

IBM SAN Volume Controller
MTM 2145-DH8, 2145-12F, 2147-12F, 2145-24F,
2147-24F, 2145-92F, and 2147-92F

Hardware Installation Guide



Note

Before using this information and the product it supports, read the following information:

- The general information in “Notices” on page 63
- The information in the “Safety and environmental notices” on page ix
- The information in the *IBM Environmental Notices and User Guide* (provided on a DVD)

This edition applies to IBM Spectrum Virtualize™ for SAN Volume Controller and Storwize® Family Version 7.8.1 and is valid until replaced by new editions.

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Safety and environmental notices

Review the safety notices, environmental notices, and electronic emission notices for IBM® SAN Volume Controller before you install and use the product.

Suitability for telecommunication environment: This product is not intended to connect directly or indirectly by any means whatsoever to interfaces of public telecommunications networks.

To find the translated text for a caution or danger notice, complete the following steps.

1. Look for the identification number at the end of each caution notice or each danger notice. In the following examples, the numbers (C001) and (D002) are the identification numbers.

CAUTION:

A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)

DANGER

A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)
--

2. Locate the *IBM System Storage SAN Volume Controller Safety Notices* with the user publications that were provided with the SAN Volume Controller hardware.
3. Find the matching identification number in the *IBM System Storage SAN Volume Controller Safety Notices*. Then, review the topics about the safety notices to ensure that you are in compliance.
4. (Optional) Read the multilingual safety instructions on the SAN Volume Controller website.
 - a. Go to www.ibm.com/support
 - b. Search for “SAN Volume Controller”
 - c. Click the documentation link

Safety notices and labels

Review the safety notices and safety information labels before using this product.

To view a PDF file, you need Adobe Acrobat Reader. You can download it at no charge from the Adobe website:

www.adobe.com/support/downloads/main.html

IBM Systems Safety Notices

This publication contains the safety notices for the IBM Systems products in English and other languages. Anyone who plans, installs, operates, or services the system must be familiar with and understand the safety notices. Read the related safety notices before you begin work.

Note: The *IBM System Safety Notices* document is organized into two sections. The danger and caution notices without labels are organized alphabetically by language in the “Danger and caution notices by language” section. The danger and caution notices that are accompanied with a label are organized by label reference number in the “Labels” section.

Note: You can find and download the current *IBM System Safety Notices* by searching for Publication number **G229-9054** in the IBM Publications Center.

The following notices and statements are used in IBM documents. They are listed in order of decreasing severity of potential hazards.

Danger notice definition

A special note that emphasizes a situation that is potentially lethal or extremely hazardous to people.

Caution notice definition

A special note that emphasizes a situation that is potentially hazardous to people because of some existing condition, or to a potentially dangerous situation that might develop because of some unsafe practice.

Note: In addition to these notices, labels might be attached to the product to warn of potential hazards.

Finding translated notices

Each safety notice contains an identification number. You can use this identification number to check the safety notice in each language.

To find the translated text for a caution or danger notice:

1. In the product documentation, look for the identification number at the end of each caution notice or each danger notice. In the following examples, the numbers (D002) and (C001) are the identification numbers.

DANGER

A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)

CAUTION:

A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)

2. After you download the *IBM System Safety Notices* document, open it.
3. Under the language, find the matching identification number. Review the topics about the safety notices to ensure that you are in compliance.

Note: This product was designed, tested, and manufactured to comply with IEC 60950-1, and where required, to relevant national standards that are based on IEC 60950-1.

Caution notices for the SAN Volume Controller




Ensure that you understand the caution notices for SAN Volume Controller.

Use the reference numbers in parentheses at the end of each notice (for example, D005) to find the matching translated notice in *IBM System Storage SAN Volume Controller Safety Notices*.

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do not: Throw or immerse into water, heat to more than 100°C (212°F), repair or disassemble. (C003)

CAUTION:

		
33.6-46.3 kg (74-102 lbs)	46.3-61.7 kg (102-136 lbs)	≥61.7-100 kg (136-220 lbs)

svc01053

The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit. (C011)

CAUTION:
To avoid personal injury, before lifting this unit, remove all appropriate subassemblies per instructions to reduce the system weight. (C012)

CAUTION:
The doors and covers to the product are to be closed at all times except for service by trained service personnel. All covers must be replaced and doors closed at the conclusion of the service operation. (C013)

CAUTION:

CAUTION regarding IBM provided VENDOR LIFT TOOL:

- Operation of LIFT TOOL by authorized personnel only
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers). Read and completely understand the contents of LIFT TOOL operator's manual before using.
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's website.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not raise, lower or slide platform load shelf unless stabilizer (brake pedal jack) is fully engaged. Keep stabilizer brake engaged when not in use or motion.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt option flat at all times except for final minor adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads. (C048, part 1 of 2)

- Do not operate while under the influence of drugs or alcohol.
- Do not support ladder against LIFT TOOL.
- Tipping hazard. Do not push or lean against load with raised platform.
- Do not use as a personnel lifting platform or step. No riders.
- Do not stand on any part of lift. Not a step.
- Do not climb on mast.
- Do not operate a damaged or malfunctioning LIFT TOOL machine.
- Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.
- No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.
- Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.
- Do not leave LIFT TOOL machine unattended with an elevated load.
- Watch and keep hands, fingers, and clothing clear when equipment is in motion.
- Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.
- A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury. (C048, part 2 of 2)

CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- (For sliding drawers) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- (For fixed drawers) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

CAUTION:

Removing components from the upper positions in the rack cabinet improves rack stability during a relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building.

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions.
 - Remove all devices in the 32U position and above.
 - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
 - Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 230 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
 - Lower the four leveling pads.
 - Install stabilizer brackets on the rack cabinet.
 - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off the pallet and bolt the rack cabinet to the pallet. (R002)

Danger notices for SAN Volume Controller

Ensure that you are familiar with the danger notices for SAN Volume Controller.

Use the reference numbers in parentheses at the end of each notice (for example, D005) to find the matching translated notice in *IBM System Storage SAN Volume Controller Safety Notices*.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- If IBM supplied a power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
 2. Attach all cables to the devices.
 3. Attach the signal cables to the connectors.
 4. Attach the power cords to the outlets.
 5. Turn on the devices.
- Sharp edges, corners and joints might be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

DANGER

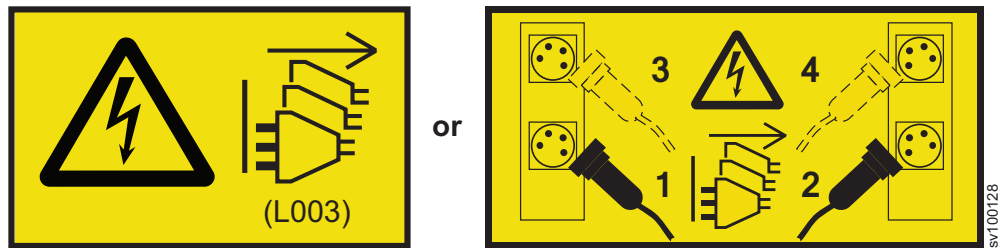
Heavy equipment—personal injury or equipment damage might result if mishandled. (D006)

DANGER

DANGER: Serious injury or death can occur if loaded lift tool falls over or if a heavy load falls off the lift tool. Always completely lower the lift tool load plate and properly secure the load on the lift tool before moving or using the lift tool to lift or move an object. (D010)

DANGER

Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. (L003)



DANGER

Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.



- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)

DANGER

Racks with a total weight of > 227 kg (500 lb.), Use Only Professional Movers! (R003)

DANGER

Do not transport the rack via fork truck unless it is properly packaged, secured on top of the supplied pallet. (R004)

DANGER:



Main Protective Earth (Ground):

This symbol is marked on the frame of the rack.

The PROTECTIVE EARTHING CONDUCTORS should be terminated at that point. A recognized or certified closed loop connector (ring terminal) should be used and secured to the frame with a lock washer using a bolt or stud. The connector should be properly sized to be suitable for the bolt or stud, the locking washer, the rating for the conducting wire used, and the considered rating of the breaker. The intent is to ensure the frame is electrically bonded to the PROTECTIVE EARTHING CONDUCTORS. The hole that the bolt or stud goes into where the terminal conductor and the lock washer contact should be free of any non-conductive material to allow for metal to metal contact. All PROTECTIVE EARTHING CONDUCTORS should terminate at this main protective earthing terminal or at points marked with \perp . (R010)

Special caution and safety notices

This information describes special safety notices that apply to the SAN Volume Controller. These notices are in addition to the standard safety notices supplied and address specific issues relevant to the equipment provided.

General safety

When you service the SAN Volume Controller, follow general safety guidelines.

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

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

Remember: Metal objects are good electrical conductors.

- Wear safety glasses when you are hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.

- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly after you have finished servicing the unit.

Electrical safety

Observe these rules when working on electrical equipment.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
 2. Attach all cables to the devices.
 3. Attach the signal cables to the connectors.
 4. Attach the power cords to the outlets.
 5. Turn on the devices.
- Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.

(D005)

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

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

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

Remember: Another person must be there to switch off the power, if necessary.

- Use only one hand when working with electrical equipment that has the power turned on; keep the other hand in your pocket or behind your back.

Remember: There must be a complete circuit to cause electrical shock. By observing the previous rule, you might prevent a current from passing through your body.

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

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

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

Inspecting the SAN Volume Controller system for unsafe conditions

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

Before you begin

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

About this task

Each device has the required safety items that are installed to protect users and IBM service personnel from injury. Only those items are addressed.

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

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

Electrical hazards (especially primary power)

Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards

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

Mechanical hazards

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

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

Procedure

1. Turn off the SAN Volume Controller system and disconnect the power cord.
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables by using the following steps:
 - a. Ensure that the third-wire ground connector is in good condition. Use a meter to check that the third-wire ground continuity is 0.1 ohm or less between the external ground pin and the frame ground.

- b. Ensure that the power cord is the appropriate type, as specified in the parts listings.
 - c. Ensure that the insulation is not worn or damaged.
- 4. Check for any obvious nonstandard changes, both inside and outside the unit. Use good judgment about the safety of any such changes.
- 5. Check inside the SAN Volume Controller node for any obvious unsafe conditions, such as metal particles, contamination, water or other fluids, or marks of overheating, fire, or smoke damage.
- 6. Check for worn, damaged, or pinched cables.
- 7. Ensure that the voltage that is specified on the product-information label matches the specified voltage of the electrical power outlet. If necessary, verify the voltage.
- 8. Inspect the power-supply assemblies and check that the fasteners (screws or rivets) in the cover of the power-supply unit are not removed or disturbed.
- 9. Check the grounding of the network switch before you connect the SAN Volume Controller system to the storage area network (SAN).

Electrical safety

Observe these rules when working on electrical equipment.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
 2. Attach all cables to the devices.
 3. Attach the signal cables to the connectors.
 4. Attach the power cords to the outlets.
 5. Turn on the devices.
- Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching.

(D005)

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

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

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

Remember: Another person must be there to switch off the power, if necessary.

- Use only one hand when working with electrical equipment that has the power turned on; keep the other hand in your pocket or behind your back.

Remember: There must be a complete circuit to cause electrical shock. By observing the previous rule, you might prevent a current from passing through your body.

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

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

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

Inspecting the SAN Volume Controller system for unsafe conditions

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

Before you begin

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

About this task

Each device has the required safety items that are installed to protect users and IBM service personnel from injury. Only those items are addressed.

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

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

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Primary voltage on the frame can cause serious or lethal electrical shock.

Explosive hazards

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Mechanical hazards

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

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

Procedure

1. Turn off the SAN Volume Controller system and disconnect the power cord.
2. Check the frame for damage (loose, broken, or sharp edges).
3. Check the power cables by using the following steps:
 - a. Ensure that the third-wire ground connector is in good condition. Use a meter to check that the third-wire ground continuity is 0.1 ohm or less between the external ground pin and the frame ground.
 - b. Ensure that the power cord is the appropriate type, as specified in the parts listings.

- c. Ensure that the insulation is not worn or damaged.
4. Check for any obvious nonstandard changes, both inside and outside the unit. Use good judgment about the safety of any such changes.
5. Check inside the SAN Volume Controller node for any obvious unsafe conditions, such as metal particles, contamination, water or other fluids, or marks of overheating, fire, or smoke damage.
6. Check for worn, damaged, or pinched cables.
7. Ensure that the voltage that is specified on the product-information label matches the specified voltage of the electrical power outlet. If necessary, verify the voltage.
8. Inspect the power-supply assemblies and check that the fasteners (screws or rivets) in the cover of the power-supply unit are not removed or disturbed.
9. Check the grounding of the network switch before you connect the SAN Volume Controller system to the storage area network (SAN).

Checking external devices:

Ensure that you complete an external device check before you install or service SAN Volume Controller.

Procedure

To conduct an external device check, complete the following steps.

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. Check the power cords for damage.
4. Check the external signal cables for damage.
5. Check the cover for sharp edges, damage, or alterations that expose the internal parts of the device.
6. Correct any problems that you find.

Checking internal devices:

Ensure that you complete an internal device check before you install or service SAN Volume Controller.

About this task

To conduct the internal device check, use the following steps:

Procedure

1. Check for any non-IBM changes that were made to the device. 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 device for any metal or other contaminants, or any indications of water, other fluid, fire, or smoke damage.
3. Check for any obvious mechanical problems, such as loose components.
4. Check any exposed cables and connectors for wear, cracks, or pinching.

Checking external devices

Ensure that you complete an external device check before you install or service SAN Volume Controller.

Procedure

To conduct an external device check, complete the following steps.

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. Check the power cords for damage.
4. Check the external signal cables for damage.
5. Check the cover for sharp edges, damage, or alterations that expose the internal parts of the device.
6. Correct any problems that you find.

Checking internal devices

Ensure that you complete an internal device check before you install or service SAN Volume Controller.

About this task

To conduct the internal device check, use the following steps:

Procedure

1. Check for any non-IBM changes that were made to the device. 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 device for any metal or other contaminants, or any indications of water, other fluid, fire, or smoke damage.
3. Check for any obvious mechanical problems, such as loose components.
4. Check any exposed cables and connectors for wear, cracks, or pinching.

Checking the grounding of a SAN Volume Controller

Ensure that you understand how to check the grounding of a SAN Volume Controller.

About this task

To test the grounding of a SAN Volume Controller node: Follow the steps for the SAN Volume Controller configuration that you are using. Before you start, confirm that you know the SAN Volume Controller model type. Determine the location of the signal cables that are attached to the SAN Volume Controller.

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

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

Procedure

1. Ensure that the SAN Volume Controller node is powered off. See MAP 5350: Powering off a SAN Volume Controller node in the *IBM SAN Volume Controller Troubleshooting Guide*.
2. Disconnect all signal cables from the SAN Volume Controller node, which includes the following cables:
 - The Fibre Channel cables
 - The Ethernet cable or cables
3. Disconnect the power cable from the site power-distribution unit.
4. Disconnect **both** input power leads from the site power distribution units.
5. Test the grounding continuity between a conductive area on the SAN Volume Controller frame and the ground pin on the plug of each input-power cable.
6. Initiate one of the following procedures after you complete testing the grounding continuity, depending on the outcome of the test.
 - If the test is successful, reconnect any cables that were removed, and power on any SAN Volume Controller nodes that were powered off.
 - If the test was not successful, ensure that all cables are securely connected. If the test still fails, test the individual system components. Before you test the individual components, remove all cables from the components. If any component test fails, replace the component. After you test each component and replace any failing ones, repeat the complete system test by returning to step 1.
 - Test the SAN Volume Controller node, from the frame to the ground pin of the input power receptacle.

Emergency power-off shutdown

The SAN Volume Controller supports emergency power-off (EPO) shutdowns.

Handling static-sensitive devices

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

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its antistatic bag, touch it to an unpainted metal part of the system unit for at least two seconds. (This action removes static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your SAN Volume Controller, without putting it down. If it is necessary to put the device

down, place it onto its static-protective bag. (If your device is an adapter, place it component-side up.) Do not place the device onto the cover of the SAN Volume Controller or onto a metal table.

- Take additional care when you handle devices during cold weather. Indoor humidity tends to decrease in cold weather, causing an increase in static electricity.

Environmental notices

The *IBM Systems Environmental Notices* contains all of the required environmental notices for IBM Systems products in English and other languages.

The *IBM Systems Environmental Notices* (<http://ibm.co/1fBgWFI>) includes statements on limitations, product information, product recycling and disposal, battery information, flat panel display, refrigeration and water-cooling systems, external power supplies, and safety data sheets.

About this guide

This guide describes the SAN Volume Controller 2145-DH8 node and the SAN Volume Controller 2145-24F, 2145-12F, and 2145-92F expansion enclosures, and provides detailed installation instructions.

Use this guide to perform the following tasks:

- Install a new SAN Volume Controller system or extend an existing system.
- Install one or more SAN Volume Controller nodes and SAN Volume Controller expansion enclosures.
- Connect SAN Volume Controller components to a SAN.
- Manage connections to an Ethernet network.
- Verify the completeness of a SAN Volume Controller installation.

The topics within this book provide conceptual, planning, and installation information for the SAN Volume Controller hardware model that was ordered.

Who should use this guide

The intended audience for this guide is the IBM service representative.

This guide should be read by the IBM service representative who is responsible for the initial installation of the SAN Volume Controller.

After the IBM service representative has installed the SAN Volume Controller hardware, use the initialization GUI presented in a web browser of any computer that is directly connected to the technician port to configure the system.

Emphasis

Different typefaces are used in this guide to show emphasis.

The following typefaces are used to show emphasis:

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

SAN Volume Controller library and related publications

Product manuals, other publications, and websites contain information that relates to SAN Volume Controller.

IBM Knowledge Center for SAN Volume Controller

The information collection in the IBM Knowledge Center contains all of the information that is required to install, configure, and manage the system. The information collection in the IBM Knowledge Center is updated between product releases to provide the most current documentation. The information collection is available at the following website:

<http://www.ibm.com/support/knowledgecenter/STPVGU>

SAN Volume Controller library

Unless otherwise noted, the publications in the library are available in Adobe portable document format (PDF) from a website.

ibm.com/shop/publications/order

Click **Search for publications** to find the online publications you are interested in, and then view or download the publication by clicking the appropriate item.

Table 1 lists websites where you can find help, services, and more information.

Table 1. IBM websites for help, services, and information

Website	Address
Directory of worldwide contacts	http://www.ibm.com/planetwide
Support for SAN Volume Controller (2145)	www.ibm.com/support
Support for IBM System Storage® and IBM TotalStorage products	www.ibm.com/support/

Each PDF publication in the Table 2 library is also available in the IBM Knowledge Center by clicking the number in the “Order number” column:

Table 2. SAN Volume Controller library

Title	Description	Order number
<i>IBM SAN Volume Controller Model 2145-SV1 Hardware Installation Guide</i>	The guide provides the instructions that the IBM service representative uses to install the hardware for SAN Volume Controller model 2145-SV1.	GI13-4547
<i>IBM SAN Volume Controller Hardware Maintenance Guide</i>	The guide provides the instructions that the IBM service representative uses to service the SAN Volume Controller hardware, including the removal and replacement of parts.	GC27-2283

Table 2. SAN Volume Controller library (continued)

Title	Description	Order number
<i>IBM SAN Volume Controller Troubleshooting Guide</i>	The guide describes the features of each SAN Volume Controller model, explains how to use the front panel or service assistant GUI, and provides maintenance analysis procedures to help you diagnose and solve problems with the SAN Volume Controller.	GC27-2284
<i>IBM Spectrum Virtualize for SAN Volume Controller and Storwize Family Command-Line Interface User's Guide</i>	The guide describes the commands that you can use from the SAN Volume Controller command-line interface (CLI).	GC27-2287

IBM documentation and related websites

Table 3 lists websites that provide publications and other information about the SAN Volume Controller or related products or technologies. The IBM Redbooks® publications provide positioning and value guidance, installation and implementation experiences, solution scenarios, and step-by-step procedures for various products.

Table 3. IBM documentation and related websites

Website	Address
IBM Publications Center	ibm.com/shop/publications/order
IBM Redbooks publications	www.redbooks.ibm.com/

Related accessibility information

To view a PDF file, you need Adobe Reader, which can be downloaded from the Adobe website:

www.adobe.com/support/downloads/main.html

IBM Publications Center

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

The IBM Publications Center website offers customized search functions to help you find the publications that you need. You can view or download publications at no charge. Access the IBM Publications Center through the following website:

ibm.com/shop/publications/order

Related websites

The following websites provide information about SAN Volume Controller or related products or technologies:

Type of information	Website
SAN Volume Controller support	www.ibm.com/support
Technical support for IBM storage products	www.ibm.com/support/
IBM Electronic Support registration	www-01.ibm.com/support/electronicssupport/

Sending your comments

Your feedback is important in helping to provide the most accurate and highest quality information.

To submit any comments about this book or any other SAN Volume Controller documentation, send your comments by email to starpubs@us.ibm.com. Include the following information in your email:

- Publication title
- Publication form number
- Page, table, or illustration numbers that you are commenting on
- A detailed description of any information that should be changed

How to get information, help, and technical assistance

If you need help, service, technical assistance, or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

Information

IBM maintains pages on the web where you can get information about IBM products and fee services, product implementation and usage assistance, break and fix service support, and the latest technical information. For more information, refer to Table 4.

Table 4. IBM websites for help, services, and information

Website	Address
Directory of worldwide contacts	http://www.ibm.com/planetwide
Support for SAN Volume Controller (2145)	www.ibm.com/support
Support for IBM System Storage and IBM TotalStorage products	www.ibm.com/support/

Note: Available services, telephone numbers, and web links are subject to change without notice.

Help and service

Before calling for support, be sure to have your IBM Customer Number available. If you are in the US or Canada, you can call 1 (800) IBM SERV for help and service. From other parts of the world, see <http://www.ibm.com/planetwide> for the number that you can call.

When calling from the US or Canada, choose the **storage** option. The agent decides where to route your call, to either storage software or storage hardware, depending on the nature of your problem.

If you call from somewhere other than the US or Canada, you must choose the **software** or **hardware** option when calling for assistance. Choose the **software** option if you are uncertain if the problem involves the SAN Volume Controller software or hardware. Choose the **hardware** option only if you are certain the problem solely involves the SAN Volume Controller hardware. When calling IBM for service regarding the product, follow these guidelines for the **software** and **hardware** options:

Software option

Identify the SAN Volume Controller product as your product and supply your customer number as proof of purchase. The customer number is a 7-digit number (0000000 - 9999999) assigned by IBM when the product is purchased. Your customer number should be on the customer information worksheet or on the invoice from your storage purchase. If asked for an operating system, use **Storage**.

Hardware option

Provide the serial number and appropriate 4-digit machine type. For SAN Volume Controller, the machine type is 2145.

In the US and Canada, hardware service and support can be extended to 24x7 on the same day. The base warranty is 9x5 on the next business day.

Getting help online

You can find information about products, solutions, partners, and support on the IBM website.

To find up-to-date information about products, services, and partners, visit the IBM website at www.ibm.com/support.

Before you call

Make sure that you have taken steps to try to solve the problem yourself before you call.

Some suggestions for resolving the problem before calling IBM Support include:

- Check all cables to make sure that they are connected.
- Check all power switches to make sure that the system and optional devices are turned on.
- Use the troubleshooting information in your system documentation. The troubleshooting section of the knowledge center contains procedures to help you diagnose problems.

- Go to the IBM Support website at www.ibm.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Using the documentation

Information about your IBM storage system is available in the documentation that comes with the product.

That documentation includes printed documents, online documents, readme files, and help files in addition to the knowledge center. See the troubleshooting information for diagnostic instructions. The troubleshooting procedure might require you to download updated device drivers or software. IBM maintains pages on the web where you can get the latest technical information and download device drivers and updates. To access these pages, go to www.ibm.com/support and follow the instructions. Also, some documents are available through the IBM Publications Center.

Sign up for the Support Line Offering

If you have questions about how to use and configure the machine, sign up for the IBM Support Line offering to get a professional answer.

The maintenance that is supplied with the system provides support when there is a problem with a hardware component or a fault in the system machine code. At times, you might need expert advice about using a function that is provided by the system or about how to configure the system. Purchasing the IBM Support Line offering gives you access to this professional advice while deploying your system, and in the future.

Contact your local IBM sales representative or your support group for availability and purchase information.

SAN Volume Controller initial installation overview

The installation and configuration of a SAN Volume Controller system requires the completion of various tasks, some of which are normally completed by an IBM service representative.

Use the installation and configuration procedures in the documents that are listed here. Additional publications are included with some of the hardware components.

When planning, installing, and configuring, have the following SAN Volume Controller information or publications available:

- Information center “Planning” section
- Information center “Configuring” section

See the “Support for SAN Volume Controller (2145)” website for access to SAN Volume Controller publications:

www.ibm.com/support

Planning tasks to complete before installing the SAN Volume Controller

Before you install the SAN Volume Controller, you must complete the following planning tasks or have them completed by an IBM service representative or IBM Business Partner:

1. Verify that all the system installation requirements have been met.

Ensure that space and power requirements are met before you begin the installation.

2. Review SAN fabric and zoning guidelines and develop your SAN Volume Controller system, host systems, and storage controllers plan.

This task helps to assure a seamless configuration.

3. Complete all physical planning charts.

Use the following charts and tables:

- Hardware location chart
- Cable connection table
- Configuration data table

The SAN Volume Controller charts and tables are available at the Support for SAN Volume Controller (2145) website:

www.ibm.com/support

You can save, edit, and share the charts and tables between members of the installation team.

Hardware installation tasks that an IBM service representative performs

To install the SAN Volume Controller hardware, an IBM service representative must complete the following tasks:

1. Verify that you have all of the required parts for the installation.

Chapters 2, 3, and 4 of the *IBM SAN Volume Controller Model 2145-DH8 Hardware Installation Guide* include lists of all the parts that are required for installation. The lists include the SAN Volume Controller nodes, SAN Volume Controller expansion enclosures, and associated parts.

2. Install the hardware.

Chapters 2, 3, and 4 describe the procedures for installing the SAN Volume Controller nodes and optional expansion enclosures.

Configuration tasks

To configure a SAN Volume Controller system, you must complete the following tasks or have them completed by an IBM service representative or IBM Business Partner:

1. Register your product.

To receive product support notifications from IBM, you must register your product. To register your product, click **Register** at this website:
www.ibm.com/support

2. Create a system.

Use the System Initialization GUI presented in a web browser of any computer that is directly connected to the technician port for this procedure, which is completed in two phases:

- a. Use the Create Cluster action on the System Initialization GUI accessed via the technician port of one of the SAN Volume Controller nodes that you have installed to create the system.

This procedure is usually performed by an IBM representative or IBM Business Partner using information that the customer provides.

- b. Follow the Setup wizard in the management GUI to perform the initial system configuration.

Chapter 1. Preparing to install the SAN Volume Controller

Before installing the SAN Volume Controller, you must meet the hardware, software, and environmental requirements (including a suitable rack cabinet physical location). Learning about the controls, indicators, operator-information panel, and connectors will prepare you for the installation procedures.

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

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

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

The nodes are always installed in pairs; a minimum of one pair and a maximum of four pairs of nodes constitute a *system*. Each pair of nodes is known as an *I/O group*.

SAN Volume Controller operating environment

To use the system, you must meet the minimum hardware and software requirements and ensure that other operating environment criteria are met.

Minimum requirements

You must set up your SAN Volume Controller operating environment according to the following requirements:

- At least one pair of SAN Volume Controller nodes
- A 19-inch rack-mounted enclosure

SAN Volume Controller 2145-DH8 node features

The SAN Volume Controller 2145-DH8 contains:

- At least one Fibre Channel adapter or one 10 Gbps Ethernet adapter
- Optional second and third Fibre Channel adapters
- 32 GB memory per processor
- One or two eight-core processors
- Dual redundant power supplies
- Up to two SAN Volume Controller expansion enclosures to house optional flash drives
- iSCSI host attachment (1 Gbps Ethernet and optional 10 Gbps Ethernet)
- Supports optional IBM(r) Real-time Compression™

Rack cabinet physical location

Before installing the SAN Volume Controller components, you must ensure that a suitable rack cabinet location is available.

Refer to the “Planning” section of the information center for full details of how to locate the SAN Volume Controller components in a rack cabinet. Key points to consider:

- Plan for the 2145-DH8 nodes to be installed in a cabinet above existing SAN Volume Controller components.
- Do not sandwich less deep units between deeper ones.
- Allow spare rack unit space for cable runs and service access.

SAN Volume Controller 2145-DH8 front panel controls and indicators

The controls and indicators on the front panel are used for power and to indicate information such as system activity, node failures, and node identification.

Figure 1 shows the controls and indicators on the front panel of the SAN Volume Controller 2145-DH8.

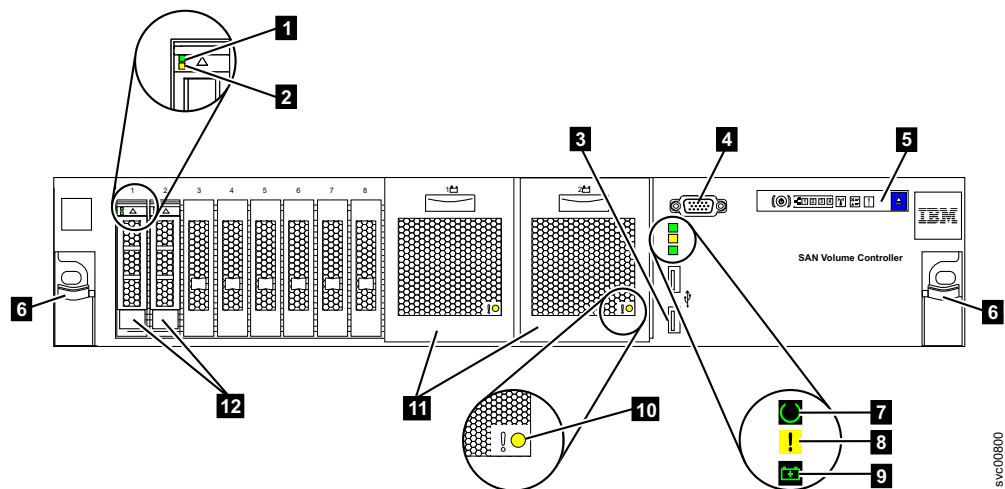


Figure 1. SAN Volume Controller 2145-DH8 front panel

- 1** Hard disk drive activity LED
- 2** Hard disk drive status LED
- 3** USB port
- 4** Video connector
- 5** Operator-information panel
- 6** Rack release latch
- 7** Node status LED
- 8** Node fault LED
- 9** Battery status LED
- 10** Battery fault LED
- 11** Batteries
- 12** Hard disk drives (boot drives)

Node status LED

The node status LED provides the following system activity indicators:

Off The node is not operating as a member of a system.

On The node is operating as a member of a system.

Slow blinking

The node is in candidate or service state.

Fast blinking

The node is dumping cache and state data to the local disk in anticipation of a system reboot from a pending power-off action or other controlled restart sequence.

Node fault LED

A node fault is indicated by the amber node-fault LED.

Off The node does not have any errors that will prevent it from doing I/O or the system software is not running on the node.

On The node has a fatal node error and is not part of the system.

Battery status LED

The green battery status LED indicates one of the following battery conditions.

Off The system software is not running on the node or the state of the system cannot be saved if power to the node is lost.

Fast blinking

Battery charge level is too low for the state of the system to be saved if power to the node is lost. Batteries are charging.

Slow blinking

Battery charge level is sufficient for the state of the system to be saved **once** if power to the node is lost.

On Battery charge level is sufficient for the state of the system to be saved **twice** if power to the node is lost.

Battery fault LED

The amber battery fault LED indicates one of the following battery conditions.

Off The system software is not running on the node or this battery does not have a fault.

Blinking

This battery is being identified.

On This battery has a fault. It cannot be used to save the system state if power to the node is lost.

Hard disk drive activity LED

The green drive activity LED indicates one of the following conditions.

Off The drive is not ready for use.

Flashing

The drive is in use.

On The drive is ready for use, but is not in use.

Hard disk drive status LED

The amber drive status LED indicates one of the following conditions.

Off The drive is in a good state or has no power.

Blinking

The drive is being identified.

On The drive has failed.

SAN Volume Controller 2145-DH8 operator-information panel

The operator-information panel contains buttons and indicators such as the power-control button, and LEDs that provide system information.

Figure 2 shows the operator-information panel for the SAN Volume Controller 2145-DH8.

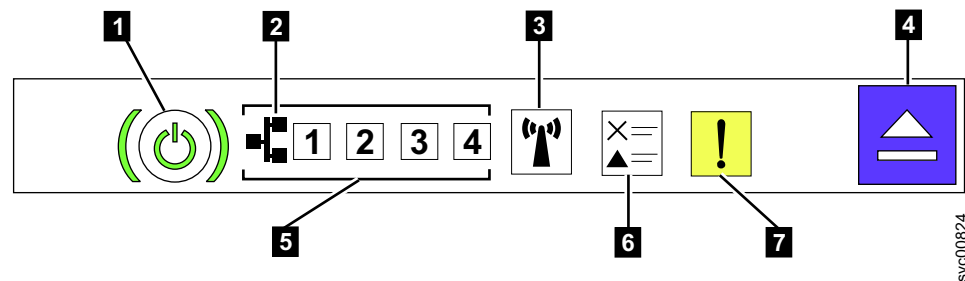


Figure 2. SAN Volume Controller 2145-DH8 operator-information panel

- 1** Power-control button and power-on LED
- 2** Ethernet icon
- 3** Identify button and LED
- 4** Release latch for the light path diagnostics panel
- 5** Ethernet activity LEDs
- 6** Check log LED
- 7** System-error LED

Note: If the node has more than 4 Ethernet ports, activity for ports 5 and above is not indicated by the Ethernet activity LEDs on the operator-information panel.

Power LED

The green power LED indicates one of the following power conditions.

Off One or more of the following are true:

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

On The SAN Volume Controller node is turned on.

Blinking

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

Power button

The power button turns main power on or off for the SAN Volume Controller.

- To turn on the power, press and release the power button. You must have a pointed device, such as a pen, to press the button.
- To turn off the power, press and release the power button. For more information about how to turn off the SAN Volume Controller node, see MAP 5350: Powering off a SAN Volume Controller node.

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

Ethernet activity LEDs

The Ethernet activity LEDs indicate that the server is transmitting to or receiving signals on the Ethernet ports. Each LED corresponds to a specific port, and indicates traffic to or from the Ethernet LAN that is connected to that port.

Ethernet activity LED 4 is for activity on the Technician port. Use the Service Assistant GUI to see activity on this port.

Identify button and LED

Press the identify button to make the LED blink. The identify LED on the back of the 2145-DH8 also blinks.

In the management GUI, select **Monitoring > System**. Right-click the node and select **Identify**. The Identify LED turns on.

System error LED

The amber system-error LED indicates that a system-board error has occurred. It lights up if the hardware detects a fatal error that requires a new field-replaceable unit (FRU).

Note: See MAP 5800: Light path to help you isolate the faulty FRU.

System information LED

The system-information LED indicates that a noncritical event has occurred. Check the light path diagnostics panel and the event log. Light path diagnostics are described in more detail in the light path maintenance analysis procedure (MAP).

Release latch

The release latch gives you access to the light-path diagnostics panel, which you can use to determine the location of a problem.

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

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

SAN Volume Controller 2145-DH8 rear-panel indicators

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

Figure 3 shows the rear-panel indicators on the SAN Volume Controller 2145-DH8 back-panel assembly.

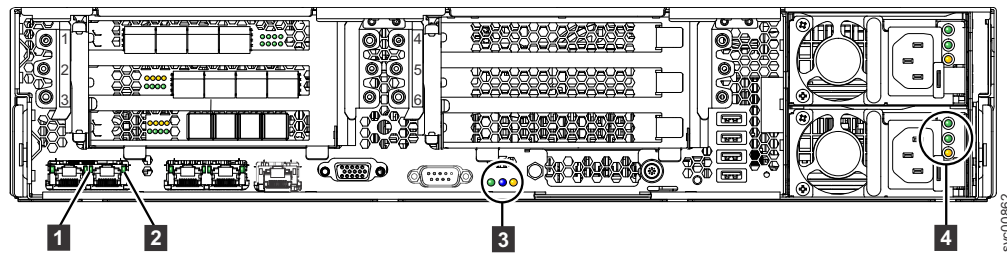


Figure 3. SAN Volume Controller 2145-DH8 rear-panel indicators

- 1** Ethernet-link LED
- 2** Ethernet-activity LED
- 3** Power, location, and system-error LEDs
- 4** AC, DC, and power-supply error LEDs

Fibre Channel LEDs

The Fibre Channel LEDs indicate the status of the Fibre Channel ports on the SAN Volume Controller 2145-DH8 node.

The SAN Volume Controller 2145-DH8 uses two light-emitting diodes (LEDs) per Fibre Channel port, which are arranged one above the other. The LEDs are arranged in the same order as the ports. Figure 4 on page 7 shows the location of the LEDs.

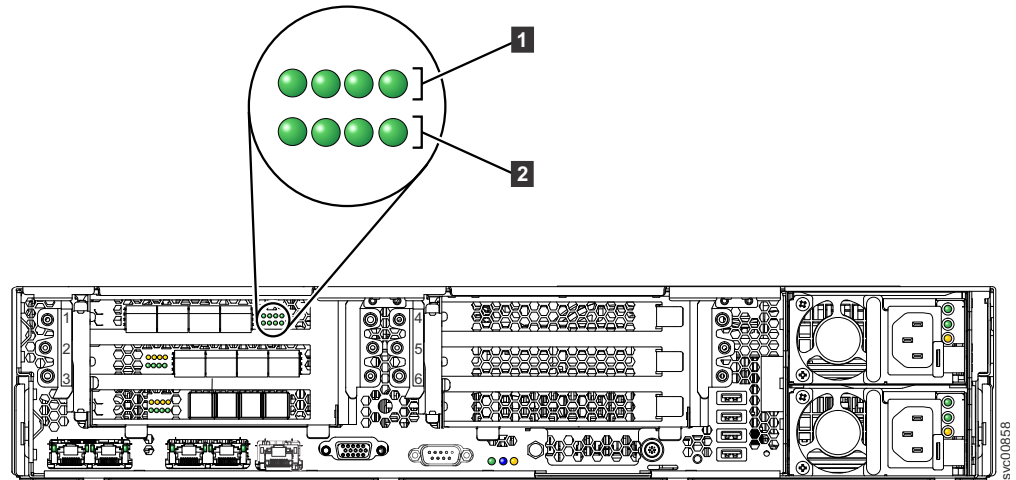


Figure 4. Fibre Channel LEDs

- 1** Link speed LEDs
- 2** Link activity LEDs

The following table lists the link status values for the Fibre Channel LEDs.

Table 5. Link status values for Fibre Channel LEDs

Top LED (link speed)	Bottom LED (link activity) Flashing indicates I/O activity.	Link status
Off	Off	Inactive
Off	On / Flashing	Active 2 Gbps
Blinking	On / Flashing	Active 4 Gbps
On	On / Flashing	Active 8 Gbps
Note: To accommodate the different Fibre Channel speed ranges, LEDs are effectively OFF=slow, FLASHING=medium, and ON=fast.		

AC, DC, and power-supply error LEDs

The AC, DC, and power-supply error LEDs indicate whether the node is receiving electrical current.

Figure 5 on page 8 shows the location of the SAN Volume Controller 2145-DH8 AC, DC, and power-supply error LEDs.

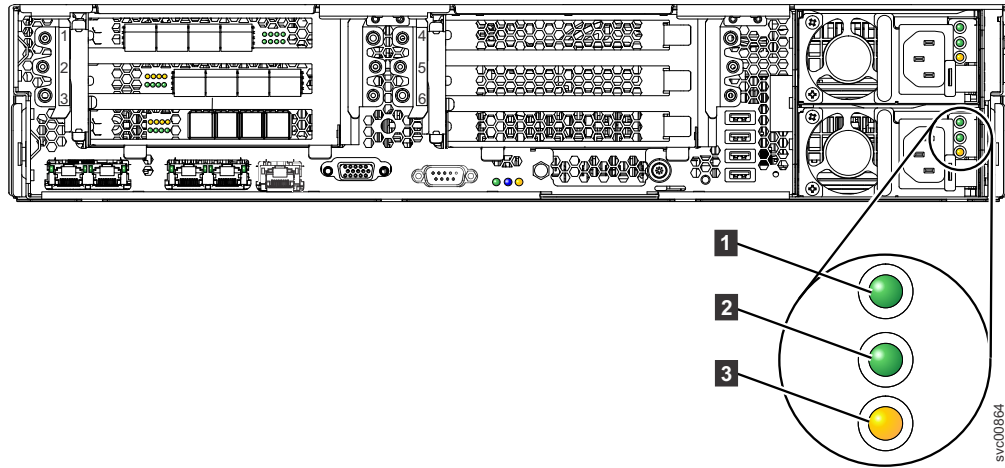


Figure 5. SAN Volume Controller 2145-DH8 AC, DC, and power-error LEDs

Each of the two power supplies has its own set of LEDs.

- 1** Indicates that AC current is present on the node.
- 2** Indicates that DC current is present on the node.
- 3** Indicates a problem with the power supply.

Power, location, and system-error LEDs

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

Figure 6 shows the location of the LEDs.

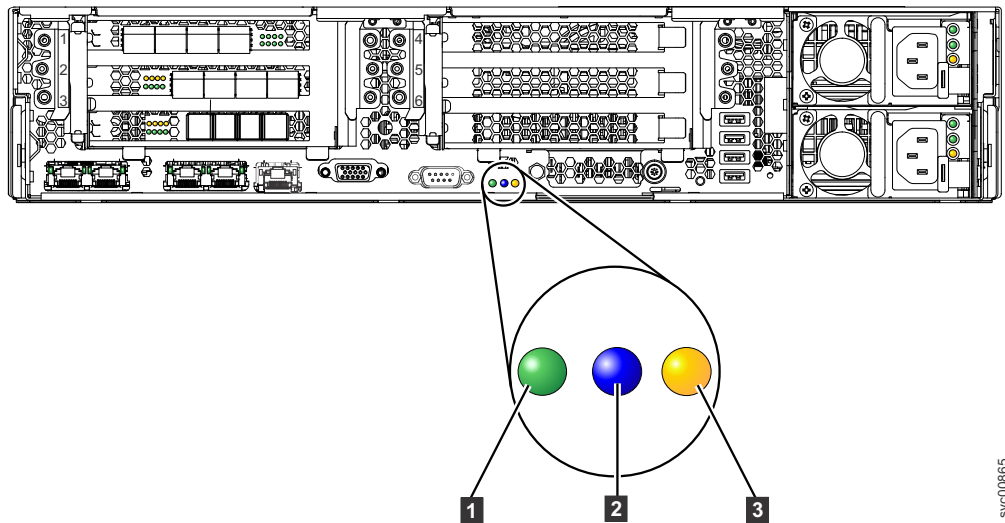


Figure 6. Power, location, and system-error LEDs

1 Power LED

This LED is the leftmost of the three LEDs and indicates the following states:

- Off** One or more of the following are true:
 - No power is present at the power supply input.

- The power supply has failed.
- The LED has failed.

On The SAN Volume Controller is on.

Flashing

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

2 Location LED

This LED is used to visually locate SAN Volume Controller 2145-DH8 nodes from other nodes on the system. This LED is the same as the system-locator LED on the front of the node.

3 System-error LED

This LED is the rightmost of the three LEDs. The LED indicates that a system board error has occurred. Light path diagnostics provide more information about the error.

SAN Volume Controller 2145-DH8 Ethernet port LEDs

Ethernet link and activity LEDs indicate the status of each Ethernet port.

- An Ethernet-link LED indicates that the node is communicating on the network that is connected to the port.
- An Ethernet-activity LED indicates an active connection on the port.

Ethernet ports on the system board

The operator-information panel LEDs refer to the Ethernet ports that are mounted on the system board (Figure 7).

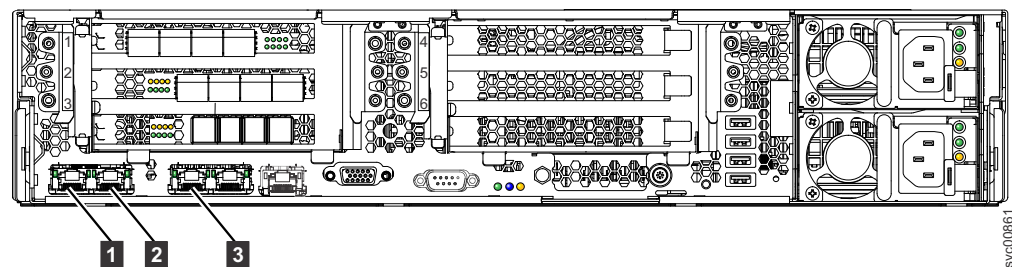


Figure 7. Ethernet ports on the system board

- 1** 1 Gbps Ethernet port 1
- 2** 1 Gbps Ethernet port 2
- 3** 1 Gbps Ethernet port 3

The status of these ports is also indicated by LEDs beside each port (Figure 8 on page 10).

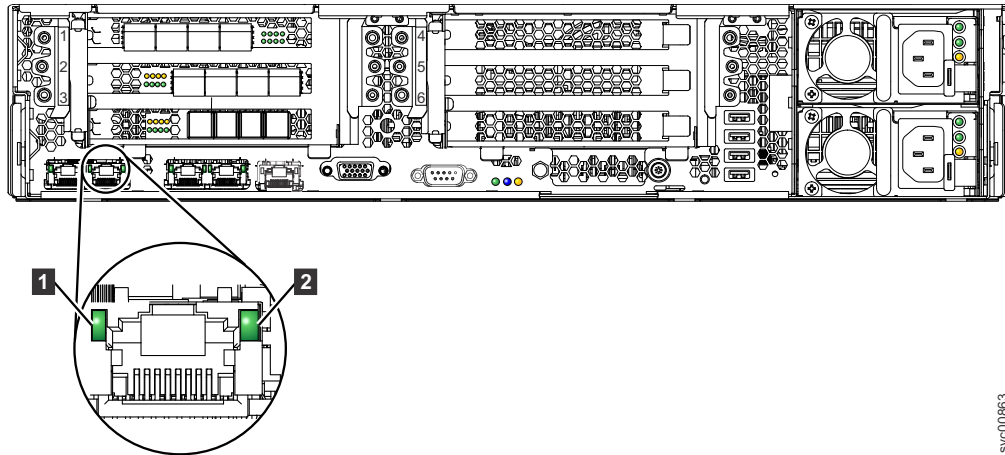


Figure 8. Ethernet port LEDs on the system board

- 1** Ethernet link LED
- 2** Ethernet activity LED

The Ethernet-link LED indicates that the node is communicating on the network that is connected to the port. The Ethernet-activity LED indicates an active connection on the port.

Ethernet ports on a 10 Gbps Ethernet adapter

If the SAN Volume Controller 2145-DH8 is equipped with a 10 Gbps Ethernet adapter, the port activity is not reflected on the activity LEDs of the operator-information panel. The activity of those ports is indicated by LEDs on the adapter itself, which are visible from the rear of the SAN Volume Controller 2145-DH8 (as shown in Figure 9). The adapter has two LEDs per port, arranged one above the other. These pairs of LEDs are arranged in the same order as the ports.

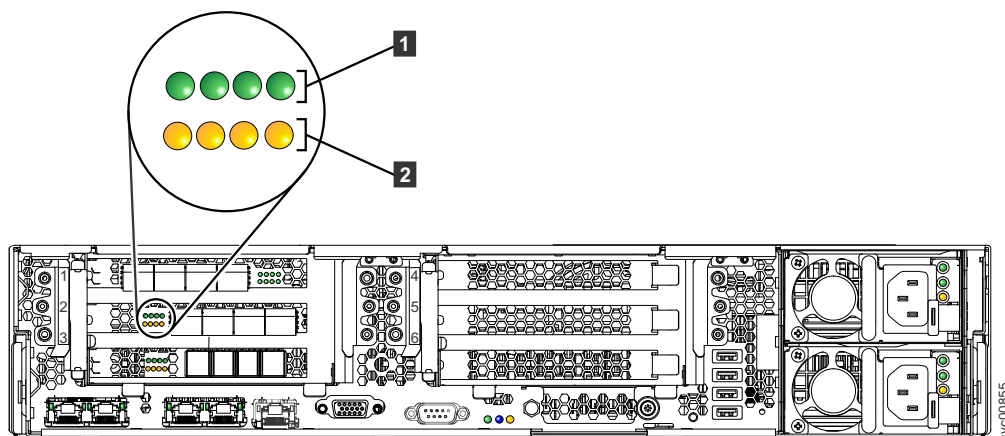


Figure 9. Ethernet port LEDs on a 10 Gbps Ethernet adapter

- 1** 10 Gbps Ethernet-link LEDs.
- 2** 10 Gbps Ethernet-fault LEDs.

SAN Volume Controller 2145-DH8 connectors

The SAN Volume Controller 2145-DH8 includes multiple external connectors for data, video, and power.

Figure 10 shows the external connectors on the SAN Volume Controller 2145-DH8 back panel assembly.

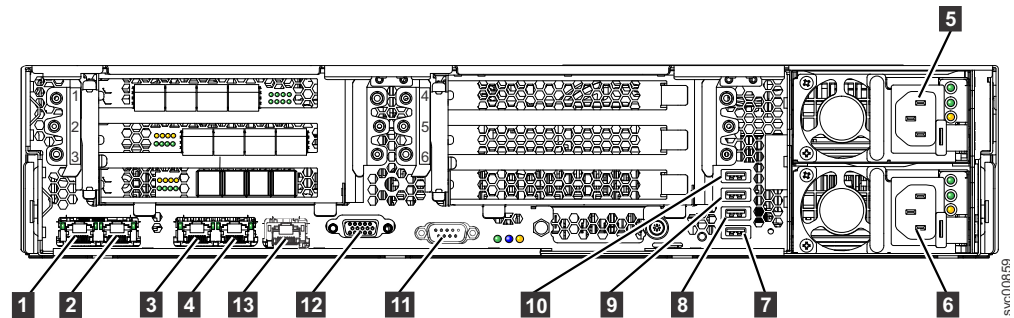


Figure 10. Connectors on the rear of the SAN Volume Controller 2145-DH8

- 1** 1 Gbps Ethernet port 1
- 2** 1 Gbps Ethernet port 2
- 3** 1 Gbps Ethernet port 3
- 4** Technician port (Ethernet)
- 5** Power supply 2
- 6** Power supply 1
- 7** USB 6
- 8** USB 5
- 9** USB 4
- 10** USB 3
- 11** Serial
- 12** Video
- 13** Unused Ethernet port

Figure 11 shows the type of connector that is located on each power-supply assembly.

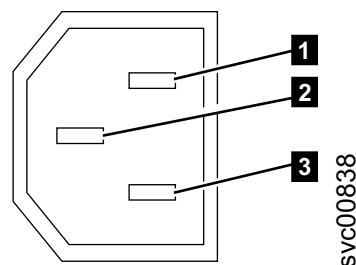


Figure 11. Power connector

- 1** Neutral
- 2** Ground
- 3** Live

Note: Optional host interface adapters provide additional connectors for 10Gbps Ethernet, Fibre Channel, or SAS.

SAN Volume Controller 2145-DH8 ports used during service procedures

The SAN Volume Controller 2145-DH8 contains a number of ports that are only used during service procedures.

Figure 12 shows ports that are used only during service procedures.

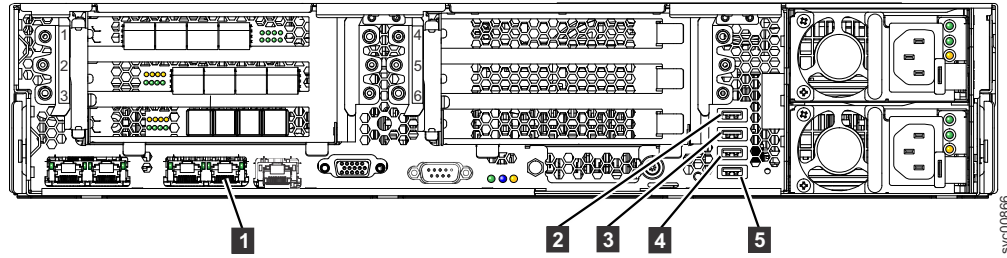


Figure 12. SAN Volume Controller 2145-DH8 service ports

- 1** Technician port (Ethernet)
- 2** USB 3
- 3** USB 4
- 4** USB 5
- 5** USB 6

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

SAN Volume Controller 2145-DH8 unused ports

The SAN Volume Controller 2145-DH8 includes one port that is not used.

Figure 13 shows the one port that is not used during service procedures or normal operation. This port is disabled in software to make the port inactive.

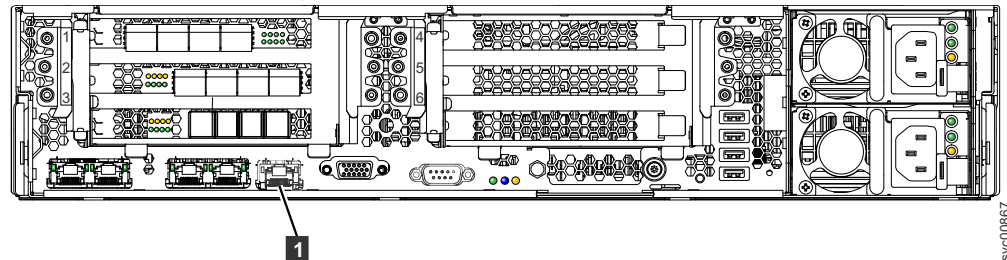


Figure 13. SAN Volume Controller 2145-DH8 unused Ethernet port

- 1** Unused Ethernet port

SAN Volume Controller 2145-DH8 Fibre Channel port numbers

Fibre Channel port numbers for the SAN Volume Controller 2145-DH8 vary, depending on how many host interface adapters have been installed, and in which slots.

Figure 14 shows the physical Fibre Channel port numbers for a SAN Volume Controller 2145-DH8 with a single Fibre Channel host interface adapter installed in slot 1.

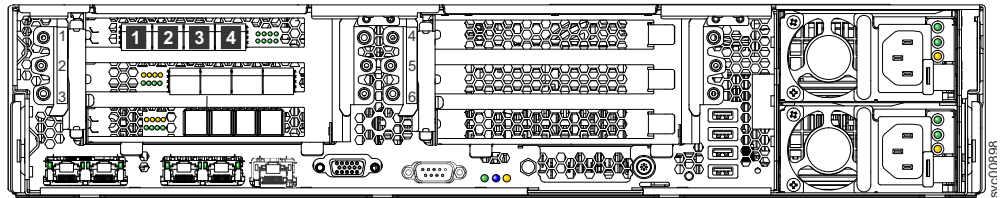


Figure 14. Physical Fibre Channel port numbers with a host interface adapter in slot 1

Figure 15 shows the physical Fibre Channel port numbers for a SAN Volume Controller 2145-DH8 with a single Fibre Channel host interface adapter installed in slot 2.

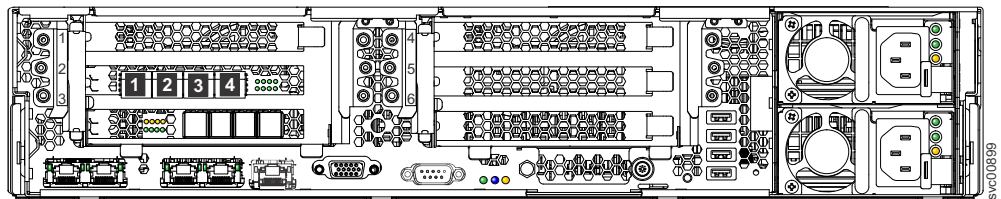


Figure 15. Physical Fibre Channel port numbers with a host interface adapter in slot 2

Figure 16 shows the physical Fibre Channel port numbers for a SAN Volume Controller 2145-DH8 with Fibre Channel host interface adapters installed in slots 1 and 2.

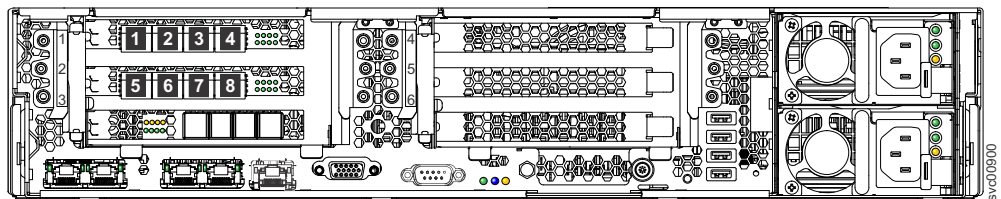


Figure 16. Physical Fibre Channel port numbers with host interface adapters in slots 1 and 2

Figure 17 on page 14 shows the physical Fibre Channel port numbers for a SAN Volume Controller 2145-DH8 with Fibre Channel host interface adapters installed in slots 1, 2, and 5.

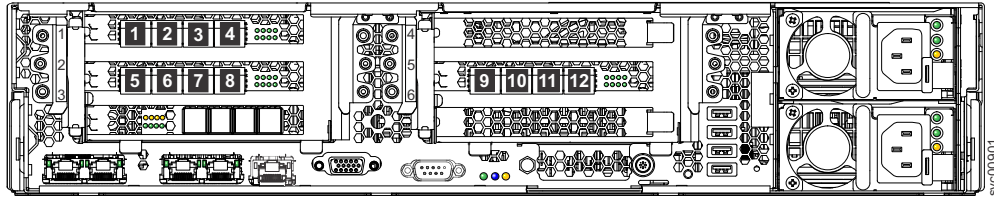


Figure 17. Physical Fibre Channel port numbers with host interface adapters in slots 1, 2, and 5

Figure 18 shows the physical Fibre Channel port numbers for a SAN Volume Controller 2145-DH8 with Fibre Channel host interface adapters installed in slots 1, 2, 3, and 5.

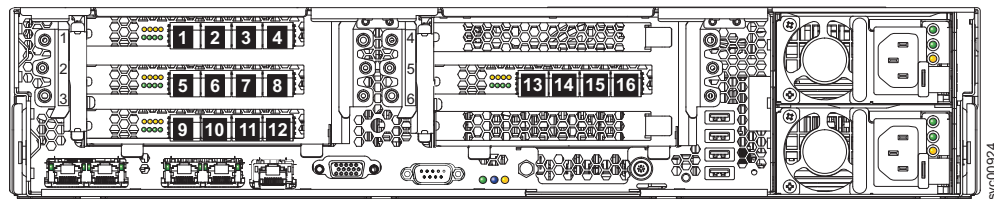


Figure 18. Physical Fibre Channel port numbers with host interface adapters in slots 1, 2, 3, and 5

Chapter 2. Installing the SAN Volume Controller 2145-DH8 hardware

There are several steps that you must complete to prepare, and then install the SAN Volume Controller hardware.

Before you begin

Note: If you are adding a new I/O group to an existing system, there is no need to turn off the existing, operating system nodes.

Procedure

To install the SAN Volume Controller hardware, complete the following steps.

1. Prepare for the hardware installation by confirming that you have all the planning information and parts that you require.
2. Install the support rails for the nodes.
3. Install the cable-management arms for the nodes.
4. Install the nodes.
5. Optionally install the expansion enclosures.
6. Connect the Fibre Channel and Ethernet cables to the nodes.
7. Optionally connect the nodes to the expansion enclosures.
8. Verify that the nodes are operational.

Results

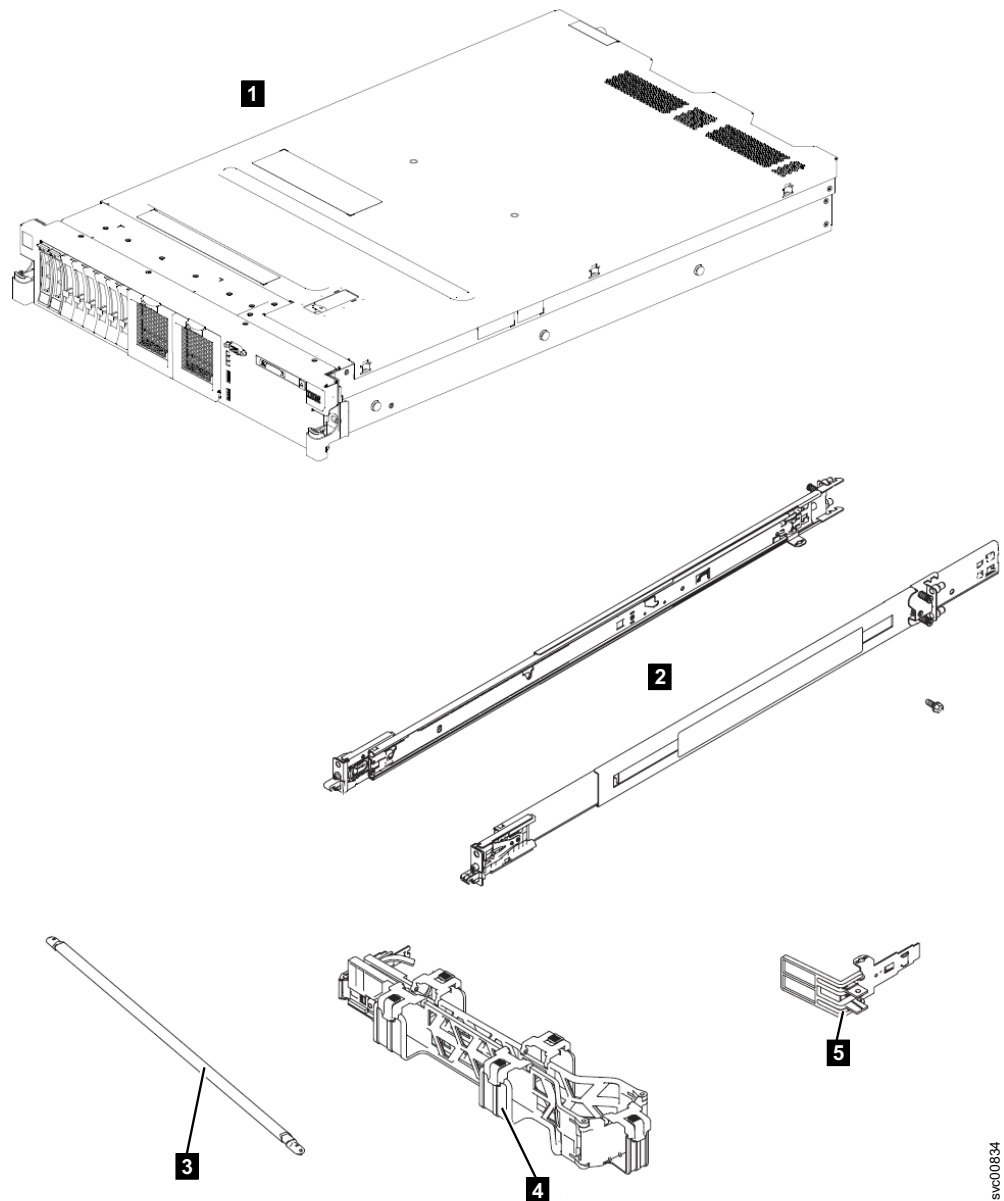
After you finish these steps, the hardware installation is complete. The customer is responsible for all configuration tasks.

Preparing for the SAN Volume Controller 2145-DH8 hardware installation

You must prepare for the installation of the SAN Volume Controller.

Before you begin

Figure 19 on page 16 shows the major hardware components required.



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Figure 19. Parts provided for SAN Volume Controller 2145-DH8 hardware installation in a rack

- 1** SAN Volume Controller 2145-DH8 node
- 2** SAN Volume Controller 2145-DH8 support rails
- 3** SAN Volume Controller 2145-DH8 cable-management support bar
- 4** SAN Volume Controller 2145-DH8 cable-management arm assembly
- 5** SAN Volume Controller 2145-DH8 cable-management stop bracket

Country-specific power cables come with the SAN Volume Controller node. These cables are intended for your country-specific power sockets.

Before you start the installation, verify that all the parts that were ordered have been received and that all the optional features are fitted. Verify that you know the quantity of nodes and optional features that were ordered.

A label on the main box indicates the features that were shipped.

Note: You must install at least two SAN Volume Controller nodes.

Procedure

To prepare for installation, complete the following steps.

1. Ensure that you have everything you need for installation, including the planning tables and charts. You can obtain the planning tables and charts from www.ibm.com/support. The planning information provides guidelines for completing the planning tables and charts. These tables include the location of hardware, cable connection, and configuration data information that you need to complete the installation procedures. Go no further with these instructions until you are satisfied that all the information is correct and valid.
2. The label on the main box indicates features that were shipped. Make sure that the contents and quantity match the order. The following feature codes are included:
 - Each of the following:
 - Feature code 3001: initial SAN Volume Controller 2145-DH8 node, quantity 1
 - Feature code 3002: additional SAN Volume Controller 2145-DH8 node, quantity 1
 - Optional features as listed in “Optional features”.
 - One of the following country-specific SAN Volume Controller 2145-DH8 power cable feature codes: 9716, 9717, 9718, 9719, 9720, 9721, 9722, 9723, 9725, 9726, 9731, 9732, 9733, 9734, 9735, 9736, or 9737.
3. Check that the correct part set has been shipped for the feature codes. Unless otherwise stated, the feature code contents are in the main box.
 - Feature codes 3001 and 3002 ship the same parts. Verify that you have the listed parts:
 - SAN Volume Controller 2145-DH8 node
 - Part number 81Y6821: SAN Volume Controller 2145-DH8 Support rail kit, quantity 1
 - Part number 69Y1192: SAN Volume Controller 2145-DH8 Cable-management arm assembly, quantity 1
 - The support rail kit contains a number of components within its box. Verify that you have the following items:
 - One left side rail
 - One right side rail
 - Four M6 screws
 - Feature codes 9716, 9717, 9718, 9719, 9720, 9721, 9722, 9723, 9725, 9726, 9731, 9732, 9733, 9734, 9735, 9736, and 9737 each ship a single power cable. Use the power plug that is appropriate to your location unless you are connecting to a rack-mounted power distribution unit.
 - SAN Volume Controller publications: ship group (one box of publications per pair of 2145-DH8 nodes):
 - SAN Volume Controller Publications CD
 - *SAN Volume Controller Read First*
 - *IBM Systems Safety Notices* CD
 - *IBM SAN Volume Controller Model 2145-DH8 Hardware Installation Guide*

- *SAN Volume Controller License Information for SAN Volume Controller CD*
- *SAN Volume Controller Statement of Limited Warranty flyer*
- *Environmental Notices CD*
- IBM license information for machine code
- Other miscellaneous flyers

If feature codes 5305, or 5325 are not ordered for Fibre Channel connection, you must supply your own fiber-optic Fibre Channel cables. Make sure that four cables per adapter are available.

If feature code AH12 is ordered, and feature codes 5305 and 5325 or ACSS are not ordered for Ethernet connection, the customer must supply their own OM2 or OM3 fiber-optic cables. Make sure that four cables per node are available.

At least one network adapter feature code AH10, AH11, AH14, or AH12 is fitted in each 2145-DH8.

Note: Part numbers and feature codes are subject to change between SAN Volume Controller releases. The numbers listed here might not always reflect what you receive.

Installing the SAN Volume Controller 2145-DH8

You must complete several tasks to install the SAN Volume Controller 2145-DH8 node.

About this task

Installing a SAN Volume Controller 2145-DH8 node consists of the following tasks:

1. Installing the support rails in the rack cabinet.
2. Installing the node in the rack.
3. Installing the cable-management arm in the rack cabinet.

Important: Do not connect the power to the node until the day that you will be powering it on by pressing the power button. The batteries can become discharged if the node is connected to power, but not powered on. To prevent this from happening, complete the appropriate steps from Table 6.

Table 6. Preventing the batteries from discharging

In this situation . . .	Complete the following steps
You connect the power to the node, but might not power it on by pressing the power button on the same day.	<ol style="list-style-type: none"> 1. Pull both batteries out of the node. Keep them out until you're ready to power on the node. Refer to "Removing the SAN Volume Controller 2145-DH8 battery". 2. Push the batteries in just before you press the power button to power on the node. Refer to "Replacing the SAN Volume Controller 2145-DH8 battery".
You power off the node, and might not power it on the same day.	<ol style="list-style-type: none"> 1. Pull both batteries out of the node. Keep them out until you're ready to power on the node. 2. Push the batteries in before you press the power button to power on the node.

Table 6. Preventing the batteries from discharging (continued)

In this situation . . .	Complete the following steps
You disconnect the power from the node, and might not reconnect power to it again on the same day.	<ol style="list-style-type: none"> 1. After both power cords are disconnected from the node, pull both batteries out of the node. This step completely turns off the battery backplane. 2. Push the batteries back in. They should now maintain charge for many months as long as the enclosure is not connected to power.

Installation guidelines

Before you install the support rails for the 2145-DH8 node, review the following guidelines.

- Do not install a unit in a rack where the internal-rack ambient temperature exceeds the maximum manufacturer-recommended ambient temperature for *any* of your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Ensure that the equipment is connected properly to the supply circuit so that the circuits do not overload and compromise the supply wiring or overcurrent protection.
- Plan the device installation by starting at the bottom of the rack cabinet to ensure that the rack is stable and cannot tip over.
- Install the heaviest device in the bottom of the rack cabinet.

Installing the support rails: 2145-DH8

Before you can install a SAN Volume Controller 2145-DH8 node, you must install the support rails.

Procedure

To install the support rails, complete the following steps.

1. Select an available 2U space (depending on the node you are installing) in your rack to install your node, as shown in Figure 20 on page 20.

Note: When you install a SAN Volume Controller 2145-DH8, be sure to install the slide rails in the bottom U of the 2U area in the rack.

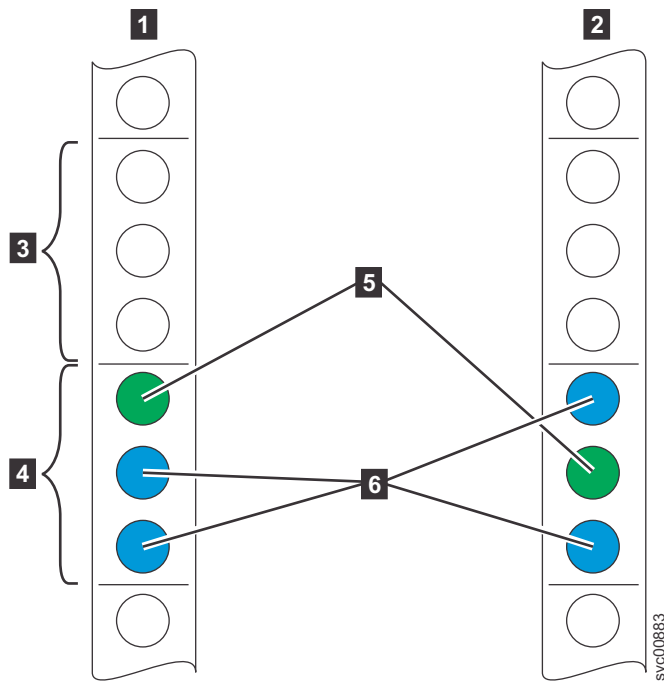


Figure 20. Identifying rack space

- 1** Front
- 2** Rear
- 3** Upper U (for 2U system)
- 4** Lower U
- 5** Optional screws for securing enclosure to rack
- 6** Pins

2. Open the rear-slide-rail hooks, as shown in Figure 21 on page 21.
 - a. Each slide rail is marked with either an R (right) or an L (left).
 - b. Select one of the slide rails and pull the rear bracket all the way back until the spring-loaded hooks open.

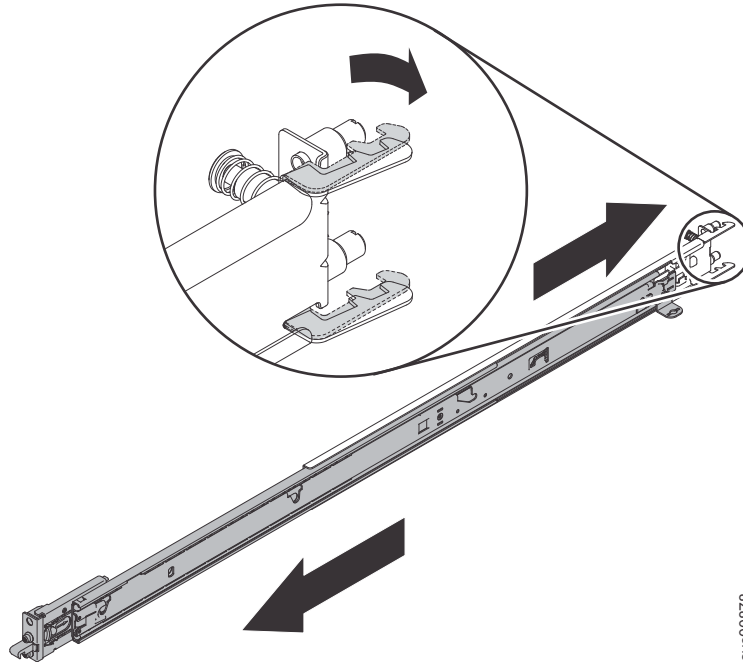


Figure 21. Opening the rear slide-rail hooks

3. Install the rear end of the slide rails, as shown in Figure 22 on page 22.
 - a. From the front of the rack, line up the two pins on the rear of the slide rail with the rear of the rack.
 - b. Push the rails so that the pins go into the holes, then slide the rails into the rack to lock the rear of the slide rails into the rack.

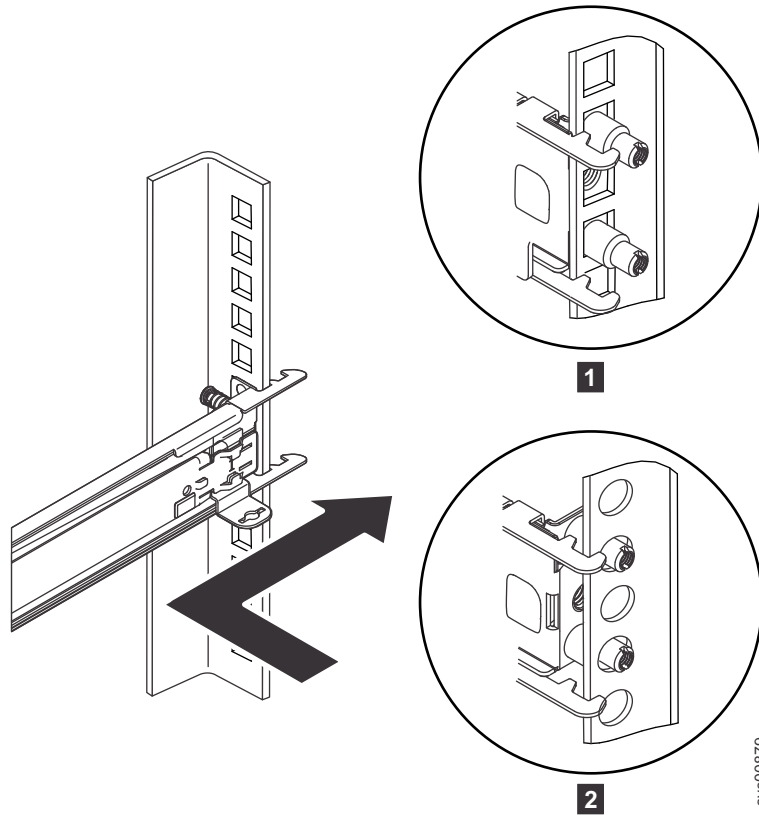


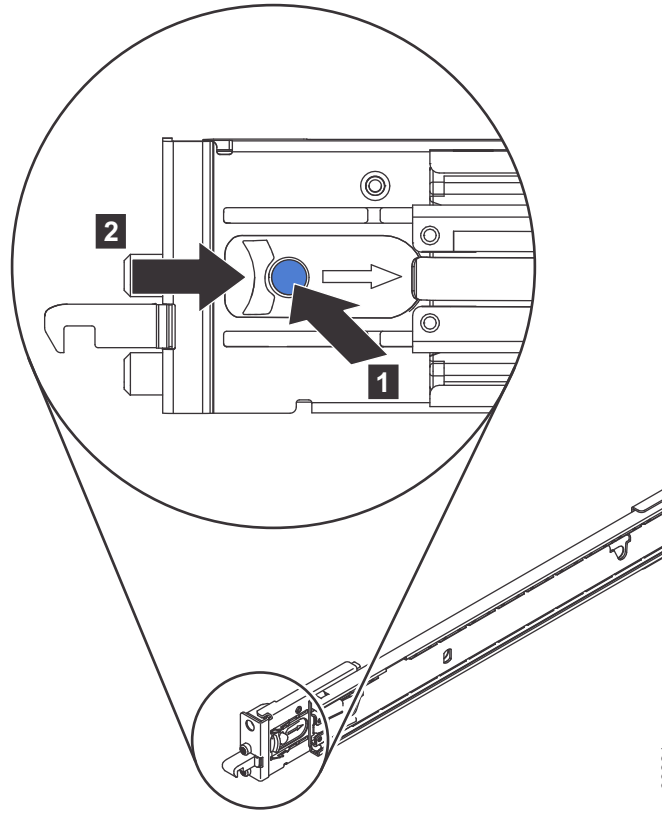
Figure 22. Installing rear end of slide rail

1 Square-hole rack

2 Round-hole rack

4. If they are closed when you receive them, open the latches by pushing the blue button **1** in and pushing the latch **2** back, as shown in Figure 23 on page 23.

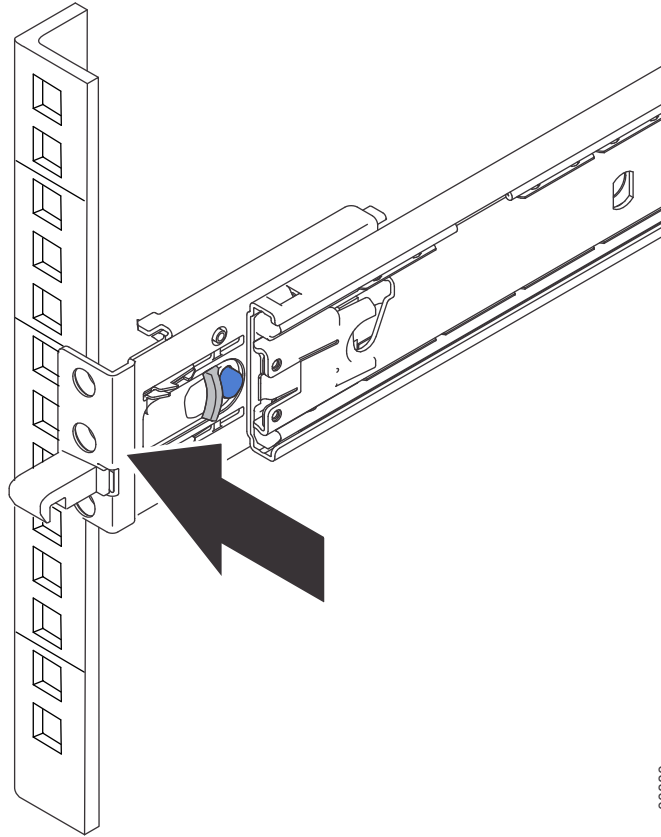
Note: If your slide rails are shipped with the front latches in the open position, skip this step and go to step 5 on page 23.



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Figure 23. Opening the front slide rail latch

5. Align front of slide rails, as shown in Figure 24 on page 24.
 - a. Pull the slide rails forward and locate the front latches in the appropriate U spaces in front of the rack EIA rails.
 - b. Adjust the length of the rail as needed.
 - c. Make sure that the front end is being rotated into position with the front latch in front of the EIA rail of the rack.



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Figure 24. Aligning front of slide rail to rack front

6. Install the front end of the slide rails, as shown in Figure 25 on page 25.
 - a. Press the blue button to close the bracket with the pins.
 - b. Move the slide rail up and down to ensure that the rail is fully engaged.
 - c. Push the front latch in all the way, and make sure that the latch is fully engaged.

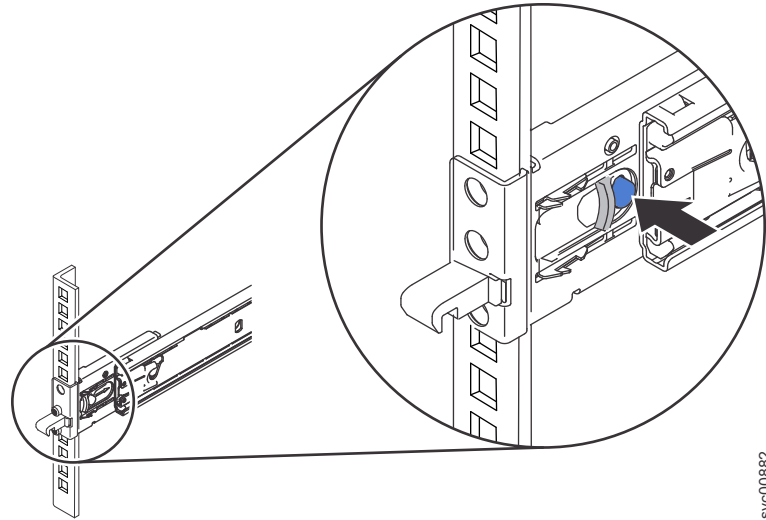


Figure 25. Installing front end of slide rail

7. Repeat steps 1 on page 19 through 6 on page 24 to install the other rail into the rack.
8. Make sure that each front latch is fully engaged.

Installing the cable management arm assembly for the SAN Volume Controller 2145-DH8

The SAN Volume Controller 2145-DH8 uses a cable management arm assembly to route and secure power and communication cables.

About this task

- The cable management arm assembly can be installed on either side of the server.
- The inner rail of the cable management arm assembly must be on top to work correctly.

Figure 26 shows the parts used to install the cable management arm assembly.

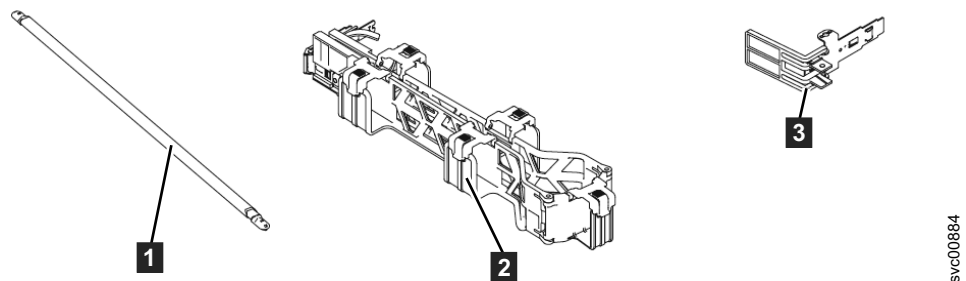


Figure 26. Parts for installing the SAN Volume Controller 2145-DH8 cable management arm assembly

- 1** SAN Volume Controller 2145-DH8 cable-management support bar
- 2** SAN Volume Controller 2145-DH8 cable-management arm assembly
- 3** SAN Volume Controller 2145-DH8 cable-management stop bracket

Procedure

To install the cable management arm assembly, complete the following steps.

1. Install the cable management support bar on the left-rear side of the node, as shown in Figure 27.
 - a. Connect one end of the support bar to the same slide rail to which you plan to attach the cable management arm assembly.
 - b. Swing the other end of the support bar toward the rack.

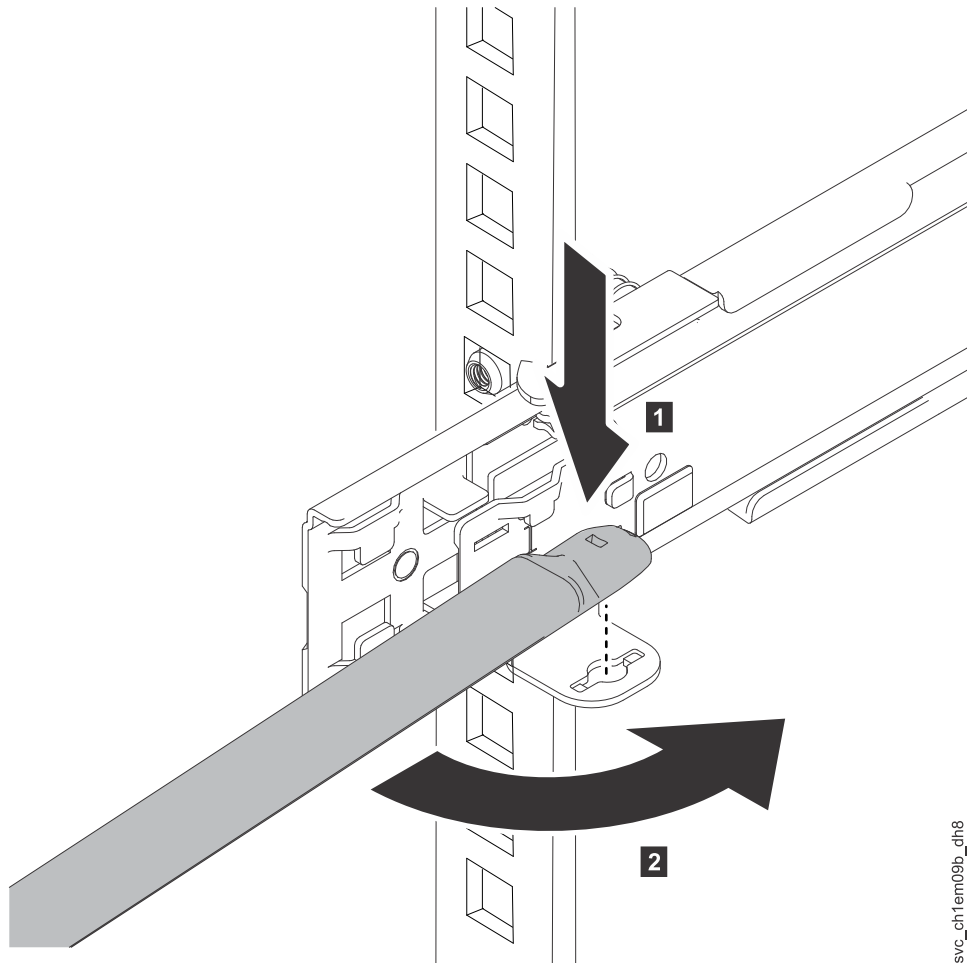
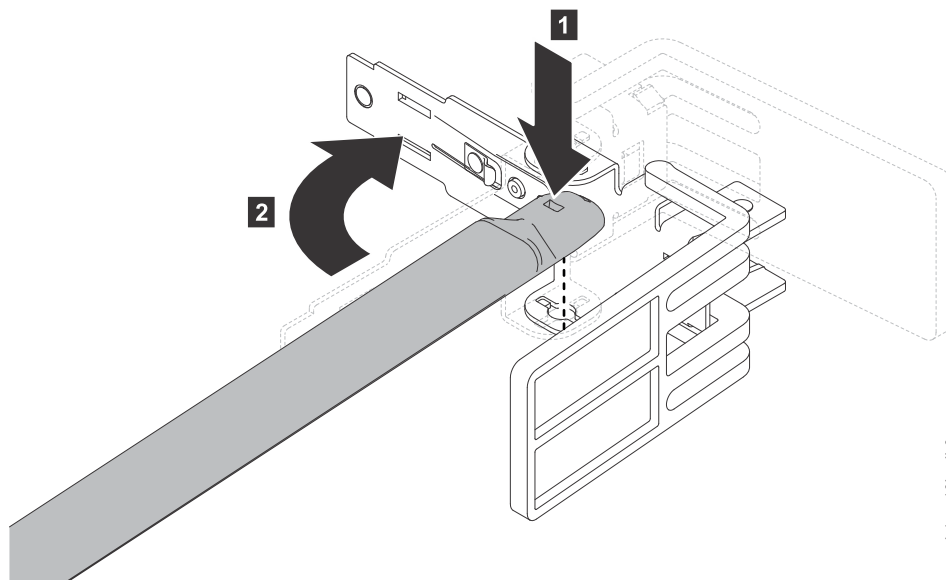


Figure 27. Installing the cable-management support bar

2. Connect the other end of the support bar to the stop bracket, as shown in Figure 28 on page 27.



svc_ch1em10b_dh8

Figure 28. Connecting the cable management support bar to the stop bracket

3. Connect the stop bracket to the slide rail, as shown in Figure 29 on page 28.
 - a. The capital letters I and O are printed on cable management arm pins to identify the inside and outside pins.
 - b. Install the stop bracket (with capital letter O) on the unattached end of the support bar.
 - c. Verify that the support bar is securely installed.

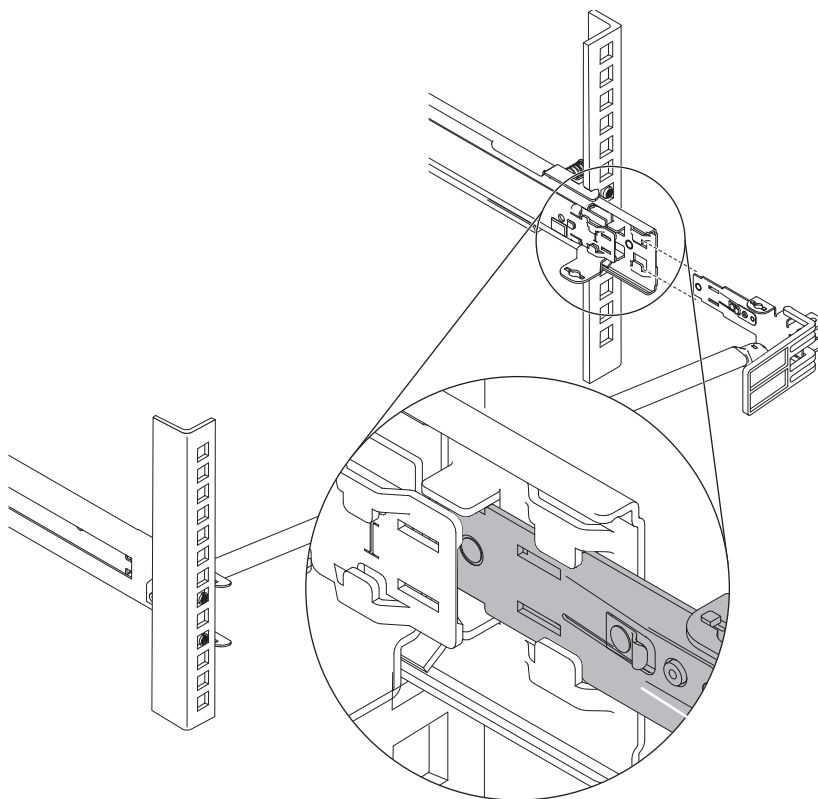


Figure 29. Connecting the stop bracket to the slide rail

4. Install the cable management arm as shown in Figure 30 on page 29.
 - a. Place the cable management arm on the support bar.
 - b. Pull out both the inside and the outside pins of the cable management arm.
 - c. Slide the cable management arm tabs into both the inside and the outside slots of the slide rail.
 - d. Push the tabs until they snap into place.

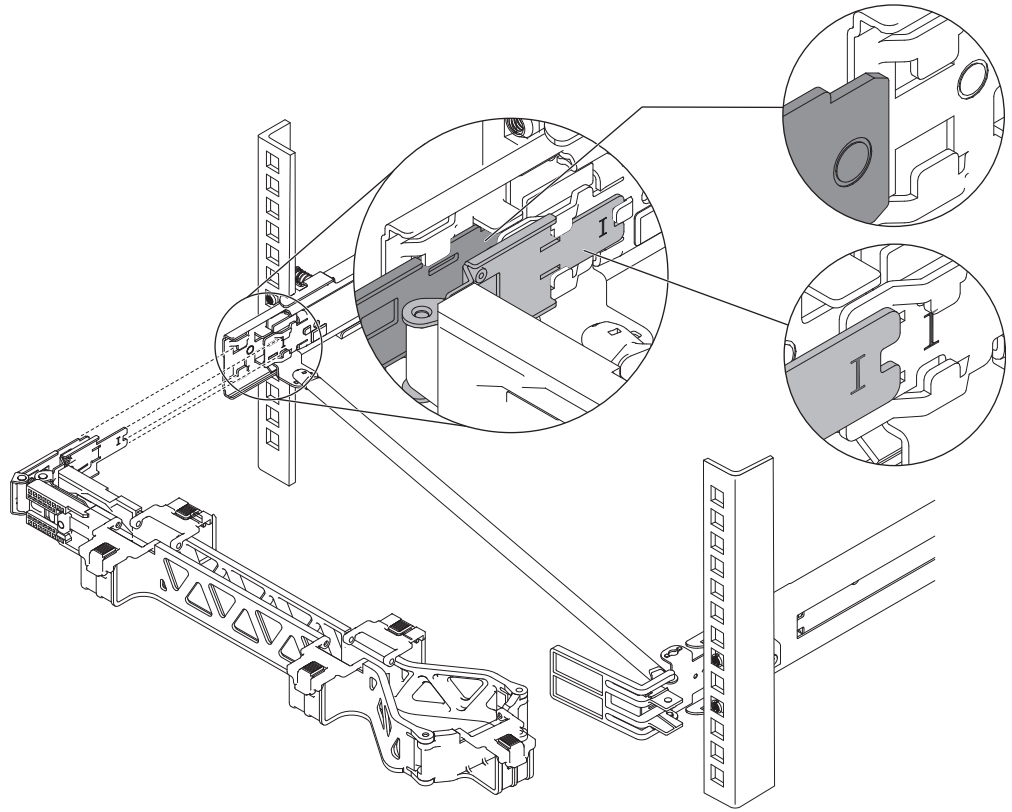


Figure 30. Installing the cable management arm

5. Close the stop bracket as shown in Figure 31 on page 30.
 - a. Open the stop bracket, which makes rotating the cable management arm on and off the support bar easier.
 - b. Push the tabs above and below the stop bracket to close it.

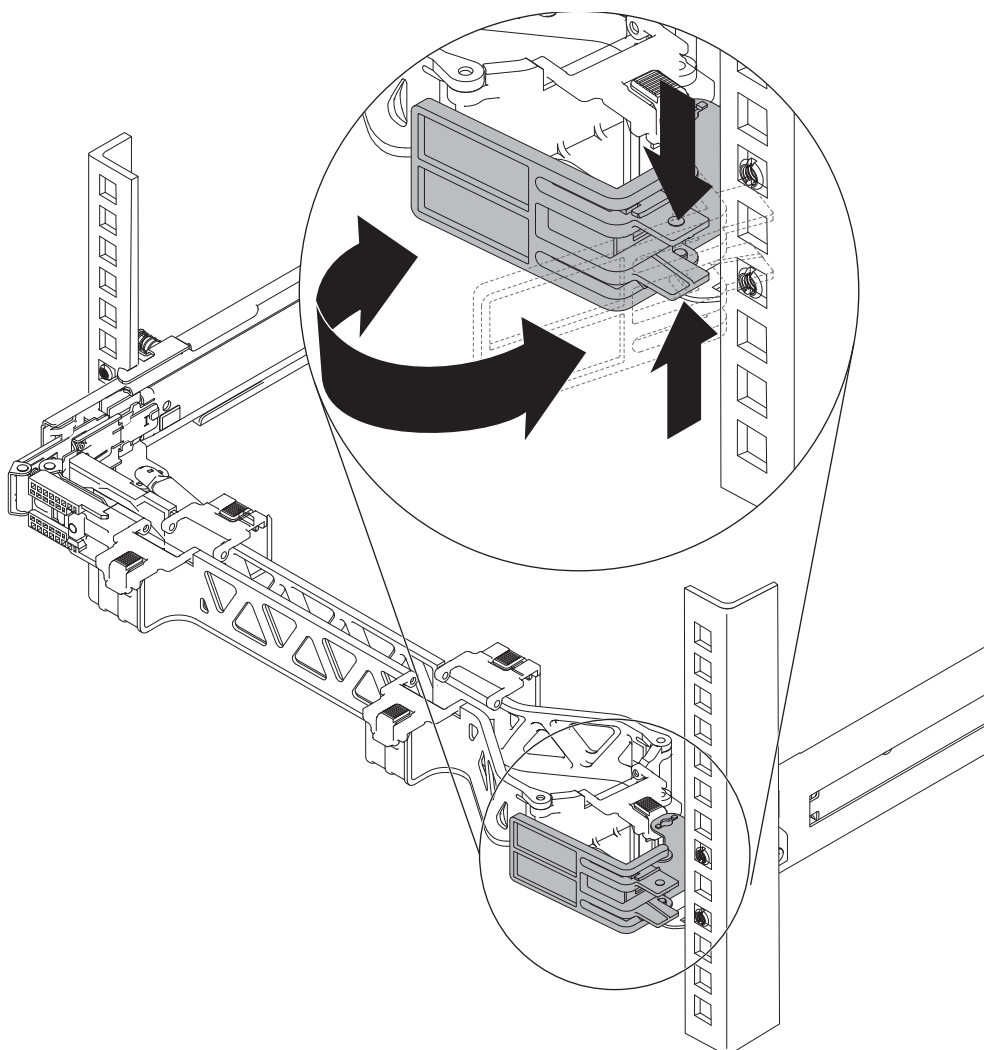


Figure 31. Closing the stop bracket

6. Connect and route the cables as shown in Figure 32 on page 31.
 - a. Connect the power cords and other cables to the rear of the node.
 - b. Route the cables and power cords on the cable management arm and secure them with cable ties or hook-and-loop fasteners.

Note:

- The location of the cable straps can vary in different systems.
- Use the cable straps that are provided on the rear of the system to retain the cables and prevent them from sagging.

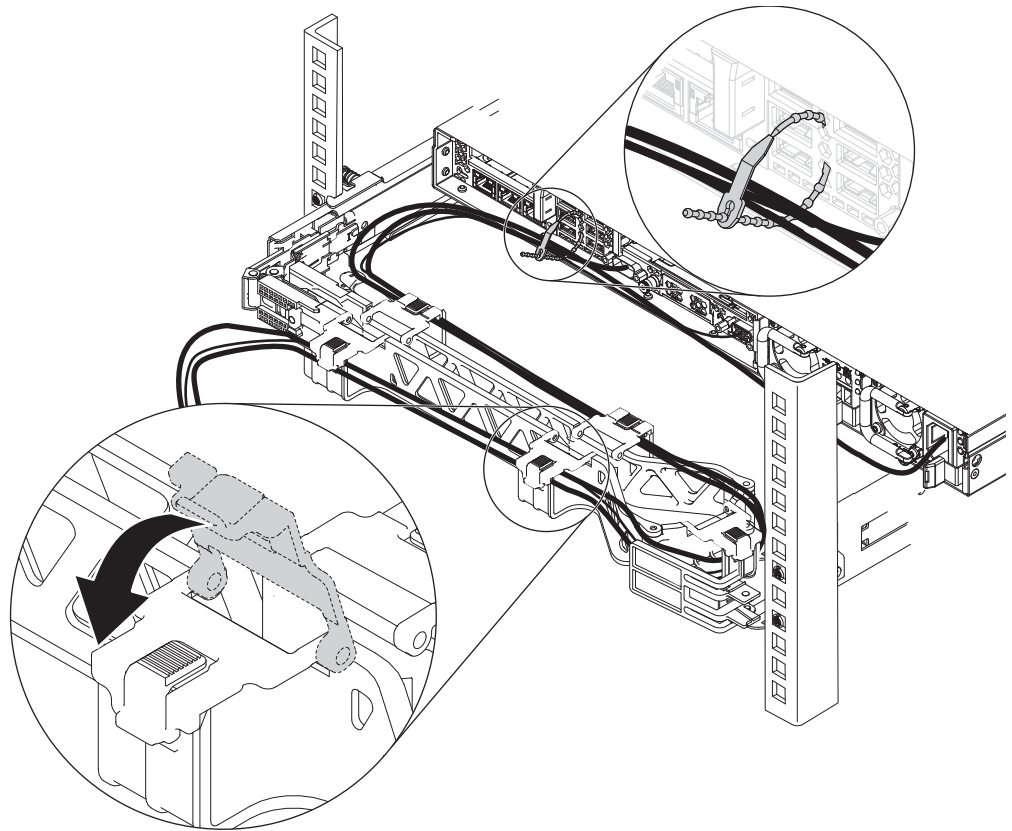


Figure 32. Connecting and routing the cables

7. Secure the cables with the hook-and-loop fastener strap, as shown in Figure 33 on page 32.

Note:

- Cables must be bundled with the hook-and-loop fastener strap to ensure full range of movement of the cable management arm.
- Make sure that the cables do not sag below the U space so they cannot interfere with the lower systems.
- Allow slack in all cables to avoid tension in the cables as the cable management arm moves.

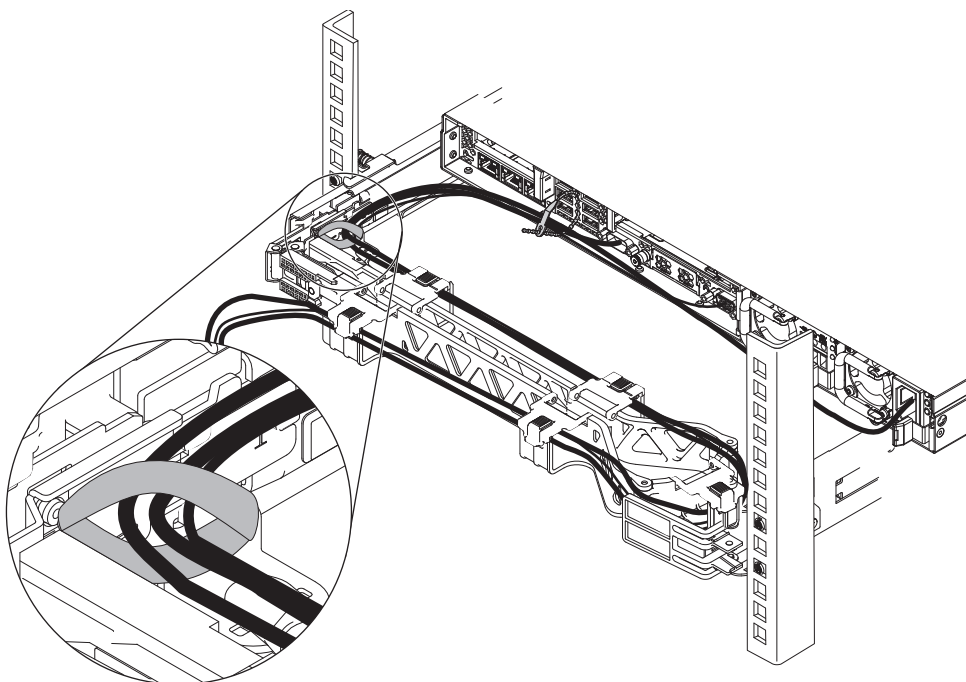


Figure 33. Securing the cables with hook-and-loop fastener strap

8. Optional: You can install the cable management arm assembly on the opposite side, as shown in Figure 34 on page 33.
 - a. Press the release buttons **1** and slide the mounting brackets **2** out of the cable management arm.
 - b. Rotate the cable management arm **3**.
 - c. Flip the mounting brackets **4**.
 - d. Insert the inner bracket (marked with a capital letter I) and outer bracket (marked with a capital letter O) into the cable management arm **5**.

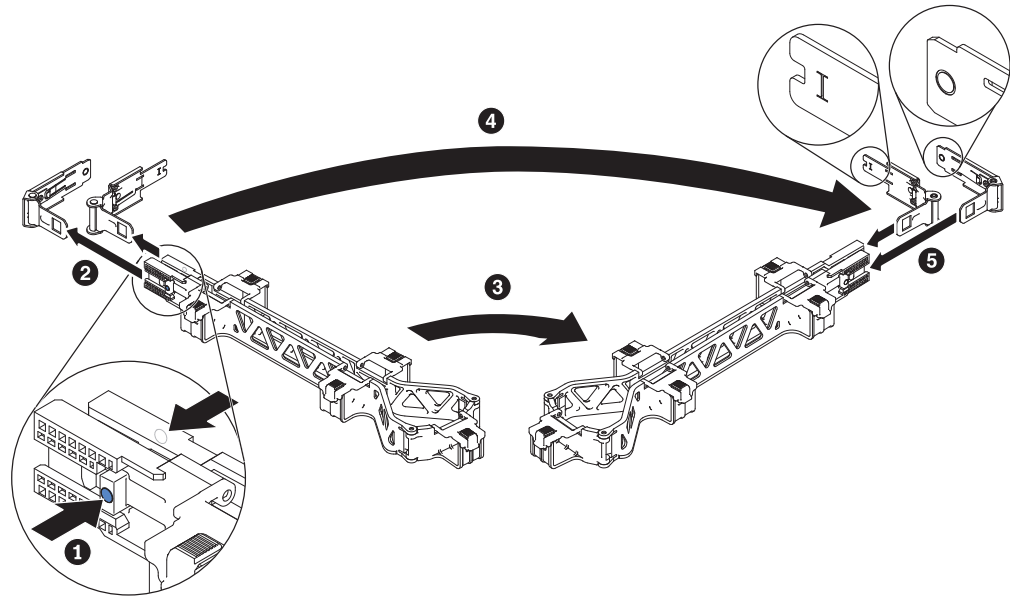


Figure 34. Installing the cable management arm on the opposite side

9. Optional: If you are in a vibration-prone area, or if you are shipping the rack with the system installed, secure the cable management arm and the server to the rack as shown in Figure 35.
 - a. Insert the M6 screws to the rear of the slides.
 - b. Use a cable tie to secure the free end of the cable management arm to the rack.

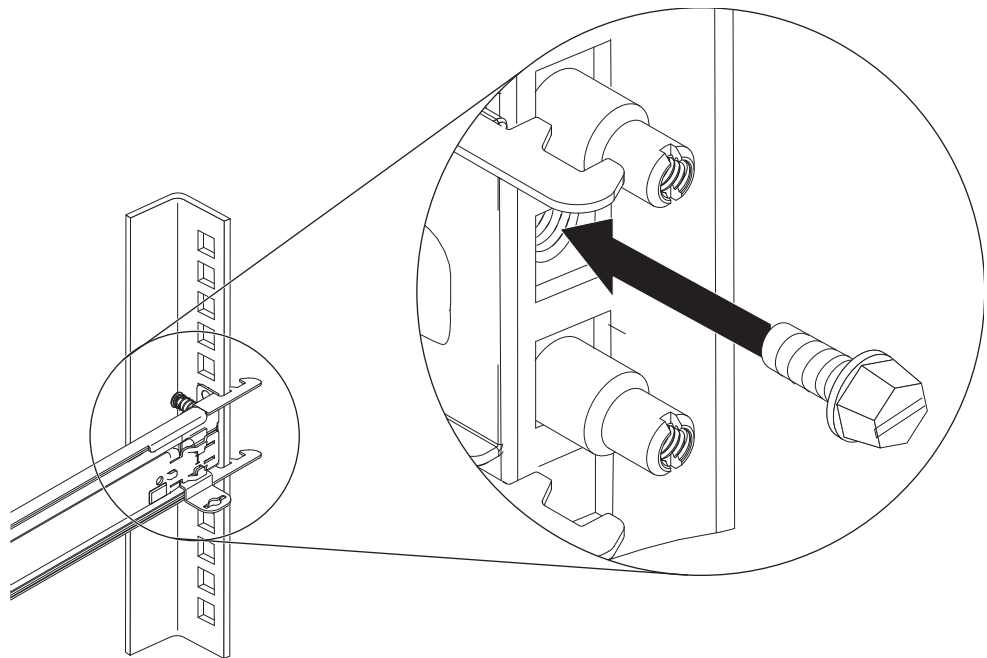


Figure 35. Securing the cable management arm and node

10. Optional: If you are in a vibration-prone area, or if you are preparing to move the rack cabinet, install the front screws as shown in Figure 36 on page 34.

- a. Slide the server into the rack until the release latches **1** engage.
- b. Insert the M6 screws **2** in the front of the server.

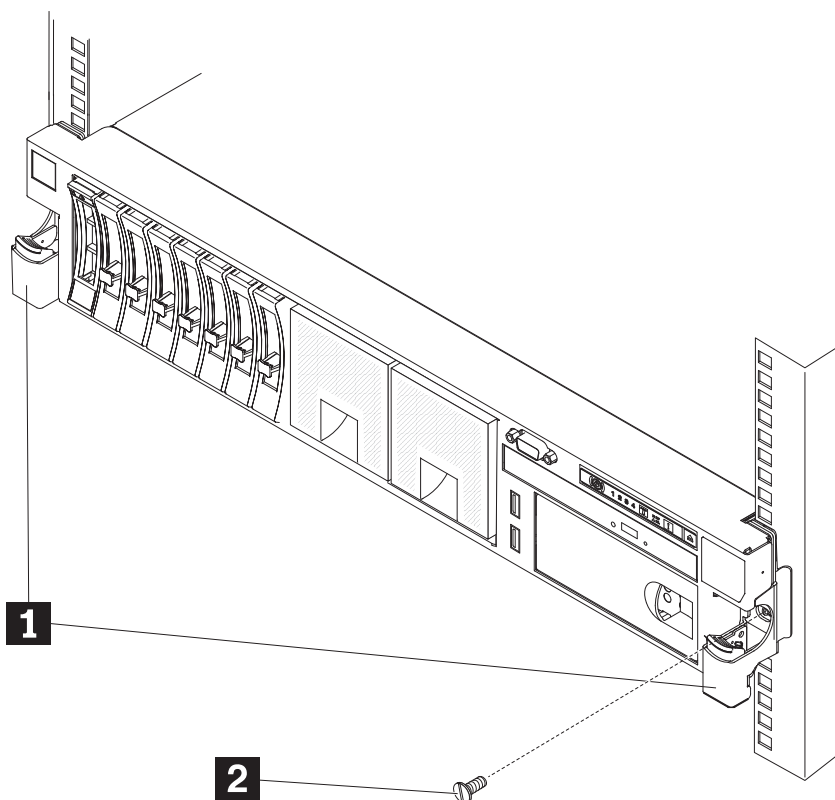


Figure 36. Installing the front screws

Installing the SAN Volume Controller 2145-DH8 in a rack

After installing the support rails and the cable arm management assembly, you can install the SAN Volume Controller 2145-DH8 node in the rack.

Before you begin

CAUTION:

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

Procedure

To install the SAN Volume Controller 2145-DH8 node in the rack, complete the following steps.

1. Place the SAN Volume Controller 2145-DH8 in the rails on the rack.
 - a. Pull the slide rails forward until they click twice into place. See **1** in Figure 37 on page 35.
 - b. Lift the node and carefully tilt it into position over the slide rails. Line up the rear rail heads **2** on the node with the rear slots **3** on the slide rails.
 - c. Slide the node down until the rear rail heads slip into the two rear slots.

- d. Lower the front of the node **4** until the other nail heads slip into the other slots on the slide rails.
- e. Verify that the front latch **5** slides over the nail heads.

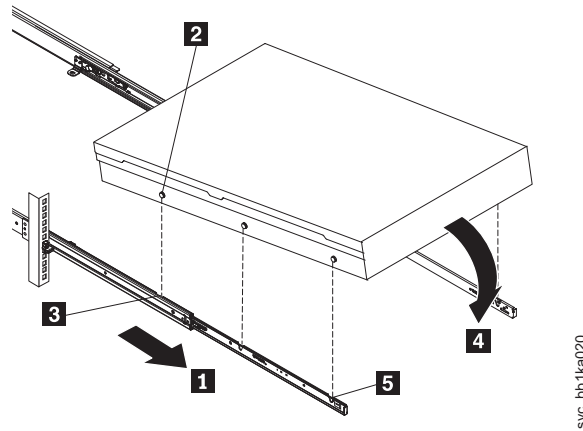


Figure 37. Installing the SAN Volume Controller 2145-DH8 node in the slide rails of the rack

2. Lift the locking levers on the slide rails and push the node **2** all the way into the rack until it clicks into place.

See **1** in Figure 38.

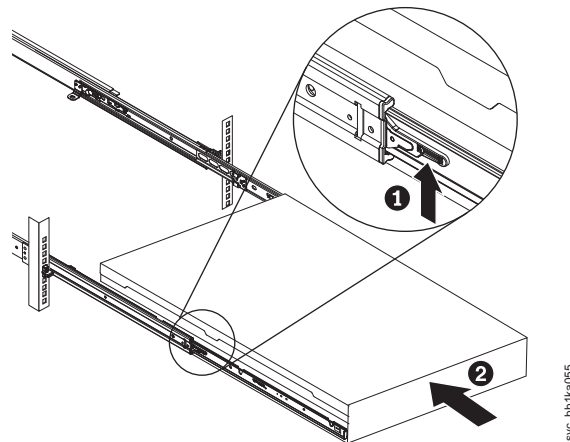


Figure 38. Raising the SAN Volume Controller 2145-DH8 locking levers of the slide rails of the rack

Connecting the SAN Volume Controller 2145-DH8 to the SAN and to the Ethernet network

Before you connect the SAN Volume Controller 2145-DH8 to the SAN, you must connect the Ethernet and Fibre Channel cables.

Before you begin

Refer to the cable-connection table to find out where to connect the Ethernet and Fibre Channel cables.

Up to three 1 Gbps Ethernet cables can be connected to the SAN Volume Controller 2145-DH8. The cable connection table indicates the number of cables to connect. Connect to the ports in numerical order, beginning with Ethernet port 1.

Procedure

To connect the SAN Volume Controller 2145-DH8 to the SAN and to the Ethernet network, complete the following steps.

1. Connect the Ethernet cables to Ethernet port 1, as shown in Figure 39.

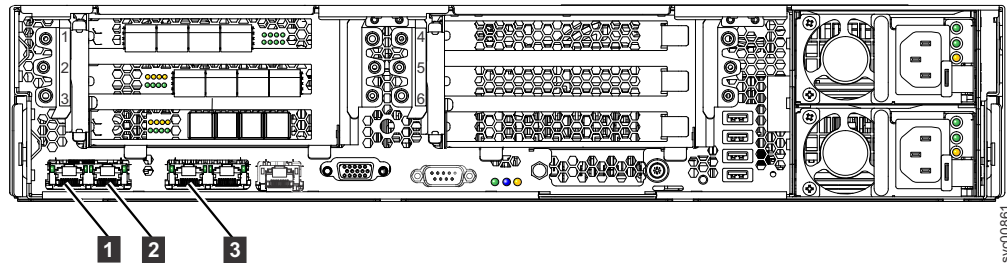


Figure 39. Ethernet ports on the rear of the SAN Volume Controller 2145-DH8

- 1 1 Gbps Ethernet port 1
 - 2 1 Gbps Ethernet port 2
 - 3 1 Gbps Ethernet port 3
2. Optional: If the 10 Gbps Ethernet feature is installed, you can connect Ethernet optical cables to 10 Gbps Ethernet ports as required by your configuration. Figure 40 shows an example of a 2145-DH8 with the 10 Gbps Ethernet feature installed in slot 2.

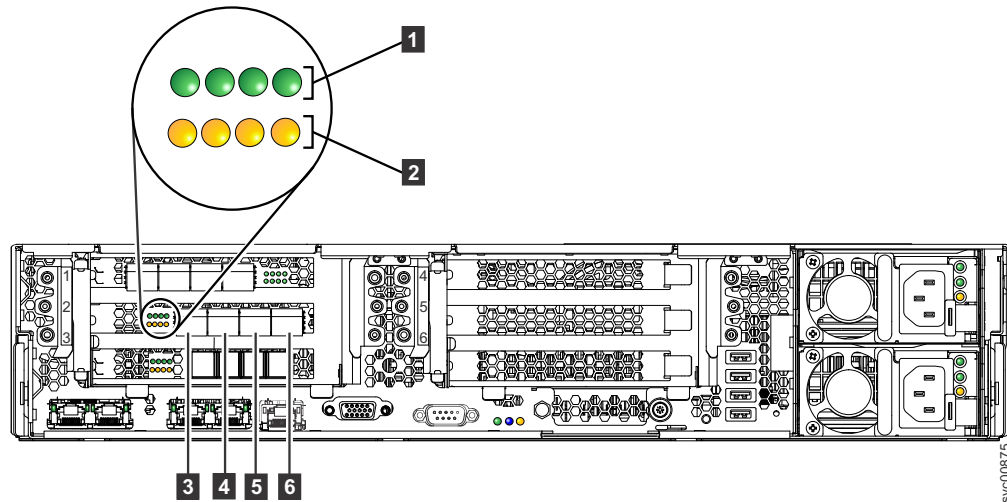


Figure 40. 10 Gbps Ethernet ports

- 1 10 Gbps Ethernet-link LEDs.
 - 2 10 Gbps Ethernet-fault LEDs.
 - 3 10 Gbps Ethernet port 4
 - 4 10 Gbps Ethernet port 5
 - 5 10 Gbps Ethernet port 6

6 10 Gbps Ethernet port 7

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

3. Connect the other end of the Ethernet cable to the proper connector on the Ethernet hub or switch.
4. Optional: If the Fibre Channel feature is installed, you can connect Fibre Channel cables to the Fibre channel ports as required by your configuration. Figure 41 shows a example of a 2145-DH8 with the Fibre Channel feature installed in slot 1.

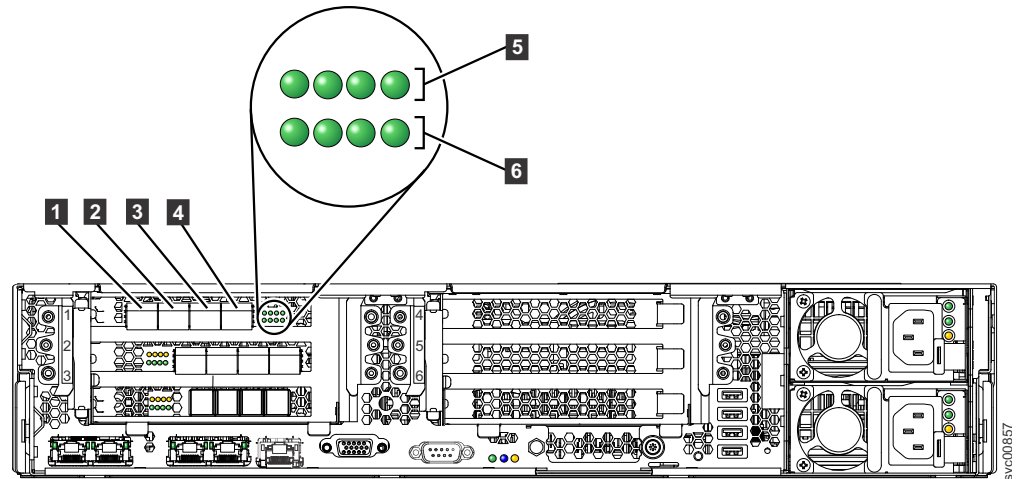


Figure 41. Fibre Channel ports

- 1 Fibre Channel port 1
- 2 Fibre Channel port 2
- 3 Fibre Channel port 3
- 4 Fibre Channel port 4
- 5 Link speed LEDs
- 6 Link activity LEDs

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.).

5. Connect the other ends of the Fibre Channel cables to the proper connectors of the Fibre Channel switches.

Verifying the SAN Volume Controller 2145-DH8 installation

You must verify the installation after the installation has completed.

Before you begin

This task shows you how to verify the installation after you install the system in the rack and connect it to the storage area network (SAN) and the Ethernet.

Note: If at any point the system does not operate as described, see MAP 5000: in the *IBM SAN Volume Controller Troubleshooting Guide*, unless a different maintenance analysis procedure (MAP) is specified.

Procedure

To verify the installation, complete the following steps.

1. Press the power-control button. Because the button is recessed, you might need a pointed device, such as a screwdriver, to press the power-control button. Verify that the green power LED is lit. If the LED is not illuminated, see MAP 5000 in the *IBM SAN Volume Controller Troubleshooting Guide* to repair the problem.

Note: You do not need to install any software. The node boots automatically. The SAN Volume Controller 2145-DH8 runs an extended series of power-on self-tests. The node might appear to be idle for up to five minutes after powering on the system.

Figure 42 shows the controls and indicators on the front panel that verify the installation. Figure 43 on page 39 is a close-up view of the operator-information panel.

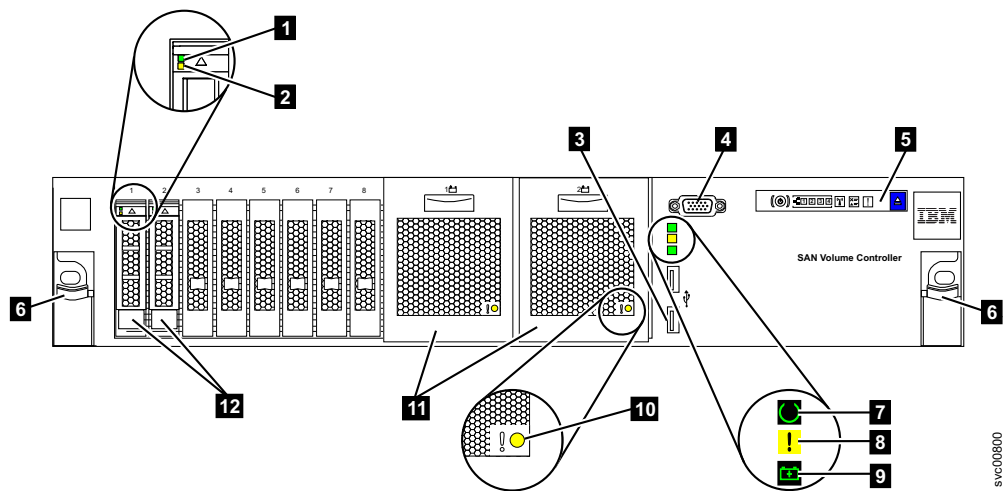


Figure 42. SAN Volume Controller 2145-DH8 front panel

- 1 Hard disk drive activity LED (green)
- 2 Hard disk drive status LED (amber)
- 3 USB port
- 4 Video connector
- 5 Operator-information panel
- 6 Rack release latch
- 7 Node status LED
- 8 Node fault LED
- 9 Battery status LED
- 10 Battery fault LED
- 11 Batteries
- 12 Hard disk drives

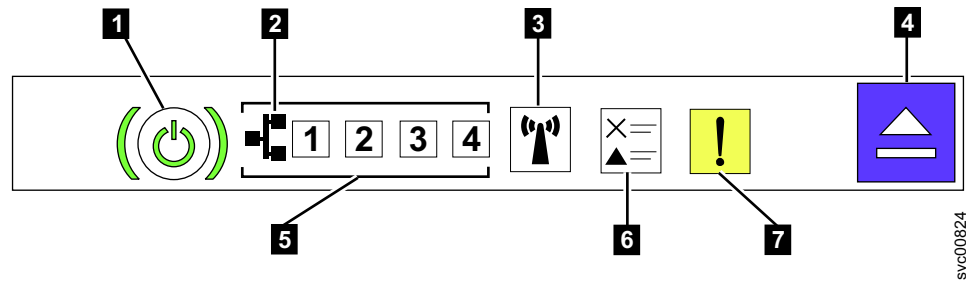


Figure 43. SAN Volume Controller 2145-DH8 operator-information panel

- 1** Power-control button and power-on LED
 - 2** Ethernet icon
 - 3** System-locator button and LED (blue)
 - 4** Release latch for the light path diagnostics panel
 - 5** Ethernet activity LEDs
 - 6** Check log LED
 - 7** System-error LED (amber)
2. Verify that the node boots without error. When the battery charge is low, the battery status LED flashes.

Results

The installation of the SAN Volume Controller hardware is now complete. No software installation is required.

What to do next

Continue with the instructions in Installing the optional 2U SAS expansion enclosure into the rack followed by Chapter 4, “Initializing the SAN Volume Controller 2145-DH8 system,” on page 49.

Chapter 3. Installing the 2U expansion enclosure

To install the SAN Volume Controller 2145-24F or 2145-12F expansion enclosure, you must install support rails, install the enclosure in the rack, and then connect it to a 2145-DH8 node. To install a 5U expansion enclosure, see the following chapter.

Installing the support rails for the 2145-24F or 2145-12F expansion enclosure

Before you install a 2145-24F or 2145-12F expansion enclosure, you must first install the support rails.

Procedure

To install the support rails, complete the following steps.

1. Locate the rack mounting rails and screws (Figure 44). The rail assembly consists of two rails that must be installed in the rack cabinet.

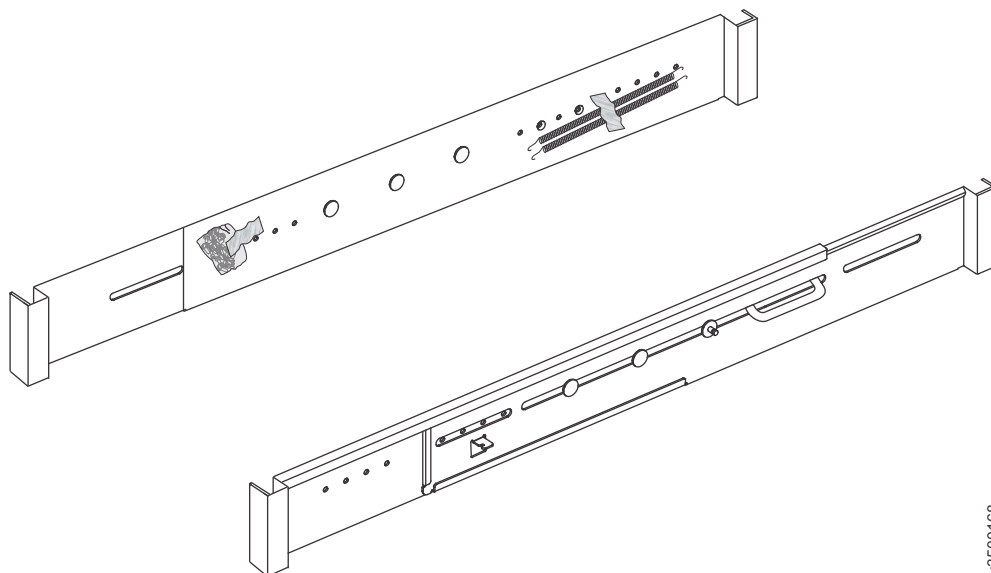
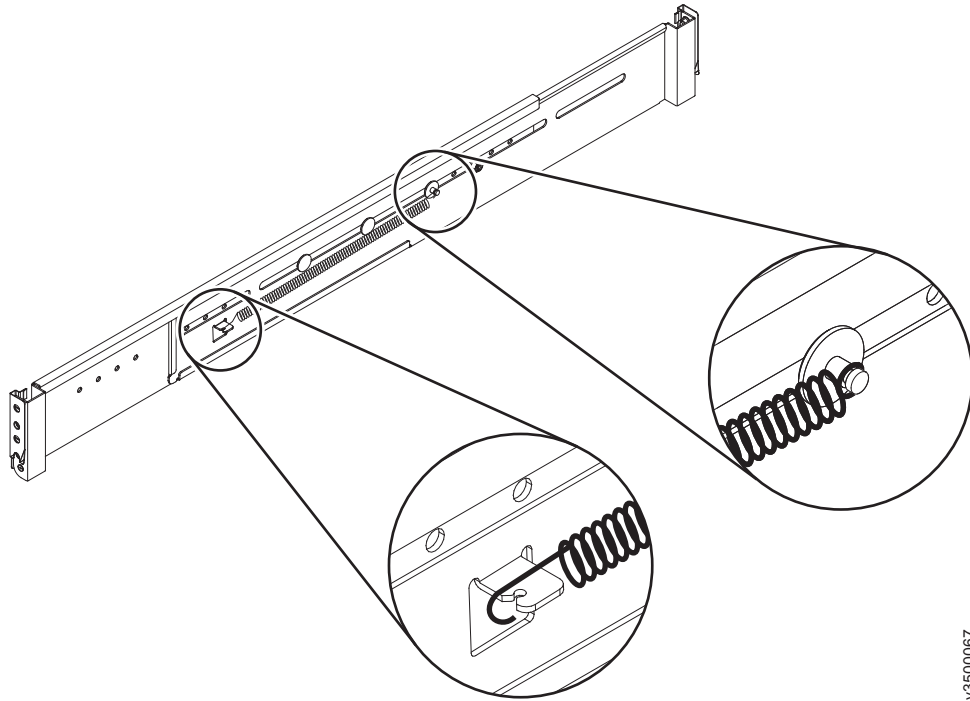


Figure 44. Rack mounting rails and screws

2. Remove the springs that are taped to one of the rails.
3. Attach a spring to the outside of each rail.
 - a. Attach the circle end of the spring around the stud on the rail (see Figure 45 on page 42).
 - b. Pulling on the spring, attach the hook end of the spring to the tab on the rail.



v3500067

Figure 45. Installing the rail spring

4. Working at the front of the rack cabinet, identify the two standard rack units (2U) of space in the rack into which you want to install the support rails. Figure 46 shows two rack units with the front mounting holes identified.

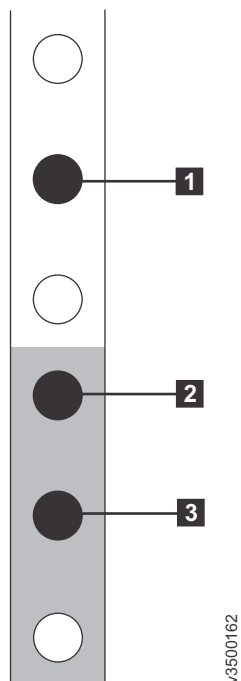


Figure 46. Hole locations in the front of the rack

- **1** Upper rail mounting bracket pin
- **2** Lower rail mounting bracket pin

- **3** Rack mounting screw hole

Note: Each rail comes with two medium bracket pins in the front bracket and two medium bracket pins in the rear bracket. The medium bracket pins are for installation in a 19-inch IBM rack cabinet. If you are installing the storage enclosure in a non-IBM rack cabinet, you might need to replace the set of medium bracket pins on the front and rear of the rail with either the small or large bracket pins that are included in the rail kit.

5. At each end of the rail, grasp the tab **1** and pull *firmly* to open the hinge bracket (see Figure 47).

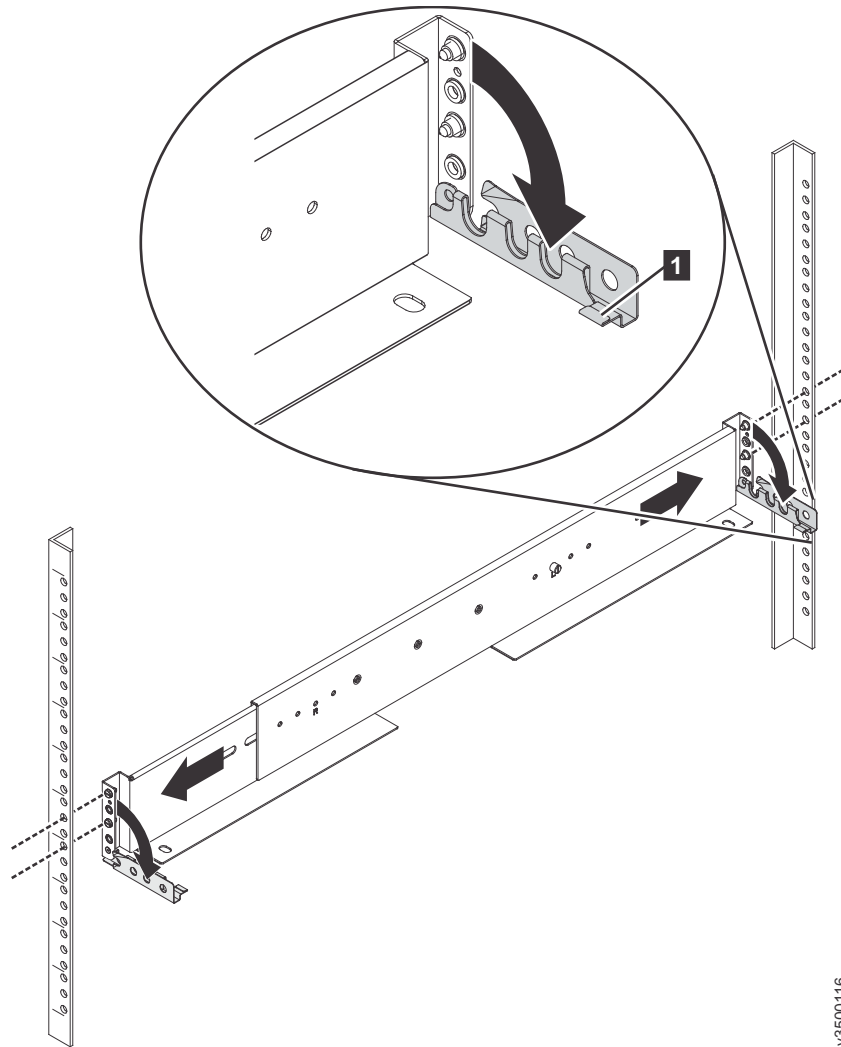


Figure 47. Opening the hinge brackets

6. Align the holes in the rail bracket with the holes on the front and rear rack cabinet flanges. Ensure that the rails are aligned on the inside of the rack cabinet.
7. On the rear of the rail, press the two bracket pins into the holes in the rack flanges and close the rear hinge bracket to secure the rail to the rack cabinet flange (see Figure 48 on page 44).

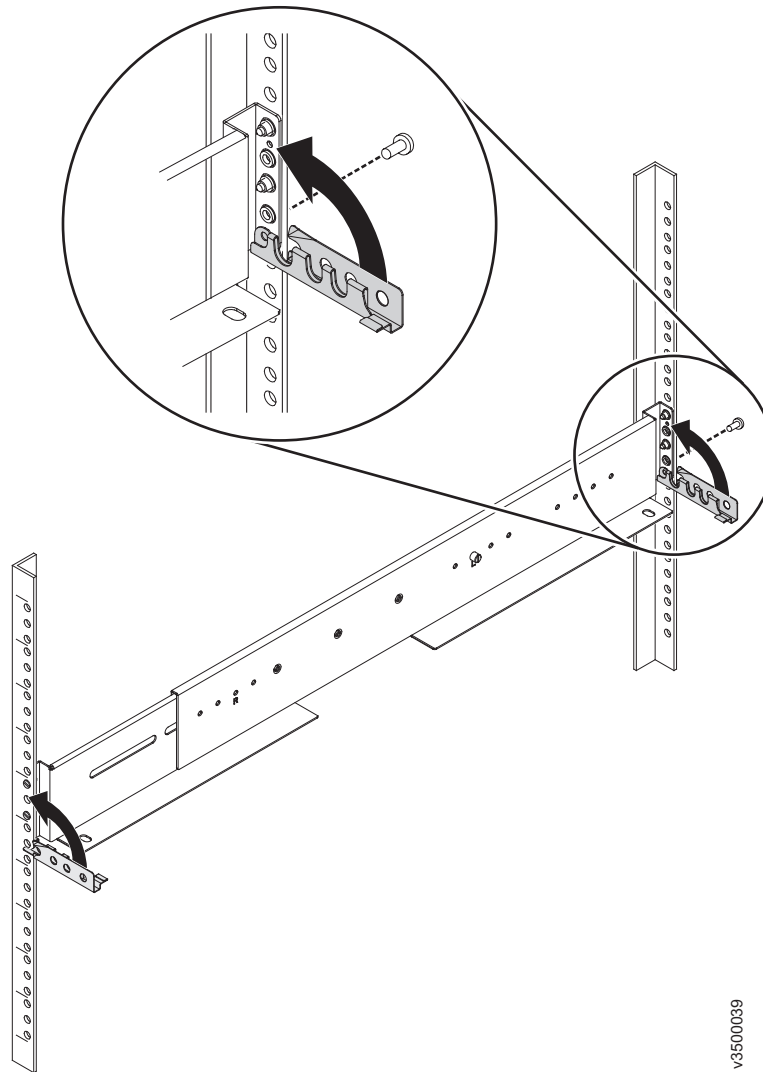


Figure 48. Closing hinge brackets and installing rear screw

8. On the front of the rail, press the two bracket pins into the holes in the rack flanges and close the front hinge bracket to secure the rail to the rack cabinet flange (see Figure 48).
9. Secure the rear of the rail to the rear rack flange with an M5 screw (see Figure 48).
10. Repeat the steps to secure the opposite rail to the rack cabinet.

Installing the 2145-24F or 2145-12F expansion enclosure in a rack

Install one or more 2145-24F or 2145-12F expansion enclosures in a rack.

About this task

CAUTION:

- To lift and install the enclosure into the rack requires at least two people.
- Load the rack from the bottom up to ensure rack stability. Empty the rack from the top down.

Procedure

To install an enclosure, complete the following steps.

1. Align the enclosure with the front of the rack cabinet.
2. Carefully slide the enclosure into the rack along the rails until the enclosure is fully inserted (see Figure 49).

Note: The rails are not designed to hold an enclosure that is partially inserted. The enclosure must always be in a fully inserted position.

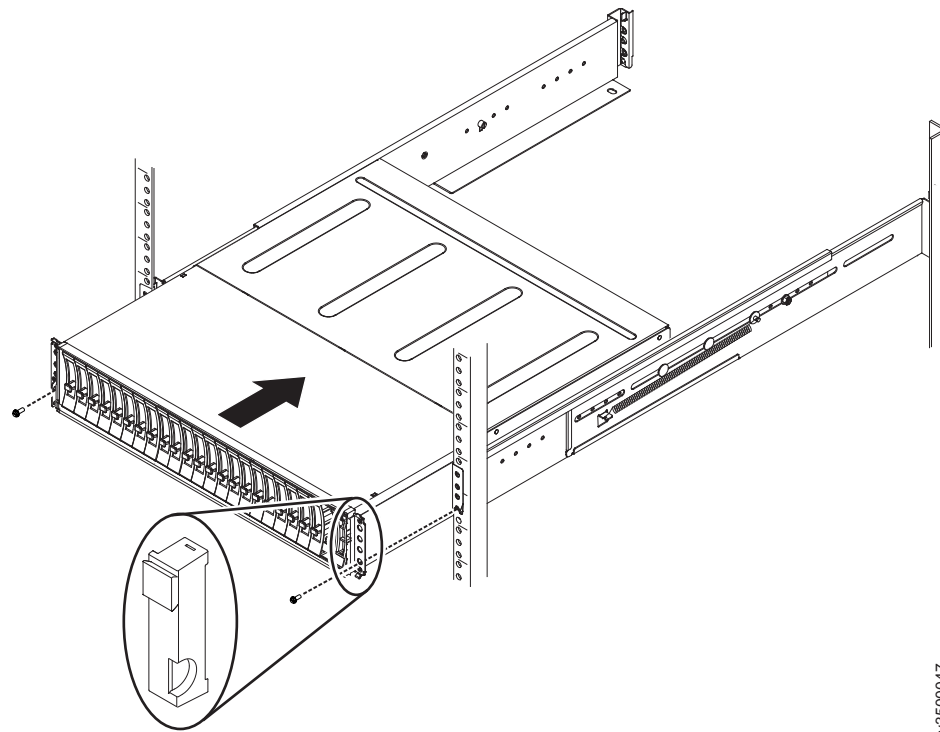


Figure 49. Inserting the enclosure

3. On either side of the drive assemblies, remove the enclosure end caps by grasping the handle and pulling the bottom of the end cap free, then clearing the tab on the top of the enclosure.
4. Secure the enclosure with a screw in the rack mounting screw hole.
5. Reinstall the left and right end caps as shown in Figure 49. The left end cap has indicator windows that align with the status LEDs (light-emitting diodes) on the edge of the enclosure.
 - a. Ensure that the serial number of the end cap matches the serial number on the rear of the enclosure.
 - b. Fit the slot on the top of the end cap over the tab on the chassis flange.
 - c. Rotate the end cap down until it snaps into place.

- d. Ensure that the inside surface of the end cap is flush with the chassis.

Connecting the optional 2U SAS expansion enclosures to the 2145-DH8

After you install the SAS expansion enclosures into the rack, you must connect them to each 2145-DH8 node in the IO group that will use them.

About this task

This task applies if you are installing a expansion enclosure. Each pair of nodes in the system can manage up to 20 expansion enclosures.

Note: When you insert SAS cables, ensure that the connector is oriented correctly.

- When you connect an expansion enclosure, the blue pull tab must be below the cable (**1** in Figure 50).
- When you connect a , the blue pull tab must be above the connector (**2** in Figure 50).
- Insert the connector gently until it clicks into place. If you feel resistance, do not force the connector; it is probably oriented the wrong way.
- When inserted correctly, the connector can be removed only by pulling the tab.

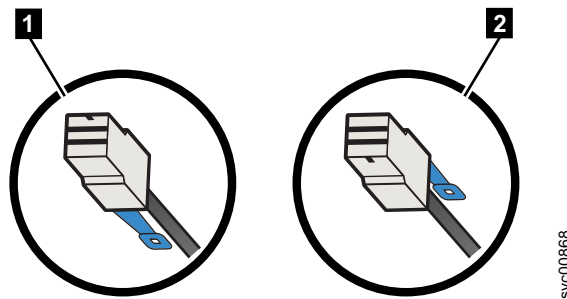


Figure 50. SAS cable connector orientation

- 1** Correct orientation for 2145-12F or 2145-24F SAS expansion enclosure
- 2** Correct orientation for 2145-DH8 node SAS expansion enclosure

Be aware of the following guidelines when you attach the cables to the SAS ports.

- No cable can be connected between a port on a left canister and a port on a right canister of the expansion enclosures.
- Ensure that cables are installed in an orderly way to reduce the risk of cable damage when replaceable units are removed or inserted.
- SAS cables must be routed through the cable management arms to avoid the risk of disconnecting the nodes that are disconnected from their flash drive arrays. This step also helps to protect the SAS cables from getting damaged if the node is slid out on its rails while attached to the enclosure.
- Arrange your cables to provide access to the following components:
 - Ethernet ports, including the technician port. The technician port is used for initial setup of the system by directly attaching to a personal computer. It can also be used to complete service actions for the system.

- USB ports. USB ports can be used to initialize the system or to perform service-related tasks by using a USB flash drive that contains executable files for initializing the system.
- Fibre Channel and Fibre Channel over Ethernet (FCoE) ports. If your system has an optionally installed Fibre Channel and FCoE adapter for host and external storage attachment, ensure that these ports are accessible.
- The nodes and the enclosures themselves. Access is required to the hardware for servicing and for safely removing and replacing components by using two or more people.

Procedure

1. Install the cables as shown in the following figure. Note that this illustration is provided to show the cable connections between the SAS enclosures and each 2145-DH8. It does not imply or represent the precise racking order for the devices in a cabinet/rack.

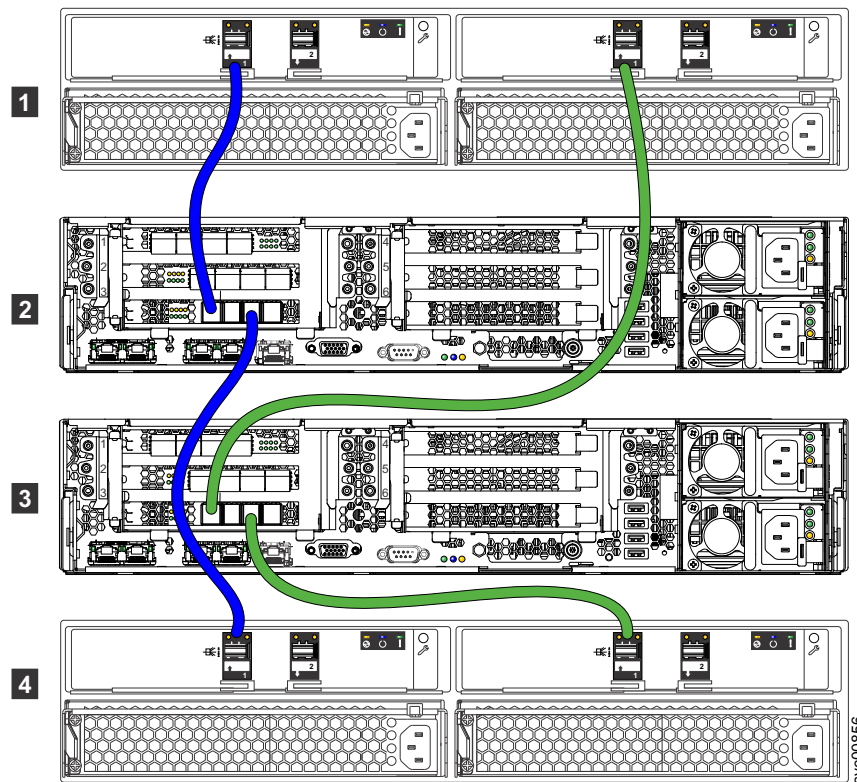


Figure 51. Connecting the SAS cables

- 1 2145-24F or 2145-12F SAS expansion enclosure
 - 2 2145-DH8 with SAS adapter in PCIe expansion slot 2
 - 3 2145-DH8 with SAS adapter in PCIe expansion slot 2
 - 4 2145-24F or 2145-12F SAS expansion enclosure
2. If more I/O groups are configured, repeat the cabling procedure for the other I/O groups. The system supports up to four I/O groups with a total of 80 expansion enclosures per system.

Combining 2U and 5U expansion enclosures

About this task

You can combine 2145-24F, 2145-12F, and 2145-92F enclosures in an SAS chain. The limiting factor is the combined *chain weight* of the various components. The maximum SAS chain weight that can be attached to a node SAS port is 10:

- 2145-92F enclosures have a chain weight of 2.5
- 2145-24F and 2145-12F enclosures have a chain weight of 1.

Example

Table 7. Examples of supported SAS chain combinations

Number of 2145-12F	Number of 2145-24F	Number of 2145-92F	Combined chain weight
2	0	3	9.5
2	3	2	10
0	7	1	9.5

Chapter 4. Initializing the SAN Volume Controller 2145-DH8 system

To begin the initialization process for the system, you must access the management GUI. You need to know the default user name and password.

Next, you initialize the system by using the technician port.

After you create the system, you must configure it.

Checking your web browser settings for the management GUI

To access the management GUI, you must ensure that your web browser is supported and has the appropriate settings enabled.

Before you begin

The GUI supports the following web browsers:

- Mozilla Firefox 49
- Mozilla Firefox Extended Support Release (ESR) 45
- Microsoft Internet Explorer (IE) 11 and Microsoft Edge
- Google Chrome 54

IBM supports higher versions of the browsers if the vendors do not remove or disable function that the product relies upon. For browser levels higher than the versions that are certified with the product, customer support accepts usage-related and defect-related service requests. If the support center cannot re-create the issue, support might request the client to re-create the problem on a certified browser version. Defects are not accepted for cosmetic differences between browsers or browser versions that do not affect the functional behavior of the product. If a problem is identified in the product, defects are accepted. If a problem is identified with the browser, IBM might investigate potential solutions or work-arounds that the client can implement until a permanent solution becomes available.

Procedure

To configure your web browser, follow these steps:

1. Enable JavaScript for your web browser.

For Mozilla Firefox, JavaScript is enabled by default and requires no additional configuration.

For Microsoft Internet Explorer (IE) 11 and Microsoft Edge running on Microsoft Windows 10, JavaScript is enabled by default and requires no additional configuration.

For Microsoft Internet Explorer (IE) running on Microsoft Windows 7:

- a. In Internet Explorer, click **Tools > Internet Options**.
- b. Click **Security Settings**.
- c. Click **Internet** to choose the Internet zone.
- d. Click **Custom Level**.

- e. Scroll down to the **Scripting** section, and then in **Active Scripting**, click **Enable**.
- f. Click **OK** to close **Security Settings**.
- g. Click **Yes** to confirm the change for the zone.
- h. Click **OK** to close **Internet Options**.
- i. Refresh your browser.

For Microsoft Internet Explorer (IE) running on Microsoft Windows Server 2008:

- a. In Internet Explorer, click **Tools > Internet Options**.
- b. Click **Security**.
- c. Click **Trusted sites**.
- d. On the **Trusted sites** dialog, verify that the web address for the management GUI is correct and click **Add**.
- e. Verify that the correct web address was added to the **Trusted sites** dialog.
- f. Click **Close** on the **Trusted sites** dialog.
- g. Click **OK**.
- h. Refresh your browser.

For Google Chrome:

- a. On the menu bar in the Google Chrome browser window, click **Settings**.
- b. Click **Show advanced settings**.
- c. In the **Privacy** section, click **Content settings**.
- d. In the **JavaScript** section, select **Allow all sites to run JavaScript**.
- e. Click **OK**.
- f. Refresh your browser.

2. Enable cookies in your web browser.

For Microsoft Internet Explorer (IE) 11 and Microsoft Edge running on Microsoft Windows 10, cookies are enabled by default and require no additional configuration.

For Mozilla Firefox:

- a. On the menu bar in the Firefox browser window, click **Tools > Options**.
- b. On the Options window, select **Privacy**.
- c. Set "Firefox will" to **Use custom settings for history**.
- d. Select **Accept cookies from sites** to enable cookies.
- e. Click **OK**.
- f. Refresh the browser.

For Microsoft Internet Explorer:

- a. In Internet Explorer, click **Tools > Internet Options**.
- b. Click **Privacy**. Under **Settings**, move the slider to the bottom to allow all cookies.
- c. Click **OK**.
- d. Refresh your browser.

For Google Chrome:

- a. On the menu bar in the Google Chrome browser window, click **Settings**.
- b. Click **Show advanced settings**.
- c. In the **Privacy** section, click **Content settings**.
- d. In the **Cookies** section, select **Allow local data to be set**.

- e. Click **OK**.
- f. Refresh your browser.
3. Enable file download on IE 10 and 11 running on Windows 2012.
 - a. In Internet Explorer, click **Tools > Internet Options**.
 - b. On the Internet Options window, select the **Security** tab.
 - c. On the **Security** tab, click the **Internet zone**.
 - d. Click **Custom level** to customize the security level for this zone.
 - e. Scroll down to **Downloads** and select **Enable** under File download.
 - f. Click **OK**.
 - g. Click **Yes** to confirm.
 - h. Click **OK** to close the Internet Options.

For Microsoft Internet Explorer (IE) 11 and Microsoft Edge running on Microsoft Windows 10, file download is enabled by default and requires no additional configuration.

4. Enable scripts to disable or replace context menus. (Mozilla Firefox only).
For Mozilla Firefox:
 - a. On the menu bar in the Firefox browser window, click **Tools > Options**.
 - b. On the Options window, select **Content**.
 - c. Click **Advanced** by the **Enable JavaScript** setting.
 - d. Select **Disable or replace context menus**.
 - e. Click **OK** to close the Advanced window.
 - f. Click **OK** to close the Options window.
 - g. Refresh your browser.
5. Enable TLS 1.1/1.2 (Microsoft Internet Explorer 9 and 10 only).
For Microsoft Internet Explorer:
 - a. Open Internet Explorer.
 - b. Select **Tools > Internet Options**.
 - c. Select the **Advanced** tab.
 - d. Scroll to the **Security** section.
 - e. Check the **Use TLS 1.1** and **Use TLS 1.2** checkboxes.

Note: IE 11 and later and Microsoft Edge enable TLS 1.1/1.2 by default.

User name and password for system initialization

During the initialization procedure, you need to log in to the initialization GUI for the system.

The default user name and password for the initialization GUI are listed in the following table.

Table 8. Default user name and password for the initialization GUI

User name	Password
superuser	passw0rd

Note: The 0 character in the password is the number zero, not the letter O.

Initializing the system by using the technician port

To initialize a new system, you must connect a personal computer to the technician port on the rear of a node and run the initialization tool. This node becomes the configuration node and provides access to the management GUI. Access the management GUI by using the management IP address through your IP network or through the technician port. Use the management GUI to add each candidate node to the system.

Before you begin

Important: Do not use the initialization tool on a node if any other node in the system is already active. For example, a node status LED is solid on any node of the system.

You require the following items:

- A supported browser that is installed on the personal computer
- An Ethernet cable to connect the personal computer to the technician port

Attention: Do not connect the technician port to a switch. If a switch is detected, the technician port connection might shut down, causing a 746 node error.

Procedure

To initialize the system, complete the following steps.

1. Ensure that the nodes and switches of the system are powered on. (Refer to “Powering on and powering off the clustered system” in the SAN Volume Controller IBM Knowledge Center.)
2. Configure an Ethernet port on the personal computer to enable Dynamic Host Configuration Protocol (DHCP) configuration of its IP address and DNS settings.
If you do not have DHCP, you must manually configure the personal computer. Specify the static IPv4 address 192.168.0.2, subnet mask 255.255.255.0, gateway 192.168.0.1, and DNS 192.168.0.1.
3. Starting from the left at the rear of the node, locate the fourth Ethernet port to the right, which is the technician port. Figure 52 shows the rear of the SAN Volume Controller node, where **1** is the technician port.

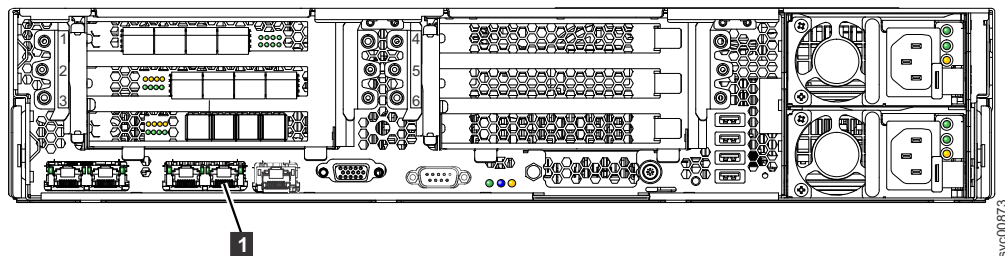


Figure 52. SAN Volume Controller 2145-DH8 technician port

4. Connect an Ethernet cable between the port of the personal computer that is configured in step 2 and the technician port. After the connection is made, the system will automatically configure the IP and DNS settings for the personal computer if DHCP is available. If it is not available, the system will use the values you provided in step 2.

5. After the Ethernet port of the personal computer is connected, open a supported browser and browse to address `http://install`. (If you do not have DHCP, open a supported browser and go to the following static IP address 192.168.0.1.) The browser is automatically directed to the initialization tool.

Note: If the system cannot be initialized, you are directed to the service assistant interface.

6. Follow the instructions that are presented by the initialization tool to configure the system with a name and management IP address.
7. If you experience a problem during the process due to a change in system states, wait 5 - 10 seconds. Then, either reopen the SSH connection or reload the service assistant.
8. After you complete the initialization process, disconnect the cable between the personal computer and the technician port.

What to do next

The system management GUI can now be reached by opening a supported web browser and pointing it to `http://management_IP_address`. Use the management GUI to add each candidate node to the system. Then, it is best to use the management GUI to set the service IP address for each node now. Ensure that the system is disconnected from the technician port.

Adding nodes to an existing system

Before you add a node to an existing system, consider this high-level overview of the requirements and tasks involved.

Before you begin

This task requires that the following conditions are met:

- All nodes that are configured in the system are present. Nodes must be installed in pairs. Each pair of nodes is an I/O group.
- All errors in the system event log are fixed.
- All managed disks (MDisks) are online.
- A node with only Fibre Channel over Ethernet (FCoE) ports (all FCoE ports) that is connected to the switch and properly zoned can also be added to an I/O group.

About this task

Table 9 lists the models and software version requirements for nodes.

Table 9. Node model names and software version requirements

Node model	Required system SAN Volume Controller software version
SAN Volume Controller 2145-SV1	7.7.1.0 or later
SAN Volume Controller 2145-DH8 with a 2145-12F expansion enclosure	7.7.0.0 or later
SAN Volume Controller 2145-DH8 with a 4-port 16G Fibre Channel adapter	7.6.0.0 or later

Table 9. Node model names and software version requirements (continued)

Node model	Required system SAN Volume Controller software version
SAN Volume Controller 2145-DH8 with a 2-port 16G Fibre Channel adapter	7.4.0.0 or later
SAN Volume Controller 2145-DH8	7.3.0.0 or later
SAN Volume Controller 2145-CG8 with two Fibre Channel adapters	6.4.1.5 or later (any partner systems must have 6.4.0 or later)
SAN Volume Controller 2145-CG8	6.2.0 or later
SAN Volume Controller 2145-CF8	5.1.0 or later

Note: The steps in the following procedure refer to uninterruptible power supply units. SAN Volume Controller 2145-DH8 and 2145-SV1 do not have an external uninterruptible power supply unit. These systems have battery modules in the front panel instead.

Procedure

1. Install the SAN Volume Controller nodes, and if applicable the uninterruptible power supply units, in the rack.
2. Connect the SAN Volume Controller nodes to the LAN.
3. Connect the SAN Volume Controller nodes to the SAN fabric (for example, the FC or FCoE ports).
4. Power on the SAN Volume Controller nodes and, if applicable, the uninterruptible power supply units.
5. Zone the SAN Volume Controller node ports in the existing SAN Volume Controller zone. The SAN Volume Controller zone exists in each fabric with only node ports.
6. Zone the SAN Volume Controller node ports in the existing SAN Volume Controller and storage zone. A storage zone contains all of the SAN Volume Controller node ports and storage system ports that are in the fabric and used to access the physical disks.
7. For each storage system that is used with the SAN Volume Controller system, use the system management application to map the LUNs that are currently used by the system to all of the WWPNs of the SAN Volume Controller nodes that you want to add. The SAN Volume Controller nodes must recognize the same LUNs that the existing nodes in the system can recognize before they can be added. If SAN Volume Controller nodes cannot recognize the same LUNs, the system is marked degraded.
8. Add the SAN Volume Controller nodes to the system.
9. Check the status of the storage systems and MDisks to ensure that status is not marked degraded. If the status is degraded, a configuration problem must be resolved before you can do any further system configuration task. If the problem cannot be resolved, remove the newly added SAN Volume Controller nodes from the clustered system and contact IBM Remote Technical Support for assistance.

What to do next

For specific instructions about adding a new node or adding a replacement node to a clustered system, see the information about adding nodes to a system.

Appendix A. Accessibility features for SAN Volume Controller

Accessibility features help users who have a disability, such as restricted mobility or limited vision, to use information technology products successfully.

Accessibility features

These are the major accessibility features for the SAN Volume Controller:

- You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. HTML documents have been tested using JAWS version 15.0.
- This product uses standard Windows navigation keys.
- Interfaces are commonly used by screen readers.
- Keys are discernible by touch, but do not activate just by touching them.
- Industry-standard devices, ports, and connectors.
- You can attach alternative input and output devices.

The SAN Volume Controller online documentation and its related publications are accessibility-enabled. The accessibility features of the online documentation are described in Viewing information in the information center .

Keyboard navigation

You can use keys or key combinations to perform operations and initiate menu actions that can also be done through mouse actions. You can navigate the SAN Volume Controller online documentation from the keyboard by using the shortcut keys for your browser or screen-reader software. See your browser or screen-reader software Help for a list of shortcut keys that it supports.

IBM and accessibility

See the IBM Human Ability and Accessibility Center for more information about the commitment that IBM has to accessibility.

Appendix B. Where to find the Statement of Limited Warranty

The Statement of Limited Warranty is available in both hardcopy format and in the SAN Volume Controller IBM Knowledge Center.

The *Statement of Limited Warranty* is included (in hardcopy form) with your product. It can also be ordered from IBM (see Table 2 on page xxxii for the part number).

Appendix C. SAN Volume Controller physical installation planning

Before the IBM service representative can set up your environment, you must verify that the prerequisite conditions for system installation are met.

SAN Volume Controller 2145-DH8 environment requirements

Before the SAN Volume Controller 2145-DH8 is installed, the physical environment must meet certain requirements. This includes verifying that adequate space is available and that requirements for power and environmental conditions are met.

Input-voltage requirements

Ensure that your environment meets the voltage requirements that are shown in Table 10.

Table 10. Input-voltage requirements

Voltage	Frequency
100-127 / 200-240Vac	50 Hz or 60 Hz

Maximum power requirements for each node

Ensure that your environment meets the power requirements as shown in Table 11.

The maximum power that is required depends on the node type and the optional features that are installed.

Table 11. Power consumption

Components	Power requirements
SAN Volume Controller 2145-DH8	200 W typical, 750 W maximum (200 - 240V ac, 50/60 Hz)

Note: You cannot mix ac and dc power sources; the power sources must match.

Environment requirements without redundant AC power

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

If you are not using redundant ac power, ensure that your environment falls within the ranges that are shown in Table 12 on page 60.

Table 12. Physical specifications

Environment	Temperature	Altitude	Relative humidity	Maximum dew point
Operating in lower altitudes	5°C to 40°C (41°F to 104°F)	0 to 950 m (0 ft to 3,117 ft)	8% to 85%	24°C (75°F)
Operating in higher altitudes	5°C to 28°C (41°F to 82°F)	951 m to 3,050 m (3,118 ft to 10,000 ft)		
Turned off (with standby power)	5°C to 45°C (41°F to 113°F)	0 m to 3,050 m (0 ft to 10,000 ft)	8% to 85%	27°C (80.6°F)
Storing	1°C to 60°C (33.8°F to 140.0°F)	0 m to 3,050 m (0 ft to 10,000 ft)	5% to 80%	29°C (84.2°F)
Shipping	-40°C to 60°C (-40°F to 140.0°F)	0 m to 10,700 m (0 ft to 34,991 ft)	5% to 100%	29°C (84.2°F)

Note: Decrease the maximum system temperature by 1°C for every 175 m increase in altitude.

Preparing your environment

The following tables list the physical characteristics of the 2145-DH8 node.

Dimensions and weight

Use the parameters that are shown in Table 13 to ensure that space is available in a rack capable of supporting the node.

Table 13. Dimensions and weight

Height	Width	Depth	Maximum weight
86 mm (3.4 in.)	445 mm (17.5 in)	746 mm (29.4 in)	25 kg (55 lb) to 30 kg (65 lb) depending on configuration

Additional space requirements

Ensure that space is available in the rack for the additional space requirements around the node, as shown in Table 14.

Table 14. Additional space requirements

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

Maximum heat output of each 2145-DH8 node

The node dissipates the maximum heat output that is given in Table 15.

Table 15. Maximum heat output of each 2145-DH8 node

Model	Heat output per node
2145-DH8	<ul style="list-style-type: none">• Minimum configuration: 419.68 Btu per hour (AC 123 watts)• Maximum configuration: 3480.24 Btu per hour (AC 1020 watts)

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