Get started

ASA r2

NetApp
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Get started

Learn about ASA r2 storage systems

The NetApp ASA r2 systems deliver a unified hardware and software solution that creates a simplified experience specific to the needs of SAN-only customers.

The following are classified as ASA r2 systems:

- ASA A1K
- ASA A90
- ASA A70
- ASA A50
- ASA A30
- ASA A20
- ASA C30

ASA r2 systems support all SAN protocols (iSCSI, FC, NVMe/FC, NVMe/TCP). The iSCSI, FC, NVMe/FC and NVMe/TCP protocols support symmetric active-active architecture for multipathing so that all paths between the hosts and storage are active/optimized. The iSCSI and NVMe/TCP protocols support direct attach between the hosts and storage. For Fibre Channel and NVMe/FC protocols direct attach is not supported.

On an ASA r2 system, ONTAP software and System Manager are streamlined to provide support for essential SAN functionality while removing features and functions not supported in SAN environments.

ASA r2 systems introduce the use of storage units with consistency groups:

- A *storage unit* makes storage space available to your SAN hosts for data operations. A storage unit refers to a LUN for SCSI hosts or an NVMe namespace for NVMe hosts.
- *A consistency group* is a collection of storage units that are managed as a single unit.

ASA r2 systems use storage units with consistency groups to simplify storage management and data protection. For example, suppose you have a database consisting of 10 storage units in a consistency group, and you need to back up the entire database. Instead of backing up each storage unit individually, you can protect the entire database by backing up the consistency group.

To help secure your data against malicious attacks such as theft or ransomware, ASA r2 systems support an on-board key manager, dual-layer encryption, multi-factor authentication and multi-admin verification. Tamper-proof snapshots are also supported on secondary ASA r2 systems.

ASA r2 systems do not support cluster mixing with ASA, AFF, or FAS systems.

For more information

- Learn more about ASA r2 systems support and limitations in the NetApp Hardware Universe.
- Learn more about the ASA r2 systems in comparison to the ASA systems.
- Learn more about the NetApp ASA.

Quick start for ASA r2 storage systems

To get up and running with your ASA r2 system, you install your hardware components, set up your cluster, set up data access from your hosts to the storage system, and provision your storage.

1 **Install and set up your hardware**

Install and set up your ASA r2 system and deploy it in your ONTAP environment.

2 **Set up your cluster**

Use System Manager to guide you through a quick and easy process to set up your ONTAP cluster.

3 **Set up data access**

Connect your ASA r2 system to your SAN clients.

4 **Provision your storage**

Provision storage to begin serving data to your SAN clients.

What's next?

You can now use System Manager to protect your data by creating snapshots.

Install your ASA r2 system

Installation and setup workflow for ASA r2 storage systems

To install and configure your ASA r2 system, you review the hardware requirements, prepare your site, install and cable the hardware components, power on the system, and set up your ONTAP cluster.

1 **Review the hardware installation requirements**

Review the hardware requirements to install your ASA r2 storage system.

2 **Prepare to install the ASA r2 storage system**

To prepare to install your ASA r2 system, you need to get the site ready, check the environmental and electrical requirements, and ensure there's enough rack space. Then, unpack the equipment, compare its contents to the packing slip, and register the hardware to access support benefits.

3 **Install the hardware for the ASA r2 storage system**

To install the hardware, install the rail kits for your storage system and shelves, and then install and secure your storage system in the cabinet or telco rack. Next, slide the shelves onto the rails. Finally, attach cable management devices to the rear of the storage system for organized cable routing.

Cable the controllers and storage shelves for the ASA r2 storage system

To cable the hardware, first connect the storage controllers to your network and then connect the controllers to your storage shelves.

Power on the ASA r2 storage system

Before you power on the controllers, power on each NS224 shelf and assign a unique shelf ID to ensure each shelf is uniquely identified within the setup.

Installation requirements for ASA r2 storage systems

Review the equipment needed and the lifting precautions for your ASA r2 storage system and storage shelves.

Equipment needed for install

To install your ASA r2 storage system, you need the following equipment and tools.

- Access to a Web browser to configure your storage system
- Electrostatic discharge (ESD) strap
- Flashlight
- Laptop or console with a USB/serial connection
- Paperclip or narrow tipped ball point pen for setting storage shelf IDs
- Phillips #2 screwdriver

Lifting precautions

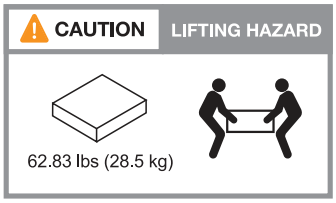
ASA r2 storage systems and storage shelves are heavy. Exercise caution when lifting and moving these items.

Storage system weights

Take the necessary precautions when moving or lifting your ASA r2 storage system.

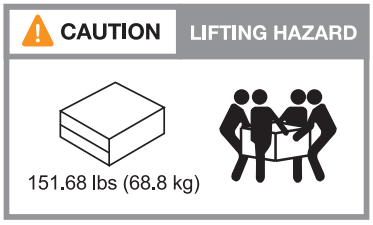
A1K

An ASA A1K storage system can weigh up to 62.83 lbs (28.5 kg). To lift the storage system, use two people or a hydraulic lift.



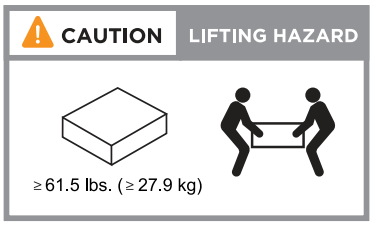
A70 and A90

An ASA A70 or ASA A90 storage system can weigh up to 151.68 lbs (68.8 kg). To lift the storage system, use four people or a hydraulic lift.



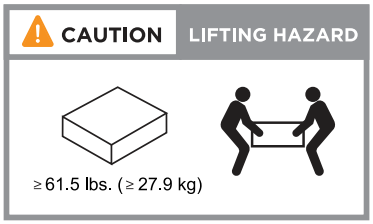
A20, A30, and A50

An ASA A20, ASA A30, or ASA A50 storage system can weigh up to 61.5 lbs (27.9 kg). To lift the storage system, use two people or a hydraulic lift.



C30

An ASA C30 storage system can weigh up to 61.5 lbs (27.9 kg). To lift the storage system, use two people or a hydraulic lift.

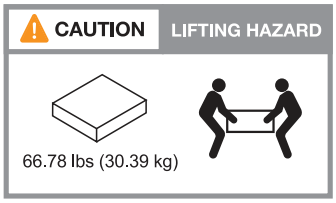


Storage shelf weights

Take the necessary precautions when moving or lifting your shelf.

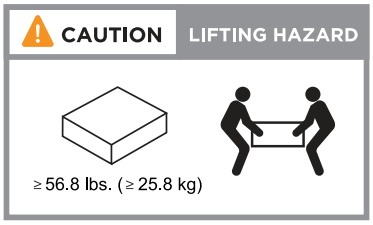
NS224 shelf

An NS224 shelf can weigh up to 66.78 lbs (30.29 kg). To lift the shelf, use two people or a hydraulic lift. Keep all components in the shelf (both front and rear) to prevent unbalancing the shelf weight.



NS224 shelf with NSM100B modules

An NS224 shelf with NSM100B modules can weigh up to 56.8 lbs (25.8 kg). To lift the shelf, use two people or a hydraulic lift. Keep all components in the shelf (both front and rear) to prevent unbalancing the shelf weight.



Related information

- Safety information and regulatory notices

What's next?

After you've reviewed the hardware requirements, you prepare to install your ASA r2 storage system.

Prepare to install an ASA r2 storage system

Prepare to install your ASA r2 storage system by getting the site ready, unpacking the boxes and comparing the contents of the boxes to the packing slip, and registering the system to access support benefits.

Step 1: Prepare the site

To install your ASA r2 storage system, ensure that the site and the cabinet or rack that you plan to use meet specifications for your configuration.

Steps

1. Use NetApp Hardware Universe to confirm that your site meets the environmental and electrical requirements for your storage system.
2. Make sure you have adequate cabinet or rack space for your storage system, shelves, and any switches:

A1K

- 4U in an HA configuration
- 2U for each NS224 storage shelf
- 1U for most switches

A70, and A90

- 4U in an HA configuration
- 2U for each NS224 storage shelf
- 1U for most switches

A20, A30, and A50

- 2U for a storage system
- 2U for each NS224 storage shelf
- 1U for most switches

C30

- 2U for a storage system
- 2U for each NS224 storage shelf
- 1U for most switches

3. Install any required network switches.

   See the Switch documentation for installation instructions and NetApp Hardware Universe for compatibility information.

Step 2: Unpack the boxes

After you've ensured that the site and the cabinet or rack that you plan to use for your ASA r2 storage system meet the required specifications, unpack all boxes and compare the contents to the items on the packing slip.

Steps

1. Carefully open all the boxes and lay out the contents in an organized manner.
2. Compare the contents you've unpacked with the list on the packing slip. If there are any discrepancies, note them down for further action.

   You can get your packing list by scanning the QR code on the side of the shipping carton.

   The following items are some of the contents you might see in the boxes.

Hardware	Cables

- Bezel
- Storage system
- Rail kits with instructions (optional)
- Storage shelf (if you ordered additional storage)
- Management Ethernet cables (RJ-45 cables)
- Network cables
- Power cords
- Storage cables (if you ordered additional storage)
- USB-C serial port cable

Step 3: Register your storage system

After you've ensured that your site meets the requirements for your ASA r2 storage system specifications, and you've verified that you have all the parts you ordered, you should register your system.

Steps

1. Locate the serial numbers for your storage system.

   You can find the serial numbers in the following locations:

   - On the packing slip
   - In your confirmation email
   - On each controller or for some systems, on the system management module of each controller

2. Go to the NetApp Support Site.
3. Determine whether you need to register your storage system:

If you are a…	Follow these steps…
Existing NetApp customer	a. Sign in with your username and password. b. Select **Systems** > **My Systems**. c. Confirm that the new serial number is listed. d. If the serial number is not listed, follow the instructions for new NetApp customers.
New NetApp customer	a. Click **Register Now**, and create an account. b. Select **Systems** > **Register Systems**. c. Enter the storage system's serial number and requested details. After your registration is approved, you can download any required software. The approval process might take up to 24 hours.

What's next?

After you've prepared to install your ASA r2 hardware, you install the hardware for your ASA r2 storage system.

Install your ASA r2 storage system

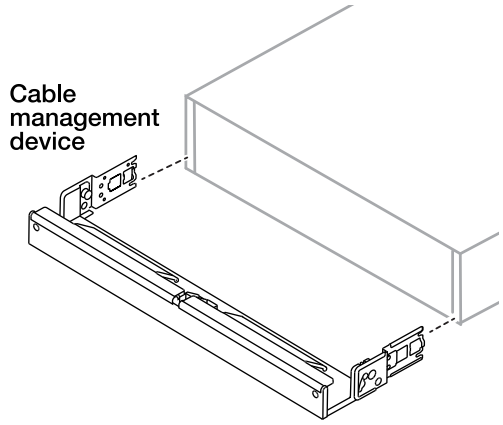
After you prepare to install your ASA r2 storage system, install the hardware for the system. First, install the rail kits. Then install and secure your storage system in a cabinet or telco rack.

Before you begin

- Make sure you have the instructions packaged with the rail kit.
- Be aware of the safety concerns associated with the weight of the storage system and storage shelf.
- Understand that the airflow through the storage system enters from the front where the bezel or end caps are installed and exhausts out the rear where the ports are located.

Steps

1. Install the rail kits for your storage system and storage shelves, as needed, using the instructions included with the kits.
2. Install and secure your storage system in the cabinet or telco rack:
   a. Position the storage system onto the rails in the middle of the cabinet or telco rack, and then support the storage system from the bottom and slide it into place.
   b. Make sure that the guiding pins on the cabinet or telco rack fit securley into the storage system guide slots.
   c. Secure the storage system to the cabinet or telco rack using the included mounting screws.
3. Attach the bezel to the front of the storage system.
4. If your ASA r2 system came with a cable management device, attach it to the rear of the storage system.



5. Install and secure the storage shelf:
   a. Position the back of the storage shelf onto the rails, and then support the shelf from the bottom and slide it into the cabinet or telco rack.

      If you are installing multiple storage shelves, place the first storage shelf directly above the controllers. Place the second storage shelf directly under the controllers. Repeat this pattern for any additional storage shelves.

   b. Secure the storage shelf to the cabinet or telco rack using the included mounting screws.

What's next?

After you've installed the hardware for your ASA r2 system, you cable the controllers and storage shelves for your ASA r2 system.

Cable the hardware for your ASA r2 storage system

After you install the rack hardware for your ASA r2 storage system, install the network cables for the controllers, and connect the cables between the controllers and storage shelves.

Before you begin

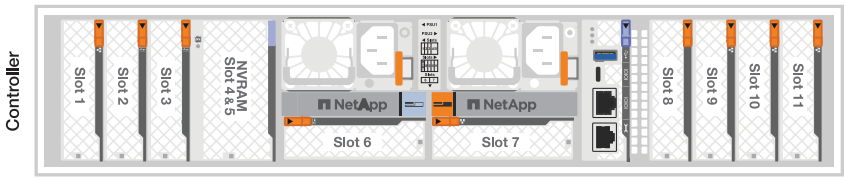
Contact your network administrator for information about connecting the storage system to your network switches.

About this task

- These procedures show common configurations. The specific cabling depends on the components ordered for your storage system. For comprehensive configuration and slot priority details, see NetApp Hardware Universe.
- The cluster/HA and host network cabling procedures show common configurations.

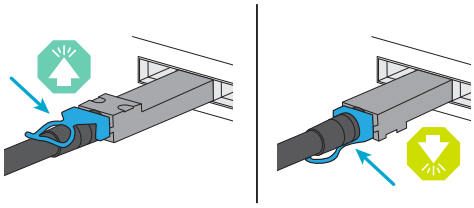
  If you do not see your configuration in the cabling procedures, go to NetApp Hardware Universe for comprehensive configuration and slot priority information to properly cable your storage system.

- If you have an ASA A1K, ASA A70, or ASA A90 storage system, the I/O slots are numbered 1 through 11.



- The cabling graphics have arrow icons showing the proper orientation (up or down) of the cable connector pull-tab when inserting a connector into a port.

  As you insert the connector, you should feel it click into place; if you do not feel it click, remove it, turn it over and try again.



- If cabling to an optical switch, insert the optical transceiver into the controller port before cabling to the switch port.

Step 1: Cable the cluster/HA connections

Cable the controllers to your ONTAP cluster. This procedure differs depending on your storage system model and I/O module configuration.

The cluster interconnect traffic and the HA traffic share the same physical ports.

A1K

Create the ONTAP cluster connections. For switchless clusters, connect the controllers to each other. For switched clusters, connect the controllers to the cluster network switches.

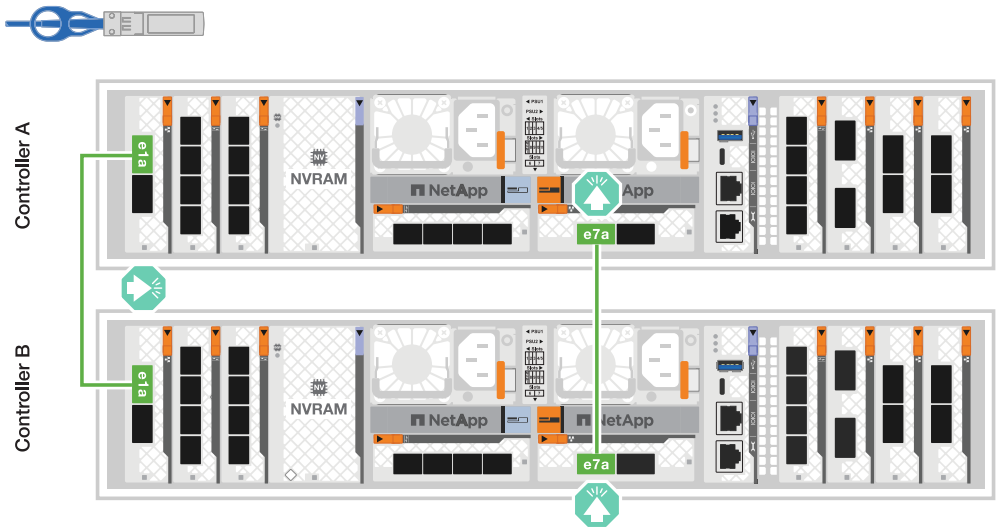
Switchless cluster cabling

Use the Cluster/HA interconnect cable to connect ports e1a to e1a and ports e7a to e7a.

Steps

1. Connect port e1a on Controller A to port e1a on Controller B.
2. Connect port e7a on Controller A to port e1a on Controller B.

Cluster/HA interconnect cables



Switched cluster cabling

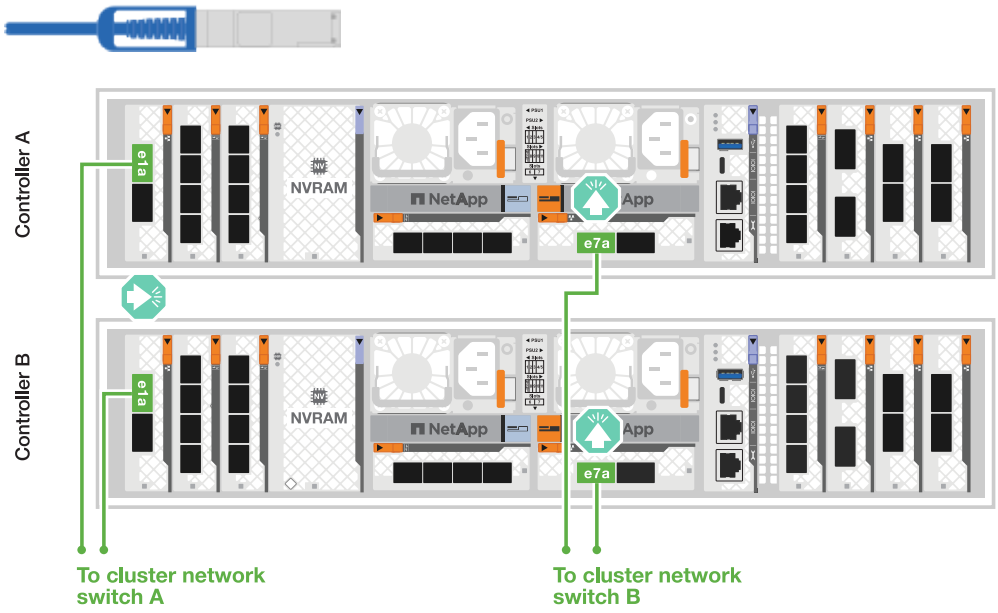
Use the 100 GbE cable to connect ports e1a to e1a and ports e7a to e7a.

Switched cluster configurations are supported in 9.16.1 and later.

Steps

1. Connect port e1a on Controller A and port e1a on Controller B to cluster network switch A.
2. Connect port e7a on Controller A and port e7a on Controller B to cluster network switch B.

100 GbE cable



A70 and A90

Create the ONTAP cluster connections. For switchless clusters, connect the controllers to each other. For switched clusters, connect the controllers to the cluster network switches.

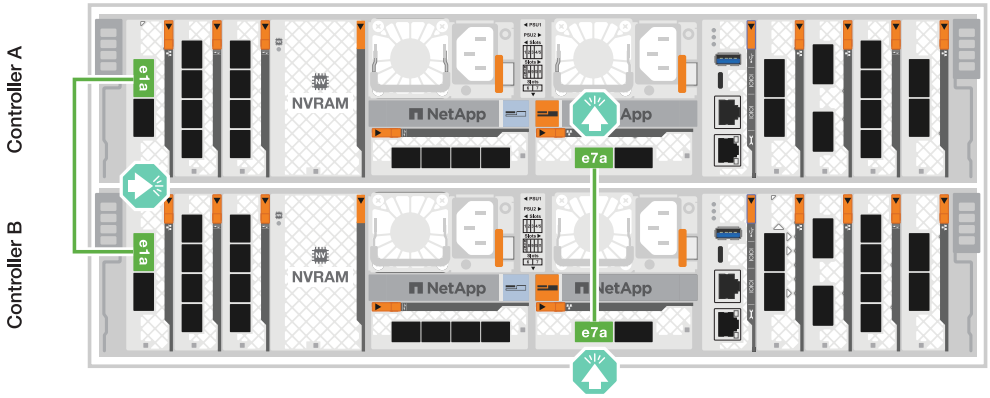
Switchless cluster cabling

Use the the Cluster/HA interconnect cable to connect ports e1a to e1a and ports e7a to e7a.

Steps

1. Connect port e1a on Controller A to port e1a on Controller B.
2. Connect port e7a on Controller A to port e1a on Controller B.

Cluster/HA interconnect cables



Switched cluster cabling

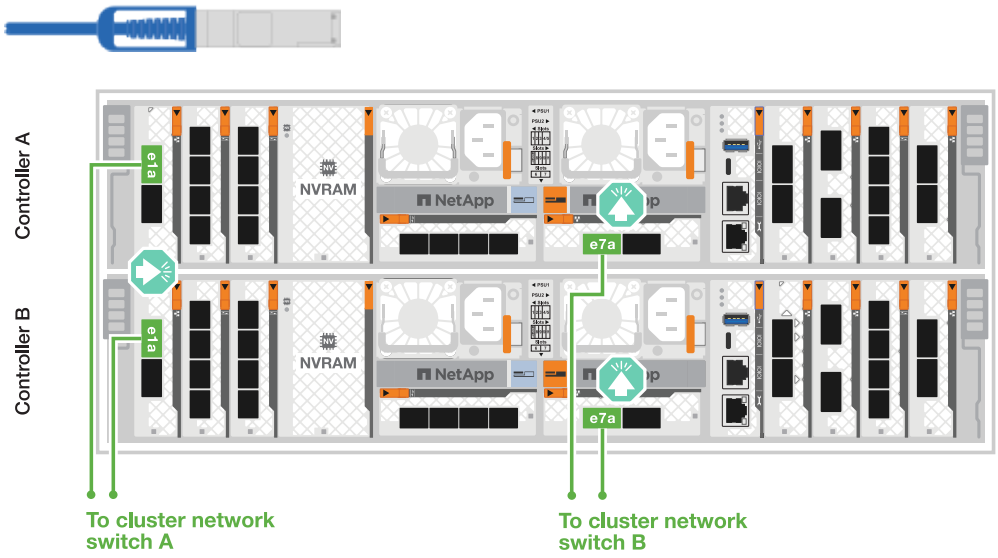
Use the 100 GbE cable to connect ports e1a to e1a and ports e7a to e7a.

Switched cluster configurations are supported in 9.16.1 and later.

Steps

1. Connect port e1a on Controller A and port e1a on Controller B to cluster network switch A.
2. Connect port e7a on Controller A and port e7a on Controller B to cluster network switch B.

100 GbE cable



A20, A30, and A50

Create the ONTAP cluster connections. For switchless clusters, connect the controllers to each other. For switched clusters, connect the controllers to the cluster network switches.

The cluster/HA cabling examples show common configurations.

If you do not see your configuration here, go to NetApp Hardware Universe for comprehensive configuration and slot priority information to cable your storage system.

Switchless cluster cabling

Connect the controllers to each other to create the ONTAP cluster connections.

ASA A30 and ASA A50 with two 2-port 40/100 GbE I/O modules

Steps

1. Connect the Cluster/HA interconnect connections:

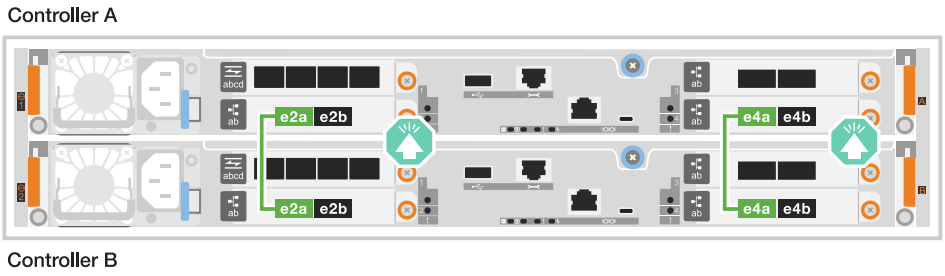
   The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O modules in slots 2 and 4). The ports are 40/100 GbE.

   a. Connect controller A port e2a to controller B port e2a.

   b. Connect controller A port e4a to controller B port e4a.

   I/O module ports e2b and e4b are unused and available for host network connectivity.

100 GbE Cluster/HA interconnect cables



ASA A30 and ASA A50 with one 2-port 40/100 GbE I/O module

Steps

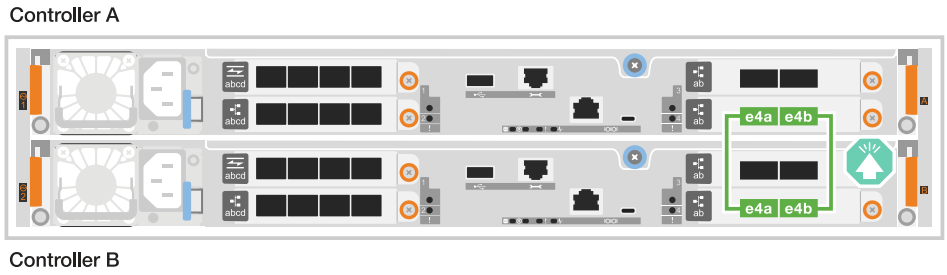
1. Connect the Cluster/HA interconnect connections:

> The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O module in slot 4). The ports are 40/100 GbE.

a. Connect controller A port e4a to controller B port e4a.

b. Connect controller A port e4b to controller B port e4b.

100 GbE Cluster/HA interconnect cables



ASA A20 with one 2-port 10/25 GbE I/O module

Steps

1. Connect the Cluster/HA interconnect connections:

> The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O module in slot 4). The ports are 10/25 GbE.

a. Connect controller A port e4a to controller B port e4a.

b. Connect controller A port e4b to controller B port e4b.

25 GbE Cluster/HA interconnect cables

Switched cluster cabling

Connect the controllers to the cluster network switches to create the ONTAP cluster connections.

ASA A30 or ASA A50 with two 2-port 40/100 GbE I/O modules

Steps

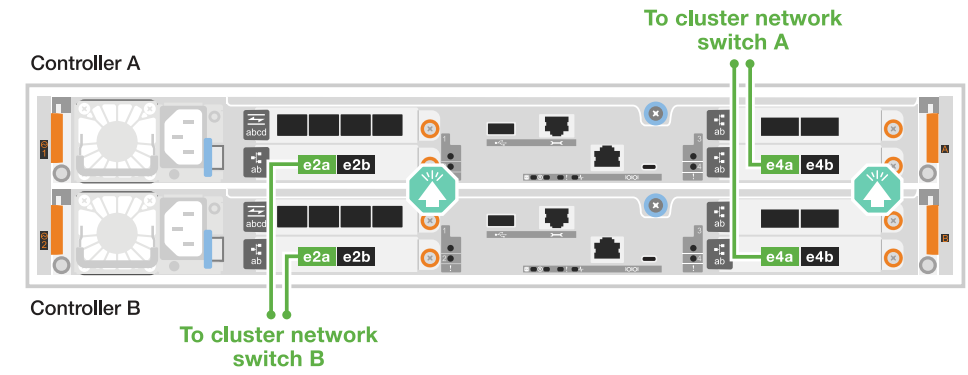
1. Cable the Cluster/HA interconnect connections:

   The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O modules in slots 2 and 4). The ports are 40/100 GbE.

   a. Connect controller A port e4a to cluster network switch A.
   b. Connect controller A port e2a to cluster network switch B.
   c. Connect controller B port e4a to cluster network switch A.
   d. Connect controller B port e2a to cluster network switch B.

   I/O module ports e2b and e4b are unused and available for host network connectivity.

40/100 GbE Cluster/HA interconnect cables



ASA A30 or ASA A50 with one 2-port 40/100 GbE I/O module

Steps

1. Cable the controllers to the cluster network switches:

> The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O module in slot 4). The ports are 40/100 GbE.

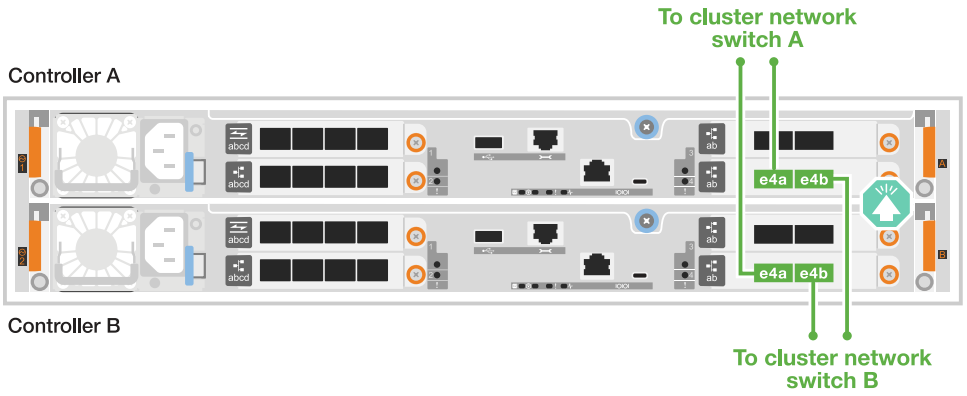
a. Connect controller A port e4a to cluster network switch A.

b. Connect controller A port e4b to cluster network switch B.

c. Connect controller B port e4a to cluster network switch A.

d. Connect controller B port e4b to cluster network switch B.

40/100 GbE Cluster/HA interconnect cables



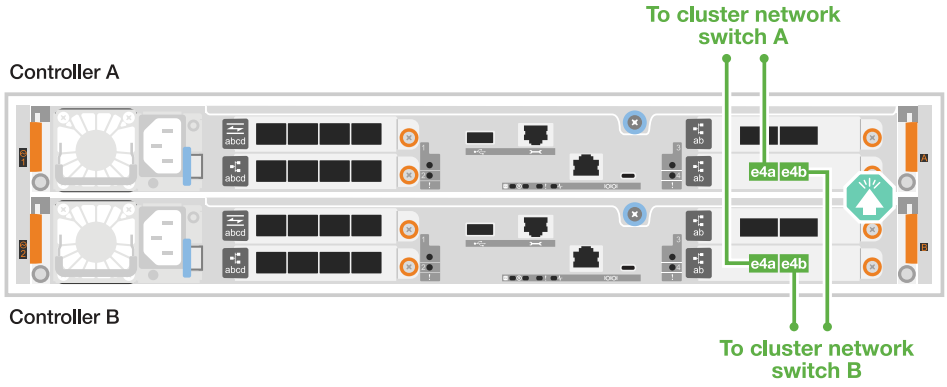
ASA A20 with one 2-port 10/25 GbE I/O module

1. Cable the controllers to the cluster network switches:

   The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O module in slot 4). The ports are 10/25 GbE.

   a. Connect controller A port e4a to cluster network switch A.
   b. Connect controller A port e4b to cluster network switch B.
   c. Connect controller B port e4a to cluster network switch A.
   d. Connect controller B port e4b to cluster network switch B.

   10/25 GbE Cluster/HA interconnect cables



C30

Create the ONTAP cluster connections. For switchless clusters, connect the controllers to each other. For switched clusters, connect the controllers to the cluster network switches.

The cluster/HA cabling examples show common configurations.

If you do not see your configuration here, go to NetApp Hardware Universe for comprehensive configuration and slot priority information to cable your storage system.

Switchless cluster cabling

Connect the controllers to each other to create the ONTAP cluster connections.

ASA C30 with two 2-port 40/100 GbE I/O modules

Steps

1. Cable the Cluster/HA interconnect connections:

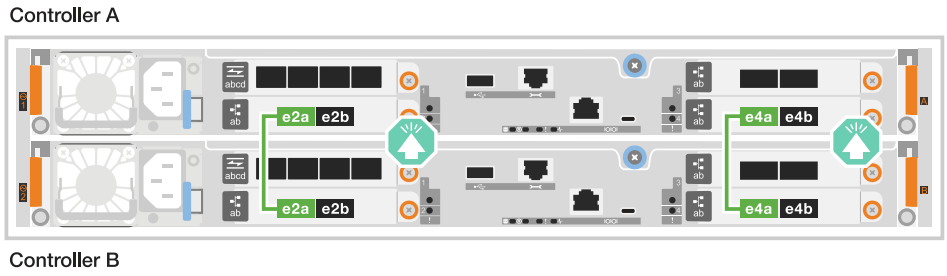
> The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O modules in slots 2 and 4). The ports are 40/100 GbE.

a. Connect controller A port e2a to controller B port e2a.

b. Connect controller A port e4a to controller B port e4a.

> I/O module ports e2b and e4b are unused and available for host network connectivity.

100 GbE Cluster/HA interconnect cables



ASA C30 with one 2-port 40/100 GbE I/O module

Steps

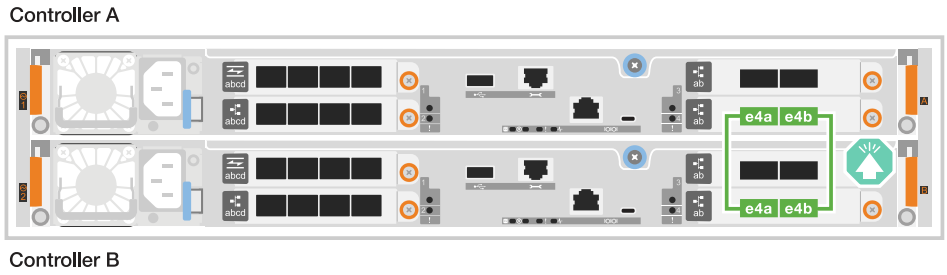
1. Cable the Cluster/HA interconnect connections:

> The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O module in slot 4). The ports are 40/100 GbE.

a. Connect controller A port e4a to controller B port e4a.

b. Connect controller A port e4b to controller B port e4b.

100 GbE Cluster/HA interconnect cables



Switched cluster cabling

Connect the controllers to the cluster network switches to create the ONTAP cluster connections.

ASA C30 with two 2-port 40/100 GbE I/O modules

Steps

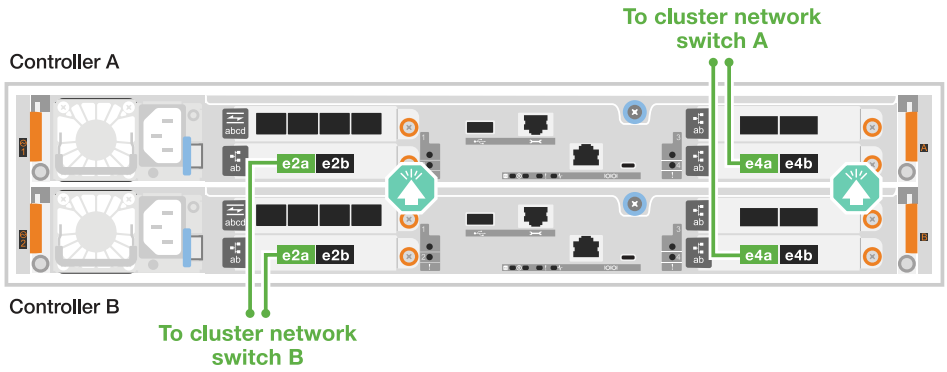
1. Cable the Cluster/HA interconnect connections:

> The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O modules in slots 2 and 4). The ports are 40/100 GbE.

a. Connect controller A port e4a to cluster network switch A.
b. Connect controller A port e2a to cluster network switch B.
c. Connect controller B port e4a to cluster network switch A.
d. Connect controller B port e2a to cluster network switch B.

> I/O module ports e2b and e4b are unused and available for host network connectivity.

40/100 GbE Cluster/HA interconnect cables



ASA C30 with one 2-port 40/100 GbE I/O module

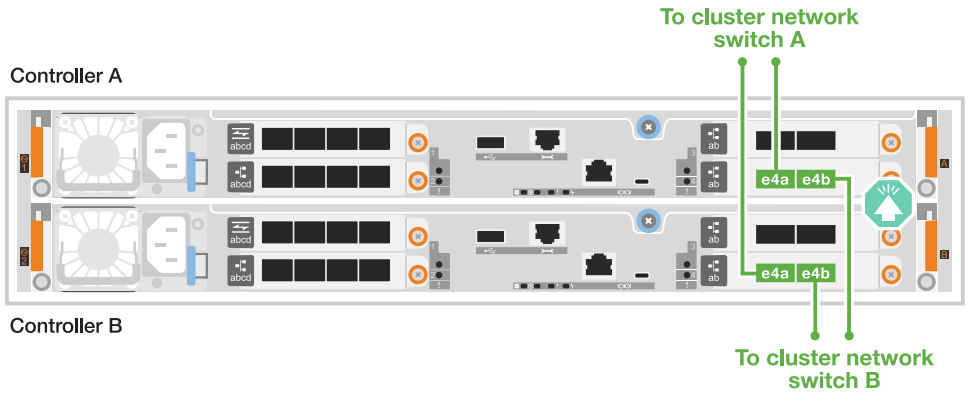
Steps

1. Connect the controllers to the cluster network switches:

   The cluster interconnect traffic and the HA traffic share the same physical ports (on the I/O module in slot 4). The ports are 40/100 GbE.

   a. Connect controller A port e4a to cluster network switch A.
   b. Connect controller A port e4b to cluster network switch B.
   c. Connect controller B port e4a to cluster network switch A.
   d. Connect controller B port e4b to cluster network switch B.

40/100 GbE Cluster/HA interconnect cables



Step 2: Cable the host network connections

Connect the controllers to your host network.

This procedure differs depending on your storage system model and I/O module configuration.

A1K

Connect the Ethernet module ports to your host network.

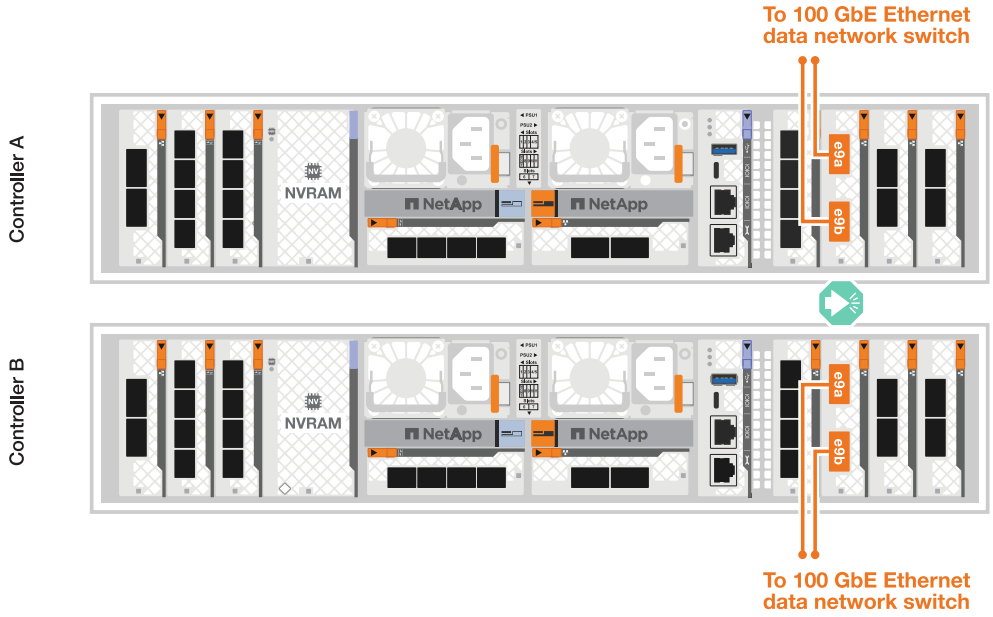
The following are some typical host network cabling examples. See NetApp Hardware Universe for your specific system configuration.

Steps

1. Connect ports e9a and e9b to your Ethernet data network switch.

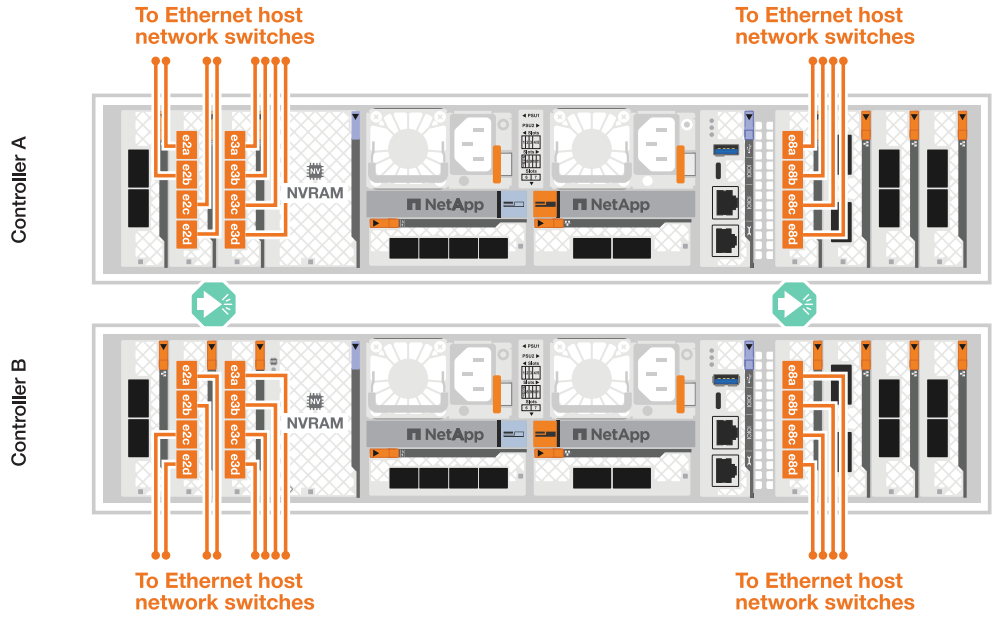
> For maximum system performance for cluster and HA traffic, do not use ports e1b and e7b ports for host network connections. Use a separate host card to maximize performance.

100 GbE cable



2. Connect your 10/25 GbE host network switches.

10/25 GbE Host



A70 and A90

Connect the Ethernet module ports to your host network.

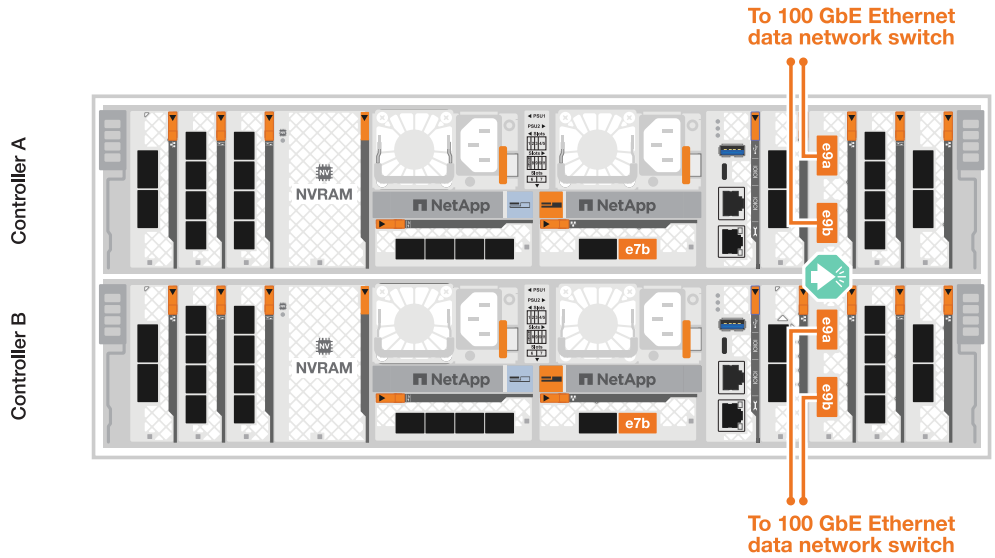
The following are some typical host network cabling examples. See NetApp Hardware Universe for your specific system configuration.

Steps

1. Connect ports e9a and e9b to your Ethernet data network switch.

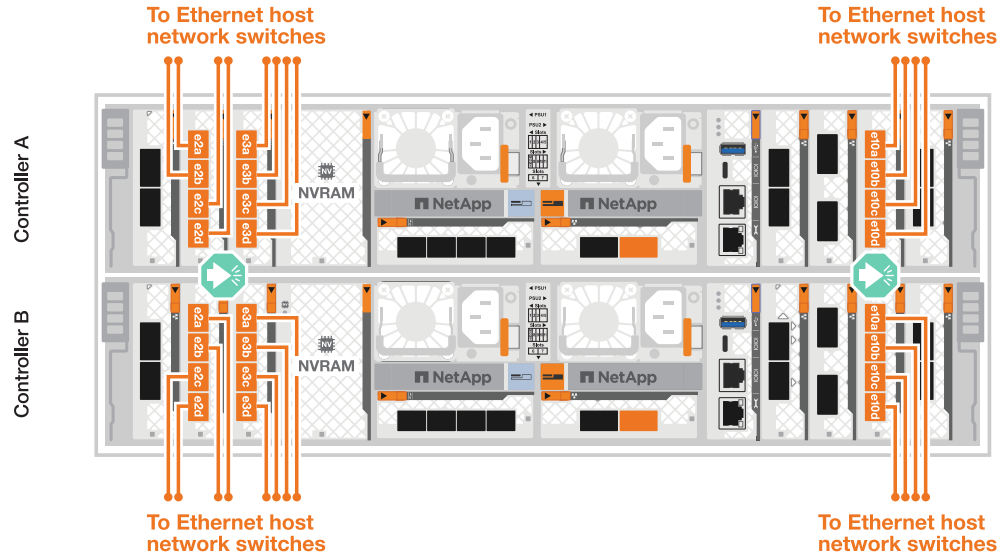
> For maximum system performance for cluster and HA traffic, do not use ports e1b and e7b ports for host network connections. Use a separate host card to maximize performance.

100 GbE cable



2. Connect your 10/25 GbE host network switches.

4-ports, 10/25 GbE Host



A20, A30, and A50

Connect the Ethernet module ports or the Fibre Channel (FC) module ports to your host network.

The host network cabling examples show common configurations.

If you do not see your configuration here, go to NetApp Hardware Universe for comprehensive configuration and slot priority information to cable your storage system.

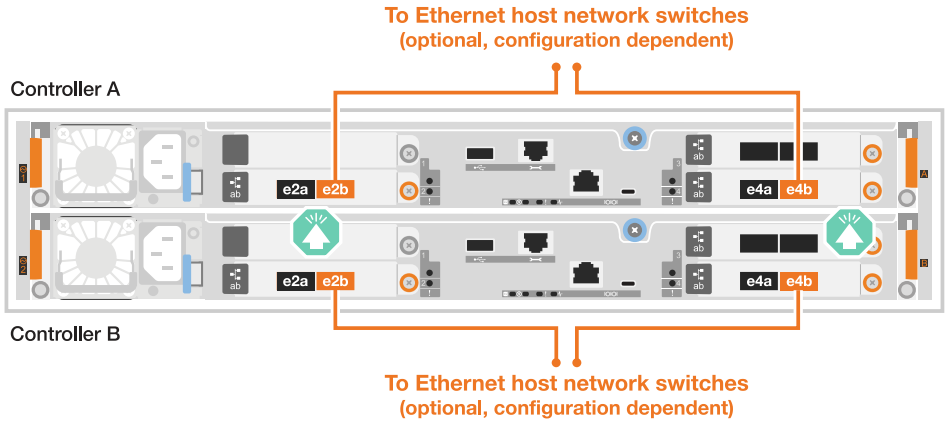
Ethernet host cabling

ASA A30 and ASA A50 with two 2-port 40/100 GbE I/O modules

On each controller, connect ports e2b and e4b to the Ethernet host network switches.

> The ports on I/O modules in slot 2 and 4 are 40/100 GbE (host connectivity is 40/100 GbE).

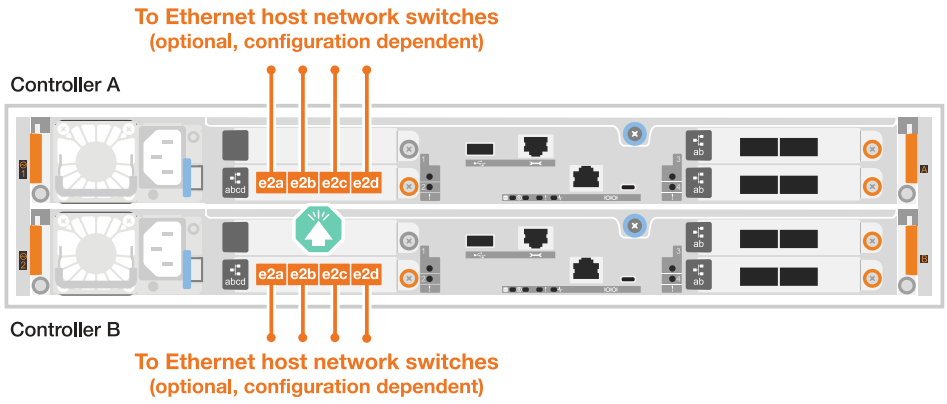
40/100 GbE cables



ASA A20, A30, and A50 with one 4-port 10/25 GbE I/O module

On each controller, connect ports e2a, e2b, e2c and e2d to the Ethernet host network switches.

10/25 GbE cables

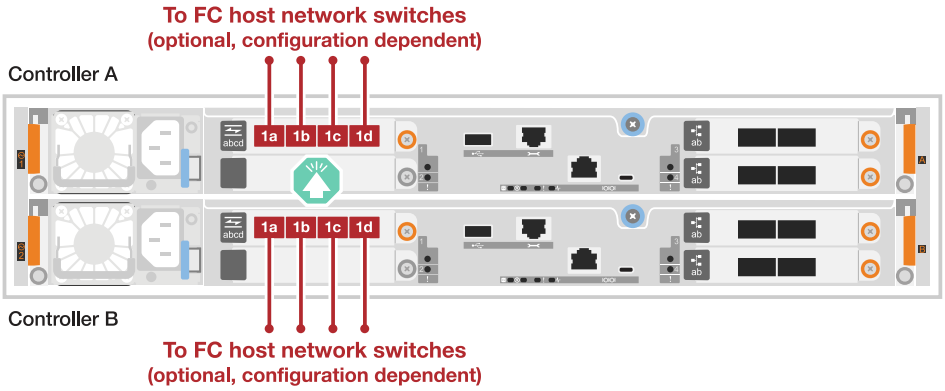


FC host cabling

ASA A20, A30, and A50 with One 4-port 64 Gb/s FC I/O module

On each controller, connect ports 1a, 1b, 1c and 1d to the FC host network switches.

64 Gb/s FC cables



C30

Connect the Ethernet module ports or the Fibre Channel (FC) module ports to your host network.

The host network cabling examples show common configurations.

If you do not see your configuration here, go to NetApp Hardware Universe for comprehensive configuration and slot priority information to cable your storage system.

Ethernet host cabling

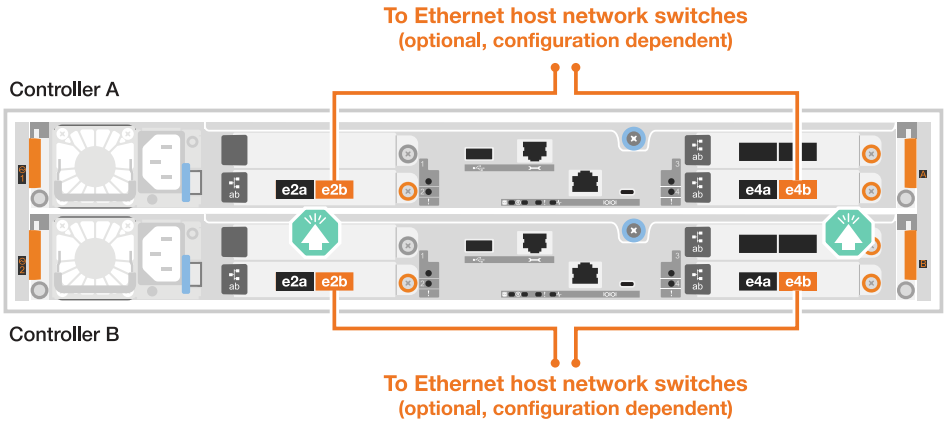
ASA C30 with two 2-port 40/100 GbE I/O modules

Steps

1. On each controller, cable ports e2b and e4b to the Ethernet host network switches.

> The ports on I/O modules in slot 2 and 4 are 40/100 GbE (host connectivity is 40/100 GbE).

40/100 GbE cables

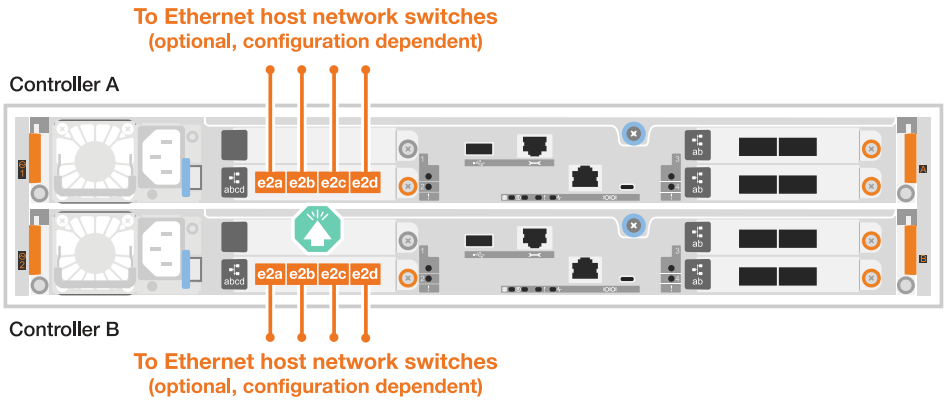


ASA C30 with one 4-port 10/25 GbE I/O module

Steps

1. On each controller, cable ports e2a, e2b, e2c and e2d to the Ethernet host network switches.

10/25 GbE cables

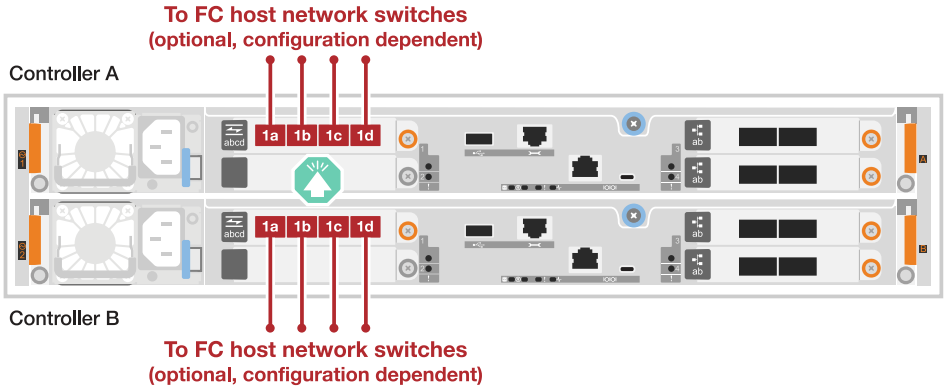


ASA C30 with one 4-port 64 Gb/s FC I/O module

Steps

1. On each controller, cable ports 1a, 1b, 1c and 1d to the FC host network switches.

64 Gb/s FC cables



Step 3: Cable the management network connections

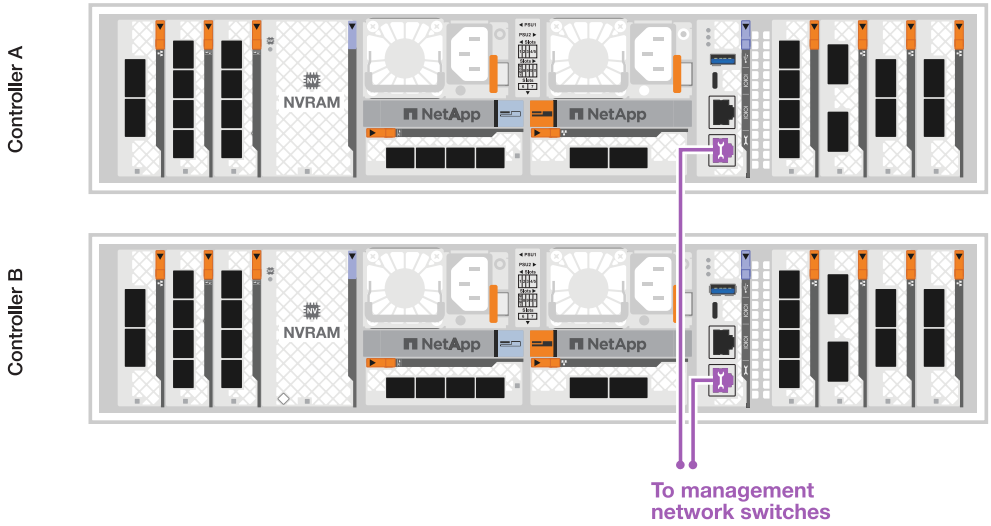
Connect the controllers to your management network.

Contact your network administrator for information about connecting your storage system to the management network switches.

A1K

Use the 1000BASE-T RJ-45 cables to connect the management (wrench) ports on each controller to the management network switches.

1000BASE-T RJ-45 cables

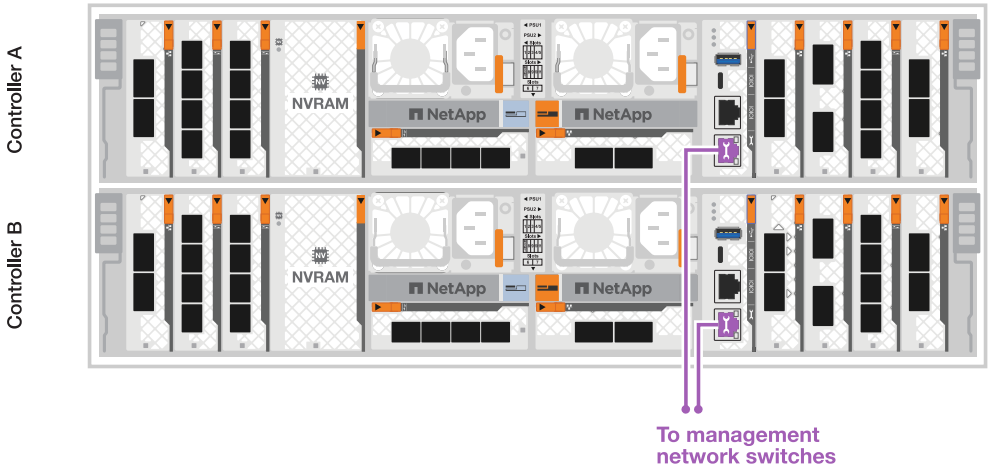


Do not plug in the power cords yet.

A70 and A90

Use the 1000BASE-T RJ-45 cables to connect the management (wrench) ports on each controller to the management network switches.

1000BASE-T RJ-45 cables

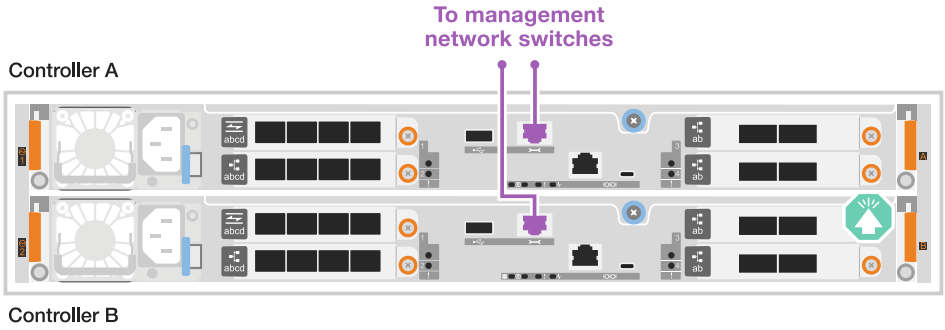


Do not plug in the power cords yet.

A20, A30, and A50

Connect the management (wrench) ports on each controller to the management network switches.

1000BASE-T RJ-45 cables

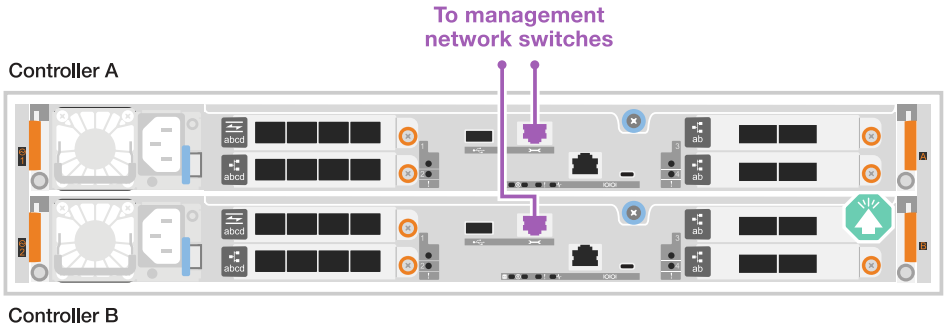


Do not plug in the power cords yet.

C30

Connect the management (wrench) ports on each controller to the management network switches.

1000BASE-T RJ-45 cables



Do not plug in the power cords yet.

Step 4: Cable the shelf connections

The following cabling procedures show how to connect your controllers to a storage shelf.

For the maximum number of shelves supported for your storage system and for all of your cabling options, such as optical and switch-attached, see NetApp Hardware Universe.

A1K

The AFF A1K storage systems support NS224 shelves with either the NSM100 or NSM100B module. The major differences between the modules are:

- NSM100 shelf modules use built-in port e0a and e0b.
- NSM100B shelf modules use ports e1a and e1b in slot 1.

The following cabling example shows NSM100 modules in the NS224 shelves when referring to shelf module ports.

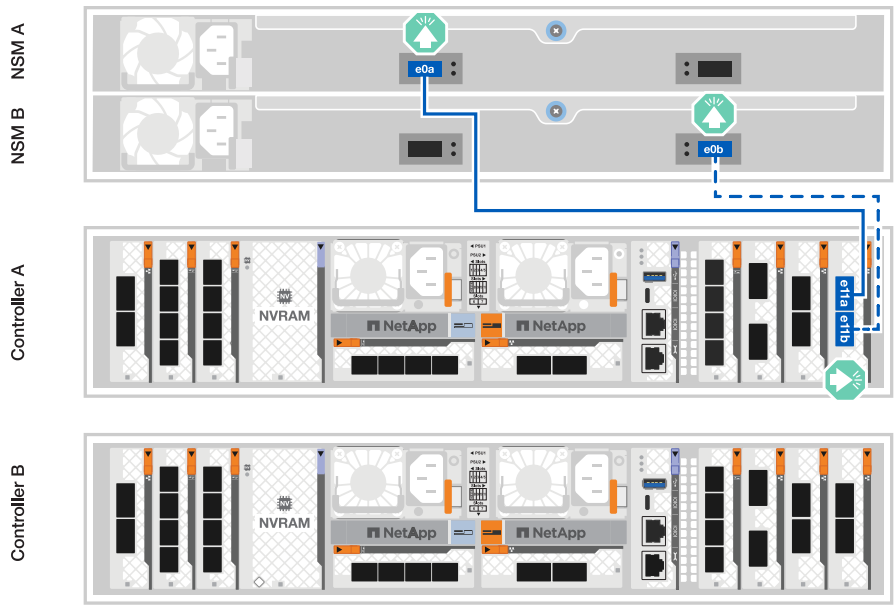
Choose one of the following cabling options that matches your setup.

Option 1: One NS224 storage shelf

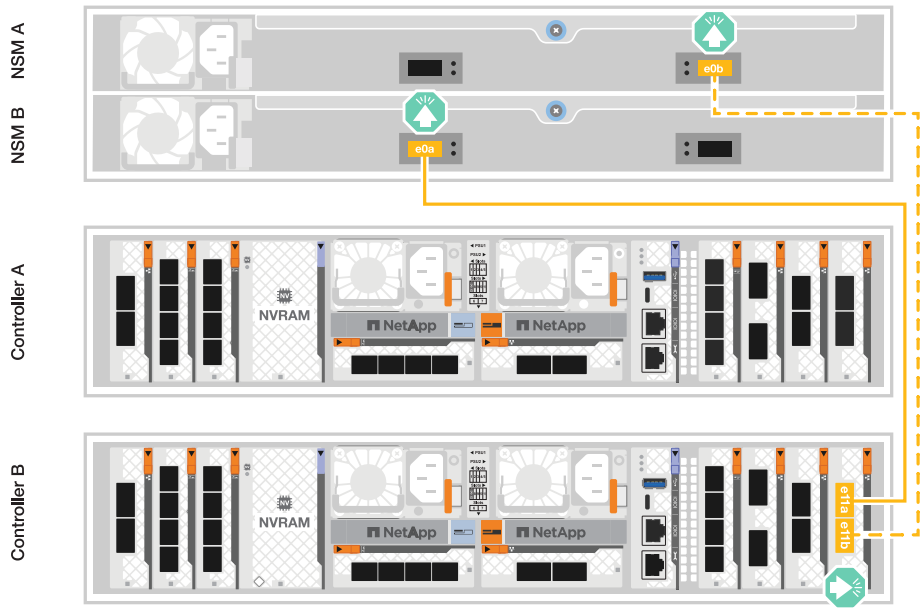
Connect each controller to the NSM modules on the NS224 shelf. The graphics show cabling from each of the controllers: Controller A cabling is shown in blue and Controller B cabling is shown in yellow.

Steps

1. On controller A, connect the following ports:
   a. Connect port e11a to NSM A port e0a.
   b. Connect port e11b to port NSM B port e0b.



2. On controller B, connect the following ports:
   a. Connect port e11a to NSM B port e0a.
   b. Connect port e11b to NSM A port e0b.

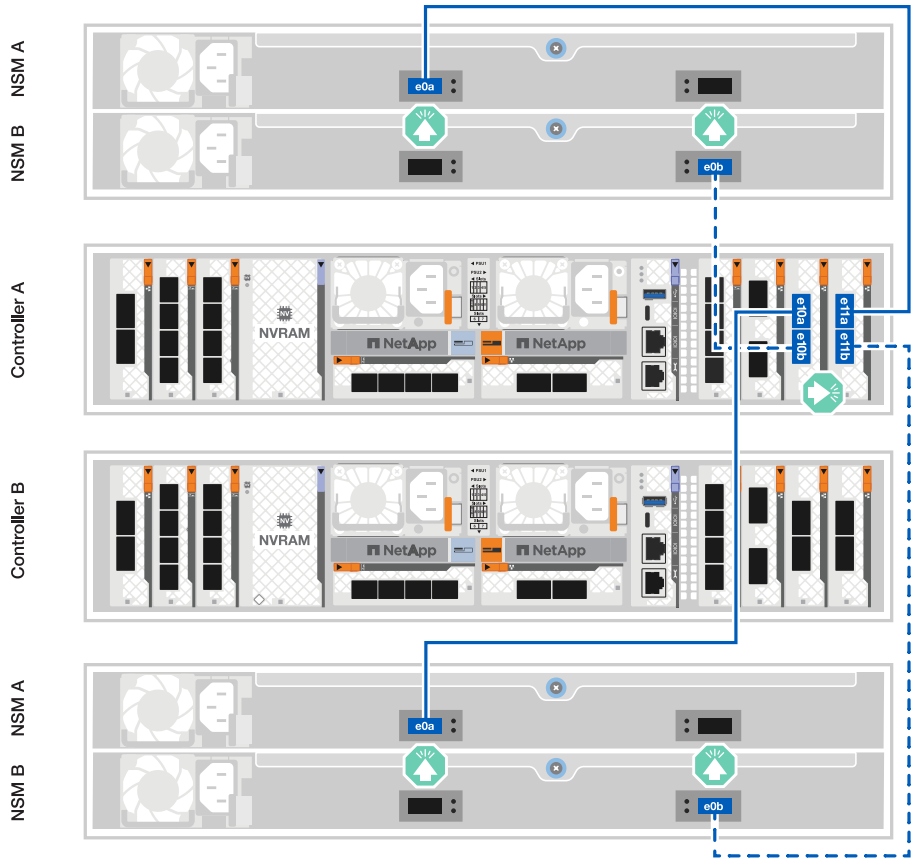


Option 2: Two NS224 storage shelves

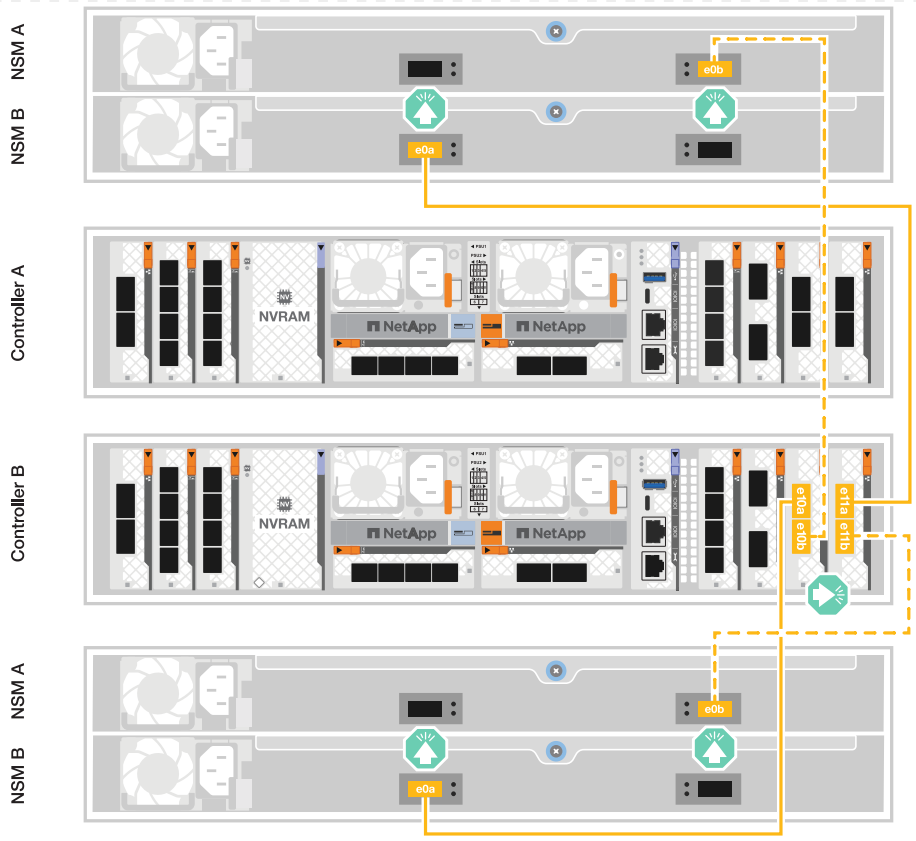
Connect each controller to the NSM modules on both NS224 shelves. The graphics show cabling from each of the controllers: Controller A cabling is shown in blue and Controller B cabling is shown in yellow.

Steps

1. On controller A, connect the following ports:
   a. Connect port e11a to shelf 1 NSM A port e0a.
   b. Connect port e11b to shelf 2 NSM B port e0b.
   c. Connect port e10a to shelf 2 NSM A port e0a.
   d. Connect port e10b to shelf 1 NSM A port e0b.



2. On controller B, connect the following ports:
   a. Connect port e11a to shelf 1 NSM B port e0a.
   b. Connect port e11b to shelf 2 NSM A port e0b.
   c. Connect port e10a to shelf 2 NSM B port e0a.
   d. Connect port e10b to shelf 1 NSM A port e0b.



A70 and A90

The AFF A70 and 90 storage systems support NS224 shelves with either the NSM100 or NSM100B module. The major differences between the modules are:

- NSM100 shelf modules use built-in ports e0a and e0b.
- NSM100B shelf modules use ports e1a and e1b in slot 1.

The following cabling example shows NSM100 modules in the NS224 shelves when referring to shelf module ports.

Choose one of the following cabling options that matches your setup.

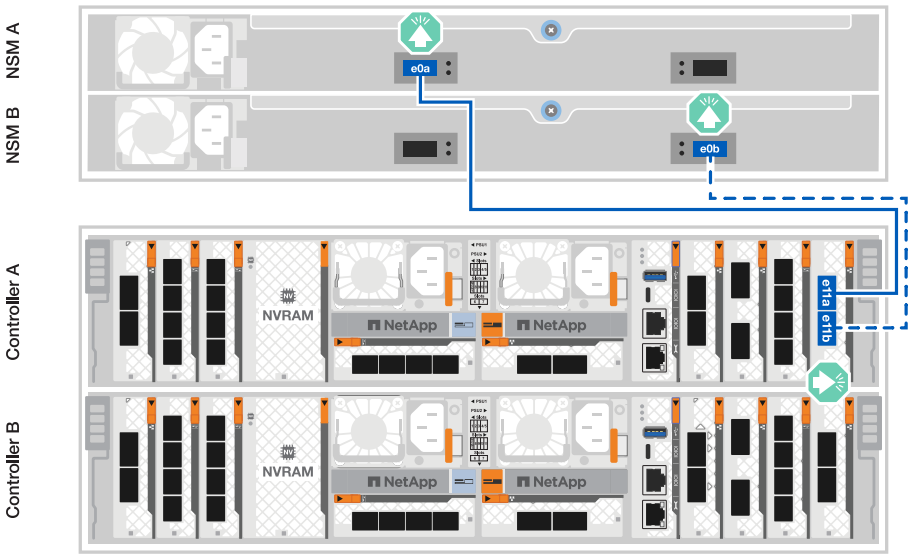
Option 1: One NS224 storage shelf

Connect each controller to the NSM modules on the NS224 shelf. The graphics show cabling from each of the controllers: Controller A cabling is shown in blue and Controller B cabling is shown in yellow.

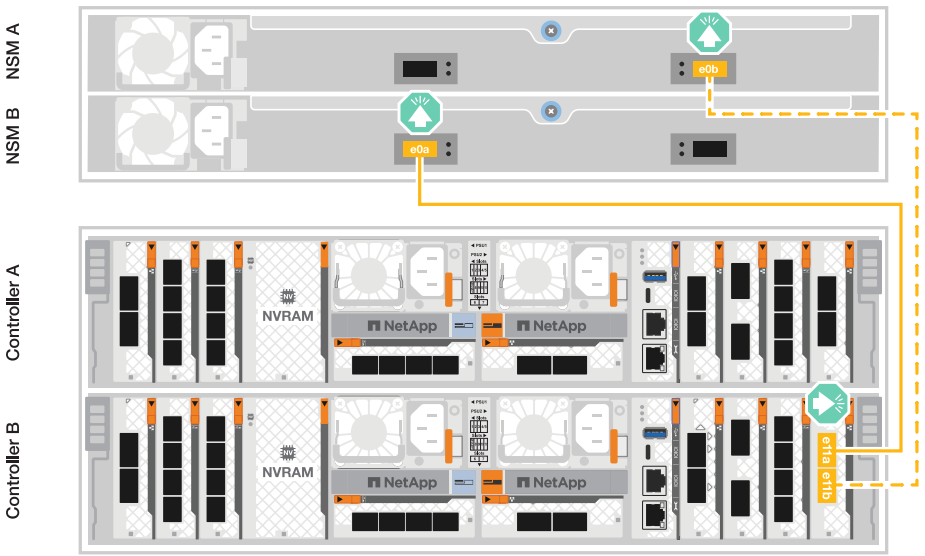
100 GbE QSFP28 copper cables

Steps

1. Connect controller A port e11a to NSM A port e0a.
2. Connect controller A port e11b to port NSM B port e0b.



3. Connect controller B port e11a to NSM B port e0a.
4. Connect controller B port e11b to NSM A port e0b.



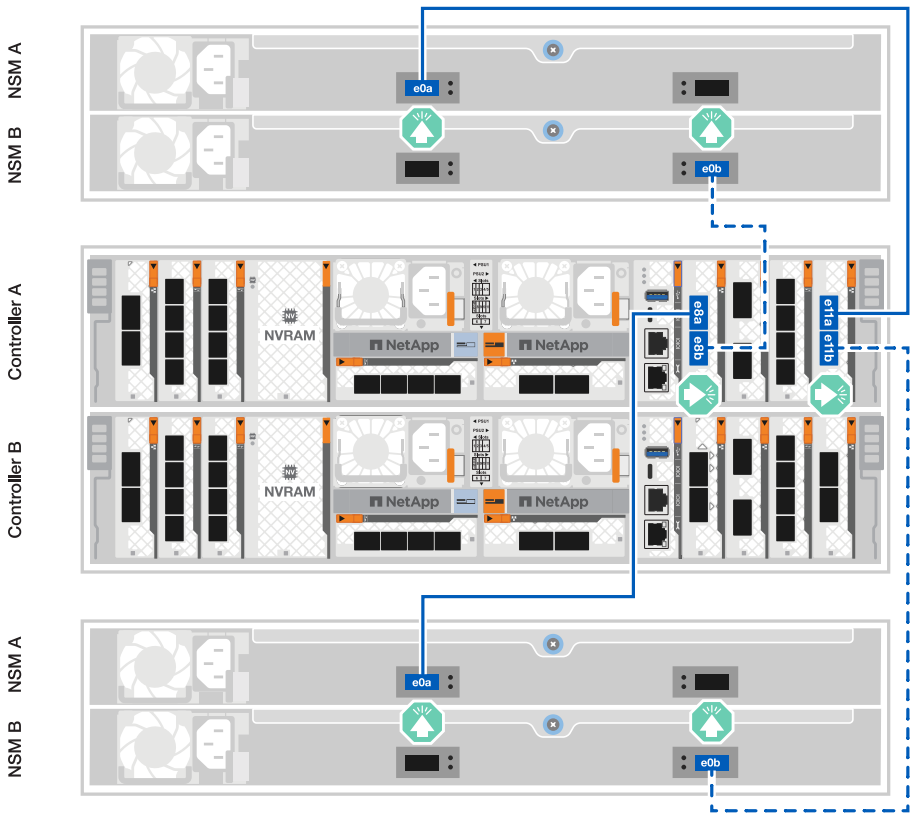
Option 2: Two NS224 storage shelves

Connect each controller to the NSM modules on both NS224 shelves. The graphics show cabling from each of the controllers: Controller A cabling is shown in blue and Controller B cabling is shown in yellow.

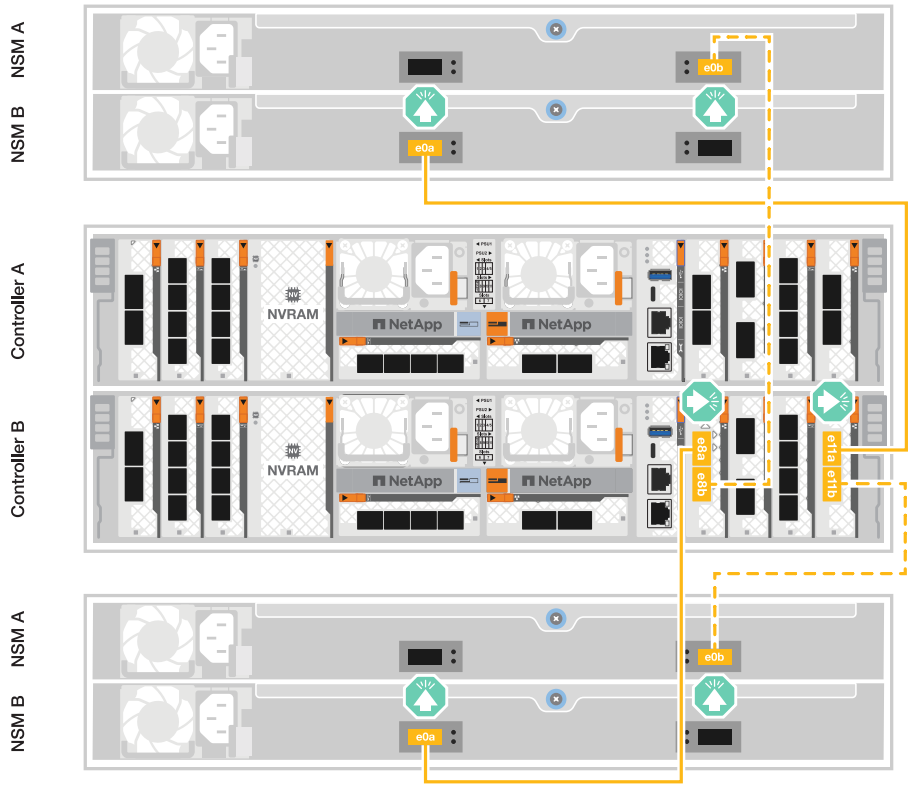
100 GbE QSFP28 copper cables

Steps

1. On on controller A, connect the following ports:
   a. Connect port e11a to shelf 1, NSM A port e0a.
   b. Connect port e11b to shelf 2, NSM B port e0b.
   c. Connect port e8a to shelf 2, NSM A port e0a.
   d. Connect port e8b to shelf 1, NSM B port e0b.



2. On controller B, connect the following ports:
   a. Connect port e11a to shelf 1, NSM B port e0a.
   b. Connect port e11b to shelf 2, NSM A port e0b.
   c. Connect port e8a to shelf 2, NSM B port e0a.
   d. Connect port e8b to shelf 1, NSM A port e0b.



A20, A30, and A50

The NS224 shelf cabling procedure shows NSM100B modules instead of NSM100 modules. The cabling is the same regardless of the type of NSM modules used, only the port names are different:

- NSM100B modules use ports e1a and e1b on an I/O module in slot 1.
- NSM100 modules use built-in (onboard) ports e0a and e0b.

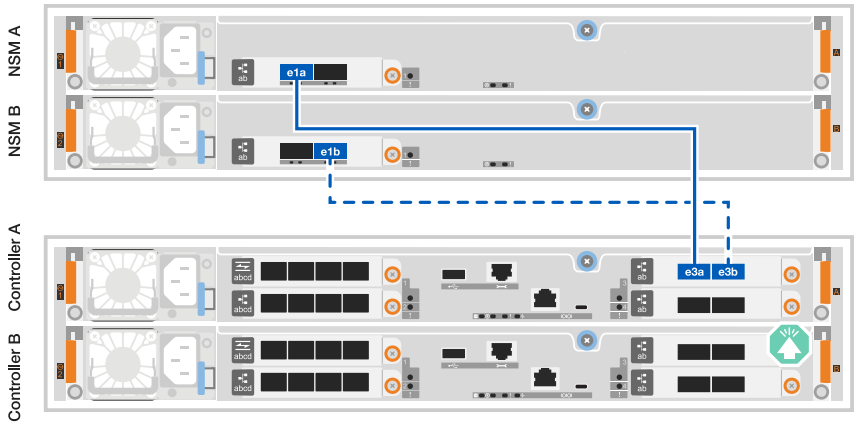
You cable each controller to each NSM module on the NS224 shelf using the storage cables that came with your storage system, which could be the following cable type:

100 GbE QSFP28 copper cables

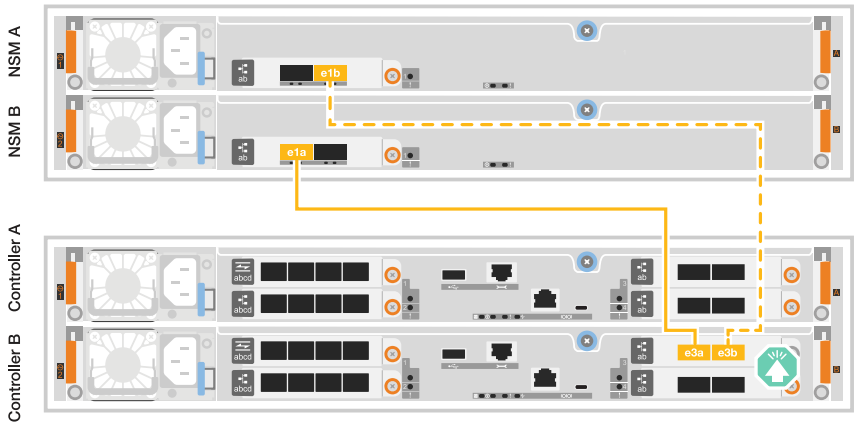
The graphics show controller A cabling in blue and controller B cabling in yellow.

Steps

1. Connect controller A to the shelf:
   a. Connect controller A port e3a to NSM A port e1a.
   b. Connect controller A port e3b to NSM B port e1b.



2. Connect controller B to the shelf:
   a. Connect controller B port e3a to NSM B port e1a.
   b. Connect controller B port e3b to NSM A port e1b.



C30

The NS224 shelf cabling procedure shows NSM100B modules instead of NSM100 modules. The cabling is the same regardless of the type of NSM modules used, only the port names are different:

- NSM100B modules use ports e1a and e1b on an I/O module in slot 1.
- NSM100 modules use built-in (onboard) ports e0a and e0b.

You cable each controller to each NSM module on the NS224 shelf using the storage cables that came with your storage system, which could be the following cable type:

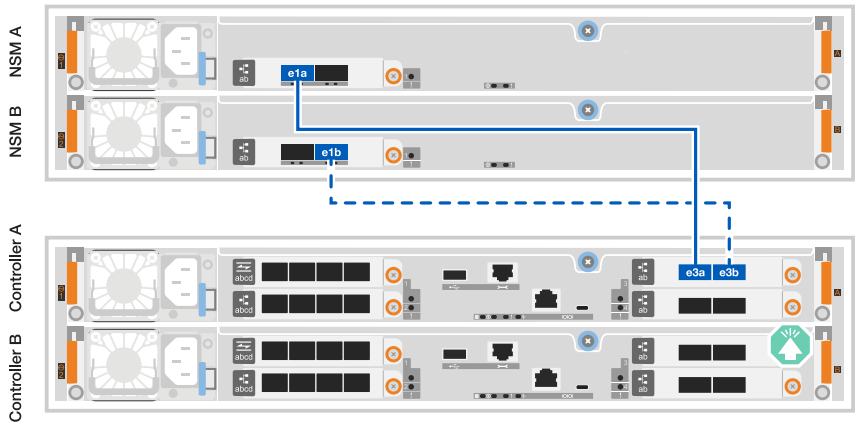
100 GbE QSFP28 copper cables

The graphics show controller A cabling in blue and controller B cabling in yellow.

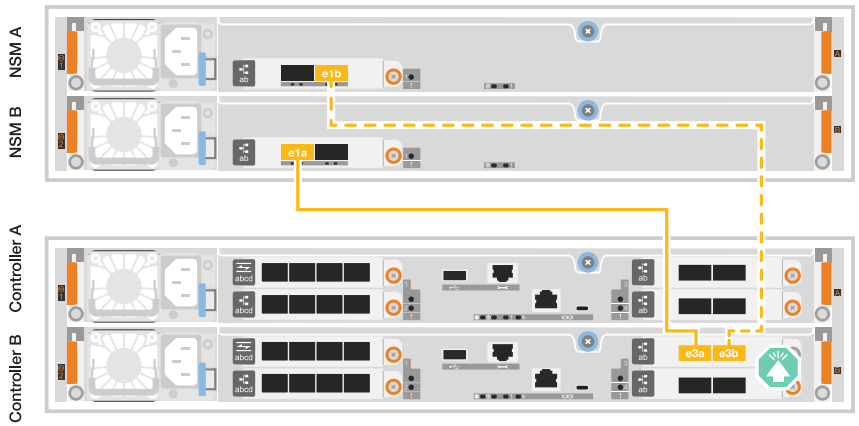
Steps

1. Connect controller A to the shelf:
   a. Connect controller A port e3a to NSM A port e1a.

b. Connect controller A port e3b to NSM B port e1b.



2. Connect controller B to the shelf:
   a. Connect controller B port e3a to NSM B port e1a.
   b. Connect controller B port e3b to NSM A port e1b.



What's next?

After you've connected the storage controllers to your network and then connected the controllers to your storage shelves, you power on the ASA r2 storage system.

Power on your ASA r2 storage system

After you install the rack hardware for your ASA r2 storage system and install the cables for the controllers and storage shelves, you should power on your storage shelves and controllers.

Step 1: Power on the shelf and assign shelf ID

Each shelf is distinguished by a unique shelf ID. This ID ensures that the shelf is distinct within your storage system setup.

About this task

- A valid shelf ID is 01 through 99.

  If you have internal shelves (storage), which are integrated within the controllers, they are assigned a fixed shelf ID of 00.

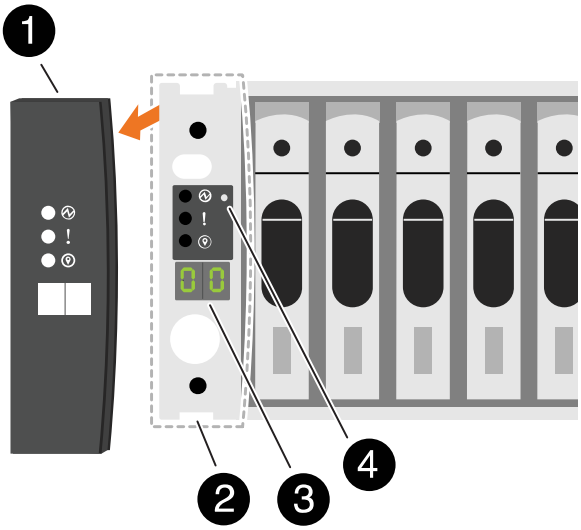
- You must power cycle a shelf (unplug both power cords, wait the appropriate amount of time, and then plug them back in) for the shelf ID to take effect.

Steps

1. Power on the shelf by connecting the power cords first to the shelf, securing them in place with the power cord retainer, and then connecting the power cords to power sources on different circuits.

   The shelf powers on and boots automatically when plugged into the power source.

2. Remove the left end cap to access the shelf ID button behind the faceplate.



1	Shelf end cap
2	Shelf faceplate
3	Shelf ID number
4	Shelf ID button

3. Change the first number of the shelf ID:
   a. Insert the straightened end of a paperclip or narrow tipped ball point pen into the small hole to press the shelf ID button.
   b. Press and hold the shelf ID button until the first number on the digital display blinks, and then release the button.

      It can take up to 15 seconds for the number to blink. This activates the shelf ID programming mode.

If the ID takes longer than 15 seconds to blink, press and hold the shelf ID button again, making sure to press it in all the way.

c. Press and release the shelf ID button to advance the number until you reach the desired number from 0 to 9.

   Each press and release duration can be as short as one second.

   The first number continues to blink.

4. Change the second number of the shelf ID:
   a. Press and hold the button until the second number on the digital display blinks.

      It can take up to three seconds for the number to blink.

      The first number on the digital display stops blinking.

   b. Press and release the shelf ID button to advance the number until you reach the desired number from 0 to 9.

      The second number continues to blink.

5. Lock in the desired number and exit the programming mode by pressing and holding the shelf ID button until the second number stops blinking.

   It can take up to three seconds for the number to stop blinking.

   Both numbers on the digital display start blinking and the amber LED illuminates after about five seconds, alerting you that the pending shelf ID has not yet taken effect.

6. Power-cycle the shelf for at least 10 seconds to make the shelf ID take effect.
   a. Unplug the power cord from both power supplies on the shelf.
   b. Wait 10 seconds.
   c. Plug the power cords back into the shelf power supplies to complete the power cycle.

      A power supply is powered on as soon as the power cord is plugged in. Its bicolored LED should illuminate green.

7. Replace the left end cap.

Step 2: Power on the controllers

After you've turned on your storage shelves and assigned them unique IDs, turn on the power to the storage controllers.

Steps

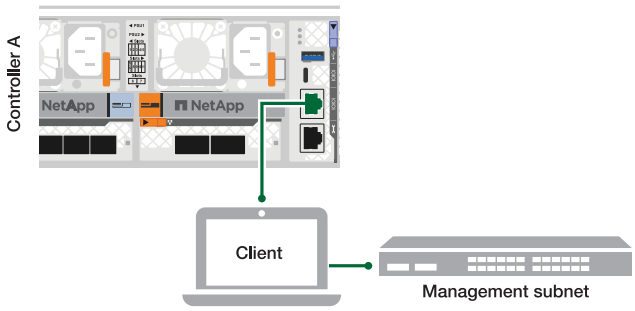
1. Connect your laptop to the serial console port. This will allow you to monitor the boot sequence when the controllers are powered on.
   a. Set the serial console port on the laptop to 115,200 baud with N-8-1.

      See your laptop's online help for instructions on how to configure the serial console port.

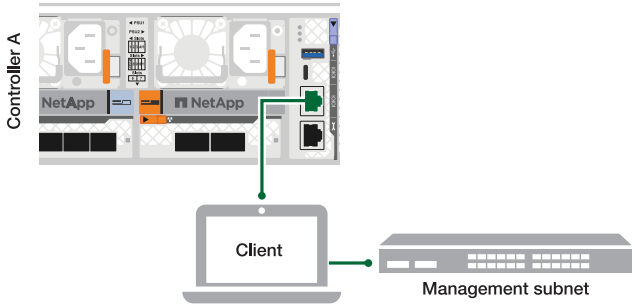
b. Connect the console cable to the laptop, and connect the serial console port on the controller using the console cable that came with your storage system.

c. Connect the laptop to the switch on the management subnet.

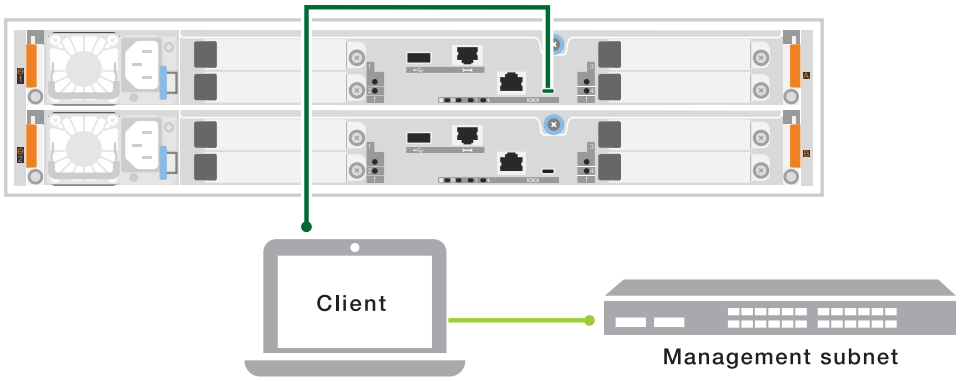
A1K



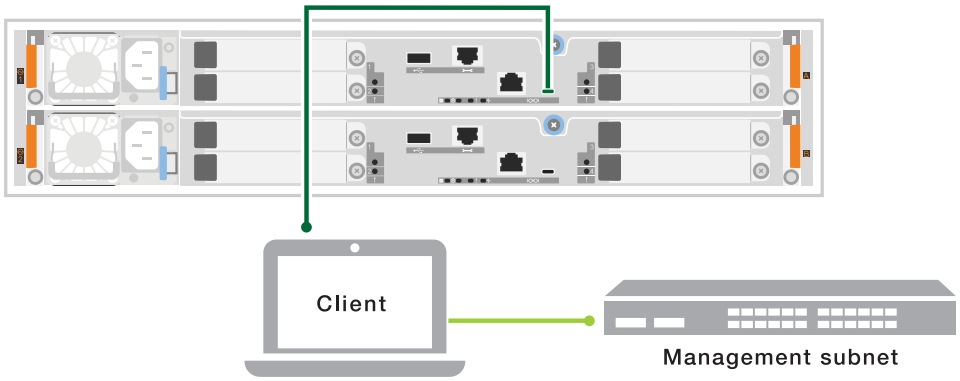
A70 and A90



A20, A30, and A50



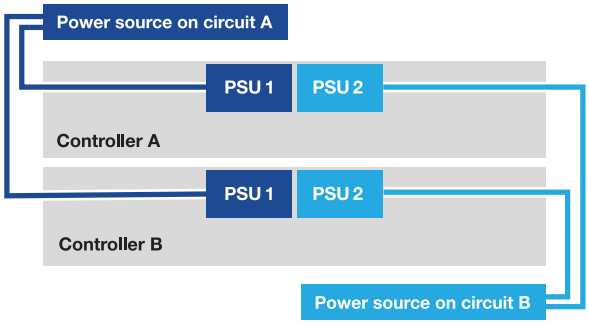
C30



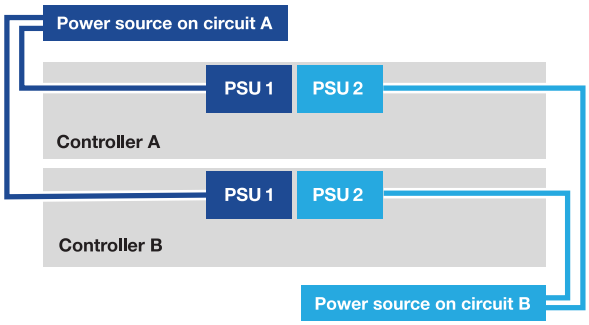
2. Assign a TCP/IP address to the laptop, using one that is on the management subnet.

3. Plug the power cords into the controller power supplies, and then connect them to power sources on different circuits.

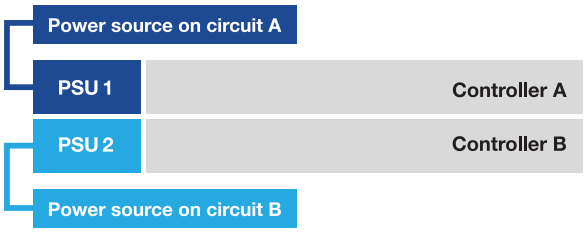
A1K



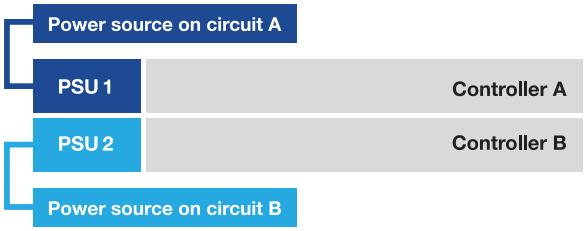
A70 and A90



A20, A30, and A50



C30



- The system initiates the boot process. The initial boot sequence can take up to eight minutes.
- During the boot process, you will observe the LEDs flashing and the fans activating, signaling that the controllers are powering up.
- Be aware that the fans may emit a high level of noise when they first start up. The fan noise during start-up is normal.
- For ASA A20, A30, A50 and ASA C30 storage systems, the shelf ID display on the front of the system chassis does not illuminate.

4. Secure the power cords using the securing device on each power supply.

What's next?

After you've turned on your ASA r2 storage system, you set up an ONTAP ASA r2 cluster.

Set up your ASA r2 system

Set up an ONTAP cluster on your ASA r2 storage system

ONTAP System Manager guides you through a quick and easy workflow to set up an ONTAP ASA r2 cluster.

During cluster setup, your default data storage virtual machine (VM) is created. Optionally, you can enable the Domain Name System (DNS) to resolve host names, set your cluster to use the Network Time Protocol (NTP) for time synchronization and enable encryption of data at rest.

In certain cases, you might need to use the ONTAP command line interface (CLI) to set up your cluster. You should use the CLI, for example, if your security protocols do not allow you to connect a laptop to your management switches, or if you are using a non-windows operating system.

Before you begin

Gather the following information:

- Cluster management IP address

  The cluster management IP address is a unique IPv4 address for the cluster management interface used by the cluster administrator to access the admin storage VM and manage the cluster. You can obtain this IP address from the administrator responsible for assigning IP addresses in your organization.

- Network subnet mask

  During cluster setup, ONTAP recommends a set of network interfaces appropriate for your configuration. You can adjust the recommendation if necessary.

- Network gateway IP address
- Partner node IP address
- DNS domain names
- DNS name server IP addresses
- NTP server IP addresses
- Data subnet mask

Steps

1. Discover your cluster network
   a. Connect your laptop to the management switch and access the network computers and devices.
   b. Open File Explorer.
   c. Select **Network**; then right-click and select **Refresh**.
   d. Select either ONTAP icon; then accept any certificates displayed on your screen.

      System Manager opens.

2. Under **Password**, create a strong password for the admin account.

   The password must be at least eight characters long and must contain at least one letter and one number.

3. Reenter the password to confirm and then select **Continue**.
4. Under **Network addresses**, enter a storage system name or accept the default name.

   If you change the default storage system name, the new name must begin with a letter and must be fewer than 44 characters. You can use a period (.), hyphen (-) or underscore (_) in the name.

5. Enter the cluster management IP address, subnet mask, gateway IP address and the IP address of the partner node; then select **Continue**.
6. Under **Network services**, select the desired options to **Use the Domain Name System (DNS) for resolving host names** and to **Use the Network Time Protocol (NTP) to keep times synchronized**.

   If you choose to use the DNS, enter the DNS domain and name servers. If you choose to use NTP, enter the NTP servers; then select **Continue**.

7. Under **Encryption**, enter a passphrase for the Onboard Key Manager (OKM).

   Encryption of data at rest using an Onboard Key Manager (OKM) is selected by default. If you want to use an external key manager, update the selections.

   Optionally, you can configure your cluster for encryption after cluster setup is complete.

8. Select **Initialize**.

   When setup is complete, you are redirected to the cluster's management IP address.

9. Under **Network**, select **Configure protocols**.

To configure IP (iSCSI and NVMe/TCP), do this…	To configure FC and NVMe/FC, do this…
a. Select **IP**; then select **Configure IP interfaces**. b. Select **Add a subnet**. c. Enter a name for the subnet, then enter the subnet IP addresses. d. Enter the subnet mask, and optionally enter a gateway; then select **Add**. e. Select the subnet you just created; then select **Save**. f. Select **Save**.	a. Select **FC**; then select **Configure FC interfaces** and/or **Configure NVMe/FC interfaces**. b. Select the FC and/or NVMe/FC ports; then select **Save**.

10. Optionally, download and run ActiveIQ Config Advisor to confirm your configuration.

    ActiveIQ Config Advisor is a tool for NetApp systems that checks for common configuration errors.

What's next?

You are ready to set up data access from your SAN clients to your ASA r2 system.

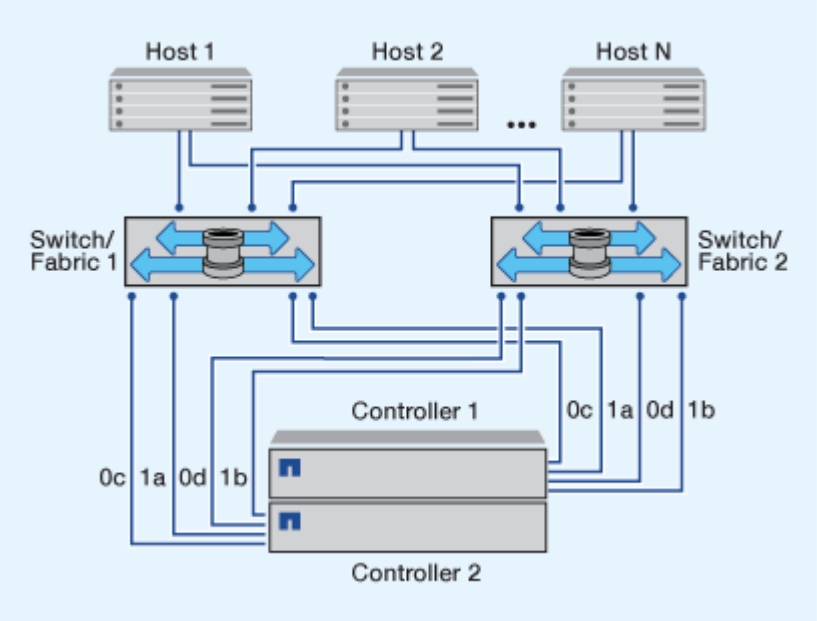
SAN host configuration with ASA r2 systems

ASA r2 systems follow the same recommendations and guidelines for SAN host configuration as all other ONTAP systems.

It is recommended that you use two or more switches to connect your storage system to one or more SAN hosts. For iSCSI configurations, the network topology connecting your hosts, switches and storage system is referred to as a *network*. For FC and FC-NVMe configurations, this same network topology is referred to as a *fabric*.

Multi-network ot multi-fabric configurations (those using two or more switches) are recommended because they provide redundancy at both the switch and storage layer. This redundancy makes your storage system more fault tolerant and provides support for nondisruptive operations.

The following illustration is an example of an FC configuration with multiple hosts using two fabrics to access a single HA pair. The FC target port numbers (0c, 0d, 1a, 1b) are also examples. The actual port numbers vary depending on your system model and whether you are using expansion adapters.



Learn more about SAN configuration for iSCSI hosts. Learn more about SAN configuration for FC and FC/NVMe hosts.

Zoning recommendation for FC hosts

You should configure your FC hosts to use zoning. ASA r2 systems follow the same FC host zoning recommendations and guidelines as all other ONTAP systems.

A zone is a logical grouping of one or more ports within a fabric. For devices to be able to discover each other, establish sessions with one another, and communicate, both ports need to have a common zone membership.

Learn more about FC/FC-NVMe zoning.

Enable data access from SAN hosts to your ASA r2 storage system

To set up data access, you should ensure that the critical parameters and settings on your SAN client for proper operation with ONTAP are configured correctly. If you are

providing storage for your VMware environment, you should install OTV 10.3 to simply the management of your ASA r2 storage.

Set up data access from SAN hosts

The configuration necessary to set up data access to your ASA r2 system from your SAN hosts varies depending on the host operating system and the protocol. Correct configuration is important for best performance and successful failover.

See the ONTAP SAN host documentation for VMware vSphere SCSI clients, VMware vSphere NVMe clients and other SAN clients to properly configure your hosts to connect to your ASA r2 system.

Migrate VMware virtual machines

If you need to migrate your VM workload from an ASA storage system to an ASA r2 storage system, NetApp recommends that you use VMware vSphere vMotion to perform a live, non-disruptive migration of your data.

ASA r2 storage units are thin provisioned by default. When migrating your VM workload, virtual disks (VMDKs) should also be thin provisioned.

Related information

- Learn more about the advantanges of using ONTAP for vSphere.
- Learn about VMware Live Site Recovery with ONTAP.
- Learn about continuous availability solutions for vSphere environments.
- Learn more about how to set up Broadcom VMware ESXi iSCSI MPIO with ONTAP SAN ASA storage systems.

Migrate data from a third-party storage system

Beginning with ONTAP 9.17.1, you can use Foreign LUN Import (FLI) to migrate data from a LUN on a third-party storage system to an ASA r2 system. Using FLI for your data migration can help you mitigate the risk of data loss and downtime during the migration process.

FLI supports both online and offline migrations. In an online migration, the client system stays online while data is copied from the third-party storage system to the ONTAP storage system. Online migrations are supported by Windows, Linux, and ESXi host operating systems. In an offline migration, the client system is taken offline, the LUN data is copied from the third-party storage system to the ONTAP storage system, and then the client system is brought back online.

- Learn how to perform an FLI offline migration.
- Learn how to perform an FLI online migrations.

Configure your ASA r2 system as a storage provider in your VMware environment

You can use ONTAP tools for VMware to easily enable your ASA r2 system as a storage provider in your VMware environment.

ONTAP tools for VMware vSphere is a set of tools that work in conjunction with VMware vCenter Server Virtual Appliance (vCSA) for easy management of virtual machines on your VMware ESXi hosts.

ASA r2 systems are supported by ONTAP tools for VMware vSphere 10.3 and later.

Learn how to Deploy ONTAP tools for VMware and then use it to do the following:

- Add vCenter Server instances
- Configure your ESXi host settings
- Discover your ASA r2 storage system and hosts

What's next?

You are ready to provision storage to enable your SAN hosts to read and write data to storage units.

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