EqualLogic FS7500

Installation and Setup

PS Series Firmware Version 5.1 and 5.2

January 2012

Part Number: K24VX-A00

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Preface

A PS Series group provides iSCSI-accessible block storage. With the latest version of the PS Series firmware and the addition of an EqualLogic FS7500, the same PS Series group can provide block storage and support for NAS (Network Attached Storage).

The EqualLogic FS7500 includes:

- Two FS7500 Controller units with pre-installed file serving software
- One FS7500 Backup Power Supply System (BPS) unit

This manual describes how to install EqualLogic FS7500 hardware and configure a NAS service.

Note: An EqualLogic FS7500 requires a PS Series group running the PS Series Firmware Version 5.1 or 5.2.

Audience

This manual is designed for the administrators responsible for installing EqualLogic FS7500 hardware. Administrators are *not* required to have extensive network or storage system experience. However, it may be useful to understand:

- Basic networking concepts
- Current network environment
- User disk storage requirements
- RAID configurations
- Disk storage management

Note: Although this manual provides examples of using an EqualLogic FS7500 in some common network configurations, detailed information about setting up a network is beyond its scope.

Organization

This manual is organized as follows:

- *Chapter 1, Before You Begin*, describes the preliminary tasks you must perform before beginning the installation.
- *Chapter 2, Hardware Rack Mounting*, describes how to install the BPS and controller hardware in a rack.
- *Chapter 3, Power Connections*, describes how to connect the BPS and controllers to power.
- *Chapter 4, Network Cable Connections*, describes how to connect the controllers to the networks.
- *Chapter 5, NAS Service Configuration*, describes how to discover controllers and set up a NAS service.

- *Chapter 6, NAS Storage Allocation*, describes how to create NAS file systems and set up and manage NFS exports and CIFS shares.
- *Chapter 7, What to Do Next*, describes common NAS service tasks and where to find more information.
- *Appendix 1, Custom Racking Instructions*, contains information about installing the EqualLogic FS7500 hardware into a tooled rack.
- The Glossary describes terminology related to the EqualLogic FS7500 and a NAS service.

Technical Support and Customer Service

Dell's support service is available to answer your questions about PS Series SAN arrays. If you have an Express Service Code, have it ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently.

Contacting Dell

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services might not be available in your area.

For customers in the United States, call 800-945-3355.

Note: If you do not have access to an Internet connection, contact information is printed on your invoice, packing slip, bill, or Dell product catalog.

Use the following procedure to contact Dell for sales, technical support, or customer service issues:

1. Visit `support.dell.com` or the Dell support URL specified in information provided with the Dell product.
2. Select your locale. Use the locale menu or click on the link that specifies your country or region.
3. Select the required service. Click the “Contact Us” link, or select the Dell support service from the list of services provided.
4. Choose your preferred method of contacting Dell support, such as e-mail or telephone.

Online Services

You can learn about Dell products and services using the following procedure:

- Visit `www.dell.com` (or the URL specified in any Dell product information).
- Use the locale menu or click on the link that specifies your country or region

Warranty Information

The EqualLogic FS7500 warranty is included in the shipping box. For information about registering a warranty, visit `support.dell.com/EqualLogic`.

1 Before You Begin

Proper planning and adherence to requirements help ensure a successful installation. Before you begin the installation, review the steps for getting started and perform all the preliminary tasks.

Introduction to the EqualLogic FS7500

A PS Series group provides iSCSI-accessible block storage. With the latest version of the PS Series firmware and the addition of an EqualLogic FS7500, the same PS Series group can provide block storage and support for NAS (Network Attached Storage).

A NAS service can support multiple, scalable NAS file systems. On each file system, you can create multiple CIFS shares and NFS exports. Clients with the correct credentials can then access the shares and exports through the NAS service IP address.

The NAS service network configuration requires three networks: client, SAN, and internal.

For security reasons, the internal network is usually a private network, and the client network is separate from the SAN and internal network. See *Network Configuration Overview on page 37*.

Figure 1 shows the NAS service hardware configuration.

Figure 1: NAS Hardware Configuration

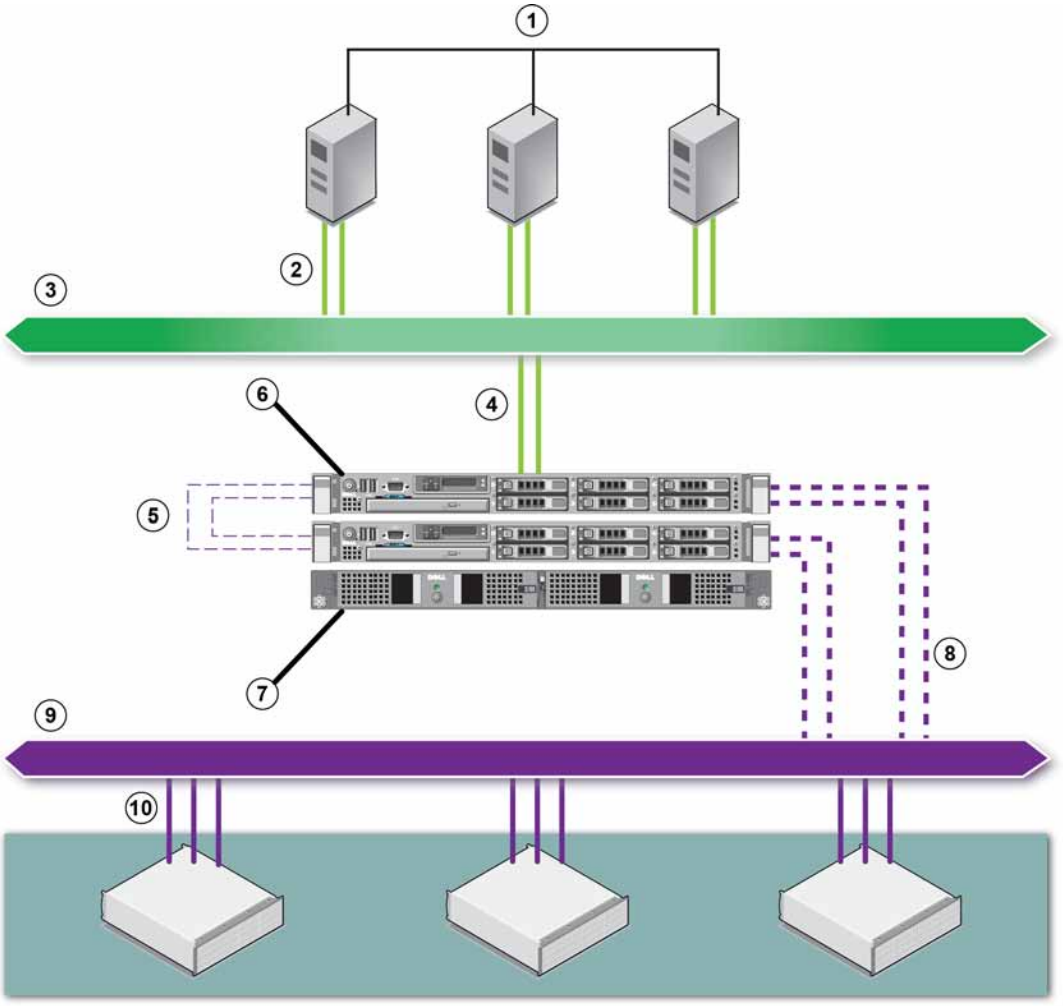


Table 1: NAS Service Components

Callout	Description
1	Clients
2	Client connections to the client network
3	Client network
4	Controller connections to the client network
5	Internal connections (between controllers)
6	EqualLogic FS7500
7	BPS
8	Controller connections to the SAN network
9	SAN network
10	PS Series group connections to the SAN network

Steps for Getting Started

To install the EqualLogic FS7500 hardware and create a NAS service, follow these steps:

1. Make sure you meet the safety, environmental, and other requirements and have all the necessary hardware. See *Preliminary Tasks on page 3*.
2. Install the FS7500 Backup Power Supply (BPS) and both FS7500 Controllers in the same rack. See *Chapter 2, Hardware Rack Mounting*.
3. Connect the BPS and controllers to power. See *Chapter 3, Power Connections*.
4. Connect the controllers to the networks. See *Chapter 4, Network Cable Connections*.
5. Use the Group Manager GUI to discover the controllers and configure a NAS service. See *Chapter 5, NAS Service Configuration*.
6. Create a NAS file system and optionally create a CIFS share or NFS export. See *Chapter 6, NAS Storage Allocation*.

After getting started, see *Chapter 7, What to Do Next*.

Preliminary Tasks

Perform the following tasks before beginning the installation.

- Read the installation safety precautions. See *Installation Safety Recommendations on page 3*.
- Learn how to protect sensitive hardware. See *Hardware Protection on page 4*.
- Make sure the installation meets the environmental requirements. See *Environmental Requirements on page 5*.
- Unpack the shipping box according to the instructions on the setup poster, and make sure the shipping box contents are complete. See *Shipping Box Contents on page 7*.
- Gather the hardware needed for the installation but not provided in the shipping box. See *Required Hardware That Is Not Supplied on page 10*.
- Make sure the rack meets the rack requirements. See *Rack Requirements on page 11*.
- Gather the tools needed for the installation, if any. See *Required Tools on page 12*.

Installation Safety Recommendations

Follow these safety recommendations:

- Before you install the EqualLogic FS7500 hardware, read and follow the safety instructions packaged with your system.
- Only individuals with rack mounting experience should install EqualLogic FS7500 hardware in a rack.

- Use care when moving and opening the cartons. Leave the components packaged until you are ready to install them.
- Place the components in a protected area that has adequate airflow and is free of humidity, flammable gas, and corrosion.
- You need at least two people to install the hardware. Use proper lifting and carrying techniques when unpacking and moving the components.
- Make sure each FS7500 Controller is fully grounded at all times to prevent damage from electrostatic discharge.
- When handling an FS7500 Controller, use the electrostatic wrist guard shipped with the controller or a similar form of protection. See *Hardware Protection on page 4*.
- Hold the hardware level with the rack when you install it.

Warning: The BPS contains LETHAL VOLTAGES. All repairs and service should be performed by AUTHORIZED SERVICE PERSONNEL ONLY. There are no customer replaceable parts inside the BPS.

- Unpacking the BPS in a low-temperature environment might cause condensation to occur in and on the chassis. This could cause electric shock. Do not install the chassis and power modules until both the inside and outside of the chassis are dry.
- Always connect the BPS battery packs to the chassis before connecting the input power cables.
- Both the 120V (LV) and the 230V (HV) power modules have IEC 320 C13 output receptacles. Make sure to use power cables rated for the correct input power source rating. The rating is on a label next to the input connector on the power module rear panel.

Hardware Protection

When not installed in a rack, an FS7500 Controller must be in its original packaging or placed on a sturdy surface that is protected from electrostatic discharge.

When handling an FS7500 Controller, make sure you use the electrostatic wrist strap that is shipped with the controller or a similar form of protection.

Using an Electrostatic Wrist Strap

You must protect sensitive hardware from electrostatic discharge.

To use an electrostatic wrist strap:

1. Connect the steel snap on the coil cord to the stud on the elastic band. See Figure 2.

Figure 2: Using an Electrostatic Wrist Strap

2. Fit the band closely around your wrist.
3. Connect the banana plug to ground, or attach the plug to the alligator clip and connect the clip to a grounded device such as an ESD mat or the metal frame of a grounded piece of equipment.

Environmental Requirements

The location of the EqualLogic FS7500 hardware must meet the following environmental requirements:

- Only operate an enclosure from a power source with a voltage range of 100 to 240 VAC.
- Make sure each power source has sufficient electrical overload protection.
- In North America, connect the enclosure to a source of power with over-current protection provided by a double pole 20A or less device (UL 489 circuit breakers). In Europe, the over-current protection must be provided by a 20A or less device (IEC circuit breakers).
- Make sure there is sufficient space for air flow in front of and behind the hardware.
- Make sure the location is properly vented.
- Review the technical specifications in *FS7500 Controller Technical Specifications on page 6* and *FS7500 Backup Power Supply Technical Specifications on page 6* to make sure your environment supports its requirements.

FS7500 Controller Technical Specifications

Table 2: FS7500 Controller Technical Specifications

Attribute	Value
Weight of controller	39 pounds or 17.69 kilograms
Operating temperature	50 to 95 degrees F (10 to 35 degrees C)
Storage temperature	-40 to 149 degrees F (-40 to 65 degrees C)
Operating altitude	-50 to 10,000 feet (-16 to 3048 meters)
Operational relative humidity	20 to 80 percent non-condensing
Thermal output (fully-loaded controller)	2446.5 BTU/hr maximum (High Output) 1712.9 BTU/hr maximum (Energy Smart)
Operational shock	Half sine shock in all operational orientations of 31G plus or minus 5% with a pulse duration of 2.6 ms plus or minus 10%
Operational vibration	0.26 Gms from 5-350 Hz for 5 minutes in operational orientations
Input voltage	90 to 264 VAC (auto-sensing)
Input frequency	47 - 63 Hz
System input power	90-264 VAC, autoranging, 47-63 Hz
Each power supply	502 W Input current: up to 55 A per power supply for 10 ms or less
Dimensions	1.68 in. height x 18.99 in. width x 30.39 in. depth (4.26 cm height x 48.24 cm width x 77.2 cm depth)

FS7500 Backup Power Supply Technical Specifications

Table 3: FS7500 Backup Power Supply Technical Specifications

Attribute	Value
Weight of fully-loaded BPS	66.1 pounds (30 kilograms)
Operating temperature	32 to 104 degrees F (0 to 40 degrees C)
Storage temperature	5 to 113 degrees F (-15 to 45 degrees C)
Operating altitude	10,000 feet (3048 meters)
Operational relative humidity	0 to 95 percent non-condensing
Input voltage	120 V models: 90-140 V, auto-sensing 230 V models: 180-264 V, auto-sensing
Input frequency	50 - 60 Hz (auto-sensing), +/- 3 Hz
Power levels	500 W DC output
Dimensions	17.1 in. x 1.6 in. x 28.5 in. (434 cm x 42 cm x 723 cm)

Shipping Box Contents

The EqualLogic FS7500 ships in one or three boxes, depending on your location. The single box contains the controllers and a box that contains the BPS. If you receive three boxes, two boxes contains the two controllers. The other box contains the BPS.

Unpack the EqualLogic FS7500. After unpacking, place each FS7500 Controller and the FS7500 Backup Power Supply on a sturdy surface that is protected from electrostatic discharge.

Make sure you have all the items supplied in the shipping box, described in Table 4.

Table 4: Shipping Box Contents

Part	Description
Two FS7500 Controllers	Provides high availability and processing power for the NAS service.
Electrostatic wrist strap	Protects sensitive hardware from electrical discharge.
Two controller bezels	Protects the front of the controller chassis.
Two USB cables	Connect the controllers to the BPS
Six power cables	Included in the FS7500 ship kit. The cords included vary based on region. Each cable has a C13 connector (to connect to the C14 connector on a BPS power module) and a connector that fits the receptacle of your power source. Note that the connector to the power source varies depending on your country. The cables are used for the following connections: • Two cables to connect each BPS power module to a power source. • Two cables to connect each controller to a power source. • Two cables to connect each controller to a BPS power module.
Two controller rail kits	Contains the left and the right rails for a tool-less square-hole or round-hole rack, in addition to two strips with hook-and-loop fasteners. Use the strips to organize your cables in the rack.
FS7500 Backup Power Supply shipping box	Contains the following: • BPS chassis with two installed power modules. • Accessory box, containing the protective bezel, two USB cables, two strips with hook-and-loop fasteners (for cable management), and two green Remote Emergency Power Off (REPO) port connectors. Check with your data center administrator about whether REPO is required for your installation. For more information about the REPO ports, see the FS7500 Backup Power Supply Hardware Maintenance Guide. • Rail kit for the BPS, containing the left and the right rails. The rail kit is tool-less and does not require any tools or extra hardware.
Documentation	The following documentation is included in the shipping box: • Hardware setup poster • *Installation and Setup* manual (this document) • License, regulatory, and warranty information

Note: You must supply the network cables for each FS7500 Controller. Each controller needs 13 network cables, depending on network configuration. See *Required Hardware That Is Not Supplied on page 10*.

FS7500 Controller Front and Back Panels

Figure 3 and Figure 5 show the front panel and the back panel of the FS7500 Controller.

The external video and USB connectors on the front panel are used when updating the FS7500 software. You can use these ports to connect an external monitor and keyboard to the controller. For more information about software updates, see the EqualLogic FS7500 *Release Notes*.

Figure 3: FS7500 Controller Front Panel

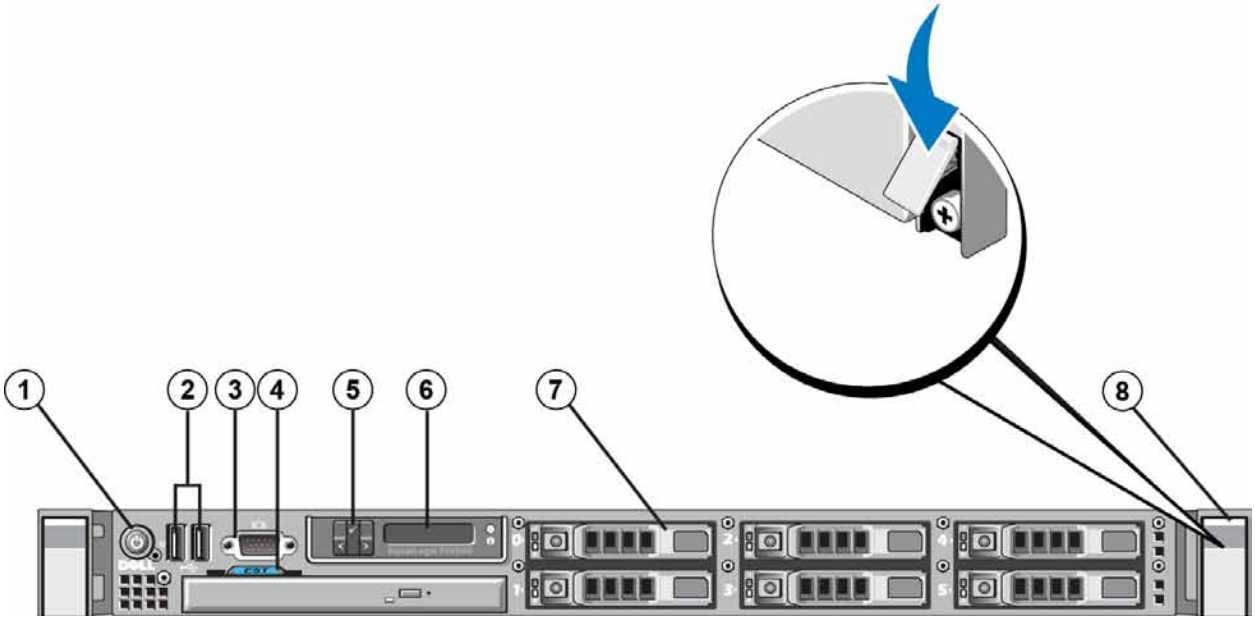


Figure 4: FS7500 Controller Front Panel Components

Number	Component
1	Power button
2	USB ports
3	Video port
4	Service tag pull-out card
5	LCD screen control keys
6	LCD screen
7	One of six hot-swappable drives
8	Retaining screws (under latch)

Figure 5: FS7500 Controller Back Panel

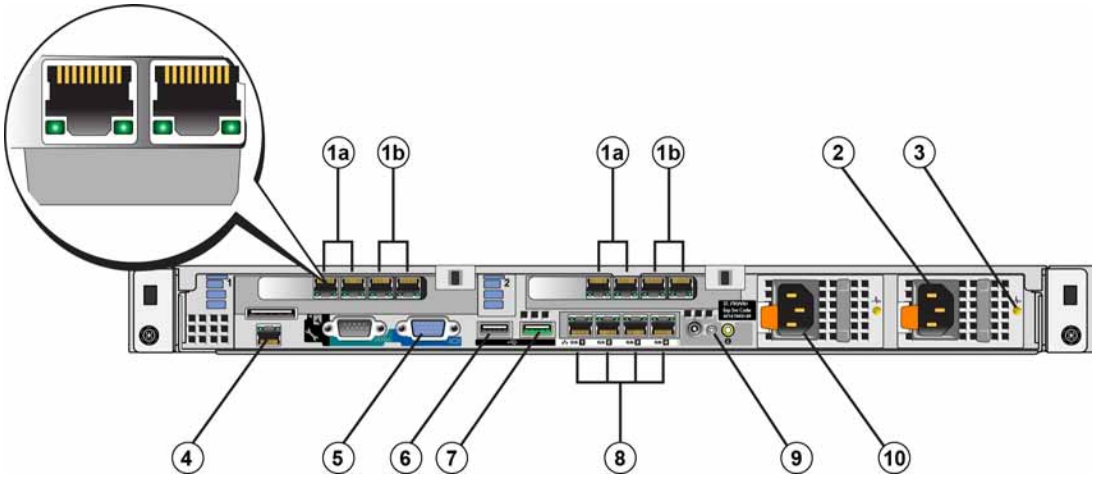


Figure 6: FS7500 Controller Back Panel Components

Number	Component
1a	Internal network interfaces
1b	SAN network interfaces
2	C14 power connector (to AC power source)
3	Power supply status LED
4	IPMI port
5	Video port
6	USB port (to external keyboard)
7	USB port (to BPS)
8	Client network interfaces
9	System power-on status LED
10	C14 power connector (to BPS)

FS7500 BPS Front and Back Panels

Figure 7 and Figure 8 show the front panels and the back panel of an FS7500 Backup Power Supply with both power modules installed, and the BPS bezel removed.

Each power module has a front cover. The power modules contain the batteries.

Figure 7: FS7500 BPS Front Panel

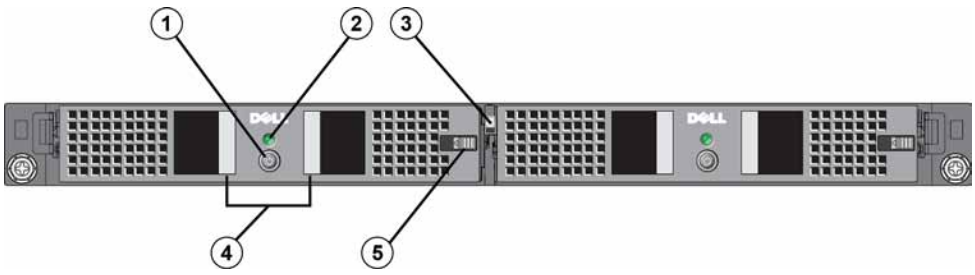


Table 5: FS7500 BPS Front Panel Components

Number	Component
1	Power button
2	Indicator LED
3	Center release latch
4	Hand grips
5	Power module cover release latch

Figure 8: FS7500 BPS Back Panel

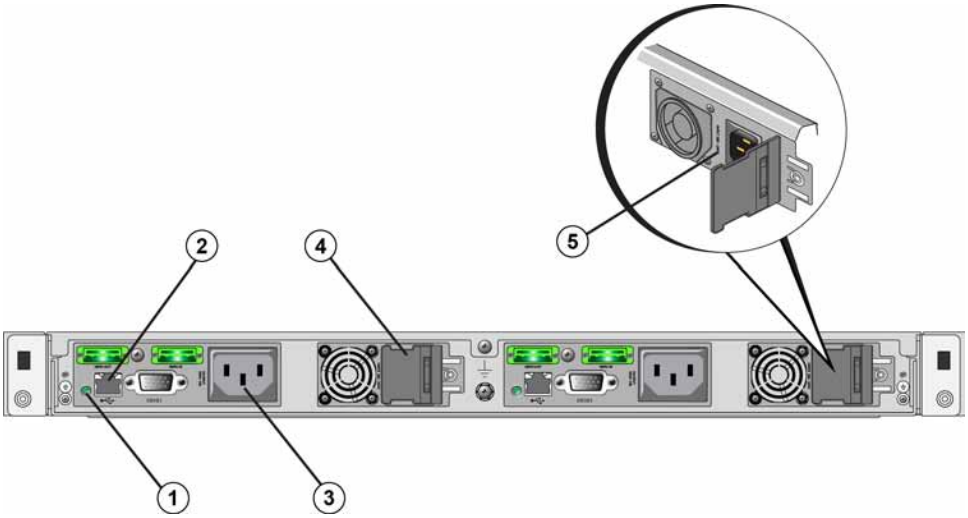


Table 6: FS7500 Back Panel Components

Number	Component
1	BPS Power Module LED
2	USB port (to controller)
3	C13 power connector (to controller)
4	C14 power connector to AC power source (under latch)
5	Power rating label (under latch)

Required Hardware That Is Not Supplied

You must provide additional hardware that is specific to your environment and not included in the shipping box. See Table 7.

Table 7: Required Hardware – Not Supplied

Component	Description
19 inch (48.3 cm), four-post, tool-less rack	Provides easy access to hardware in your computing environment. See *Rack Requirements on page 11*.
Network cables	Connects FS7500 Controller network ports to a network switch. Use Category 5E or Category 6 cables with RJ45 connectors. Use Category 5 cables only if they adhere to the TIA/EIA TSB95 standard. For each FS7500 Controller, you need 13 network cables. • For a two-controller installation: 26 cables total. • For a four-controller installation: 52 cables total. See *Network Configuration Overview on page 37*.
1GE network switch	Connects devices to a network. Multiple switch stacks are recommended. See *Switch Requirements on page 12*.

Rack Requirements

For each EqualLogic FS7500, you must install the BPS and the two controllers in the same rack.

See your FS7500 support provider for detailed information about supported racks.

The rack and the hardware installation must meet the following requirements:

- Only four-post, square-hole or round-hole, tool-less racks are supported by default. The graphics in this manual show a square-hole rack, but the installation instructions are applicable to round-hole racks.
- Use an industry-standard (for example, CEA-310-E), 48.3 cm (19 inch) rack.
- Tooled racks are supported only if you obtain a different FS7500 Controller rail kit than that which is provided in the shipping box. This rail kit must include installation instructions and also a list of the hardware needed for the tooled installation. In addition, the user must reconfigure the FS7500 Backup Power Supply rail kit to support a tooled rack and must obtain the necessary hardware (screws) to fit their rack. *Appendix 1, Custom Racking Instructions*, describes how to convert the rail kit to fit a tooled rack.
- The rack must be rated for 540 kg (1200 pounds) static load or greater.
- The minimum rack depth is 100 cm (40 inches) from the front to the back of the rack.
- The distance between the inside of the front and back rack posts (the mounting surfaces) must be 61 cm (24 inches) to 90 cm (36 inches).
- Secure the rack to the floor for added stability.
- There must be at least 4.1 cm (1.6 inches) between the rack door and the front of the hardware to accommodate the front bezel.
- The rack (with installed hardware) must meet the safety requirements of UL 60950-1 and IEC 60950-1.
- Mount the hardware in a horizontal position, or you void your warranty and support contract.

Switch Requirements

At a minimum, you can connect all the network ports in an EqualLogic FS7500 to the same physical switch. However, this configuration is appropriate only for demonstration or testing purposes because the network switch is a single point of failure. Dell recommends that you use a highly-available network switch configuration for the client, SAN, and internal network connections.

Ideally, you want a network switch configuration in which a switch failure does not disrupt the availability of the NAS service. This means that no single switch should have all the client, SAN, or internal network connections.

See *Network Connection Requirements and Recommendations on page 38*.

Required Tools

You might need tools to install the controllers and BPS in a rack. These tools are not provided in the shipping box.

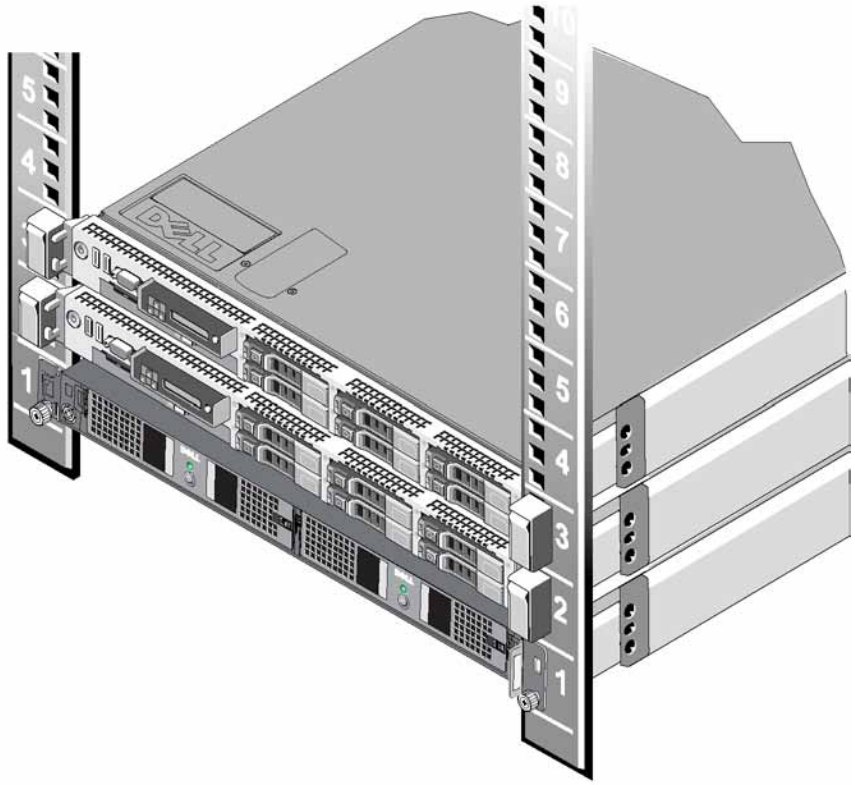
- #2 Phillips screwdriver

2 Hardware Rack Mounting

For proper operation, you must install the EqualLogic FS7500 hardware (two FS7500 Controller nodes and one FS7500 Backup Power Supply unit) in a rack.

Figure 9 shows the BPS and two controllers installed in a rack. Your FS7500 installation should look similar to this when complete.

Figure 9: EqualLogic FS7500 Installed in a Rack



Guidelines for Installing Mounting Rails in a Rack

Before you install the EqualLogic FS7500 hardware in a rack, you must plan where to install the mounting rails for each controller and for the BPS. Each device is a 1U device.

Dell recommends that you install the rails according to the following guidelines:

- Make sure rack meets the requirements in *Rack Requirements on page 11*. The graphics in this manual show a square-hole rack, but the installation instructions are applicable to round-hole racks.
- If you are installing multiple sets of EqualLogic FS7500 hardware in the same rack, separate each pair of controllers with a BPS.
- Make sure that the BPS and the controllers are located close enough together that the cabling between the components can be easily installed. For best results, use the shortest network cables possible.
- Install hardware starting from the bottom of the rack.
- Install a maximum of four EqualLogic FS7500 configurations in a rack.

Note: Using the rail kits shipped with the EqualLogic FS7500, you can install the controllers and BPS only in a four-post, tool-less, square-hole or round-hole rack.

You can install an EqualLogic FS7500 in a tooled rack *only* if you contact your PS Series support provider and obtain a different controller rail kit. In addition, you must reconfigure the BPS rail kit to support a tooled rack, as described in *Appendix 1, Custom Racking Instructions*.

Steps for Installing an FS7500 Backup Power Supply into a Rack

Before you begin, obtain the FS7500 Backup Power Supply (BPS) rail kit. See *Shipping Box Contents on page 7*.

Note: Even if you have an uninterruptible power supply (UPS) system in your lab, you must install the BPS.

Caution: You need at least two individuals to install the BPS in a rack. The BPS is heavy, and you must keep it level to install it properly.

Warning: Make sure the voltage of your power source is compatible with the voltage rating of the BPS. If the power source voltage is too low, the BPS will not activate. If the voltage is too high, the BPS can be destroyed.

Follow these steps to mount a FS7500 BPS in a rack using the rail kits:

1. Position the left and right BPS rails in the orientation in which you will install the rails. See *Positioning the BPS Rails on page 15*.
2. Attach the rails to the rack posts. See *Attaching the BPS Rails to the Rack on page 15*.
3. Place the BPS chassis on a stable surface.
4. Remove the power modules from the BPS chassis. See *Removing the Power Modules from the BPS Chassis on page 16*.
5. Slide the empty BPS chassis into the rack and secure the chassis to the rack. See *Installing the Empty BPS Chassis Into a Rack on page 17*.
6. For each power module, connect the battery. See *Connecting the Battery in a BPS Power Module on page 18*.

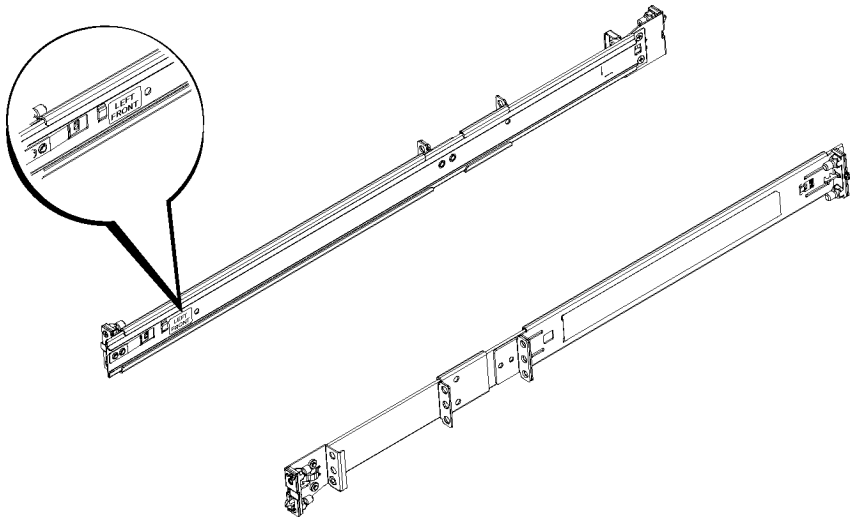
7. Insert each power module into the BPS chassis. See *Inserting Each Power Module into the BPS Chassis on page 22*.
8. Attach the bezel on the front of the BPS. See *Attaching the BPS Bezel on page 22*.

These steps are described in detail in the following sections.

Positioning the BPS Rails

Orient the left and right BPS rails in the position in which you will install them in the rack. Make sure that the FRONT label is toward the front of the rack. Make sure that the label is not upside down.

Figure 10: Positioning the BPS Rails



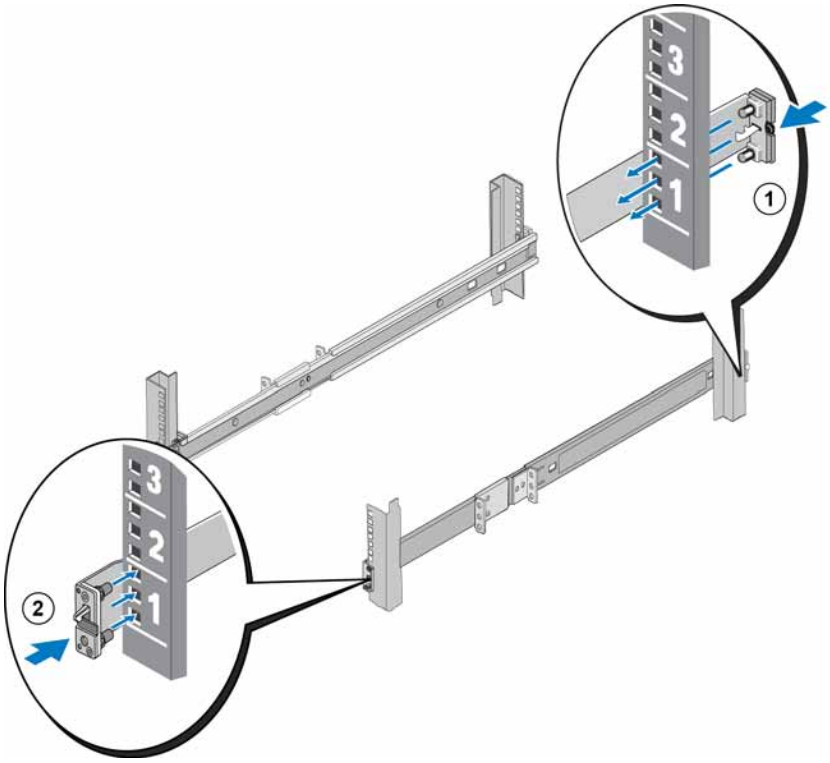
Attaching the BPS Rails to the Rack

See Figure 11 and follow these steps for each rail:

1. Verify where to place the BPS rails in the rack. See *Guidelines for Installing Mounting Rails in a Rack on page 13*.
2. From the front of the rack, fit the rear portion of the rail in the desired U holes on the outside of the rear post and pull the rail forward until the latch locks in place (Callout 1). Make sure that the bracket is flush with the rack.
3. Pull the front end of the rail past the front post.
4. Fit the front portion of the rail in the desired U holes on the post and push the rail into the rack until the latch locks in place (Callout 2). You should hear the latch click twice. Make sure that the front bracket is flush with the rack.

Check both ends of the rails to ensure they are fully seated in the same rack hole positions and that the rails are level.

Figure 11: Installing the BPS Rails



Removing the Power Modules from the BPS Chassis

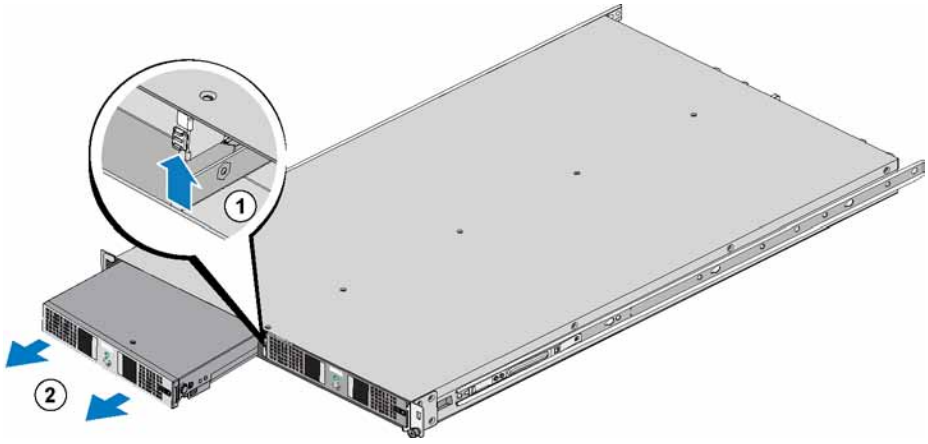
You must remove both power modules from the BPS before installing the empty chassis in the rack. The power modules contain the batteries.

Caution: The weight of the batteries in the BPS power modules is located toward the front of the power module. Keep the power module level as you remove it from the chassis.

To remove a power module from the BPS chassis, follow these steps:

1. Make sure that the BPS is on a stable surface.
2. Locate the module retainer lever in the middle of the chassis between the two modules. See Callout 1 in Figure 12 for the location of the lever.

Figure 12: Lifting the Module Retainer Lever



3. Simultaneously, slide up the lever, grasp the hand hold on the module, and slide the module part way from the chassis. See Callout 2 in Figure 12.
4. Supporting the module, slowly pull the module from the module bay.
5. Place the power module on a flat, stable surface with the front of the power module facing you.
6. Repeat steps 2 through 5 to remove the other power module.

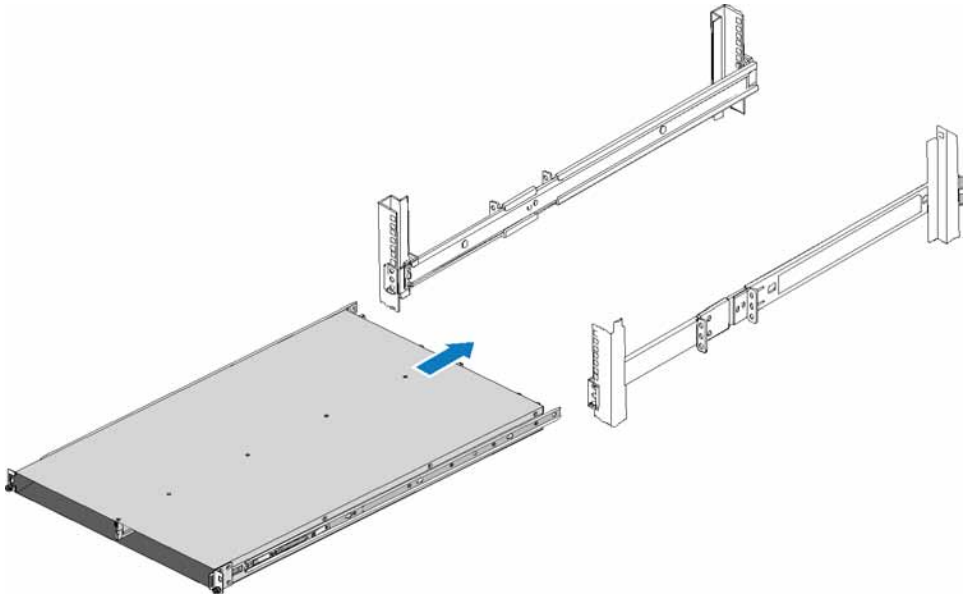
The BPS chassis should now be empty.

Installing the Empty BPS Chassis Into a Rack

To install the empty BPS chassis in the rack, see Figure 13 and follow these steps:

1. Using two individuals on each side of the BPS, lift the BPS and hold it level.
2. Insert the rails attached to the BPS chassis into the rails attached to the rack and make sure that the rails are engaged on both sides of the BPS.
3. Slide the chassis completely into the rack. You should hear the rails attached to the BPS chassis click when the chassis is completely installed. The triangular projections on the front edges of the rails attached to the rack should fit through the rectangular holes in the front brackets on the BPS chassis.

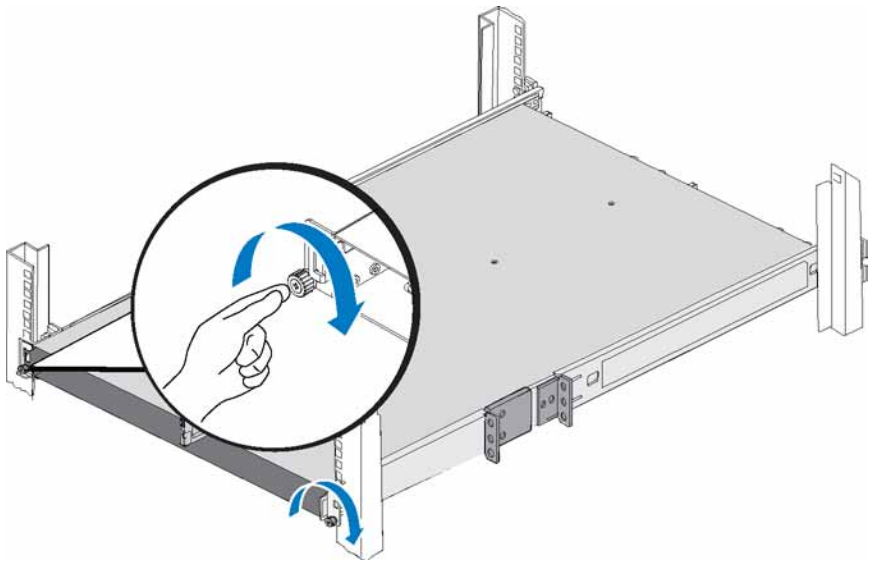
Figure 13: Installing the Empty BPS Chassis Into a Rack



4. Locate the retaining thumbscrews on each side of the BPS under the holes in the front brackets of the chassis and turn the thumbscrews clockwise until the chassis is securely attached to the front post. See Figure 14.

   Tighten the thumbscrews by hand only. Do not use hand tools or power tools.

Figure 14: Securing the BPS Chassis



Connecting the Battery in a BPS Power Module

Note: Before you perform this procedure, make sure each BPS power module is on a stable surface.

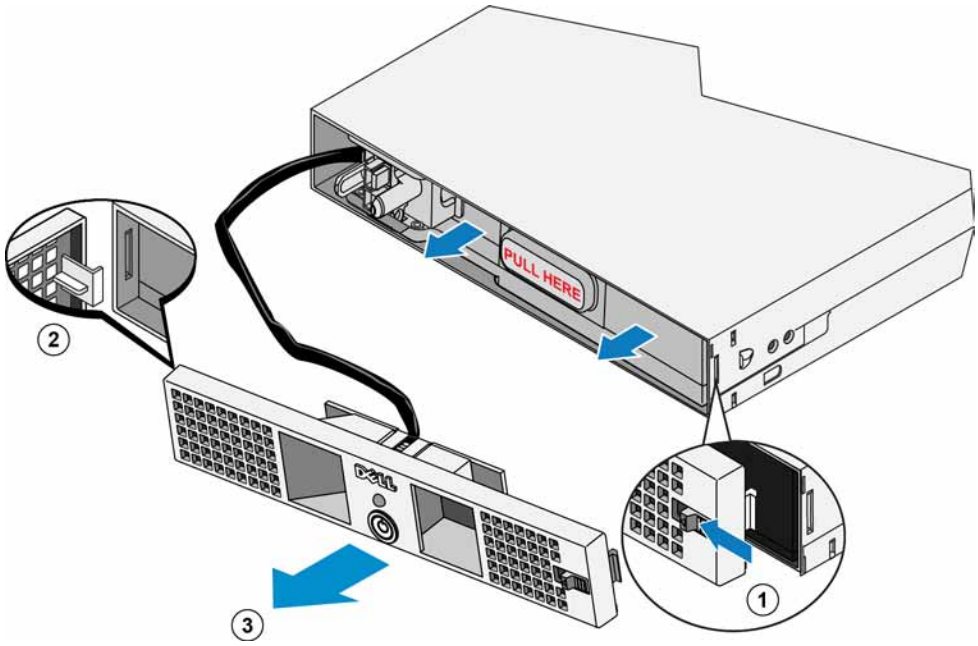
The battery in a BPS is installed backwards in the factory to preserve power during shipment. You must remove the battery from each power module, turn it around, and reinsert it to complete the circuit for proper operation.

Perform these steps for each power module:

1. Locate the module cover lever on the right side of the module. See Callout 1 in Figure 15.
2. Simultaneously, slide the cover latch to the left, grasp the hand-holds on the module and gently pull the right side of the cover from the chassis (callout 2), and then slide the cover to the right to disengage it from the module (callout 3).

   Make sure not to pull on the ribbon cable or disconnect it.

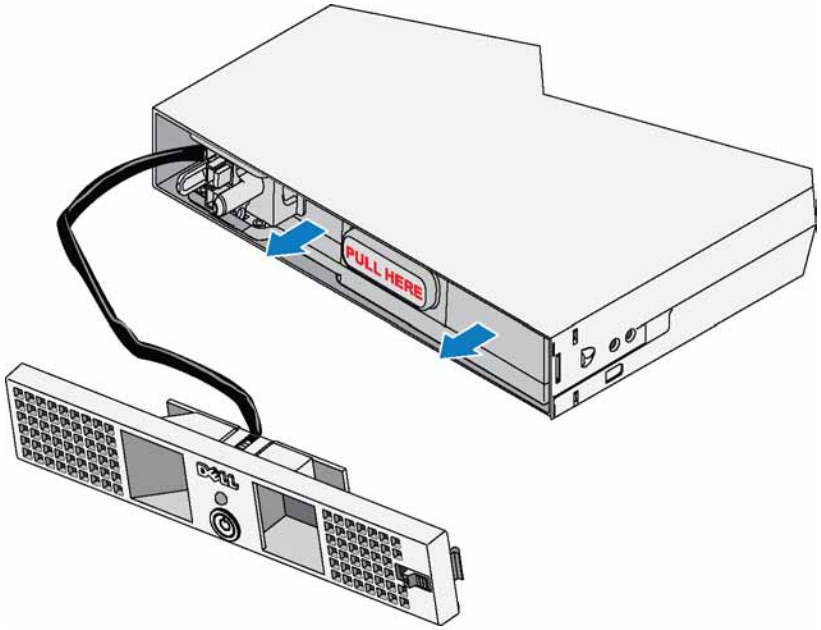
Figure 15: Removing the Module Cover



3. Grasp the plastic handle labeled PULL HERE on the battery inside the module and slowly remove the battery. See Figure 16.

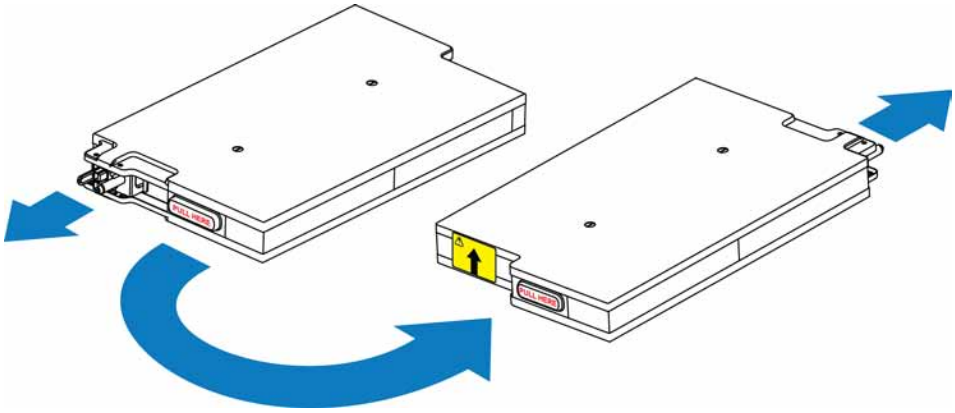
Warning: For safety, do not allow the power module front cover to come in contact with the battery pack during removal.

Figure 16: Removing the Battery



4. Rotate the battery 180 degrees so the blind mate connector faces toward the back of the power module chassis. See Figure 17.

Figure 17: Rotating the Battery

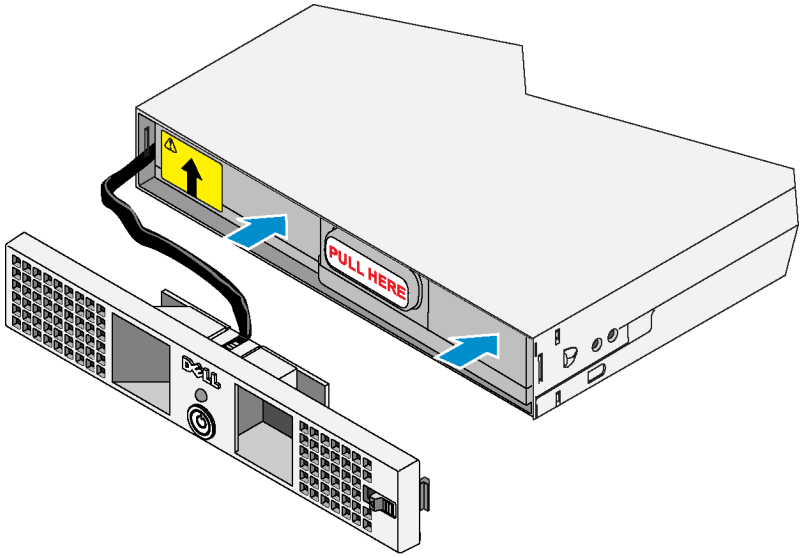


5. Keeping the battery pack level and making sure the arrow on the yellow label is pointing up, reinsert the battery in the module. See Figure 18.

   Make sure the battery is completely installed in the module. If the battery protrudes from the module, the cover will not install correctly.

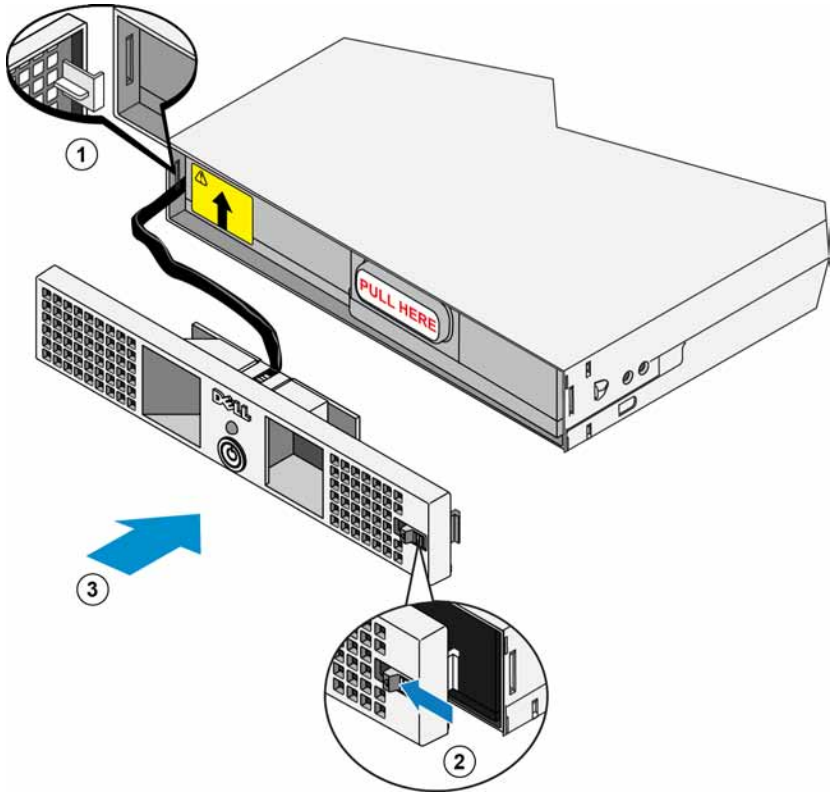
Warning: For safety, always attach the power module front cover as soon as the battery pack is inserted and connected.

Figure 18: Reinstalling the Battery



6. Immediately reattach the module cover by inserting the stationary hook on the cover into the open slot on the left side of the module (Callout 1 in Figure 19) and then simultaneously sliding the right-side latch to the left (Callout 2), and pushing the right side of the cover forward to the chassis until the cover engages completely (Callout 3). Then, release the latch. See Figure 19.

Figure 19: Attaching the BPS Power Module Cover

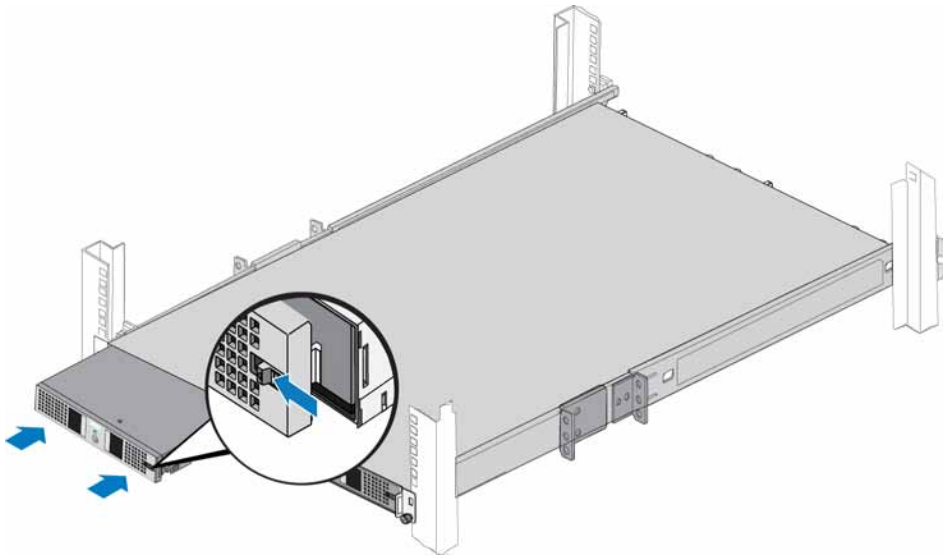


Inserting Each Power Module into the BPS Chassis

To insert a power module into the BPS chassis, see Figure 20 and follow these steps:

1. Lift the power module.
2. Carefully slide the power module into the BPS chassis. The center latch clicks when the module is properly installed.

Figure 20: Inserting a Power Module Into the BPS Chassis

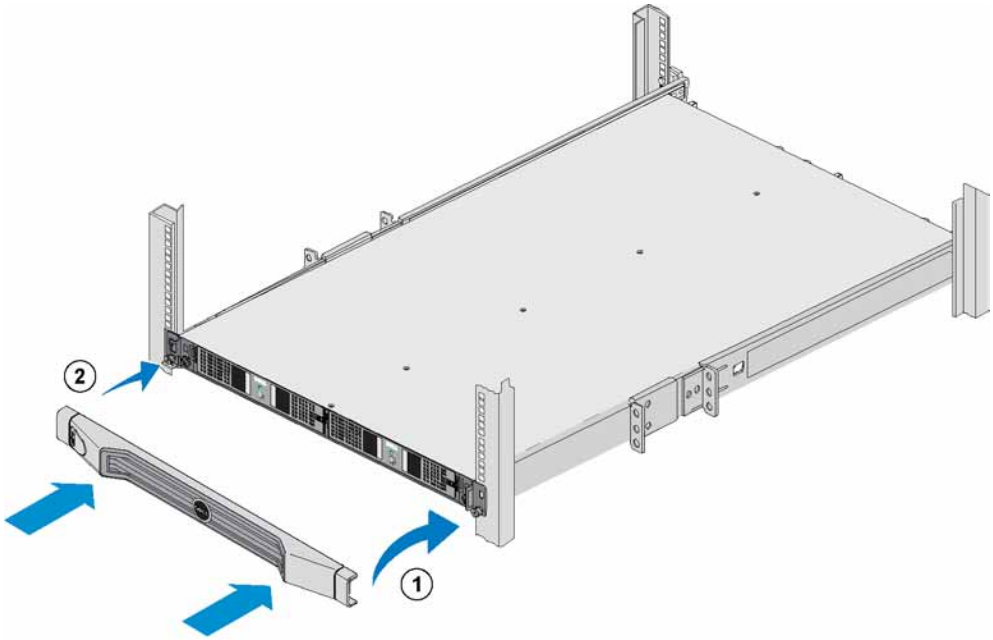


Attaching the BPS Bezel

To attach the BPS bezel to the front of the chassis, see Figure 21 and follow these steps:

1. Locate the BPS chassis bezel that was delivered in the accessory box with the BPS.
2. Gently fit the bezel onto the right side of the chassis (Callout 1).
3. Lift the latch on the left side of the bezel. Push the left side of the bezel onto the left side of the chassis to engage the bezel with the front of the chassis (Callout 2). Release the latch.

Figure 21: Attaching the BPS Bezel



Steps for Installing an FS7500 Controller in a Rack

Before you begin, obtain the FS7500 Controller rail kit. See *Shipping Box Contents on page 7*.

Caution: You need at least two persons to install the controller in a rack.

1. Position the left and right controller rails in the orientation in which you will install the rails. See *Positioning the ControllerRails on page 24*.
2. Attach the controller rails to the rack. See *Attaching the Controller Rails to the Rack on page 24*.
3. Attach the controller to the rails and slide the controller into the rack. See *Installing the Controllers Into the Rack on page 25*.
4. Secure the controller to the rack. See *Securing the Controllers to the Rack on page 25*.
5. Attach the bezel to the controller. See *Attaching the Controller Bezel on page 26*.

These steps are described in detail in the following sections.

Note: If you are installing the controller into a shallow rack (less than 1 m deep), you may remove the cable management brackets on the controller rails. See *Removing the Brackets From the Controller Rails on page 73* for information about how to remove the brackets.

Positioning the ControllerRails

Orient the left and right controller rails in the position in which you will install them in the rack. Make sure that the FRONT label is toward the front of the rack. Make sure that the label is not upside down.

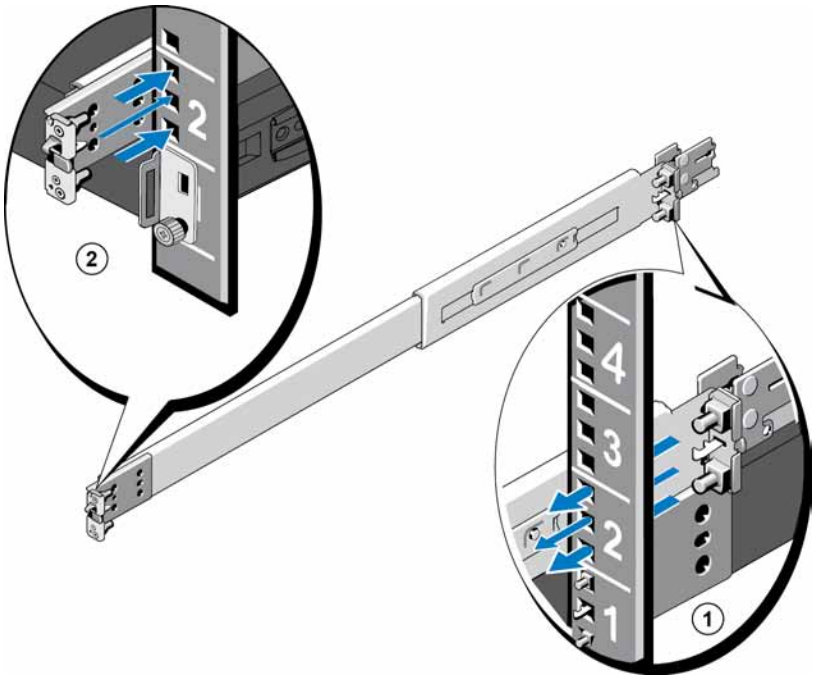
Attaching the Controller Rails to the Rack

See Figure 22 and follow these steps for each rail:

1. Verify where to place the controller rails in the rack. See *Guidelines for Installing Mounting Rails in a Rack on page 13*.
2. From the front of the rack, fit the rear portion of the rail in the desired U holes on the outside of the rear post and pull the rail forward until the latch locks in place (Callout 1).
3. Pull the front end of the rail past the front post.
4. Fit the front portion of the rail in the desired U holes on the post and push the rail into the rack until the latch locks in place (Callout 2). You should hear the latch click twice. Make sure that the front bracket is flush with the rack.

Check both ends of the rails to ensure they are fully seated in the same rack hole positions and that the rails are level.

Figure 22: Attaching the Controller Rails to a Rack

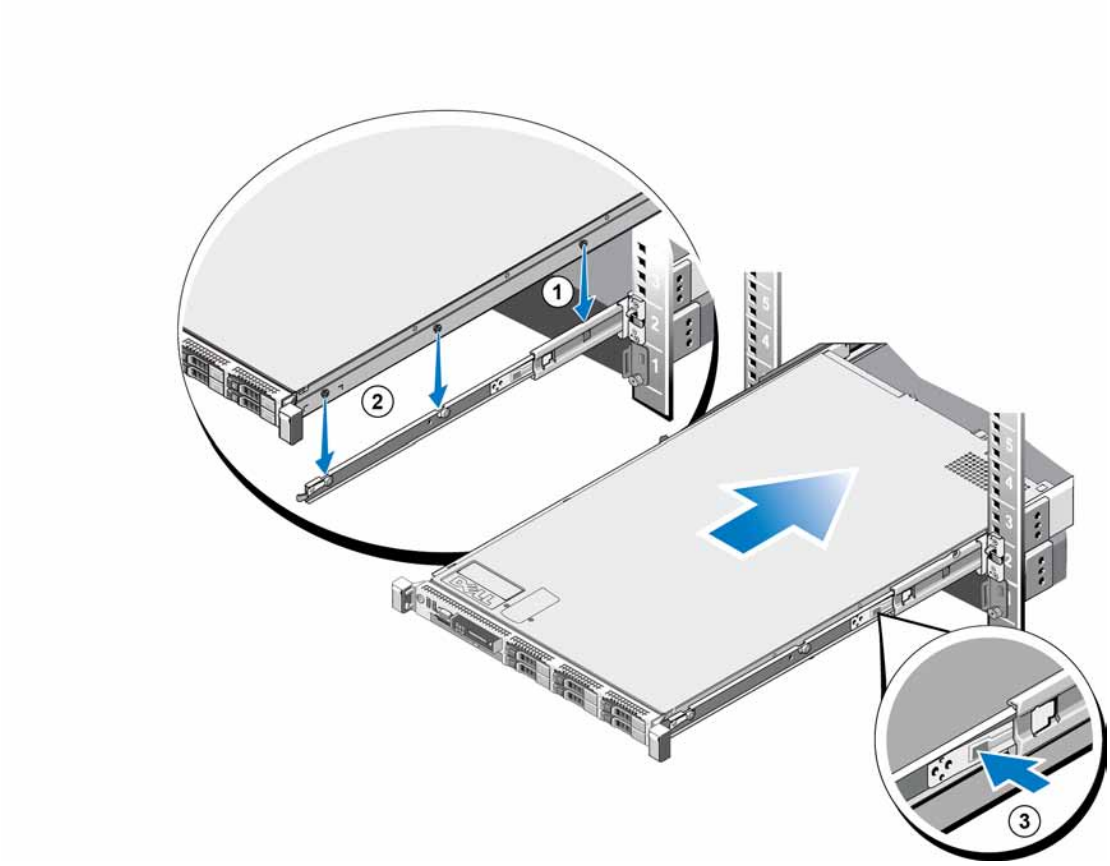


Installing the Controllers Into the Rack

See Figure 23 and follow these steps for each controller:

1. From the front of the rack, pull out the inner sliding rails until they lock into place.
2. Using two individuals on each side of the controller, lift the controller and then lower the rear shoulder screws on the controller into the rear J-slots on the extended rails (Callout 1 in Figure 23).
3. Continue to lower the controller onto the extended rails until all shoulder screws fit in the J-slots (Callout 2).
4. Push the controller inward until you hear the front release latch click.
5. Press the slide-release lock button on each rail (Callout 3) and slide the controller completely into the rack.

Figure 23: Sliding a Controller into the Rack



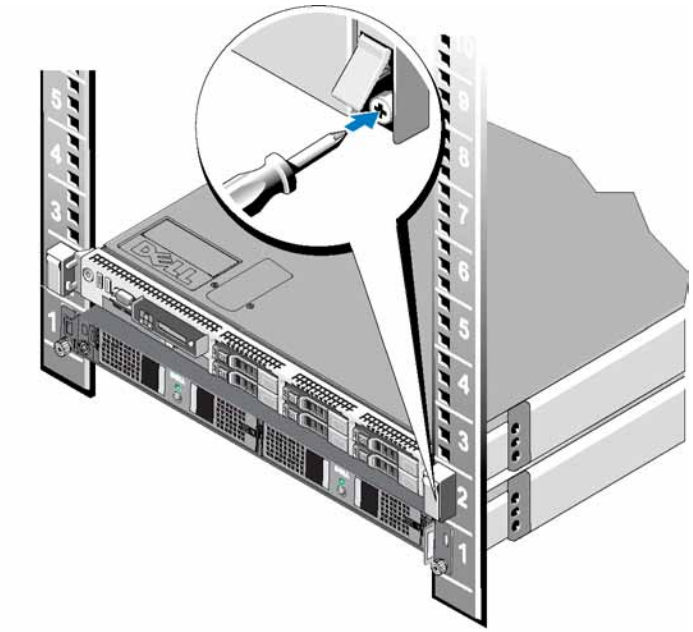
Securing the Controllers to the Rack

When you push a controller into the rack, the latches on each side of the controller automatically attach the controller to the front rack posts.

To more securely attach the controller to the rack, see Figure 24 and follow these steps for each latch:

1. From the front of the rack, press the top half of the latch, exposing the inner screw.
2. Tighten the screw with a #2 Phillips screwdriver.

Figure 24: Securing the Controllers to the Rack

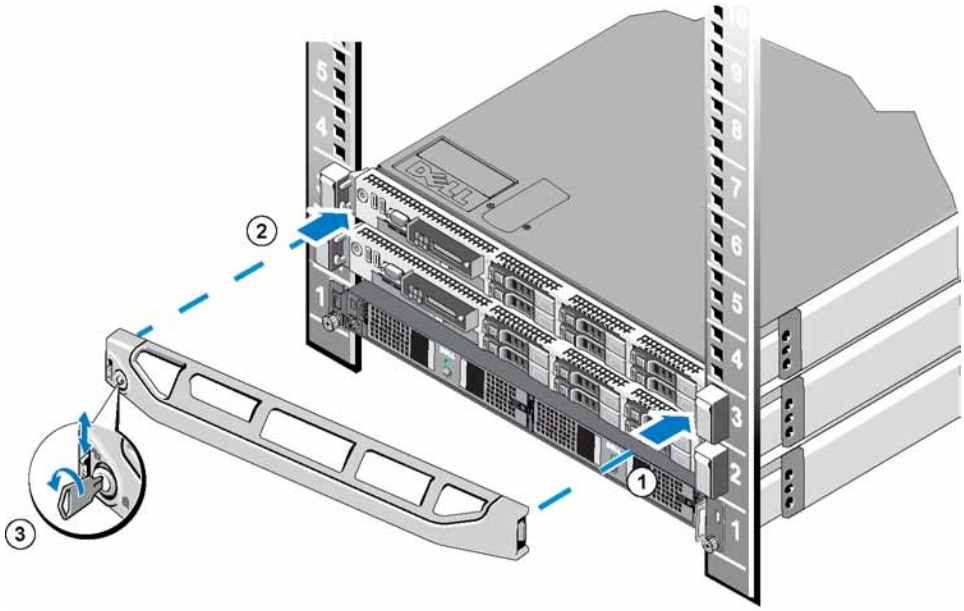


Attaching the Controller Bezel

To attach the controller bezel, see Figure 25 and follow these steps:

1. Insert the right side of the bezel into the slot on the right side of the controller. (Callout 1)
2. Push the bezel toward the left side and engage the bezel with the left side of the controller chassis. (Callout 2)
3. Use key to lock the bezel. (Callout 3)

Figure 25: Attaching the Controller Bezel



3 Power Connections

After connecting the FS7500 Backup Power Supply (BPS) batteries and installing the BPS and the two FS7500 Controller units in a rack, connect the BPS and controllers to power and make sure they are operational.

Steps for Connecting a BPS to Power

To connect a BPS to power, follow these steps:

1. Connect each BPS power module to a separate power source. See *Connecting a BPS Power Module to a Power Source on page 29*.
2. Remove the BPS bezel. See *Removing the BPS Bezel on page 31*.
3. Turn on each BPS power module and make sure each module is operational. See *Turning On Power to a BPS Power Module on page 32*.
4. Attach the BPS bezel. See *Attaching the BPS Bezel on page 22*.

The following sections describe these steps in detail.

Figure 26 shows the two power modules in a BPS connected to different power sources.

Figure 26: FS7500 BPS Power Connections

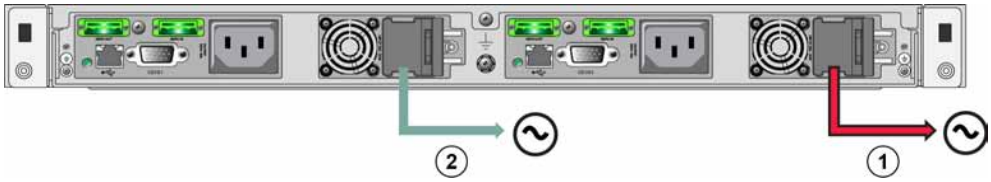


Table 8: BPS Power Connections

Callout	Description
1	Power connection from BPS to Power Source 1
2	Power connection from BPS to Power Source 2

Connecting a BPS Power Module to a Power Source

Dell recommends that you connect the power modules in a BPS to separate power sources, preferably on different circuits for the highest availability.

Warning: Make sure the voltage of your power source is compatible with the voltage rating of the BPS. If the power source voltage is too low, the BPS will not activate. If the voltage is too high, the BPS can be destroyed.

To connect a BPS power module to a power source, follow these steps:

1. Obtain a power cable with a C13 connector and a connector that fits the receptacle of your power source, in addition to a hook-and-loop fastener provided in the BPS shipping box.

   If power cables are not in the shipping box, see your PS Series support provider or reseller for power cable information.

2. Open the latch for the C14 input connector on the power module (on the right side of the power module) and insert the cable's C13 connector. See Figure 27.

3. Connect the power cable to a power source.

4. Use the hook-and-loop fastener strip to secure the power cable to the latch on the power module. This provides strain relief for the cable. See Figure 28.

Figure 27: Connecting a BPS Power Module to a Power Source

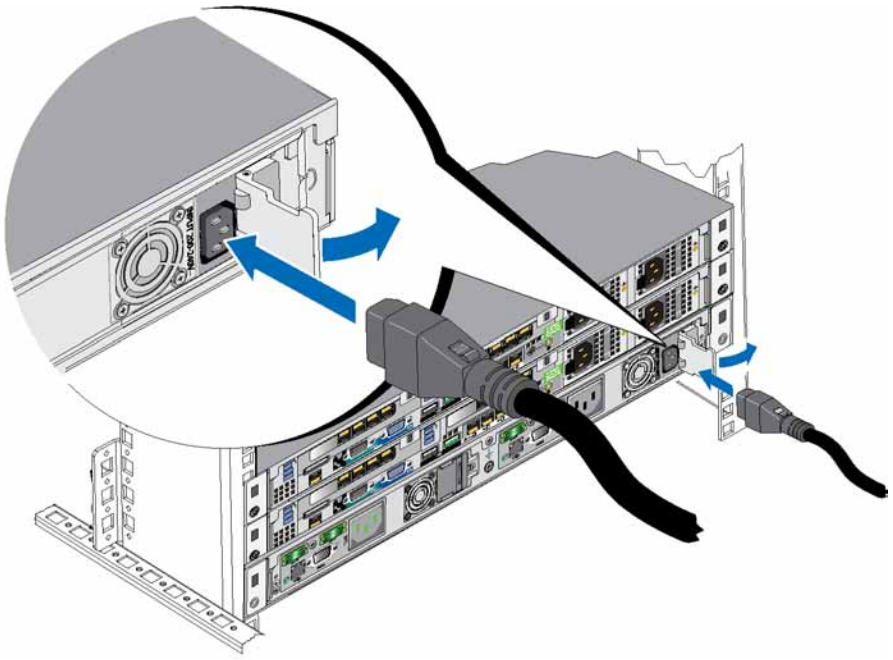
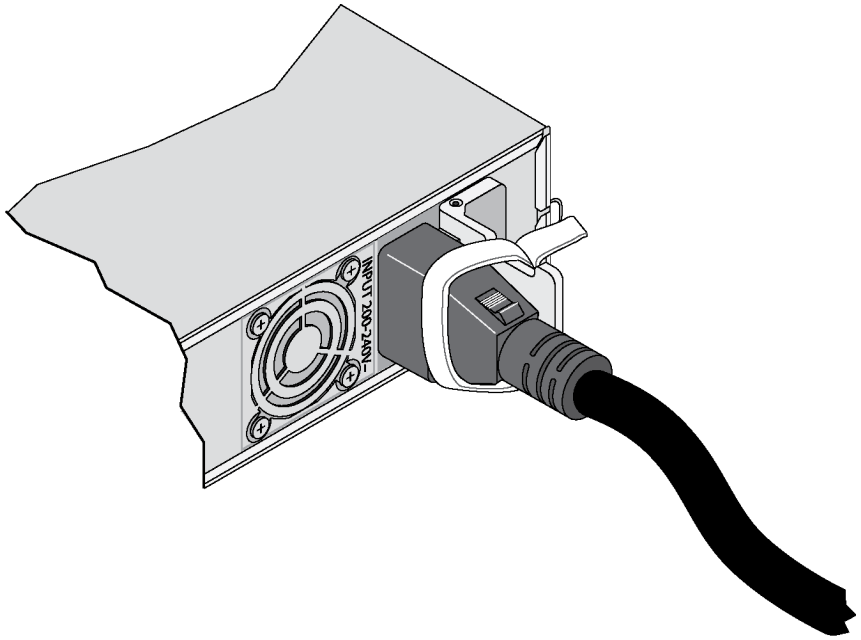


Figure 28: Using the BPS Cable Strain Relief

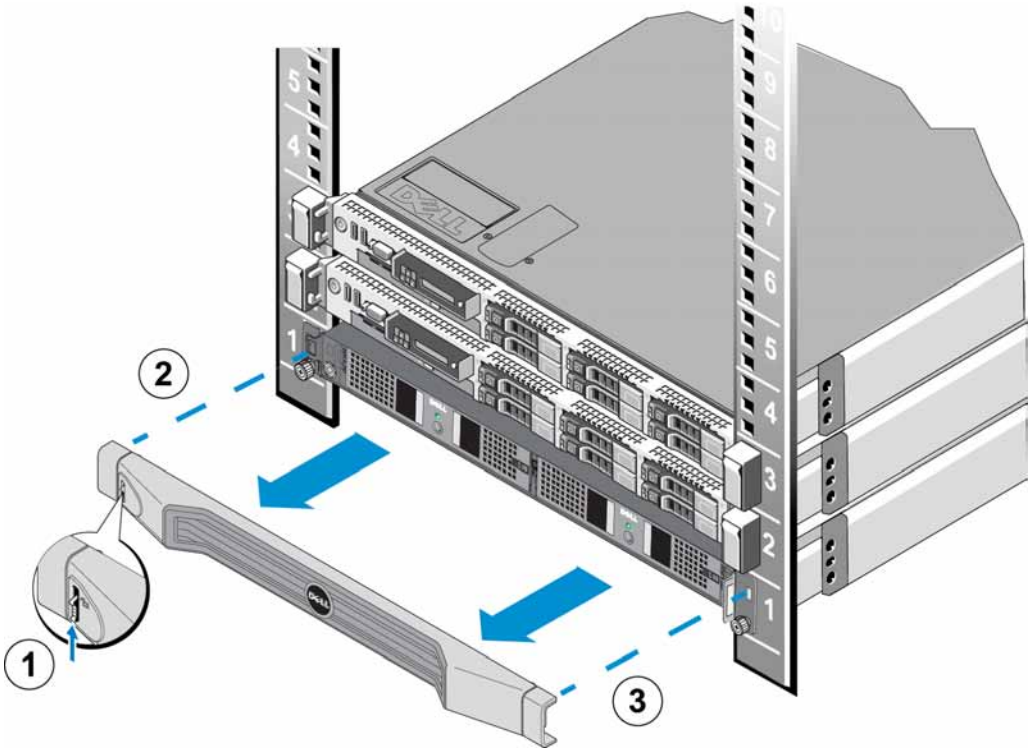


Removing the BPS Bezel

To remove the BPS bezel, see Figure 29 and follow these steps:

1. Push up on the release latch on the left side of the bezel (callout 1) and disengage the bezel from the left side of the BPS (callout 2).
2. Disengage the bezel from the right side of the BPS (callout 3).

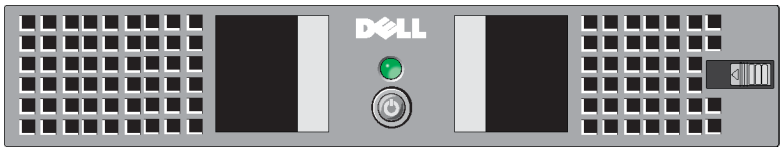
Figure 29: Removing the BPS Bezel



Turning On Power to a BPS Power Module

To turn on a BPS power module and verify that it is operational, see Figure 30 and follow these steps:

Figure 30: BPS Power Module



1. On the front of the power module, press and hold the power button for 0.5 seconds.
2. Examine the LED on the front of the power module above the power button.

   If the LED shows a steady green light and an alarm is not audible, the power module is operational.

   If the LED is not green or if you hear an alarm, see Table 9 and Table 10.

Note: To silence an audible alarm, press the power button for 0.5 seconds. If the condition continues, you will hear the alarm again.

Table 9: FS7500 BPS Troubleshooting - LEDs

LED Color and Patterns	Description
None	BPS power module is off. BPS is in standby mode.
Solid green, not blinking	Operational. Utility power is on and BPS power module is on.
Blinking amber	No utility power; unit can support the load on the battery (before battery low condition).
Solid amber	Active alarm due to BPS error condition, or utility power is off.
Alternating green and amber (slow blinking)	Flash upgrade is in progress.
Alternating green and amber (fast blinking)	BPS is in boot loader mode.

Table 10: FS7500 BPS Troubleshooting - Sounds

Sound	Description
None	No active alarms or active notices, the BPS is not turned on, or an active alarm has been muted.
Continuous buzzer	Shutdown is imminent or a hardware failure occurred.
Continuous fast beeping	Active alarm due to BPS error condition.
Slow beeping	Active notice.

Attaching the BPS Bezel

See *Attaching the BPS Bezel on page 22*.

Steps for Connecting a Controller to a BPS and Power

You must connect each FS7500 Controller to a different BPS power module and a different source of power. You can then verify that each controller is operational.

Follow these steps for each controller:

1. Obtain the following cables:
   - Power cable with a C13 connector and a connector that fits the receptacle of your power source.
   - Power cable with a C13 connector and a C14 connector.
   - USB cable provided in the FS7500 BPS shipping box.

     If power cables are not in the shipping box, see your PS Series support provider or reseller for power cable information.
2. Using the cables obtained in Step 1, connect the controller to a power source, connect the controller to the power output receptacle on a BPS power module, and connect the controller to the USB port on the same BPS power module. See *Connecting a Controller to a Power Source and a BPS Power Module on page 34*.
3. Remove the bezel from the controller. See *Removing the Controller Bezel on page 35*.

4. Turn on the controller and make sure the controller is operational. See *Turning On Power to a Controller on page 36*.
5. Attach the controller bezel. See *Attaching the Controller Bezel on page 26*.

The following sections describe these steps in detail. Figure 31 shows the two controllers and the BPS properly connected.

Figure 31: Complete EqualLogic FS7500Power Connections

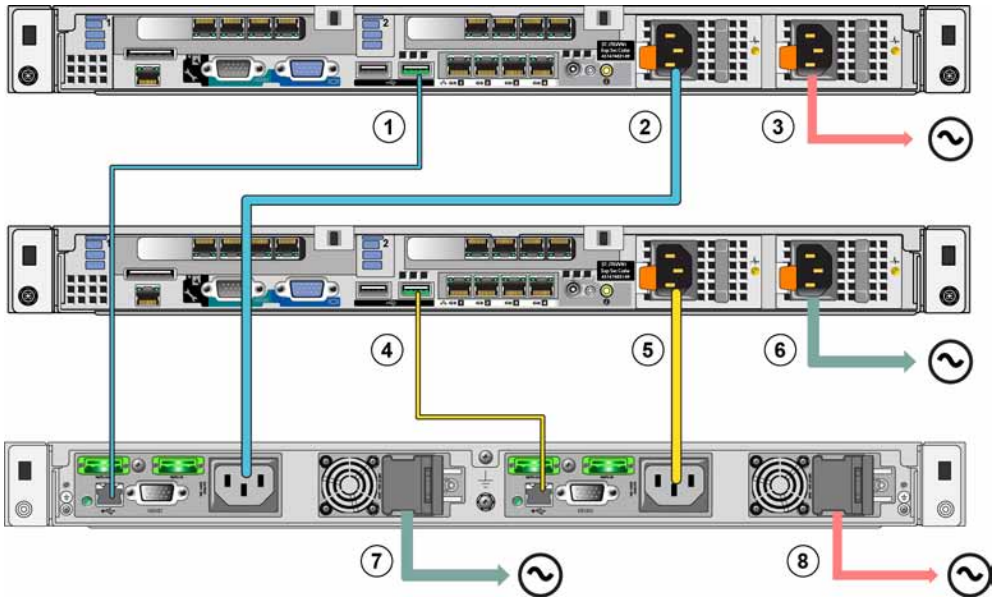


Table 11: EqualLogic FS7500 Power Connections

Callout	Description
1	USB connection from Controller 1 to BPS power module 1
2	Power connection from Controller 1 to BPS power module 1
3	Power connection from Controller 1 to Power Source 1
4	USB connection from Controller 2 to BPS power module 2
5	Power connection from Controller 2 to BPS power module 2
6	Power connection from Controller 2 to Power Source 2
7	Power connection from BPS to Power Source 2
8	Power connection from BPS to Power Source 1

Connecting a Controller to a Power Source and a BPS Power Module

To connect a controller to a power source and a BPS power module, see Figure 31 and Table 11 and follow these steps:

1. Connect the A connector on the USB cable to the USB port on the controller (located to the left of the bottom network interface card) and connect the B connector to the USB port on a BPS power module (callout 1 in Figure 31).

2. Use a power cable with a C13 connector and a C14 connector to connect the controller's left power supply to the output receptacle on the same BPS power module to which you connected the USB cable in the previous step (see callout 2 in Figure 31). Use the cable strain relief strap on the power supply to secure the power cable to the controller chassis.
3. Using a power cable with a C13 connector and a connector that fits the receptacle of your power source, connect the controller's right power supply to a power source (callout 3 in Figure 31). Use the cable strain relief strap on the power supply to secure the power cable to the controller chassis.

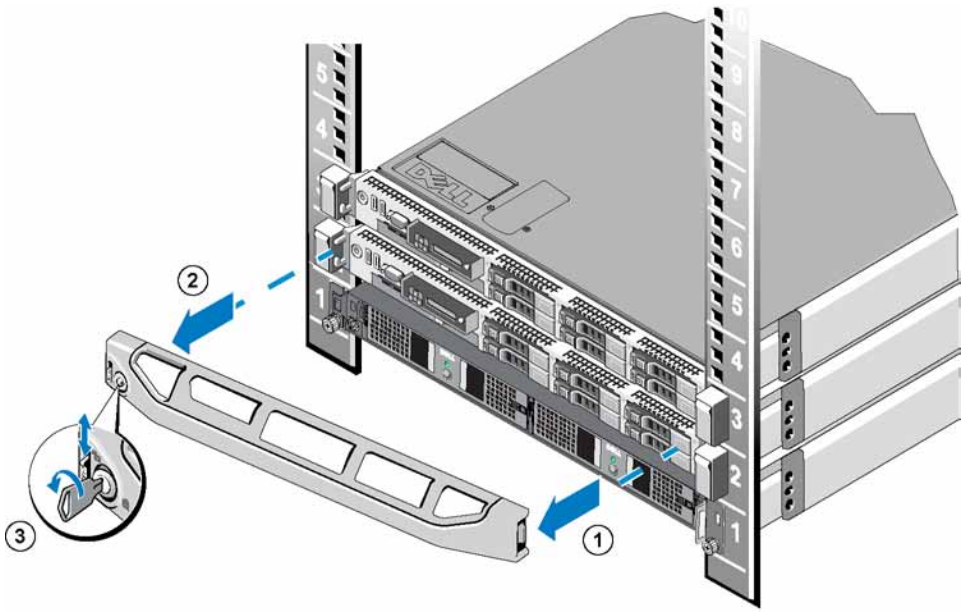
   For high availability, make sure the power source is not the same as the power source to which the BPS power module is connected.
4. Repeat the three steps to connect the second controller to the other power module on the BPS.

Removing the Controller Bezel

To remove the FS7500 Controller bezel, see Figure 32 and follow these steps:

1. Use the key to unlock the bezel, if it is locked (callout 3).
2. Push up on the release latch on the left side of the bezel and carefully pull out the bezel from the left side of the controller (callout 2).
3. Holding the bezel, move it to the left to disengage the bezel from the right side of the controller (callout 1).

Figure 32: Removing the Controller Bezel



Turning On Power to a Controller

From the front of the controller, press the power button on the left side of the controller. See for the location of the power button.

An LED indicator on the controller power button indicates if power is supplied to the controller and if the controller is operational.

In addition, the controller power supplies have an LED that shows whether power is present or whether a power fault has occurred, as shown in and described in Table 12.

Table 12: FS7500 Controller Troubleshooting – Power Supply LED

LED Color and Patterns	Description
Not lit	No power.
Green	When the controller is in standby mode (power connected but the controller is not turned on), a green LED indicates that a valid AC source is connected to the power supply, and that the power supply is operational. When the controller is turned on, a green LED also indicates that the power supply is providing DC power to the controller.
Amber	Indicates a problem with the power supply.
Alternating green and amber	See *Table 9 on page 33*.

Attaching the Controller Bezel

See *Attaching the Controller Bezel on page 26*.

Powering Down the Controller

To power down the controller, quickly press and release the power button. The controller writes any remaining data in the cache to storage, and then executes a graceful shutdown (turns off power to the node). To turn on power to the controller, press the power button again.

Caution: Do not press and hold the power button to shut down the controller. If you press and hold the power button to turn off the power, you could lose your data. Never power down both controllers at once.

4 Network Cable Connections

Before you connect each FS7500 Controller to the network hardware, you must set up the required network infrastructure and connect each FS7500 Controller to the networks used in the NAS service.

Network Configuration Overview

The EqualLogic FS7500 requires three networks:

- **Client network** – Used for client access to the NFS exports and CIFS shares hosted by the NAS service. The recommended configuration is four client network connections for each controller.
- **SAN network** – Used for access between the PS Series group (SAN) and the NAS nodes. The recommended configuration is four SAN network connections for each controller.
- **Internal network** – Used for communication between the NAS nodes. The recommended configuration is five internal network connections for each controller.

For security reasons, the internal network is usually a private network. The client network must be separate from the SAN and from the internal network.

An FS7500 Controller has three four-port NICs, plus a single network interface port in the lower left corner of the back panel. These ports are dedicated to specific networks:

- The ports in the two top NICs and the single port are only for SAN and internal network connections.
- The ports in the bottom NIC are only for client network connections.

Controller Network Interface Ports

Figure 33 shows the network interface ports on the controller. Table 13 describes their functions.

Figure 33: FS7500 Controller Network Interface Ports

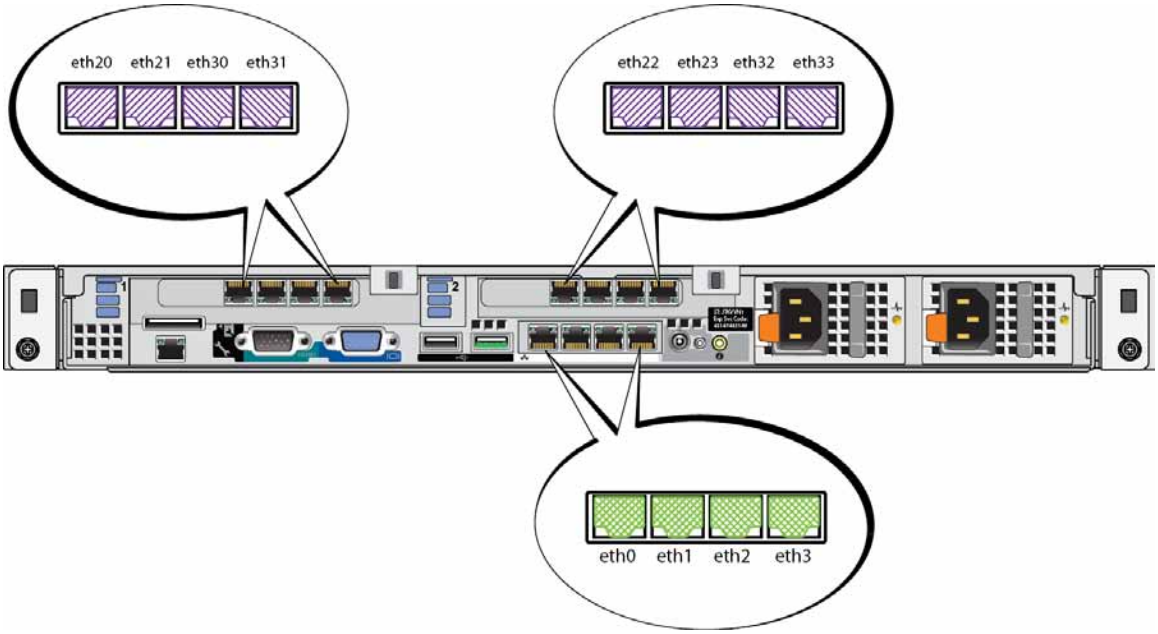


Table 13: Controller Interface Port Functions

Ethernet Port Numbers	Function	Comments
eth20, eth21, eth22, eth23 Left port pairs in upper callouts:	Private internal subnet	Allows internal communication between the two controllers.
eth30, eth31, eth32, eth33 Right port pairs in upper callouts:	SAN network	Allows communication between the NAS cluster and the PS Series group (SAN). Eth30 on each node must be on the same network or VLAN as the IPMI port on the other node. For example: • Node0 Eth30 on same network as Node1 IPMI • Node0 IPMI on same network as Node1 Eth30
eth0, eth1, eth2, eth3 Four ports in bottom callout:	Client network	Allows access to the client network (workstations, PCs, shares).

See *NAS Service Network Requirements and Recommendations on page 51* for more information.

Network Connection Requirements and Recommendations

At a minimum, you can connect all the network ports in an EqualLogic FS7500 to the same physical switch. However, this configuration is appropriate only for demonstration or testing purposes because the network switch is a single point of failure. Dell recommends that you use a highly-available network switch configuration for the client, SAN, and internal network connections.

Ideally, you want a network switch configuration in which a switch failure does not disrupt the availability of the NAS service. This means that no single switch should have all the client, SAN, or internal network connections.

Network connection requirements and recommendations for each FS7500Controller are as follows:

- A switched 1GE network is recommended.
- You need 13 network cables for each FS7500 controller.
- Connect the IPMI port to the internal network. *Figure 5 on page 9* shows the location of the IPMI port on the controller back panel.
- Connect the two internal network ports on each network interface card (NIC) to different switches.
- Do not connect the internal network ports to a router.
- Connect the two SAN network ports on each NIC to different switches.
- Do not connect the SAN network ports to a router.
- Connect two client network ports on the bottom NIC to one switch, and connect the other two client network ports to a different switch.

For the SAN network:

- Flow Control must be enabled on switches and network interfaces
- Unicast storm control must be disabled on switches
- Jumbo Frames must be enabled. Specifically, the network switching infrastructure must be configured to support an MTU size of 9216 bytes.
- VLANs can be used, but are not required.

Note: If you use VLANs within your switch stack, the internal and SAN networks must be in the same VLAN.

Steps for Connecting Network Cables

To connect network cables to a FS7500 Controller, follow these steps:

1. Obtain the correct number of network cables. For each controller, you need 13 network cables. This means that you will need a total of 26 cables for both controllers.
2. Connect the cables for the SAN and internal network connections. See *Connecting SAN and Internal Network Cables on page 41*.
3. Connect the cables for the client network connections. See *Connecting the Client Network Cables on page 41*.
4. Use the cable management system to organize the network cables. See *Managing the Controller Cables on page 41*.

Figure 34 shows the recommended EqualLogic FS7500 network configuration. Note that BPS and power connections are not shown. Table 14 describes the components shown.

Figure 34: EqualLogic FS7500 Network Configuration

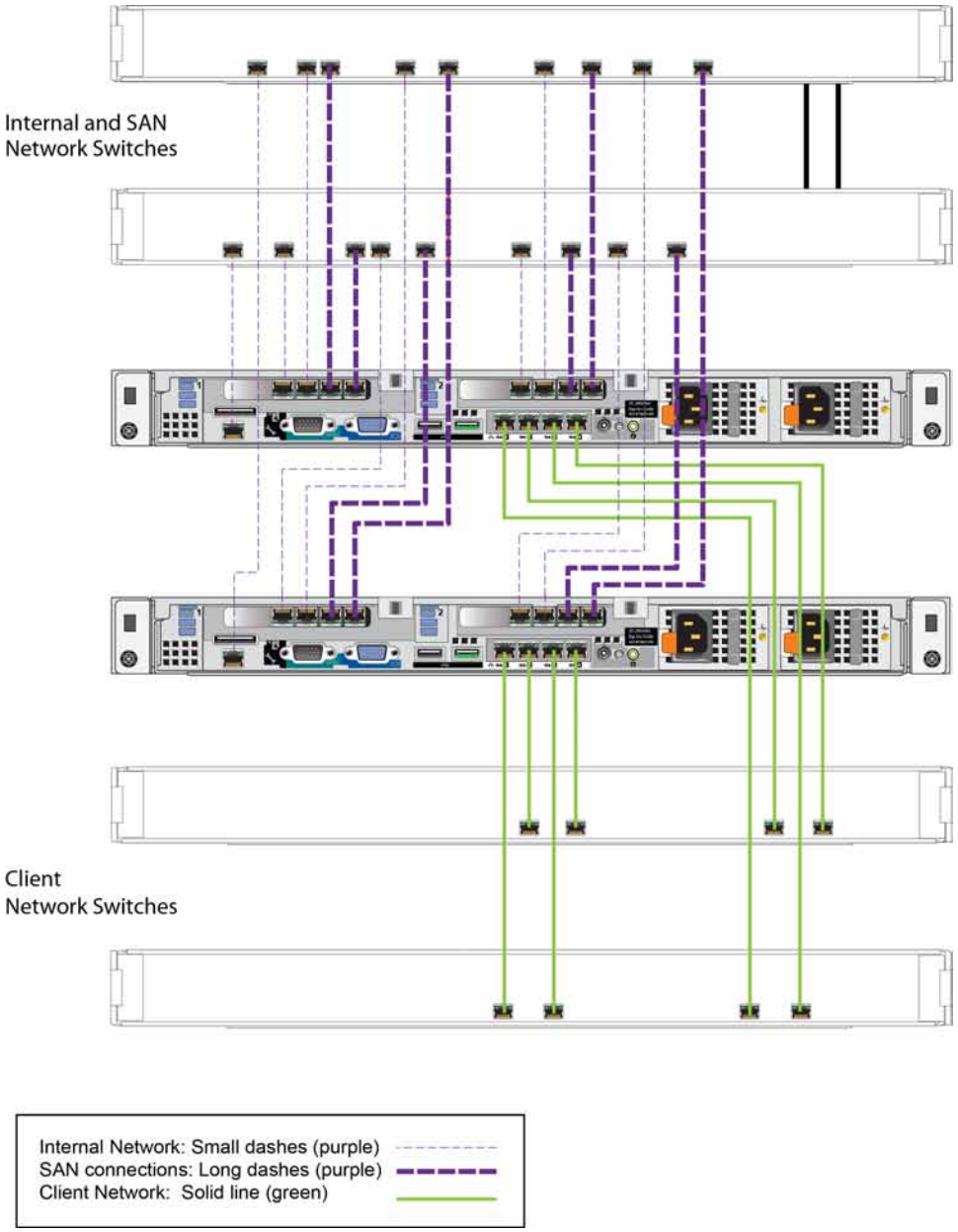


Table 14: Network Component Descriptions

Description	Line Attributes
Switch stack for internal network connections	Small dashes (purple)
Switch stack for SAN connections	Long dashes (purple)
Switch stack for client connections	Solid line (green)

Note: If you use VLANs within your switch stack, the internal and SAN networks must be in the same VLAN.

Connecting SAN and Internal Network Cables

See *Figure 34 on page 40*. For each controller, make the following controller connections to the two switch stacks:

- The ports labeled Eth30, Eth31, Eth32, and Eth33 on the two top network interface cards.
- Single port in the lower-left corner of the controller.

Connecting the Client Network Cables

See Callout 1 in *Figure 34 on page 40*.

For each controller, use four network cables to connect all the ports on the bottom network interface card to a switch stack that is different from the switch stack for the SAN and internal network connections.

Managing the Controller Cables

There are three main methods of managing the controller cables in the EqualLogic FS7500. The three methods differ in how the controller cables are routed and secured. The three methods are:

- Cabling the FS7500 installed in sliding rails. This is the standard installation as described in *Hardware Rack Mounting on page 1*, using the rails provided in the shipping box. The cable connections are described in *Steps for Connecting Network Cables on page 39*.
- Adding a service loop to the FS7500 controller installed in the provided rails. A service loop is an extra length of cable between the rear of the controller and the rack. The additional cable allows you to slide the controller forward on the rails for servicing without having to disconnect the cables and power cables.
- Cabling the FS7500 controller installed in static rails. This method requires a different set of rails that must be ordered separately. *Appendix 1, Custom Racking Instructions*, describes how to manage cables on controllers that are installed in static rails.

For more information about routing controller cables, see the Dell white paper *Dell Best Practices Guide for Rack Enclosures*. This white paper is available online in the Dell Storage Document Center at http://www.dellstorage.com/resources/document-center.aspx.

Steps for Managing Cables in a Standard Installation

Cable management for the FS7500 controller consists of the following steps:

- Route the power cables through the strain relief straps
- Bundle the signal and power cables together using the hook-and-loop fasteners supplied in the shipping box
- Secure the signal and power cable bundles to the rails

Figure 35 shows the back panel of the controller with all of the cable connections. See *Steps for Connecting a Controller to a BPS and Power on page 33* for detailed information about the cable connections.

Figure 35: Controller Cable Connections

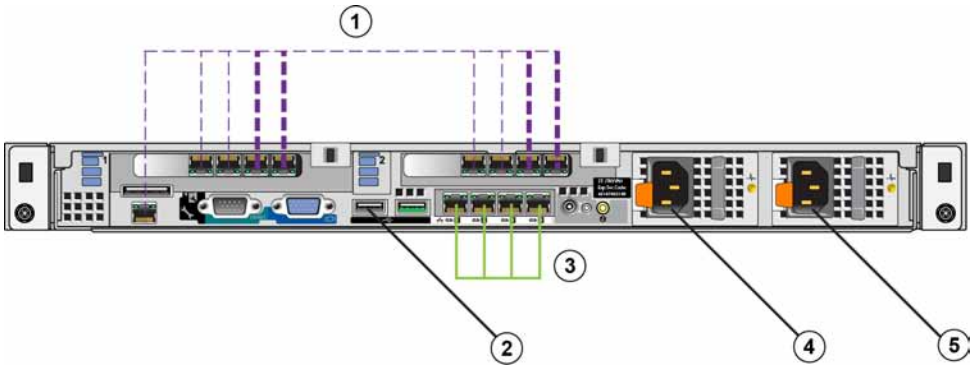


Table 15: Controller Cable Connections

Number	Description
1	SAN and internal network connections, including the IPMI cable
2	USB connection to BPS
3	Client network connections
4	Power connection to BPS power module
5	Power connection to power source

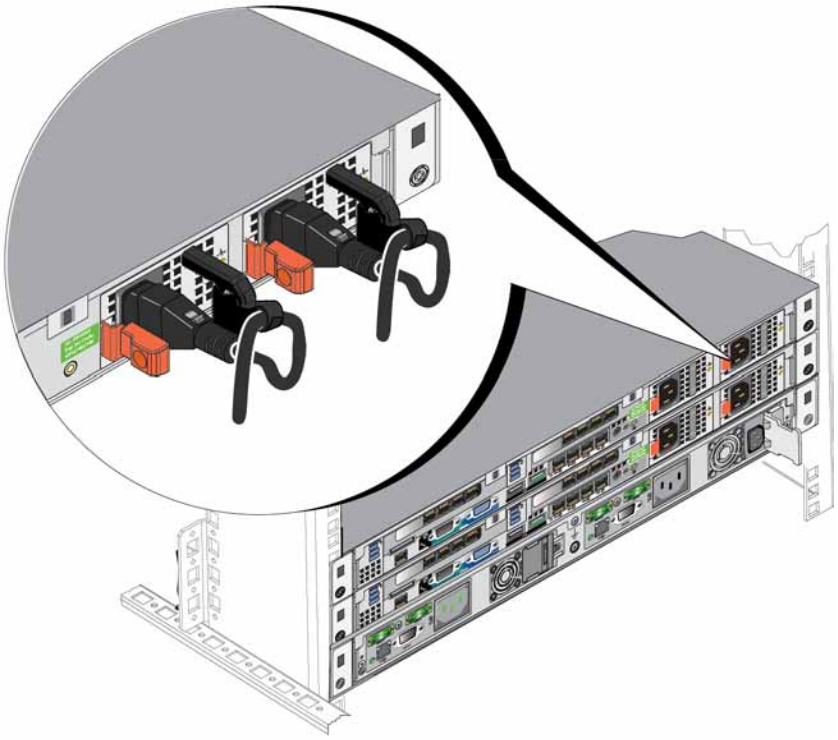
Routing the Power Cables Through the Strain Relief Straps

The strain relief straps are located on the D-shaped handles on the back of the power supplies. To route the power cables through the strain relief straps, perform this procedure for each of the power cables on each of the two controllers:

1. Create a small loop near the end of the power cable where it connects to the controller.
2. Secure the cord to the power supply handle using the strain relief strap. The loop that you created in the previous step helps provide the strain relief.

Figure 36 shows how to loop the power cables through the strain relief straps.

Figure 36: Looping the Power Cables Through the Strain Relief Straps



Bundling the Signal and Power Cables

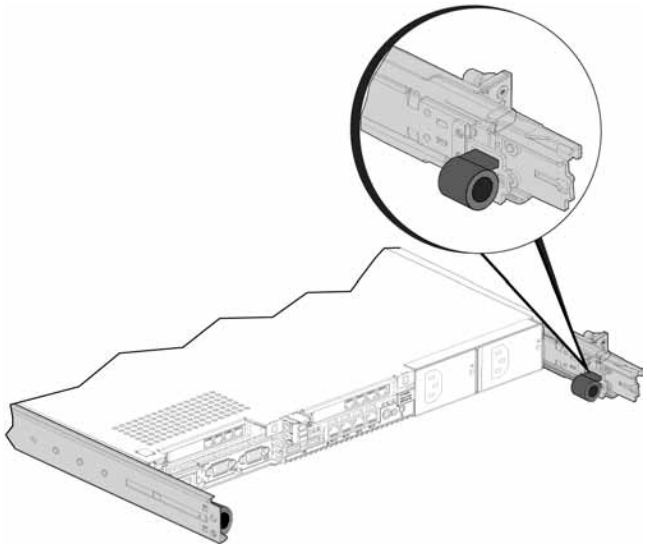
Using the hook-and-loop fasteners provided in the shipping box, bundle the cords together as follows:

1. Use a hook-and-loop fastener to bundle the signal cords together and route the bundle toward the left side of the controller back panel.
2. Use a hook-and-loop fastener to bundle together the two power cables and route them toward the right side of the controller back panel.

Securing the Signal and Power Cable Bundles to the Rails

The FS7500 controller rails have brackets attached to the rear of each rail. These brackets extend beyond the back of the system when the rails are installed. Figure 37 shows the location of the hook-and-loop fasteners on the brackets.

Figure 37: Cable Management Brackets



Secure the bundled cords to the brackets as follows:

1. Use the hook-and-loop fastener to secure the bundled signal cables to the bracket on the rail on your left as you face the back of the controller.
2. Use a hook-and-loop fastener to secure the bundled power cables to the bracket on the rail on your right as you face the back of the controller.

Figure 38 shows the signal and power cable bundles. The rails are hidden in this illustration for clarity.

Figure 38: Bundled Signal and Power Cables

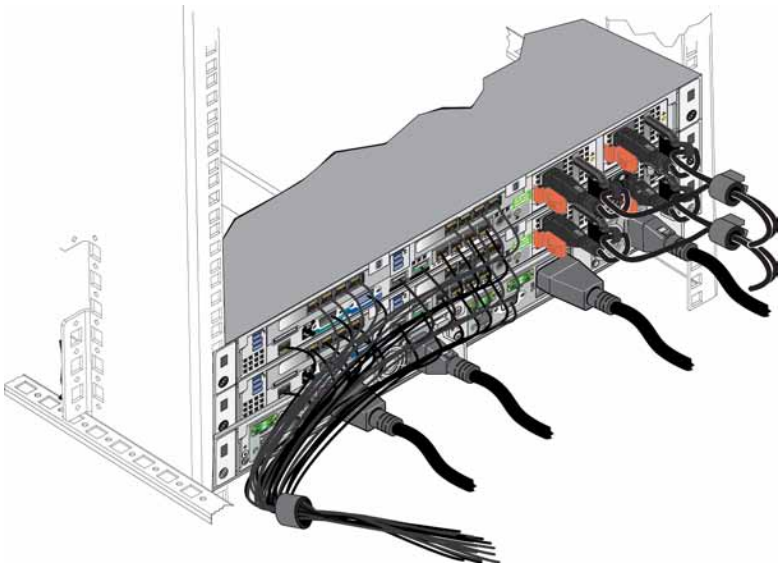
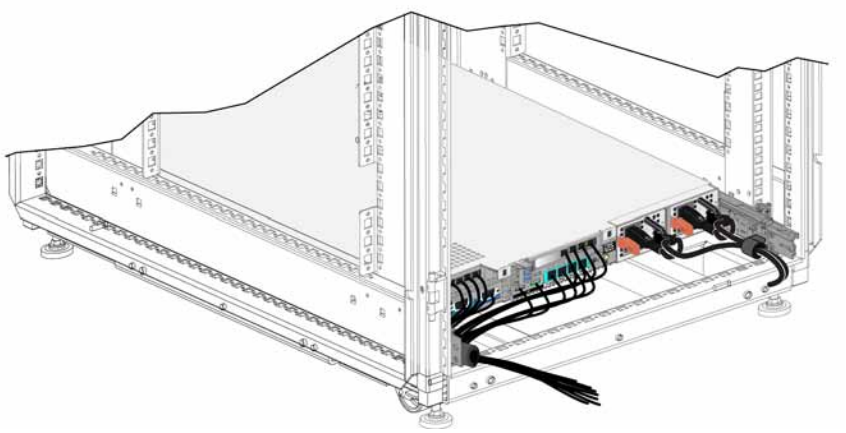


Figure 39 shows the back panel of the FS7500 controller with the bundled cords secured to the rails.

Figure 39: Securing the Signal and Power Cable Bundles



Steps for Managing Cables Using a Service Loop

A service loop is an extra length of cable between the rear of the rack and the controller. Using a service loop allows you to extend the controller forward on its rails for servicing without needing to disconnect all of the cables from the back panel of the controller.

Note: Servicing a controller installed with a service loop requires at least two individuals one at the front of the rack and one at the back.

The procedure to install a service loop consists of the following steps:

- Make sure that the signal and power cables are properly connected to the controller back panel.
- Extend the controller forward from the rack into the service position
- Route the power cables through the strain relief straps
- Bundle the signal and power cables together using the hook-and-loop fasteners supplied in the shipping box
- Secure the signal and power cable bundles to the rails
- Slide the controller back into the rack

Routing the Power Cables Through the Strain Relief Straps

See *Routing the Power Cables Through the Strain Relief Straps on page 42* for the procedure.

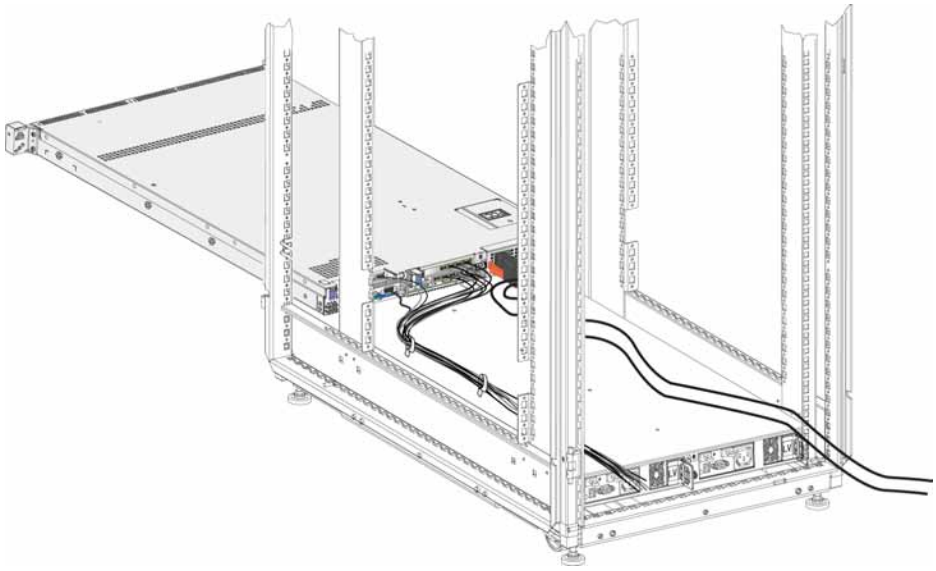
Note: Using strain relief with the power cables in this installation prevents the controller from being powered down accidentally during servicing.

Extending the Controller into Service Position

From the front of the rack, extend the FS7500 controller toward you on its rails until the rails click into place. This indicates that the controller is in its service position.

Figure 40 shows the controller extended forward into the service position, as viewed from the back of the rack. Note the extra lengths of the power and signal cables.

Figure 40: Controller in Service Position



Bundling the Signal and Power Cables

Note: This procedure requires at least two people, one at the front of the rack and one at the back.

Using the hook-and-loop fasteners provided in the shipping box, bundle the cords together as follows:

1. Use a hook-and-loop fastener to bundle the signal cords together and route the bundle toward the left side of the controller back panel. For best results, use hook-and-loop fasteners to bundle the cords in at least two locations along the length of the cords. This helps keep the bundle together and prevents tangling.
2. Use a hook-and-loop fastener to bundle together the two power cables and route them toward the right side of the controller back panel.
3. If desired, bundle the signal and power cables as described in *Bundling the Signal and Power Cables on page 43*. If you bundle the cords, use the hook-and-loop fasteners to secure them together.

   Note: Securing the signal cable and power cable bundles to the rails is optional. If you do secure the cord bundles to the rails, they will need to be unsecured before the controller can be extended for service.
4. Press the slide release lock buttons on the sides of the rails to release the locking mechanism.

5. Gently push the controller back into the rack until it clicks back into place. Take care to ensure that the cord bundles do not snag or become pinched.

5 NAS Service Configuration

After completing the EqualLogic FS7500 hardware installation, you can configure a NAS service.

Steps for Configuring a NAS Service

Follow these steps for configuring a NAS service:

1. Gather the information needed to complete the NAS service configuration. See *Gathering the NAS Service Configuration Information on page 49*.
2. Complete *Table 17 on page 53*.
3. Use the Group Manager GUI to discover each FS7500 Controller that you want to include in the NAS service and then start the Configure NAS Service wizard. See *Discovering Controllers and Configuring a NAS Service on page 54*.

When the NAS Service Configuration wizard completes, the group begins to configure the NAS service. The NAS Service Configuration – Progress window appears, enabling you to track the progress of the service configuration.

The PS Series group remains fully operational during the NAS service configuration.

After you successfully configure a NAS service, you can create multiple NAS file systems. See *Chapter 6, NAS Storage Allocation*.

Gathering the NAS Service Configuration Information

Before beginning the NAS service configuration, obtain the following:

- **Service tag for each FS7500 Controller you want to add to the NAS service.**

  You must add controllers (NAS nodes) to a NAS service in pairs. The service tag identifies a controller. The service tag appears on the pullout card on the front of the controller (see *Figure 3 on page 8*), and in the LCD screen on the front panel of a powered-on controller.

  Reading the service tag number from the card is the simplest way to collect the controller information. However, if the service tag pull-out card is missing or the information is not printed on it, you can get the service tag information from the LCD. See *Using the LCD Screen to Display Service Tag Information on page 50*.

- **Initial size of the NAS reserve and the storage pool from which to consume the space.**

The NAS reserve is the amount of storage pool space to allocate to the NAS service. The NAS reserve stores the following data:

– Internal data. Each controller pair requires 250 GB of space.
– NAS client data. You must estimate the amount of space needed to store data from clients.

Make sure to account for the space needed to store internal data when sizing the NAS reserve. The minimum NAS reserve for a NAS service with two controllers is 250 GB. For each additional two controllers, the minimum NAS reserve increases by 250 GB.

Note: Because 250 GB of NAS reserve space is used for internal data for each node pair, if you specify the minimum NAS reserve size, you will have little to no space for creating file systems until you increase the NAS reserve. Specify a value larger than the minimum to avoid space issues.

After you configure the NAS service, you can increase the size of the NAS reserve, as needed.

- **Information about the client, SAN, and internal networks used in the NAS service.**

  See *NAS Service Network Requirements and Recommendations on page 51* and complete *Table 17 on page 53* before you begin the NAS service configuration.

Using the LCD Screen to Display Service Tag Information

The front panel LCD screen is shown and described in Figure 41 and Table 16.

Figure 41: Front Panel LCD Screen Controls

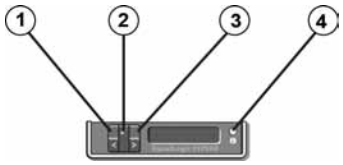


Table 16: Front Panel LCD Screen Controls

Callout	Description
1	Left arrow button
2	Checkmark (OK) button
3	Right arrow button
4	LCD screen

Use the buttons next to the display to navigate the display commands. To display the service tag, do the following:

1. Press the check-mark button (callout 2).
2. Press the right arrow (callout 3). The screen shows View.
3. Press the check-mark button (callout 2).
4. Press the right arrow (callout 3). The screen shows Number.

5. Press the check-mark button (callout 2).
6. Press the right arrow (callout 3). The screen displays the service tag.

NAS Service Network Requirements and Recommendations

A NAS service includes three networks: client, SAN, and internal. Network requirements and recommendations are as follows:

- Obtain IP addresses from your network administrator.
- **Do not** use the same subnet for the internal network and the client network.
- Dell recommends that the internal network be a private network. A private network, often implemented in a Local Area Network (LAN), uses private IP address space and adheres to RFC 1918 and RFC 4193 standards.

Client Network

The client network uses a single, virtual IP address for client access to the entire NAS subsystem. The nodes (members) determine which one accepts the client connection and continues to host that connection until the session ends.

In addition, each node port also has an actual, unique IP address. These addresses must be configured manually; you cannot use DNS. You must make sure that the DNS library reflects the IP number by manually setting the subsystem name and IP address.

Client network requirements include:

- **NAS service name** – Unique name that clients use to access the NAS service.

  If using DNS in the PS Series group, you must manually add the NAS service name and NAS service IP address to the DNS server.

- **NAS service IP address** – IP address that clients use to access the CIFS shares and NFS exports hosted by the NAS service.

  After creating the NAS service, you can modify the client network configuration and add more NAS service IP addresses to ensure proper load balancing across client subnets.

- **NAS service netmask** – Mask that identifies the subnet to which the NAS service IP address belongs.
- **NAS service default gateway** – Gateway that enables client access across subnets.
- **NAS node IP addresses for the client network** – IP addresses for internal and maintenance operations. Specify one IP address for each NAS node (FS7500 Controller) you are adding to the NAS service.

  When creating a NAS service, in the dialog box that prompts you for the client network information, click the `Auto fill` button to automatically enter one IP address for each NAS node, based on the NAS service IP address.

SAN Network

SAN access requirements include:

- **NAS service management IP address** – IP address for PS Series group access to the NAS service. Must be on the same subnet as the group IP address.
- **NAS node IP addresses for SAN access** – IP addresses for PS Series group access to the NAS nodes. Specify one (minimum) or four (recommended) IP addresses for each NAS node. When creating a NAS service, in the dialog box that prompts you for the SAN access information, click the `Auto fill` button to automatically enter one or four IP addresses for each NAS node, based on the NAS service management IP address.

Note: Dell strongly recommends that you specify **either** one or four IP addresses for each NAS node; *do not* specify two or three IP addresses for each NAS node.

Internal Network

Internal network requirements include:

- Block of IP addresses
- Initial IP address for the address block

When you configure or modify the internal network configuration, you can choose one of the following options:

- 256 IP addresses (/24) - Specifies 256 for the IP address block size. Allows one choice for the initial IP address (0 for the fourth octet).
- 128 IP addresses (/25) - Specifies 128 for the IP address block size. Allows two choices for the initial IP address (0 or 64 for the fourth octet).
- 64 IP addresses (/26) - Specifies 64 for the IP address block size. Allows four choices for the initial IP address (0, 64, 128, or 192 for the fourth octet).

The option you choose depends on your network configuration and the number of available IP addresses. In some cases (for example, in a Class C network), selecting the option for 256 IP addresses is the easiest and provides the most flexibility. However, if you do not want to allocate such a large number of IP addresses, you can select a different option.

The actual size of the IP address block does not have any impact on NAS service performance.

After obtaining the NAS service information, use it to complete *Table 17 on page 53*. You will need this information when configuring the NAS service.

NAS Configuration Reference Table

Obtain the information described in *Gathering the NAS Service Configuration Information on page 49* and fill in Table 17. Obtain IP addresses from your network administrator.

Information appended with an asterisk (*) is required when creating a NAS service.

Note: Do not use the same subnet for the internal network and the client network. However, you can optionally use the same switch and iSCSI VLAN; you do not need to create separate VLANs.

Table 17: NAS Service Initial Network Configuration

Network	**Configuration Information**				
Client Network	NAS Service Name*				
	NAS Service IP Address*				
	Netmask*				
	Default gateway*				
	Node IP addresses for the client network (one* IP address for each node)				
	Node 0				
	Node 1				
	Node 2				
	Node 3				
SAN access	Group IP address				
	NAS service management IP address*				
	Node IP address for SAN access (One* or four IP addresses for each node)				
	Node 0				
	Node 1				
	Node 2				
	Node 3				
Internal network	IP address block size*				
	Initial IP address*				

Security and Permissions

The NAS Service supports the following share types:

- NTFS (Microsoft)
- UNIX (POSIX)
- Mixed

All three options allow access to the other types. However, the Mixed type changes the permission based on the assigned permissions of the last user who accessed the share. Therefore, the Mixed type is not recommended in environments where share access needs to be controlled.

Microsoft Active Directory and UNIX/Linux POSIX permissions are different, and cannot be accurately related to each other. Determine whether your environment is predominantly Microsoft or Linux, then decide on a share type that allows the best access control with the least management effort.

For example, if your environment has chiefly Microsoft clients, define the shares as NTFS. Active Directory permissions will be applied by user name regardless of whether the client is actually Linux or Microsoft.

Conversely, the permissions used in a predominantly Linux/POSIX environment will be POSIX-based by either an LDAP or NIS server.

Transferring Share Ownership

When you create a CIFS share, it is initially owned by the CIFS administrator. This built-in account has a randomly-generated password for security purposes. From the Group Manager GUI where you logged in as the default Group Manager administrator (the (`grpadmin` account), you must change the CIFS administrator's password before attempting to access the CIFS share from a client system.

To change the CIFS administrator password, see *"Setting the CIFS Password"* in the Group Administration guide.

From a Windows client system, log in to the CIFS share using the new CIFS administrator password. assign or share read-write permissions to individual users or groups.

You can also perform this operation using the Domain Administrator account, if the NAS Service is part of an Active Directory domain. Only the CIFS administrator or the domain administrator can set the permissions for other local users and groups, or domain users and groups.

Discovering Controllers and Configuring a NAS Service

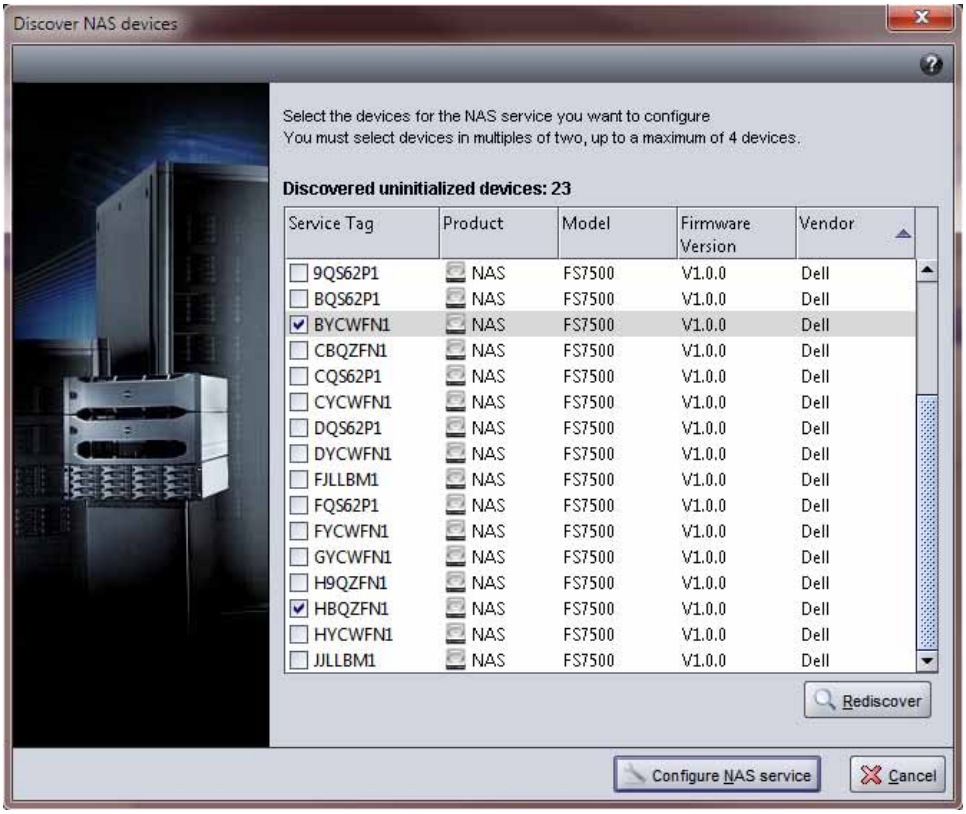
To discover controllers and configure a NAS service, follow these steps:

1. In the Group Manager GUI, click `Discover devices` in the Activities panel.
2. In the Discover Devices dialog box (Figure 42), select the service tag for each FS7500 Controller that you want to include in the NAS service. Make sure that `NAS` appears in the `Product` column for the device.

   You must add controllers to a NAS service in pairs. After being configured into a NAS service, a controller appears in Group Manager as a NAS node.

   If all the expected devices do not appear in the Discover Devices dialog box, click `Rediscover`. If the expected devices still do not appear, make sure each FS7500 Controller is correctly connected to the networks.
3. Click `Configure NAS service` in the Discover Devices dialog box to start the Configure NAS Service wizard.

Figure 42: Discover Devices



4. A series of dialog boxes appear, prompting you for the information described in *Gathering the NAS Service Configuration Information on page 49*.

   See Figure 43 to Figure 48 for an example of the NAS Service Configuration wizard dialog boxes. When you click `Finish` in the final summary dialog box, the NAS Service Configuration Progress window appears, enabling you to track the progress of the service configuration. The PS Series group remains fully operational during the NAS service configuration.

   By default, the NAS Service will be configured in the default pool (Figure 47). You can select any other pool that has enough free space for the service; however, you cannot move the NAS Service to a different pool later. Therefore, select the storage pool carefully, based on expected space usage for the NAS Service and other pool use (such as volumes, snapshots, and delegated space to replication partners).

When the NAS service configuration completes, expand `Group Configuration` in the far-left panel and click `NAS Service` *`service_name`*. The NAS Service – Status window appears (Figure 49), displaying details about the NAS service.

After configuring a NAS service, you can create multiple file systems, each with its own size, access controls, snapshot settings, Common Internet File System (CIFS) shares, and Network File System (NFS) exports. See *Chapter 1, NAS Storage Allocation*.

Figure 43: Configure NAS Service – Getting Started

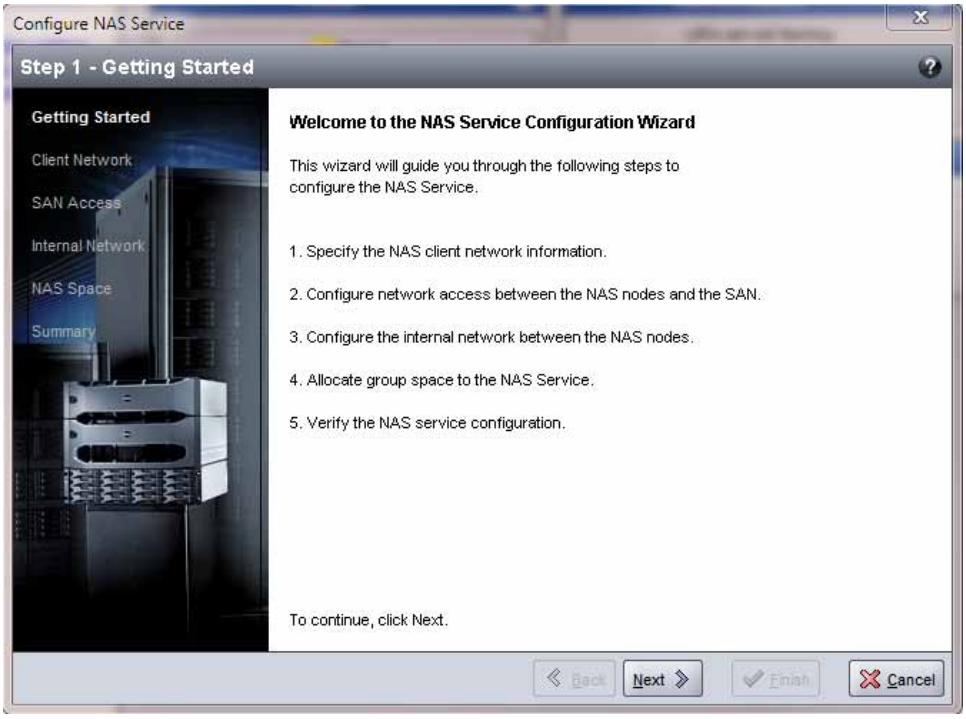


Figure 44: Configure NAS Service – Client Network

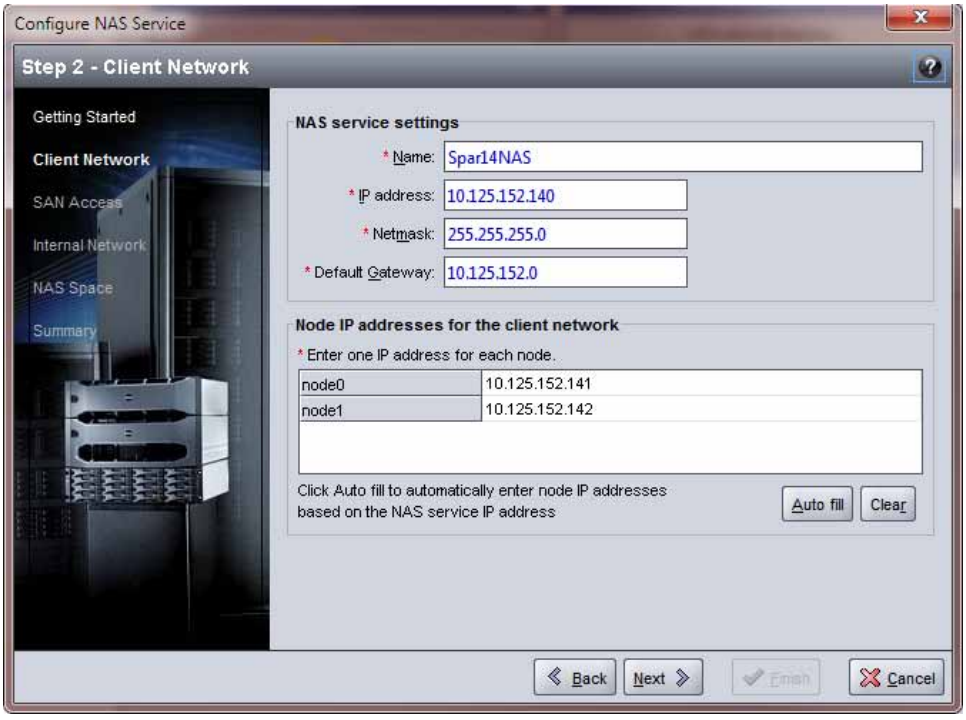


Figure 45: Configure NAS Service – SAN Access

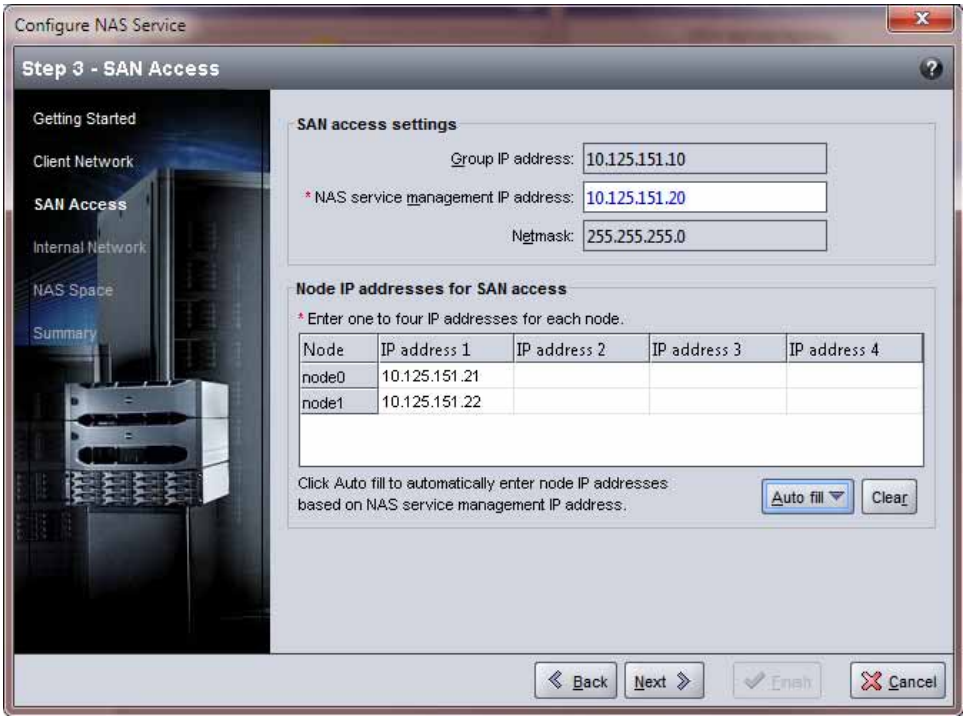


Figure 46: Configure NAS Service – Internal Network

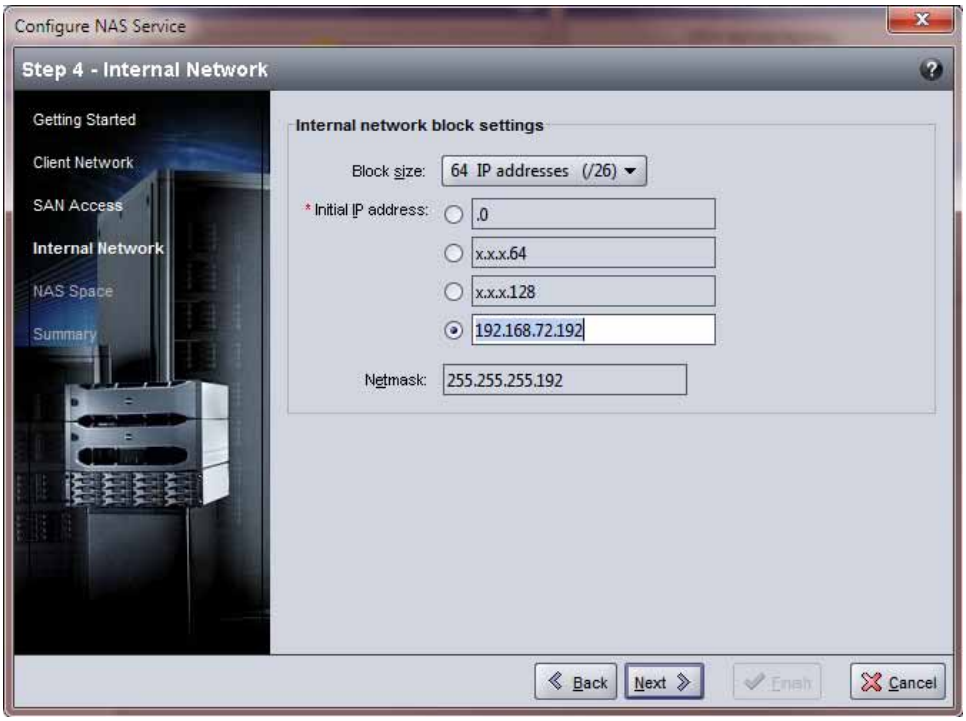


Figure 47: Configure NAS Service – NAS Space

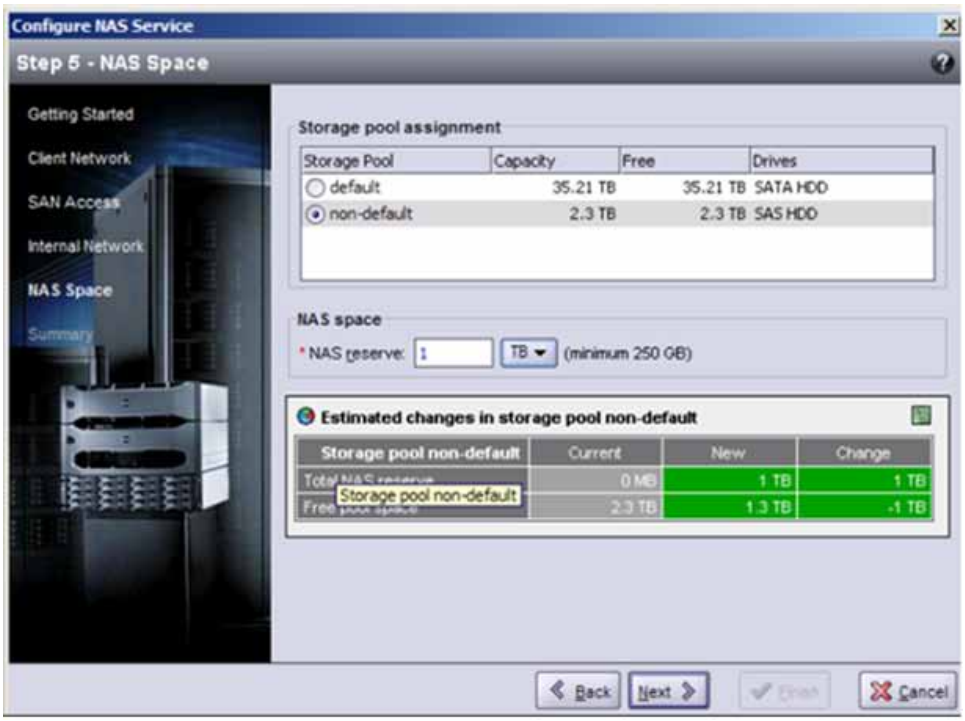


Figure 48: Configure NAS Service – Summary

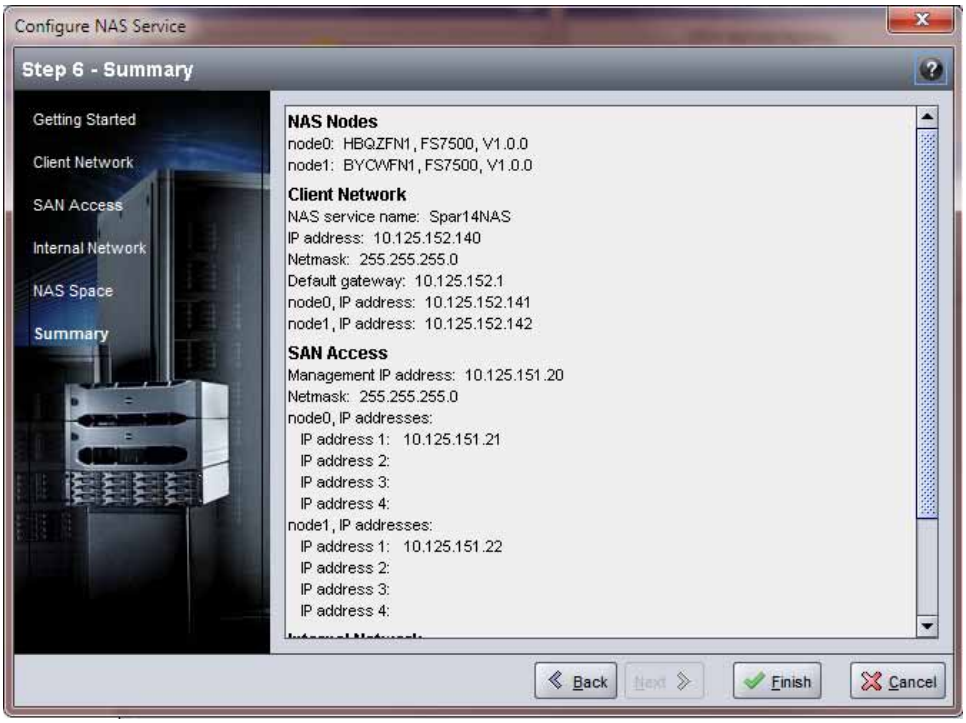
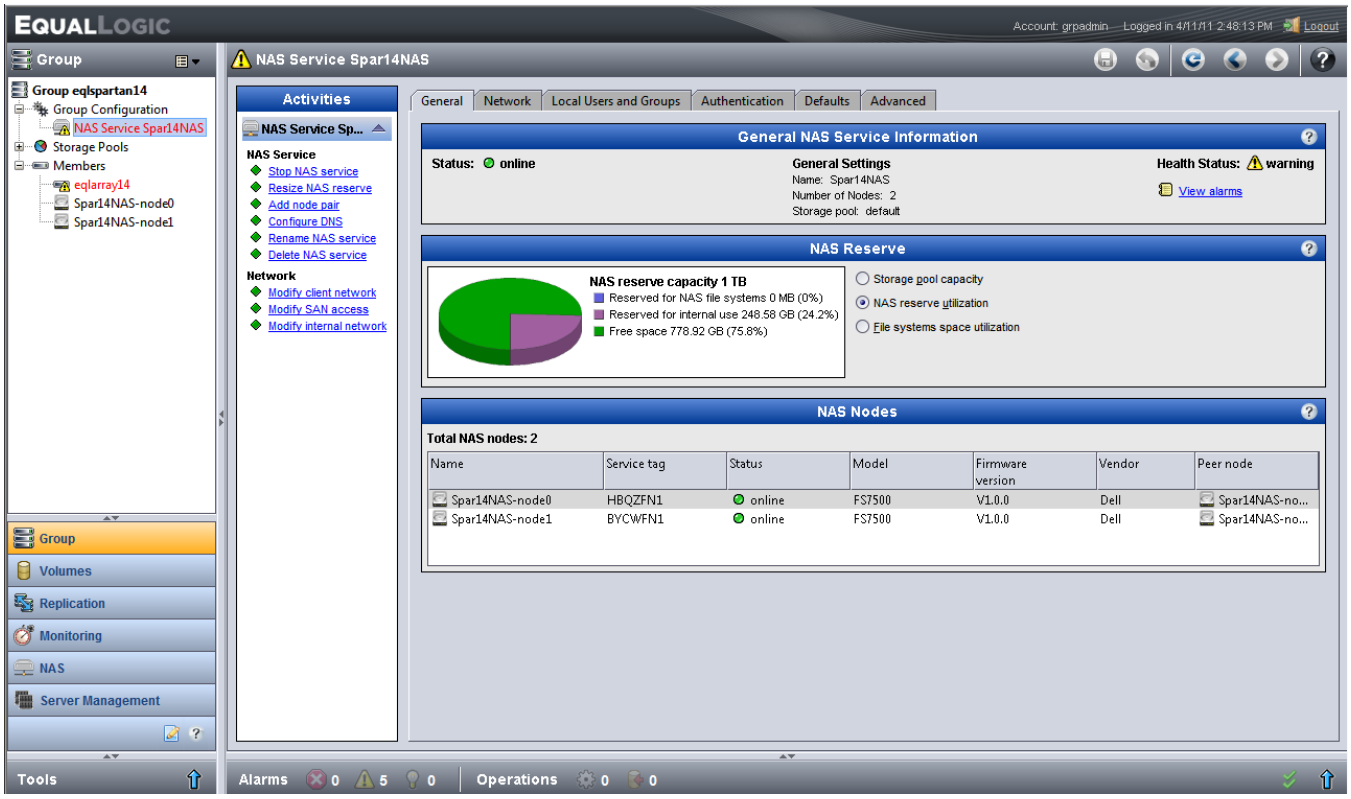


Figure 49: NAS Service – Status



6 NAS Storage Allocation

After creating a NAS service, you can create multiple file systems, each with its own size, access controls, and snapshot settings.

On each file system, you can create multiple Common Internet File System (CIFS) shares and Network File System (NFS) exports and allow client access to the shares and exports.

Steps for Allocating NAS Storage

A NAS service can contain multiple NAS file systems. On each file system, you can create multiple CIFS shares and NFS exports, as needed by your environment.

To allocate NAS storage for client use:

1. Gather the information for the NAS storage allocation. See *Gathering the NAS File System Information on page 61*.
2. Create a file system and, optionally, a CIFS share or NFS export. See *Creating a NAS File System on page 62*. You can also create shares and exports on a file system at a later time.

   Note: When you create a file system, CIFS share, or NFS export, service-wide default values are applied. You can modify the NAS service and change the service-wide default values.

   In some cases, you can override a default value when creating a file system, share, or export. For example, you can change the default snapshot reserve value when creating a file system. In other cases, you must modify the file system, share, or export to change a default value. For example, you must modify the file system to change the default file system security mode or the UNIX file and directory permissions.
3. Make sure clients can access each share or export that you created. See *Accessing a CIFS Share on page 65* and *Accessing an NFS Export on page 66*.

After allocating NAS storage, see *Chapter 7, What to Do Next*.

Gathering the NAS File System Information

Before creating a NAS file system, obtain or decide upon the following information:

- **File system name** — Identifies the file system. File system names must be unique in the PS Series group. The file system name must be a valid UNIX file name. Clients use the file system name to access NFS exports on the file system.

- **File system size** — Capacity of the file system. You can increase or decrease the size of the file system with no disruption to users.
- **Snapshot reserve** (optional) — Percentage of the file system size that can be used to store snapshots. Snapshot reserve is consumed from the NAS reserve space allocated to the file system. Therefore, user data and snapshots compete for the same file system space. Note that data takes precedence over snapshots. If the file system begins to run out of space, it will take space from the snapshot reserve. the oldest snapshots will be deleted first.

  Unless you specify a different value, the file system will use the service-wide default value for the snapshot reserve (50%).
- **In-use warning limit**— Percentage of the file system size that—when consumed by user data or snapshots—results in an event message.

  Unless you specify a different value, the file system will use the service-wide default value for the in-use warning limit (80%).
- **Security mode and permissions** — By default, a file system supports mixed (NTFS and UNIX) security mode, and 744 and 755, respectively, for the UNIX directory and file permissions. You can modify the file system to change the security mode and permissions. See *Security and Permissions on page 53* for more information.

Creating a NAS File System

As part of creating a file system, you can select the option to create a CIFS share or an NFS export and specify the share or export name and the directory. However, you can skip creating a share or export at this time, and create shares and exports after creating the file system.

NAS Services support Unicode for the following:

- CIFS share name
- CIFS directory name
- NFS export name
- NFS directory name

More specifically, this means all the characters in any language's alphabet, Arabic numerals, dots (also called periods), and the dash or hyphen character (-).

To create a NAS file system:

1. Click `NAS` in the lower-left GUI window and then click `Create NAS File System` in the Activities panel.
2. In the Create NAS File System wizard dialog boxes, enter the information you obtained in *Gathering the NAS Service Configuration Information on page 49*.
3. The final dialog box shows a summary of the file system configuration and any share or export you created. Click `Finish` to complete the configuration. Click `Back` to make changes.

Figure 50 to Figure 52 show how to use the Create NAS File System wizard to create a NAS file system and a CIFS share.

Figure 50: Create NAS File System – General Settings

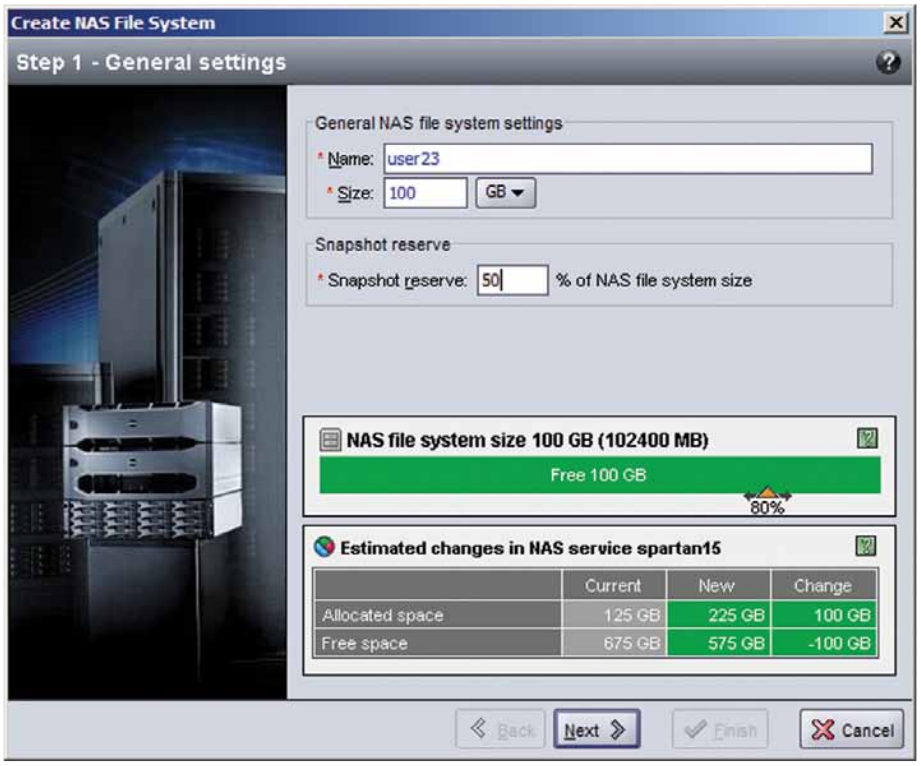


Figure 51: Create NAS File System – Create Share (Optional)

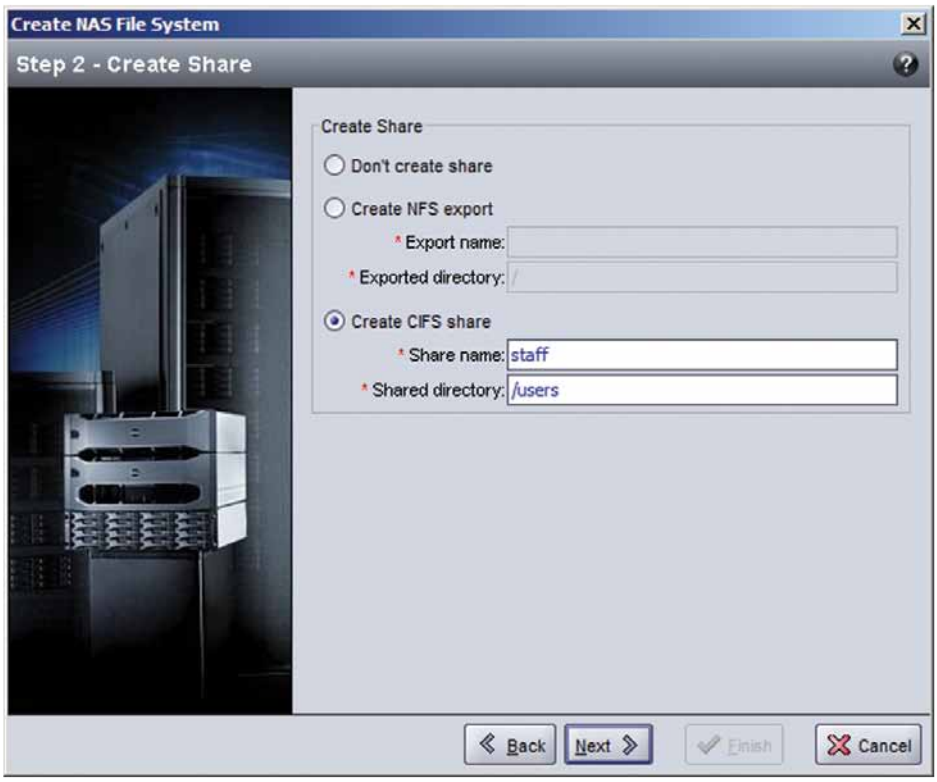
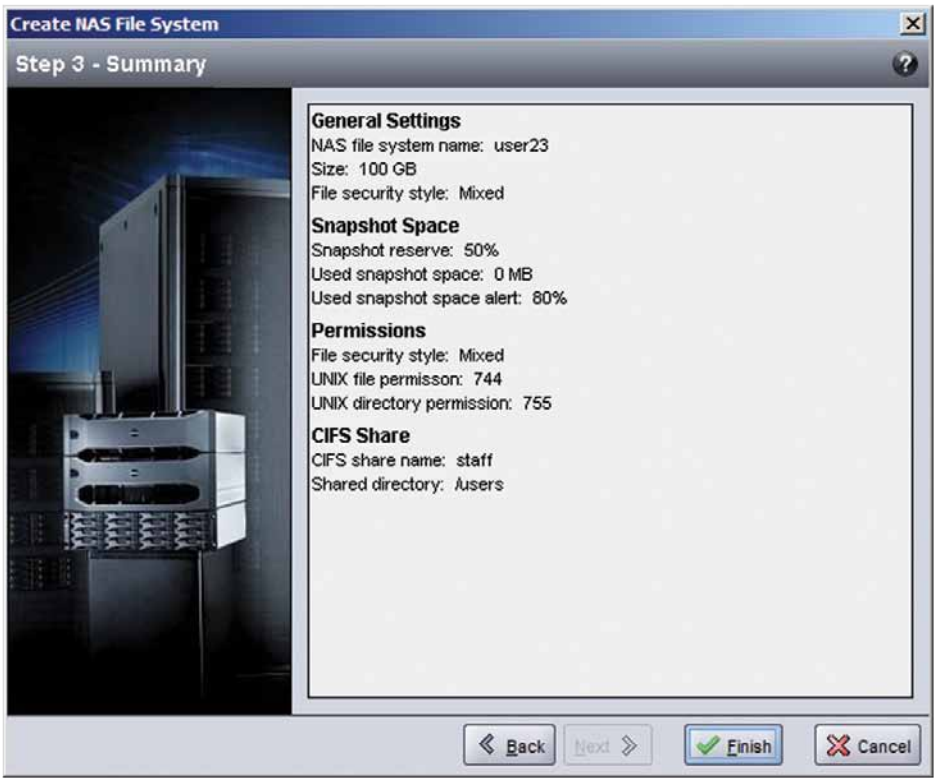


Figure 52: Create NAS File System – Summary



Accessing a CIFS Share

For a user to have access to a CIFS share, the following conditions must be met:

- The user must be a valid user and provide a valid password (local or remote authentication)
- The group administrator must set the CIFS administrator password
- An administrator must log in to the share using the CIFS administrator account (CIFSstorage\administrator) and password and use the normal Windows operating system process to assign the user write permission to the share

If the last two conditions are not met, a user can access the CIFS share but cannot write to it.

To access a CIFS share from a Windows system, follow these steps:

1. Click `Start > Run`.
2. Specify the NAS Service IP address in the `Open` field and click `OK`.
3. Right-click the share and select `Map Network Drive`.
4. In the Map Network Drive dialog box:

- Enter `\\service_ip_address\share_name`.
- Click `Connect using a different user name`.

5. In the Connect As dialog box, enter a valid user name and password, then click OK. Note that you can enter CIFSstorage\administrator for a user name and the CIFS password that you set previously.

The user can now log in to the CIFS share and perform read and write operations. The default permission is to disallow guest access. You can modify the share to allow guest access.

Accessing an NFS Export

If you plan to use NFS over UDP, do the following first:

1. Adjust the firewall to allow the FS7500 controllers to be the source IP.
2. Open the firewall to allow for port ranges.

To mount an NFS export on a UNIX system, log in as `root` and run the `mount` command with the following recommended options and parameters.

Note: While the command example shows the recommended parameters, you can change the protocol to UDP and the NFS version to 2.

```
mount -o rw,bg,hard,nointr,tcp,vers=3,timeo=2,retrans=10,rsize=32768,wsize=32768
client_access_vip:/exported_directorylocal_directory
```

The *exported_directory* must be the full path name that you specified when creating the NFS export.

Because the default trusted user setting is "All except root," only users other than `root` can access the export. You can modify the export and change the trusted users to "Nobody" or "All."

In addition:

- The default client access permission provides access to all clients. You can modify the export and limit access to specific IP addresses.
- The default access type is read-write. You can modify the export and change it to read-only.

7 What to Do Next

After getting started, you can customize the NAS service and create additional file systems, CIFS shares, and NFS exports. You can also use snapshots to protect NAS file system data.

NAS Service Documentation

The PS Series *Group Administration* manual provides detailed NAS service information. The Group Manager online help describes how to use the Group Manager graphical user interface (GUI) to manage a NAS service.

The PS Series *CLI Reference* manual and the Group Manager command line interface (CLI) help describe how to use the CLI to manage a NAS service.

For information about maintaining NAS service hardware, see the following manuals:

- FS7500 Controller *Hardware Maintenance*
- FS7500 Backup Power Supply *Hardware Maintenance*

For the latest information about NAS services, see the Dell EqualLogic customer support website.

NAS Service Post-Setup Tasks

After configuring a NAS service, see the following list of common post-setup tasks.

- Display NAS service information.

  You can display information about a NAS service, including the status, space utilization, and network configuration.

- Modify the default values for space and permission settings applied to new file systems.

  When you create a file system, the service applies default values for space and permission settings.

  You can modify the following service-wide default values for a new file system:
  - File system in-use space warning limit, snapshot reserve percentage, and snapshot in-use space warning limit.
  - File security style (`Mixed`, `NFTS`, or `UNIX`).
  - UNIX file permissions and UNIX directory permissions (744 and 755, respectively).

- Modify the default value for the guest access setting applied to new CIFS shares.

When you create a CIFS share, the service applies a default value for the guest access setting. You can modify the value of the service-wide default setting to allow or disallow guest access by unknown users.

- Modify the default values for permission settings applied to new NFS exports.

  When you create an NFS export, the service applies default values for settings.

  You can modify the following service-wide default values for a new NFS export:
  - Read-write or read-only permission.
  - Trusted users (`All except root`, `all`, or `nobody`).
- Set up local users and groups.
- Set up Active Directory for external authentication of Windows users.
- Set up NIS or LDAP for external authentication of UNIX users.
- Create a file system.

  You can create multiple file systems in a NAS service.

NAS File System Post-Setup Tasks

After creating a NAS file system, see the following list of common post-setup tasks.

- Display file system information.

  You can display information about the file systems in the NAS service, including the status, space utilization, CIFS shares, NFS exports, snapshots, schedules, and quotas.
- Modify the file security style.

  You can modify the file security style (`Mixed`, `NFTS`, or `UNIX`) for a file system.
- Modify the UNIX directory and UNIX file permissions.

  You can modify theUNIX file and UNIX directory permissions (`Read`, `Write`, and `Execute`) for `Owner`, `Group`, and `Others`.
- Create group and user quotas.

  You can create group and user quotas to control client space usage in a file system.
- Create a CIFS share.

  You can create multiple CIFS shares on a file system.
- Modify whether to allow guest access to a CIFS share.

  You can allow or disallow guest access to a CIFS share by unknown users.
- Create an NFS export.

  You can create multiple NFS exports on a file system.

- Modify the permission settings for an NFS export.

  You can modify:
  - Client access permission setting (allow access to all clients or only clients with the specified IP address).
  - Read-only or read-write permission setting.
  - Trusted users (`All except root`, `all`, or `nobody`).
- Create a snapshot.

  To protect file system data, you can create snapshots.
- Create a snapshot schedule.

  To create file system snapshots regularly, you can create a snapshot schedule.

Appendix 1: Custom Racking Instructions

You can install an EqualLogic FS7500 in a tooled rack only if you contact your PS Series support provider and obtain a different controller rail kit than the kit that is shipped with the controller. In addition, you must reconfigure the BPS rail kit to support a tooled rack.

Reconfiguring the BPS Rails for a Tooled Rack (Special Configuration)

To reconfigure the BPS rail brackets, perform these steps on each rail:

1. Remove the two screws on the front brackets (callout 1 in Figure 53) and rotate each piece 180 degrees (callout 2).
2. Reattach the brackets using the same two screws (Figure 54).

Figure 53: Removing and Rotating a BPS Rail Front Bracket

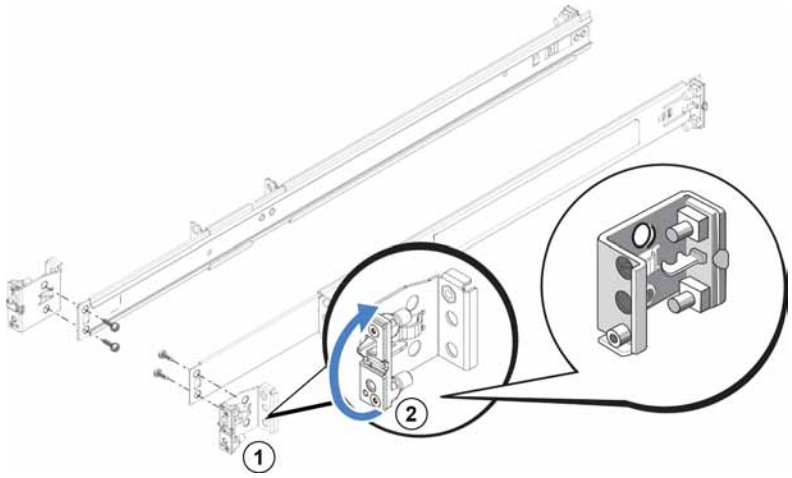
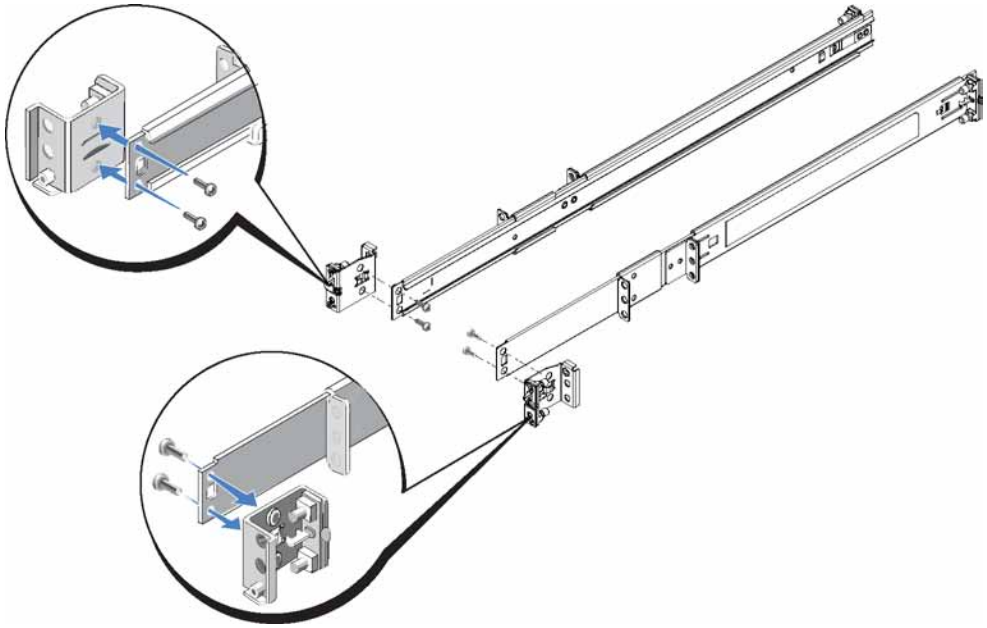


Figure 54: Reattaching a BPS Rail Front Bracket



3. To reconfigure the rear portion of the BPS rail, extend the rear portion of the rail completely, press the release latch to release the rear portion and remove it from the rail, rotate the rear portion 180 degrees, and then slide the read portion onto the rail until you hear the release latch click.

At this point, both the front and rear of the BPS rails are configured for a tooled rack. You must obtain the hardware (screws) needed to attach the rails to the tooled rack.

Cable Management for Controllers Installed on Static Rails

The standard rails included in the shipping box with the FS7500 controller are sliding rails. If you want to use static rails, you must purchase them separately. remember that you will need two sets, one for each controller.

To manage cables for controllers installed on static rails, do the following:

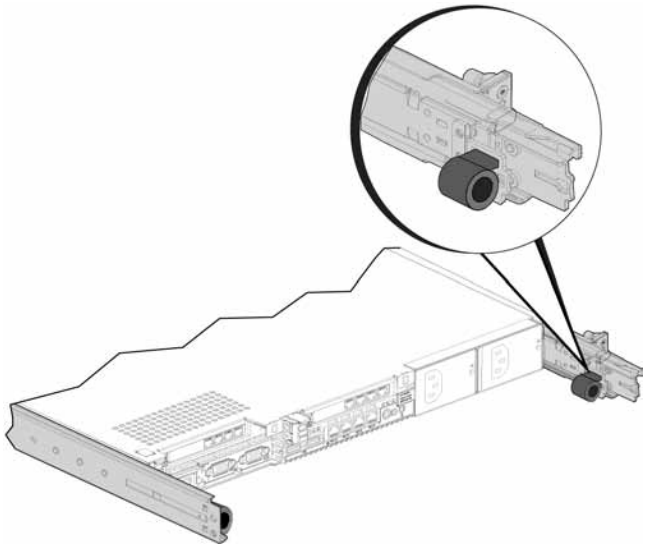
1. Install the static rails into the rack. Follow the instructions included in your rail kit.
2. Install the controller into the rails.
3. Secure the hook-and-loop fasteners (included in the FS7500 shipping box) to the back of the rails.
4. Install the cables as described in *Chapter 4, Network Cable Connections*. Verify that all of the connections are secure.
5. Bundle the cables as described in *Bundling the Signal and Power Cables on page 46*.

Removing the Brackets From the Controller Rails

If you are installing the FS7500 into a shallow rack, you should remove the cable management brackets from the rear ends of the controller rails. Removing the brackets allows the controller rails to fit properly in a shallow rack.

Figure 55 shows the location of the brackets on the rails and the accompanying strain relief straps.

Figure 55: Locating the Cable Management Brackets



To remove the bracket, use a #2 Phillips screwdriver to remove the two screws securing the bracket to the back end of the rail.

Glossary

Understanding terminology related to a NAS service will help you successfully deploy, manage, and maintain your unified storage environment.

Backup Power Supply (BPS)

Provides a highly-available source of power for a NAS controller to ensure cache consistency and availability.

BPS

See Backup Power Supply.

Dell Scalable File System (DSFS)

High-performance, scalable file system that is configured on storage space.

DSFS

See Dell Scalable File System.

group

See PS Series group.

group IP address

Highly available IP address that iSCSI initiators use to access iSCSI targets hosted by a PS Series group.

IPMI

Intelligent Platform Management Interface.

NAS controller

Dell server preconfigured with file sharing software (for example, FS7500 Controller).

NAS file system

Virtualized file system that consumes space in the NAS reserve. Administrators can create CIFS shares and NFS exports on a NAS file system and share them with authorized users. A NAS service supports multiple NAS file systems.

NAS node

NAS controller configured as part of a node pair in a NAS service.

NAS reserve

Storage pool space allocated to a NAS service for storing internal data and user data and configured with DSFS.

NAS service

Provides highly-available and scalable NAS storage by using a PS Series group and at least one EqualLogic FS7500, configured and managed through Group Manager.

NAS service IP address

Highly available IP address that clients use to access CIFS shares and NFS exports hosted by a NAS service.

NAS service management IP address

IP address used for internal operations between NAS nodes and the PS Series group.

node pair

Two NAS nodes that are configured as peer nodes in a NAS service. Cache data is mirrored across the NAS nodes.

peer node

NAS node with which a NAS node is paired in a NAS service.

power module

One of two battery units in an FS7500 Backup Power Supply.

PS Series group

One or more PS Series storage arrays configured on a network, accessed through a single IP address, and managed as a single system.

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