virtual disks.

mapping. See *FlashCopy mapping*.

MDisk. See *managed disk*.

N

node. One SAN Volume Controller. Each node provides virtualization, cache, and Copy Services to the SAN.

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.

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.

P

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.

R

RAID. See *redundant array of independent disks*.

reliability. The ability of a system to continue to return data even if a component fails.

S

SAN. See *storage area network.*

SCSI. See *Small Computer Systems Interface.*

Small Computer System Interface (SCSI). A standard hardware interface that enables a variety of peripheral devices to communicate with one another.

SNMP. See *Simple Network Management Protocol.*

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.

IBM Subsystem Device Driver (SDD). An IBM pseudo device driver designed to support the multipath configuration environments in IBM products.

U

uninterruptible power supply. A device 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.

V

valid configuration. A configuration that is supported.

VDisk. See *virtual disk.*

virtual disk (VDisk). In SAN Volume Controller, a device that host systems attached to the SAN recognize as a 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.

W

worldwide node name (WWNN). An identifier for an object that is gobally unique. WWNNs are used by fibre channel and other standards.

worldwide port name (WWPN). A unique 64-bit identifier associated with a fibre-channel adapter port. It is assigned in an implementation-and protocol-independent manner.

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Readers' Comments — We'd Like to Hear from You

IBM TotalStorage Virtualization Family
SAN Volume Controller:
Installation Guide
Version 1 Release 1

Publication No. SC26-7541-00

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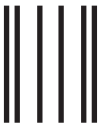

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