



Cable shelf for hot-add

Install and maintain

NetApp

February 13, 2026

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Table of Contents

Cable shelf for hot-add	1
Overview of cabling for a hot-add - NS224 shelves	1
About this task	1
Cable shelf to AFF systems - NS224 shelves	2
Cable shelf to ASA systems - NS224 shelves	31
Cable shelf to end-of-availability systems - NS224 shelves	59

Cable shelf for hot-add

Overview of cabling for a hot-add - NS224 shelves

You cable each NS224 shelf you are hot-adding so that each shelf has two connections to each controller in the HA pair.

This cabling section describes how to cable the NS224 shelf to the following storage systems:

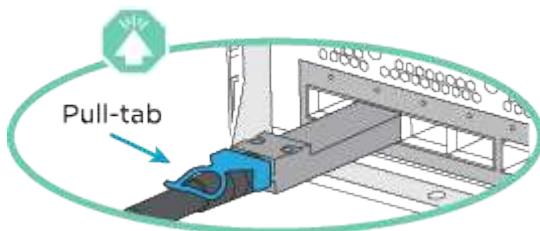
- [Cable to AFF systems](#)
- [Cable to ASA systems](#)
- [Cable to EOA systems](#)

About this task

- This procedure applies to direct-attached storage only. To view instructions for switch-attached storage, view our [switch-attached cabling guide](#).
- Familiarize yourself with proper cable connector orientation, and the location and labeling of ports on the NS224 NSM100 shelf modules.
 - Cables are inserted with the connector pull-tab facing up.

When a cable is inserted correctly, it clicks into place.

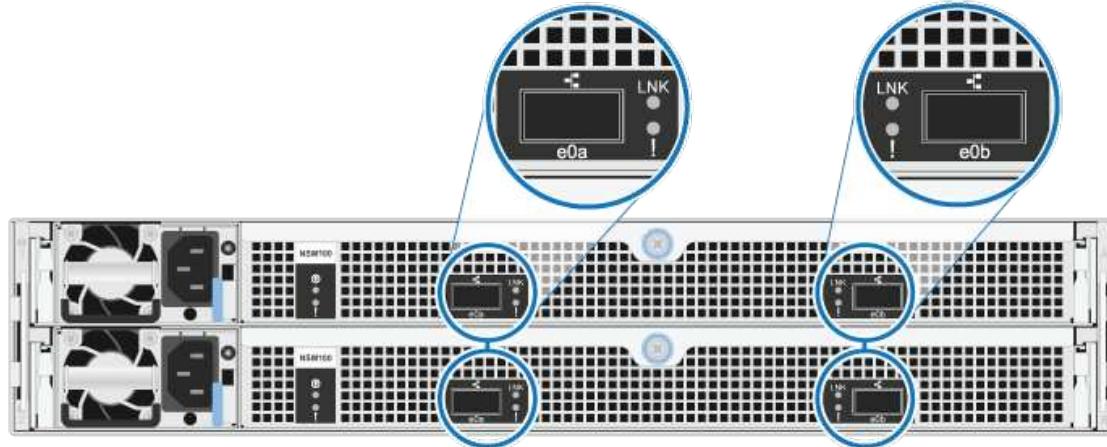
After you connect both ends of the cable, the shelf and controller port LNK (green) LEDs illuminate. If a port LNK LED does not illuminate, reseat the cable.



- You can use the following illustration to help you physically identify the shelf NSM100 ports, e0a and e0b.

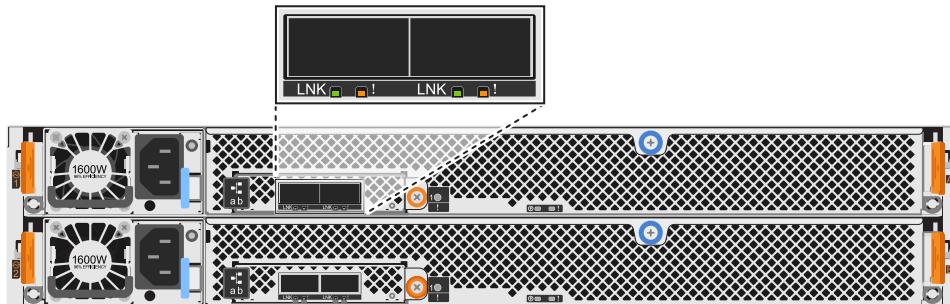
NSM100 modules

- An NS224 shelf contains two NSM100 modules. The top module goes in slot A (NSM A) and the bottom module goes in slot B (NSM B).
- Each NSM100 module includes 2 x 100GbE QSFP28 ports: e0a and e0b.



NSM100B modules

- An NS224 shelf contains two NSM100B modules. The top module goes in slot A (NSM A) and the bottom module goes in slot B (NSM B).
- Each NSM100B module includes 2 x 100GbE CX6/DX ports: e1a and e1b.



- After you have cabled a hot-added shelf, ONTAP recognizes the shelf:
 - Drive ownership is assigned if automatic drive assignment is enabled.
 - NSM shelf firmware and drive firmware should be updated automatically, if needed.



Firmware updates can take up to 30 minutes.

Cable shelf to AFF systems - NS224 shelves

You cable each NS224 shelf you are hot-adding so that each shelf has two connections to each controller in the HA pair.

About this task

Your hardware system may be compatible with both NS224 shelves with NSM100 modules and NS224 shelves with NSM100B modules. To check the compatibility and port names for your hardware and shelves, consult the [NetApp Hardware Universe](#).

Cable shelf to AFF A1K

You can hot-add up to three additional NS224 shelves (for a total of four shelves) to an AFF A1K HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has at least one existing NS224 shelf.
- This procedure addresses the following hot-add scenarios:
 - Hot-adding a second shelf to an HA pair with two RoCE-capable I/O modules in each controller. (You have installed a second I/O module and recabled the first shelf to both I/O modules or already had the first shelf cabled to two I/O modules. You will cable the second shelf to both I/O modules).
 - Hot-adding a third shelf to an HA pair with three RoCE-capable I/O modules in each controller. (You have installed a third I/O module and will cable the third shelf to only the third I/O module).
 - Hot-adding a third shelf to an HA pair with four RoCE-capable I/O modules in each controller. (You have installed a third and fourth I/O module and will cable the third shelf to the third and fourth I/O modules).
 - Hot-adding a fourth shelf to an HA pair with four RoCE-capable I/O modules in each controller. (You have installed a fourth I/O module and recabled the third shelf to the third and fourth I/O modules or already had the third shelf cabled to the third and fourth I/O modules. You will cable the fourth shelf to both the third and fourth I/O module).

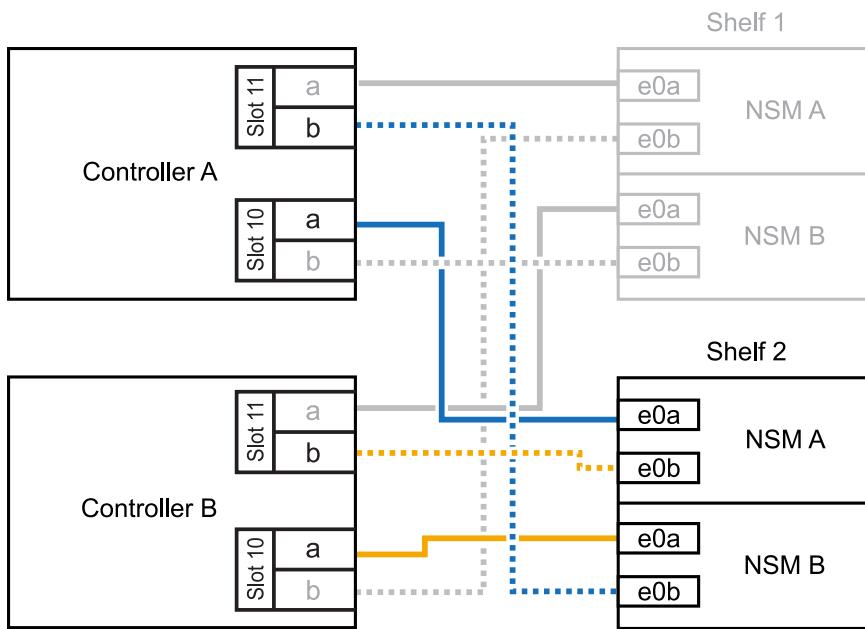
Steps

1. If the NS224 shelf you are hot-adding will be the second NS224 shelf in the HA pair, complete the following substeps.

Otherwise, go to the next step.

- a. Cable shelf NSM A port e0a to controller A slot 10 port a (e10a).
- b. Cable shelf NSM A port e0b to controller B slot 11 port b (e11b).
- c. Cable shelf NSM B port e0a to controller B slot 10 port a (e10a).
- d. Cable shelf NSM B port e0b to controller A slot 11 port b (e11b).

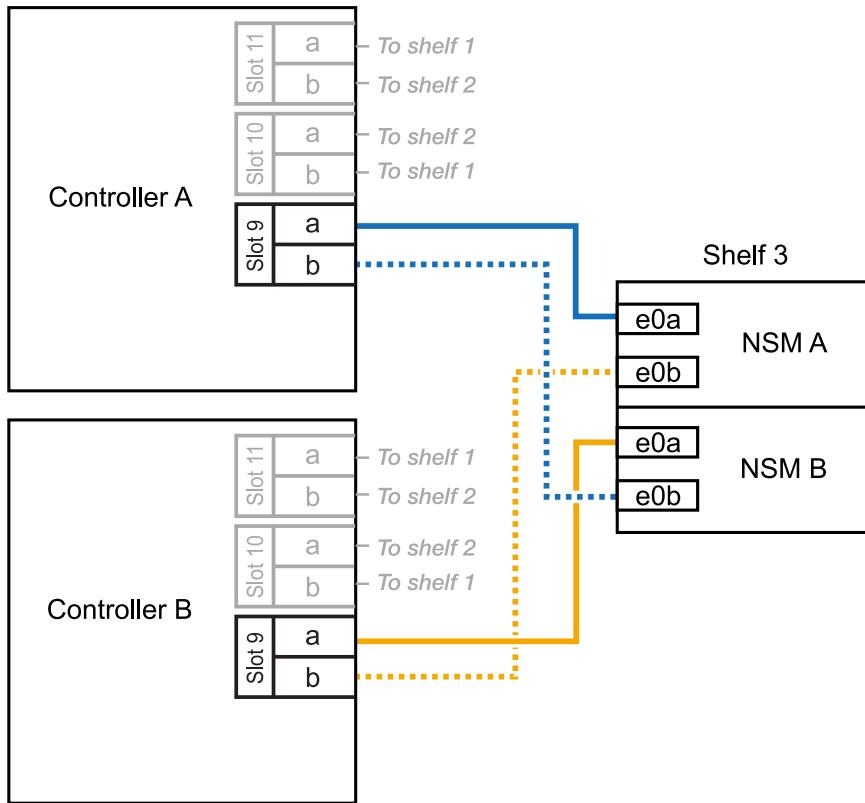
The following illustration highlights the cabling for the second shelf in the HA pair with two RoCE-capable I/O modules in each controller:



2. If the NS224 shelf you are hot-adding will be the third NS224 shelf in the HA pair with three RoCE-capable I/O modules in each controller, complete the following substeps. Otherwise, go to the next step.

- Cable shelf NSM A port e0a to controller A slot 9 port a (e9a).
- Cable shelf NSM A port e0b to controller B slot 9 port b (e9b).
- Cable shelf NSM B port e0a to controller B slot 9 port a (e9a).
- Cable shelf NSM B port e0b to controller A slot 9 port b (e9b).

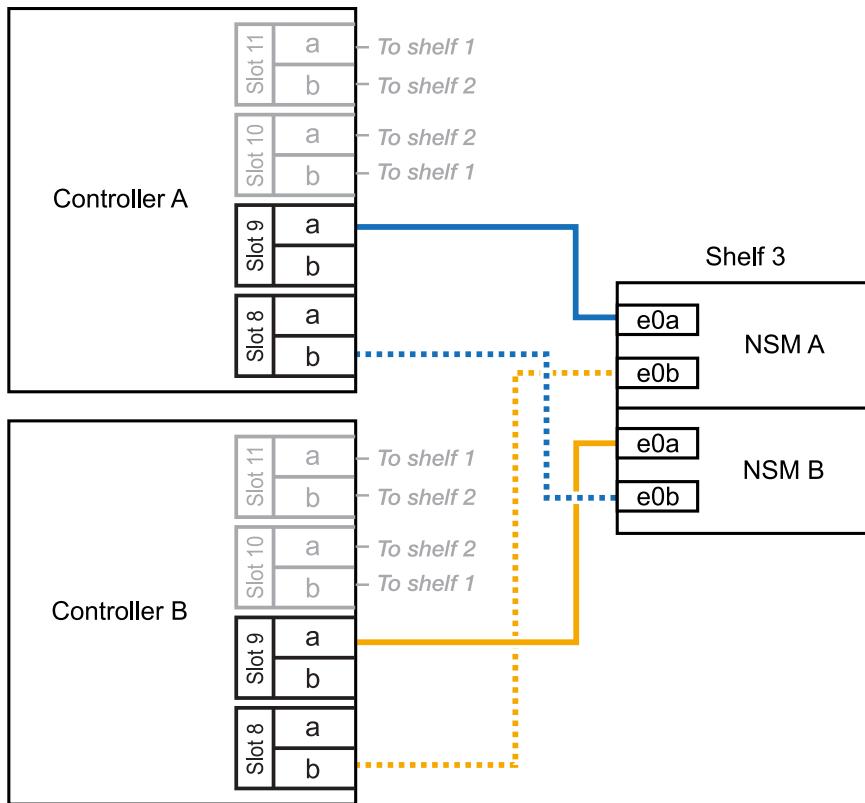
The following illustration highlights the cabling for the third shelf in the HA pair with three RoCE-capable I/O modules in each controller:



3. If the NS224 shelf you are hot-adding will be the third NS224 shelf in the HA pair with four RoCE-capable I/O modules in each controller, complete the following substeps. Otherwise, go to the next step.

- Cable shelf NSM A port e0a to controller A slot 9 port a (e9a).
- Cable shelf NSM A port e0b to controller B slot 8 port b (e8b).
- Cable shelf NSM B port e0a to controller B slot 9 port a (e9a).
- Cable shelf NSM B port e0b to controller A slot 8 port b (e8b).

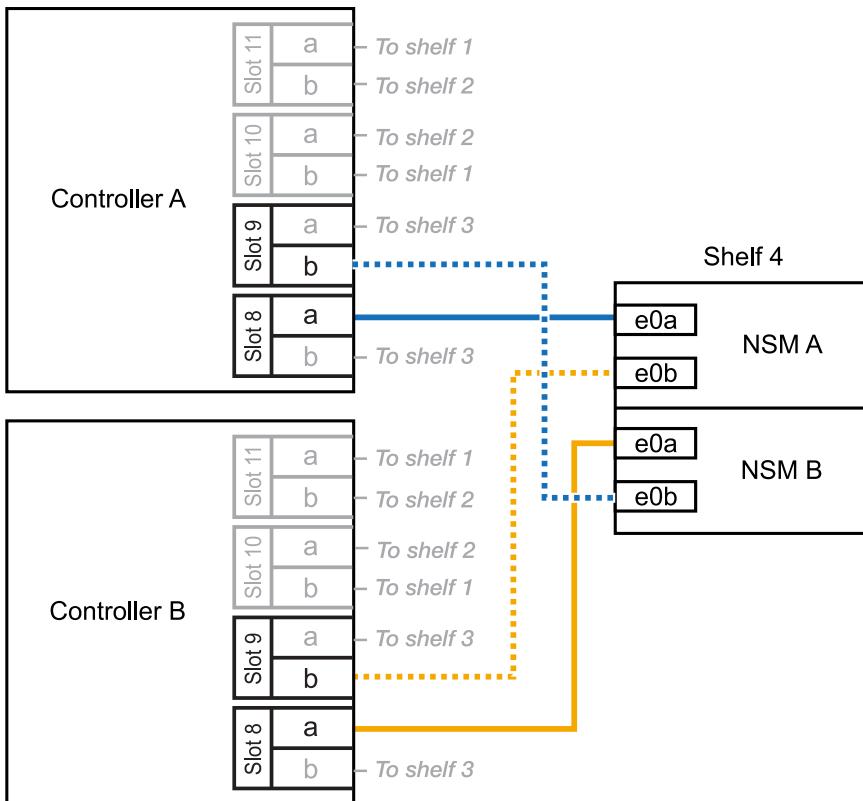
The following illustration highlights the cabling for the third shelf in the HA pair with four RoCE-capable I/O modules in each controller:



4. If the NS224 shelf you are hot-adding will be the fourth NS224 shelf in the HA pair with four RoCE-capable I/O modules in each controller, complete the following substeps.

- Cable shelf NSM A port e0a to controller A slot 8 port a (e8a).
- Cable shelf NSM A port e0b to controller B slot 9 port b (e9b).
- Cable shelf NSM B port e0a to controller B slot 8 port a (e8a).
- Cable shelf NSM B port e0b to controller A slot 9 port b (e9b).

The following illustration highlights the cabling for the fourth shelf in the HA pair with four RoCE-capable I/O modules in each controller:



5. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to AFF A20

You can hot-add one NS224 shelf to an AFF A20 HA pair when additional storage (to the internal shelf) is needed.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has only internal storage (no external shelves) and that you are hot-adding up to one additional shelf.
- This procedure addresses the following hot-add scenarios:
 - Hot-adding the first shelf to an HA pair with one RoCE-capable I/O module in each controller.
 - Hot-adding the first shelf to an HA pair with two RoCE-capable I/O modules in each controller.
- These systems are compatible with both NS224 shelves with NSM100 modules and NS224 shelves with NSM100B modules. To ensure you cable your controllers to the correct ports, replace the "X" in each diagram with the correct port number for your module:

Module type	Port labeling
NSM100	"0" ex. e0a
NSM100B	"1" ex. e1a

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE-capable I/O module) in each controller module, and this is the only NS224 shelf in your HA pair, complete the following substeps.

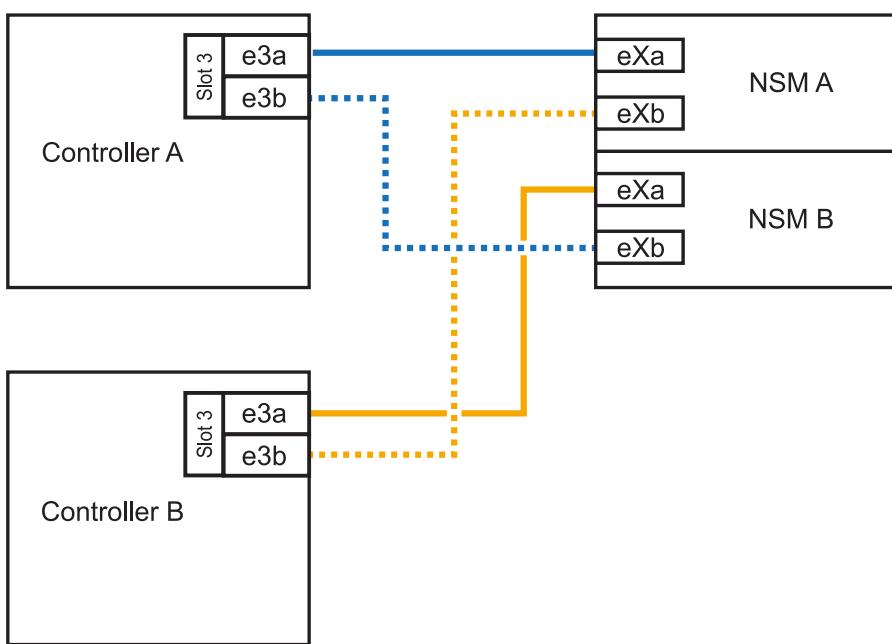
Otherwise, go to the next step.



This step assumes you installed the RoCE-capable I/O module in slot 3.

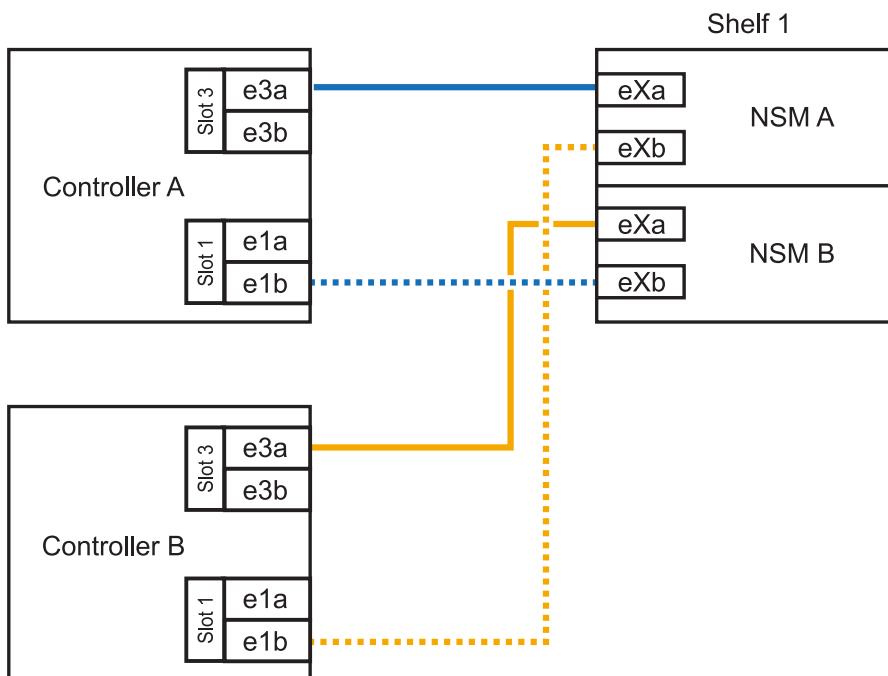
- a. Cable shelf NSM A port eXa to controller A slot 3 port a (e3a).
- b. Cable shelf NSM A port eXb to controller B slot 3 port b (e3b).
- c. Cable shelf NSM B port eXa to controller B slot 3 port a (e3a).
- d. Cable shelf NSM B port eXb to controller A slot 3 port b (e3b).

The following illustration shows cabling for one hot-added shelf using one RoCE-capable I/O module in each controller module:



2. If you are hot-adding one shelf using two sets of RoCE-capable ports (two RoCE-capable I/O modules) in each controller module, complete the following substeps.
 - a. Cable NSM A port eXa to controller A slot 3 port a (e3a).
 - b. Cable NSM A port eXb to controller B slot 1 port b (e1b).
 - c. Cable NSM B port eXa to controller B slot 3 port a (e3a).
 - d. Cable NSM B port eXb to controller A slot 1 port b (e1b).

The following illustration shows cabling for one hot-added shelf using two RoCE-capable I/O modules in each controller module:



1. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to AFF A30, AFF A50, AFF C30, or AFF C60

You can hot-add up to two NS224 shelves to an AFF A30, AFF C30, AFF A50, or AFF C60 HA pair when additional storage (to the internal shelf) is needed.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has only internal storage (no external shelves) and that you are Hot-adding up to two additional shelves and two RoCE-capable I/O modules in each controller.
- This procedure addresses the following hot-add scenarios:
 - Hot-adding the first shelf to an HA pair with one RoCE-capable I/O module in each controller.
 - Hot-adding the first shelf to an HA pair with two RoCE-capable I/O modules in each controller.
 - Hot- adding the second shelf to an HA pair with two RoCE-capable I/O modules in each controller.
- These systems are compatible with both NS224 shelves with NSM100 modules and NS224 shelves with NSM100B modules. To ensure you cable your controllers to the correct ports, replace the "X" in each diagram with the correct port number for your module:

Module type	Port labeling
NSM100	"0" ex. e0a
NSM100B	"1" ex. e1a

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE-capable I/O module) in each controller module, and this is the only NS224 shelf in your HA pair, complete the following substeps.

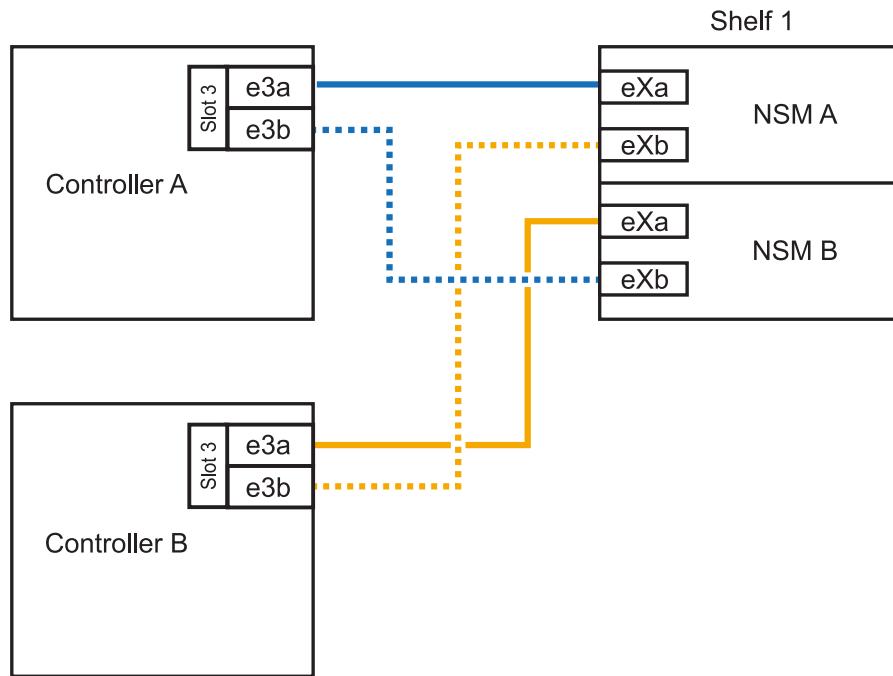
Otherwise, go to the next step.



This step assumes you installed the RoCE-capable I/O module in slot 3.

- a. Cable shelf NSM A port eXa to controller A slot 3 port a (e3a).
- b. Cable shelf NSM A port eXb to controller B slot 3 port b (e3b).
- c. Cable shelf NSM B port eXa to controller B slot 3 port a (e3a).
- d. Cable shelf NSM B port eXb to controller A slot 3 port b (e3b).

The following illustration shows cabling for one hot-added shelf using one RoCE-capable I/O module in each controller module:



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (two RoCE-capable I/O modules) in each controller module, complete the applicable substeps.



This step assumes you installed the RoCE-capable I/O modules in slots 3 and 1.

Shelves	Cabling
Shelf 1	<p>a. Cable NSM A port eXa to controller A slot 3 port a (e3a).</p> <p>b. Cable NSM A port eXb to controller B slot 1 port b (e1b).</p> <p>c. Cable NSM B port eXa to controller B slot 3 port a (e3a).</p> <p>d. Cable NSM B port eXb to controller A slot 1 port b (e1b).</p> <p>e. If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.</p> <p>The following illustration shows cabling for one hot-added shelf using two RoCE-capable I/O modules in each controller module:</p> <pre> graph LR subgraph Shelf1 [Shelf 1] subgraph ControllerA [Controller A] direction TB S3A[Slot 3] --- e3aA[e3a] S3A --- e3bA[e3b] S1A[Slot 1] --- e1aA[e1a] S1A --- e1bA[e1b] end subgraph ControllerB [Controller B] direction TB S3B[Slot 3] --- e3aB[e3a] S3B --- e3bB[e3b] S1B[Slot 1] --- e1aB[e1a] S1B --- e1bB[e1b] end subgraph NSM [NSM] direction TB NSMA[NSM A] --- eXA[eXA] NSMA --- eXB[eXB] NSMB[NSM B] --- eXA[eXA] NSMB --- eXB[eXB] end end e3aA --- eXA e3bA --- eXB e1aA --- eXB e1bA --- eXA e3aB --- eXA e3bB --- eXB e1aB --- eXB e1bB --- eXA </pre>

Shelves	Cabling
Shelf 2	<ol style="list-style-type: none"> Cable NSM A port eXa to controller A slot 1 port a (e1a). Cable NSM A port eXb to controller B slot 3 port b (e3b). Cable NSM B port eXa to controller B slot 1 port a (e1a). Cable NSM B port eXb to controller A slot 3 port b (e3b). Go to the next step. <p>The following illustration shows cabling for two hot-added shelf using two RoCE-capable I/O modules in each controller module:</p> <pre> graph TD subgraph Shelf1 [Shelf 1] CA[Controller A] NSMA[NSM A] NSMB[NSM B] end subgraph Shelf2 [Shelf 2] CB[Controller B] NSMA2[NSM A] NSMB2[NSM B] end CA -- "e1a, e1b" --> NSMA CA -- "e1a, e1b" --> NSMB CB -- "e3a, e3b" --> NSMA2 CB -- "e3a, e3b" --> NSMB2 </pre>

3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to AFF A70, AFF A90 or AFF C80

You can hot-add up to two NS224 shelves to an AFF A70, AFF A90 or AFF C80 HA pair when additional storage (to the internal shelf) is needed.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has only internal storage (no external shelves) and that you are hot-adding up to two additional shelves and two RoCE-capable I/O modules in each controller.
- This procedure addresses the following hot-add scenarios:
 - Hot-adding the first shelf to an HA pair with one RoCE-capable I/O module in each controller.
 - Hot-adding the first shelf to an HA pair with two RoCE-capable I/O modules in each controller.
 - Hot- adding the second shelf to an HA pair with two RoCE-capable I/O modules in each controller.

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE-capable I/O module) in each controller module, and this is the only NS224 shelf in your HA pair, complete the following substeps.

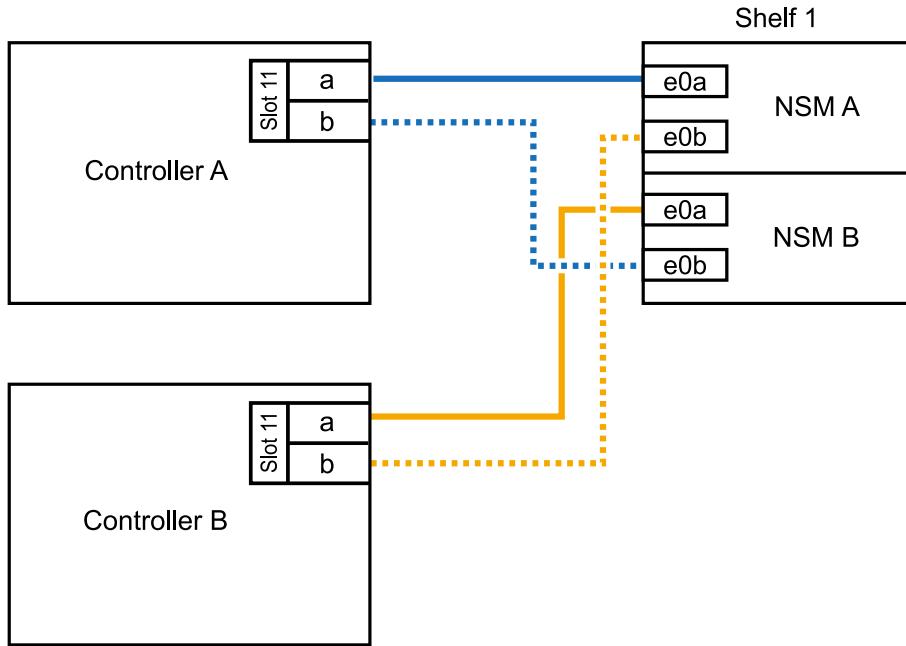
Otherwise, go to the next step.



This step assumes you installed the RoCE-capable I/O module in slot 11.

- a. Cable shelf NSM A port e0a to controller A slot 11 port a (e11a).
- b. Cable shelf NSM A port e0b to controller B slot 11 port b (e11b).
- c. Cable shelf NSM B port e0a to controller B slot 11 port a (e11a).
- d. Cable shelf NSM B port e0b to controller A slot 11 port b (e11b).

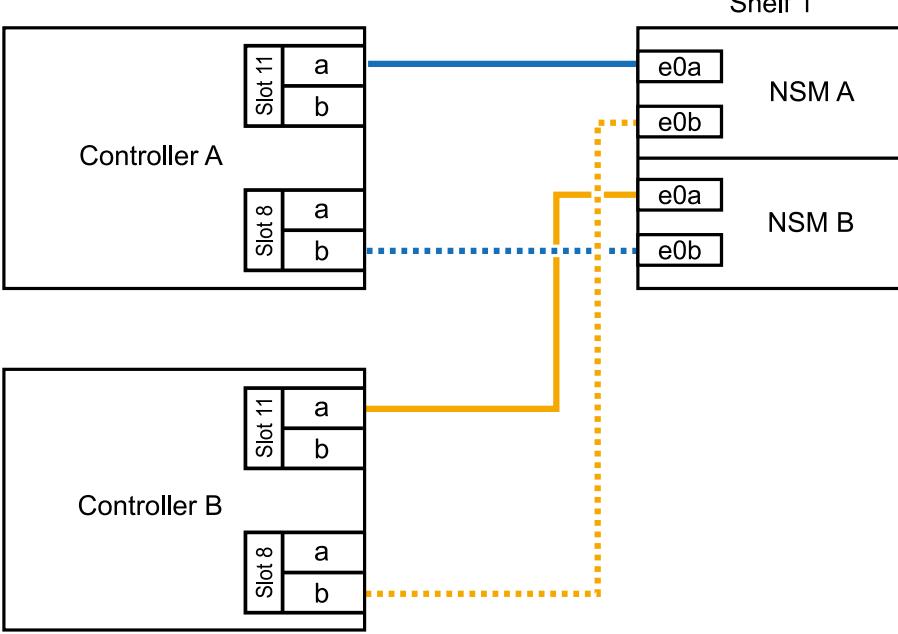
The following illustration shows cabling for one hot-added shelf using one RoCE-capable I/O module in each controller module:



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (two RoCE-capable I/O modules) in each controller module, complete the applicable substeps.



This step assumes you installed the RoCE-capable I/O modules in slots 11 and 8.

Shelves	Cabling
Shelf 1	<ol style="list-style-type: none"> a. Cable NSM A port e0a to controller A slot 11 port a (e11a). b. Cable NSM A port e0b to controller B slot 8 port b (e8b). c. Cable NSM B port e0a to controller B slot 11 port a (e11a). d. Cable NSM B port e0b to controller A slot 8 port b (e8b). e. If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step. <p>The following illustration shows cabling for one hot-added shelf using two RoCE-capable I/O modules in each controller module:</p>  <pre> graph LR subgraph ControllerA [Controller A] S11a[Slot 11 a] S11b[Slot 11 b] S8a[Slot 8 a] S8b[Slot 8 b] end subgraph ControllerB [Controller B] S11a[Slot 11 a] S11b[Slot 11 b] S8a[Slot 8 a] S8b[Slot 8 b] end subgraph NSM_A [NSM A] e0a1[e0a] e0b1[e0b] end subgraph NSM_B [NSM B] e0a2[e0a] e0b2[e0b] end S11a --> e0a1 S8b --> e0b2 S11a --> e0a2 S8b --> e0b1 </pre>

Shelves	Cabling
Shelf 2	<p>a. Cable NSM A port e0a to controller A slot 8 port a (e8a).</p> <p>b. Cable NSM A port e0b to controller B slot 11 port b (e11b).</p> <p>c. Cable NSM B port e0a to controller B slot 8 port a (e8a).</p> <p>d. Cable NSM B port e0b to controller A slot 11 port b (e11b).</p> <p>e. Go to the next step.</p> <p>The following illustration shows cabling for two hot-added shelf using two RoCE-capable I/O modules in each controller module:</p>

3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to AFF A250 or AFF C250

When additional storage is needed, you can hot-add a maximum of one NS224 shelf to an AFF A250 or AFF C250 HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

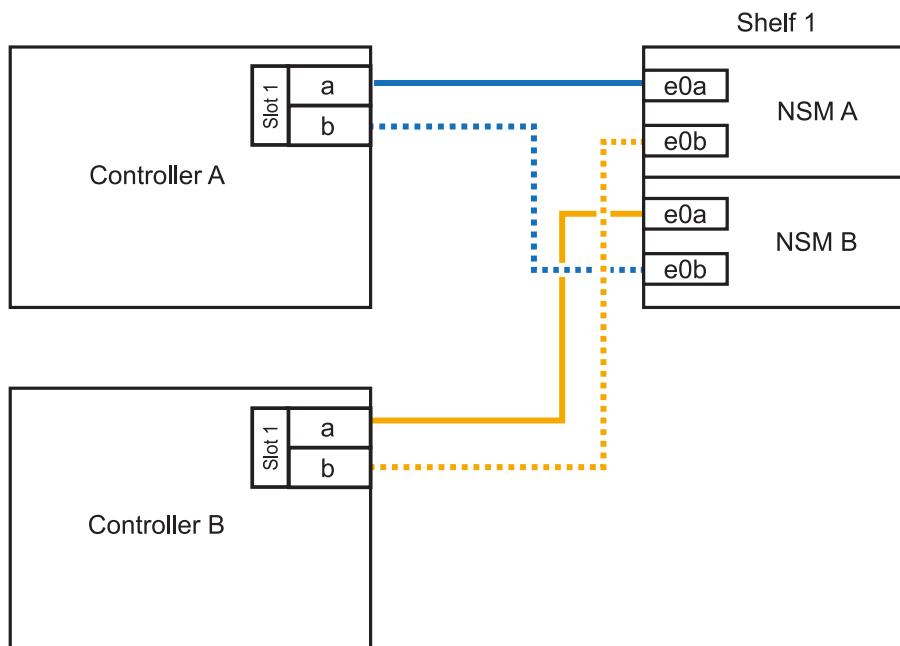
About this task

When viewed from the rear of the platform chassis, the RoCE-capable card port on the left is port "a" (e1a) and the port on the right is port "b" (e1b).

Steps

1. Cable the shelf connections:
 - a. Cable shelf NSM A port e0a to controller A slot 1 port a (e1a).
 - b. Cable shelf NSM A port e0b to controller B slot 1 port b (e1b).
 - c. Cable shelf NSM B port e0a to controller B slot 1 port a (e1a).
 - d. Cable shelf NSM B port e0b to controller A slot 1 port b (e1b).

The following illustration shows the shelf cabling when completed.



2. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to AFF A400 or AFF C400

How you cable an NS224 shelf for a hot-add depends on whether you have an AFF A400 or AFF C400 HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

Cable shelf to an AFF A400 HA pair

For an AFF A400 HA pair, you can hot-add up to two shelves and use onboard ports e0c/e0d and ports in slot 5 as needed.

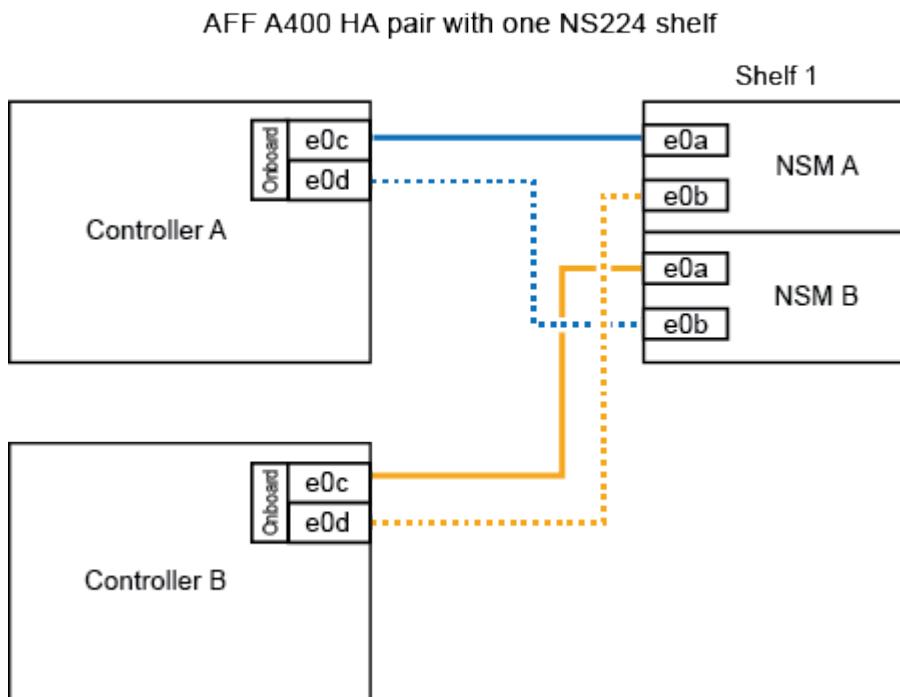
Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (onboard RoCE-capable ports) on each controller, and this is the only NS224 shelf in your HA pair, complete the following substeps.

Otherwise, go to the next step.

- a. Cable shelf NSM A port e0a to controller A port e0c.
- b. Cable shelf NSM A port e0b to controller B port e0d.
- c. Cable shelf NSM B port e0a to controller B port e0c.
- d. Cable shelf NSM B port e0b to controller A port e0d.

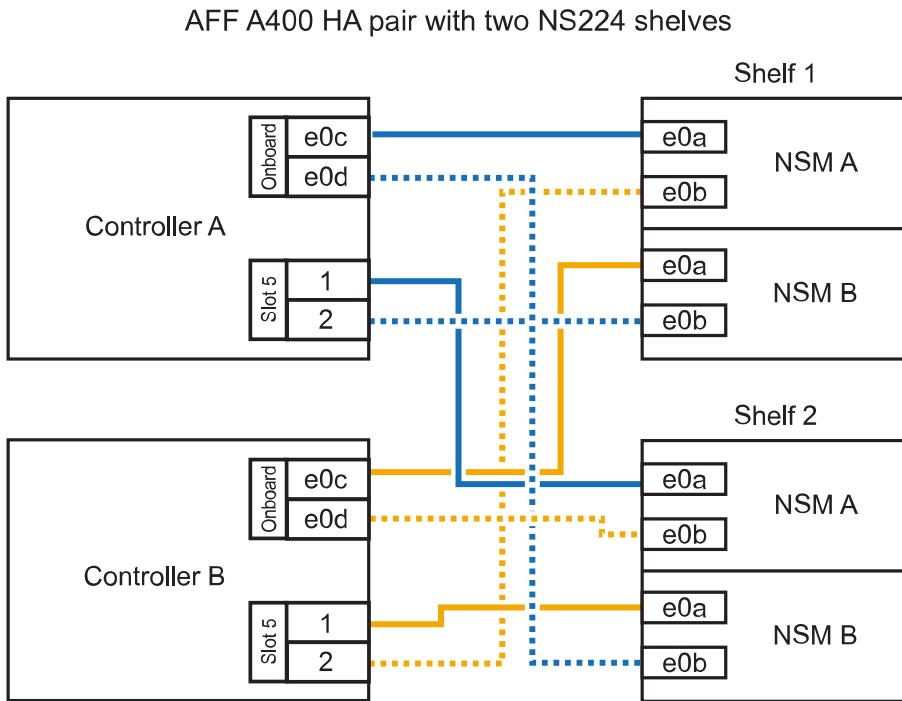
The following illustration shows cabling for one hot-added shelf using one set of RoCE-capable ports on each controller:



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (on board and PCIe card RoCE-capable ports) on each controller, complete the following substeps.

Shelves	Cabling
Shelf 1	<ol style="list-style-type: none"> Cable NSM A port e0a to controller A port e0c. Cable NSM A port e0b to controller B slot 5 port 2 (e5b). Cable NSM B port e0a to controller B port e0c. Cable NSM B port e0b to controller A slot 5 port 2 (e5b). If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.
Shelf 2	<ol style="list-style-type: none"> Cable NSM A port e0a to controller A slot 5 port 1 (e5a). Cable NSM A port e0b to controller B port e0d. Cable NSM B port e0a to controller B slot 5 port 1 (e5a). Cable NSM B port e0b to controller A port e0d. Go to the next step.

The following illustration shows cabling for two hot-added shelves:



3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

4. If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then re enable automatic drive assignment, if needed. See [Complete the hot-add](#).

Otherwise, you are done with this procedure.

Cable shelf to an AFF C400 HA pair

For an AFF C400 HA pair, you can hot-add up to two shelves and use ports in slot 4 and 5 as needed.

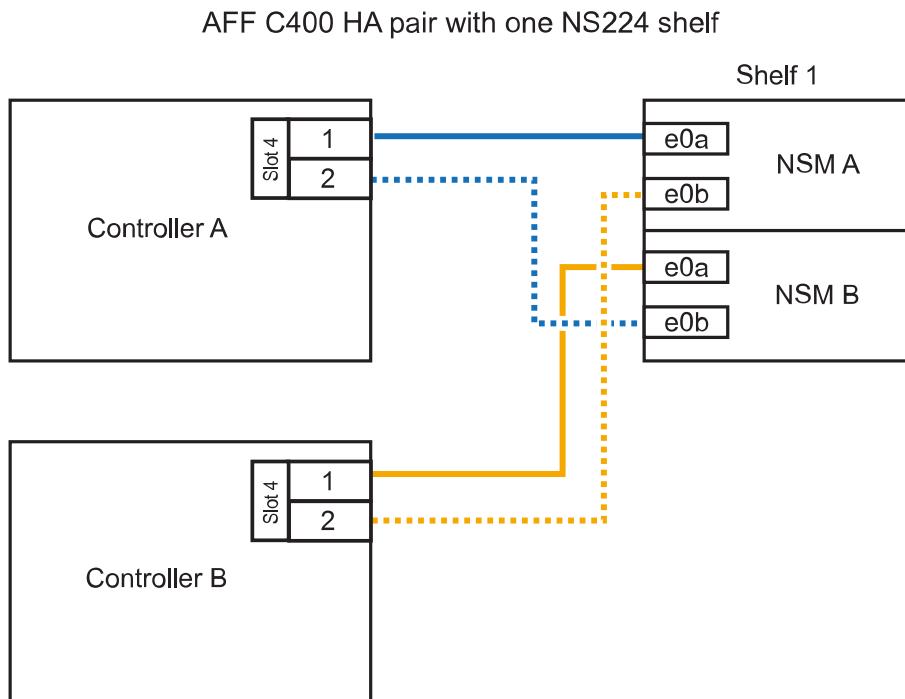
Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports on each controller, and this is the only NS224 shelf in your HA pair, complete the following substeps.

Otherwise, go to the next step.

- a. Cable shelf NSM A port e0a to controller A slot 4 port 1 (e4a).
- b. Cable shelf NSM A port e0b to controller B slot 4 port 2 (e4b).
- c. Cable shelf NSM B port e0a to controller B slot 4 port 1 (e4a).
- d. Cable shelf NSM B port e0b to controller A slot 4 port 2 (e4b).

The following illustration shows cabling for one hot-added shelf using one set of RoCE-capable ports on each controller:

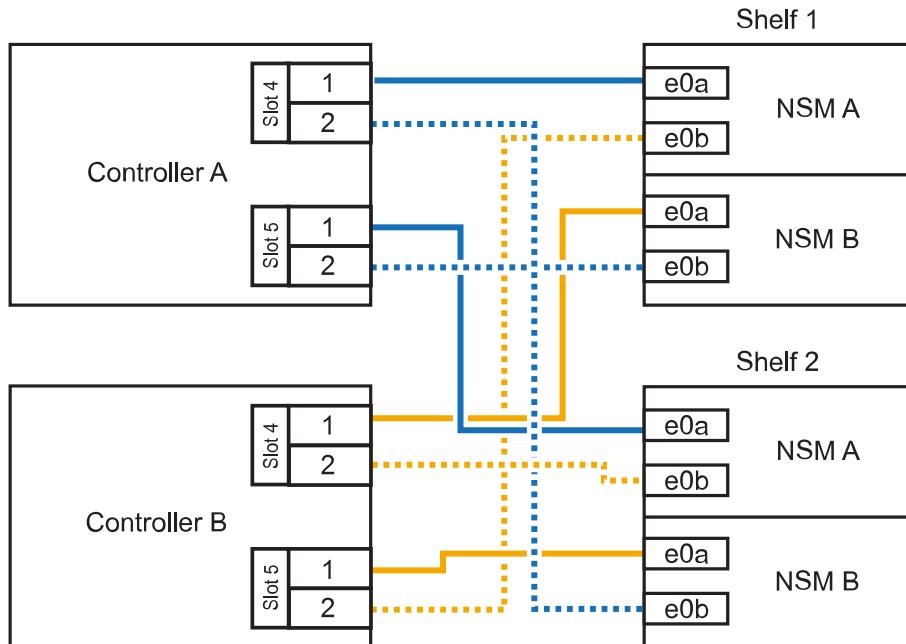


2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports on each controller, complete the following substeps.

Shelves	Cabling
Shelf 1	<ul style="list-style-type: none"> a. Cable NSM A port e0a to controller A slot 4 port 1 (e4a). b. Cable NSM A port e0b to controller B slot 5 port 2 (e5b). c. Cable NSM B port e0a to controller B port slot 4 port 1 (e4a). d. Cable NSM B port e0b to controller A slot 5 port 2 (e5b). e. If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.
Shelf 2	<ul style="list-style-type: none"> a. Cable NSM A port e0a to controller A slot 5 port 1 (e5a). b. Cable NSM A port e0b to controller B slot 4 port 2 (e4b). c. Cable NSM B port e0a to controller B slot 5 port 1 (e5a). d. Cable NSM B port e0b to controller A slot 4 port 2 (e4b). e. Go to the next step.

The following illustration shows cabling for two hot-added shelves:

AFF C400 HA pair with two NS224 shelves



3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to AFF A800 or AFF C800

How you cable an NS224 shelf in an AFF A800 or AFF C800 HA pair depends on the number of shelves you are hot-adding and the number of RoCE-capable port sets (one or two) you are using on the controllers.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE-capable PCIe card) on each controller, and this is the only NS224 shelf in your HA pair, complete the following substeps.

Otherwise, go to the next step.

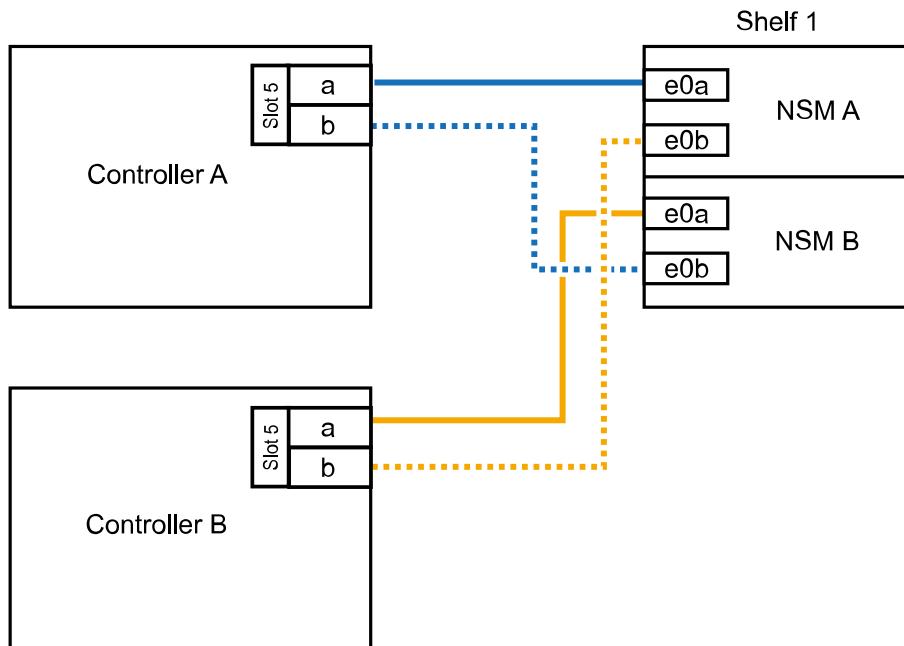


This step assumes you installed the RoCE-capable PCIe card in slot 5.

- a. Cable shelf NSM A port e0a to controller A slot 5 port a (e5a).
- b. Cable shelf NSM A port e0b to controller B slot 5 port b (e5b).
- c. Cable shelf NSM B port e0a to controller B slot 5 port a (e5a).
- d. Cable shelf NSM B port e0b to controller A slot 5 port b (e5b).

The following illustration shows cabling for one hot-added shelf using one RoCE-capable PCIe card on each controller:

AFF A800 or AFF C800 HA pair with one NS224 shelf



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (two RoCE-capable

PCIe cards) on each controller, complete the applicable substeps.

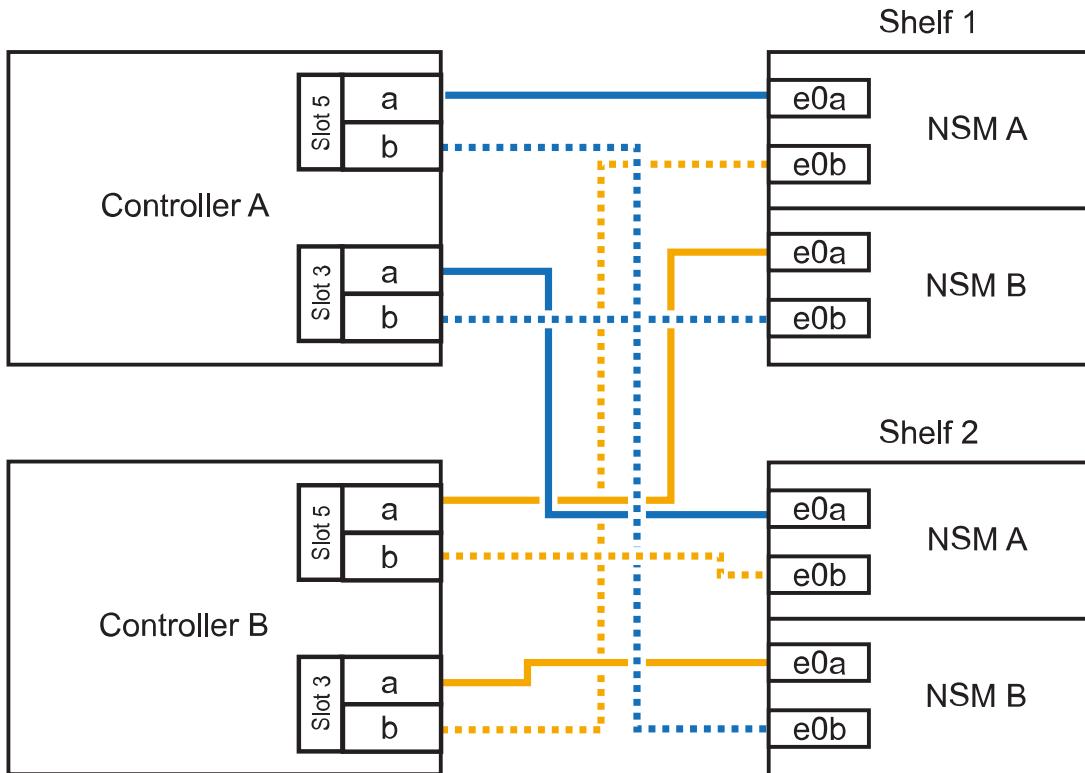


This step assumes you installed the RoCE-capable PCIe cards in slot 5 and slot 3.

Shelves	Cabling
Shelf 1	<p> These substeps assume you are beginning the cabling by cabling shelf port e0a to the RoCE-capable PCIe card in slot 5, instead of slot 3.</p> <ol style="list-style-type: none">Cable NSM A port e0a to controller A slot 5 port a (e5a).Cable NSM A port e0b to controller B slot 3 port b (e3b).Cable NSM B port e0a to controller B slot 5 port a (e5a).Cable NSM B port e0b to controller A slot 3 port b (e3b).If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.
Shelf 2	<p> These substeps assume you are beginning the cabling by cabling shelf port e0a to the RoCE-capable PCIe card in slot 3, instead of slot 5 (which correlates with the cabling substeps for shelf 1).</p> <ol style="list-style-type: none">Cable NSM A port e0a to controller A slot 3 port a (e3a).Cable NSM A port e0b to controller B slot 5 port b (e5b).Cable NSM B port e0a to controller B slot 3 port a (e3a).Cable NSM B port e0b to controller A slot 5 port b (e5b).Go to the next step.

The following illustration shows cabling for two hot-added shelves:

AFF A800 or AFF C800 HA pair with two NS224 shelves



3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to AFF A900

When additional storage is needed, you can hot-add up to three additional NS224 drive shelves (for a total of four shelves) to an AFF A900 HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has at least one existing NS224 shelf and that you are hot-adding up to three additional shelves.
- If your HA pair has only one existing NS224 shelf, this procedure assumes that the shelf is cabled across two RoCE-capable 100GbE I/O modules on each controller.

Steps

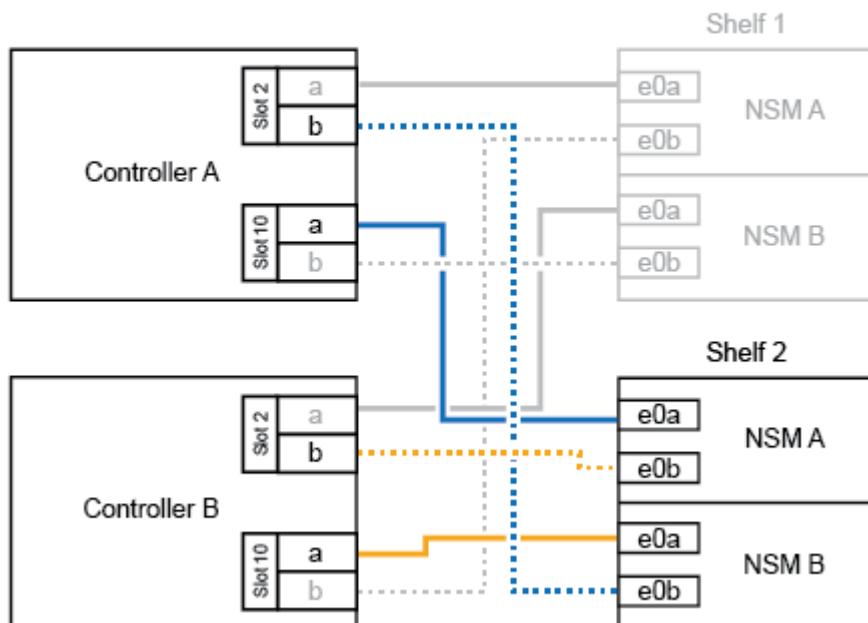
1. If the NS224 shelf you are hot-adding will be the second NS224 shelf in the HA pair, complete the following substeps.

Otherwise, go to the next step.

- a. Cable shelf NSM A port e0a to controller A slot 10 port a (e10a).
- b. Cable shelf NSM A port e0b to controller B slot 2 port b (e2b).
- c. Cable shelf NSM B port e0a to controller B slot 10 port a (e10a).
- d. Cable shelf NSM B port e0b to controller A slot 2 port b (e2b).

The following illustration shows the second shelf cabling (and the first shelf).

AFF A900 HA pair with two NS224 shelves



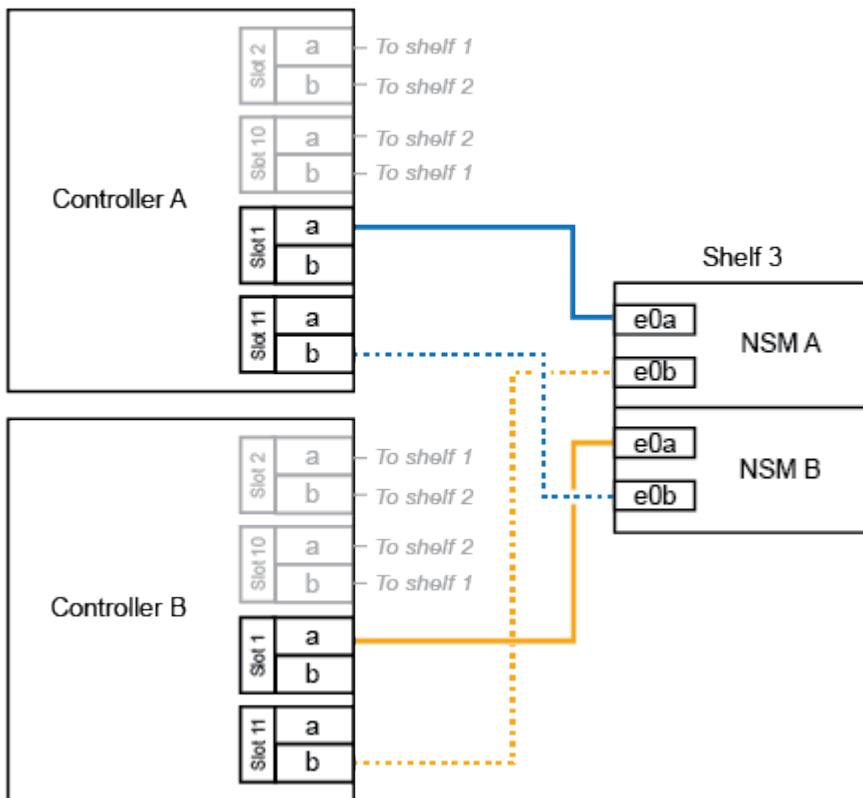
2. If the NS224 shelf you are hot-adding will be the third NS224 shelf in the HA pair, complete the following substeps.

Otherwise, go to the next step.

- Cable shelf NSM A port e0a to controller A slot 1 port a (e1a).
- Cable shelf NSM A port e0b to controller B slot 11 port b (e11b).
- Cable shelf NSM B port e0a to controller B slot 1 port a (e1a).
- Cable shelf NSM B port e0b to controller A slot 11 port b (e11b).

The following illustration shows the third shelf cabling.

AFF A900 HA pair with three NS224 shelves



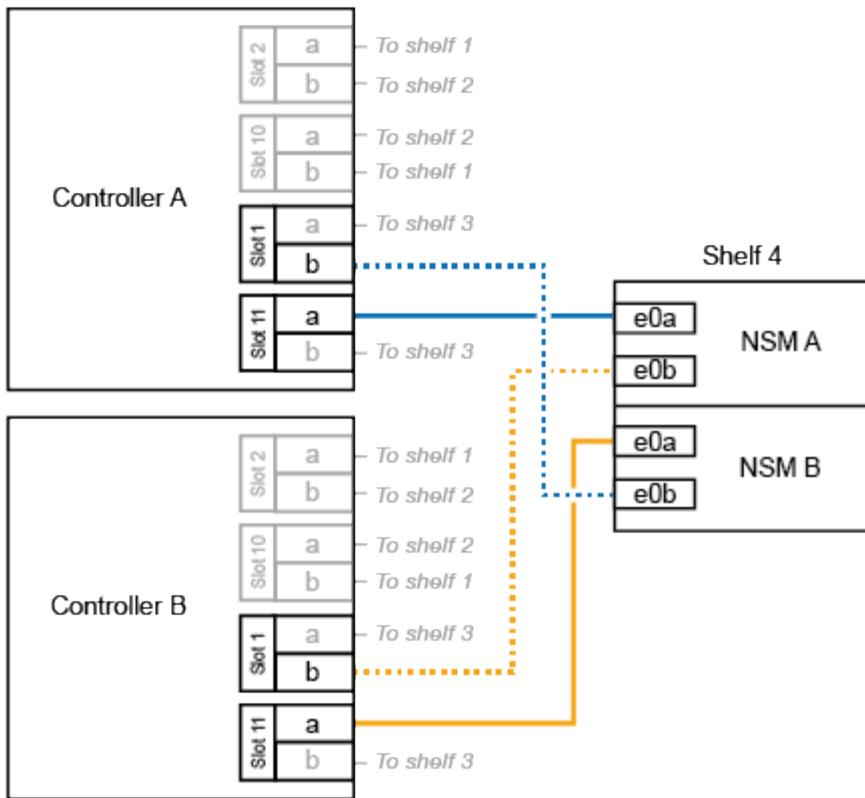
3. If the NS224 shelf you are hot-adding will be the fourth NS224 shelf in the HA pair, complete the following substeps.

Otherwise, go to the next step.

- Cable shelf NSM A port e0a to controller A slot 11 port a (e11a).
- Cable shelf NSM A port e0b to controller B slot 1 port b (e1b).
- Cable shelf NSM B port e0a to controller B slot 11 port a (e11a).
- Cable shelf NSM B port e0b to controller A slot 1 port b (e1b).

The following illustration shows the fourth shelf cabling.

AFF A900 HA pair with four NS224 shelves



4. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to ASA systems - NS224 shelves

You cable each NS224 shelf you are hot-adding so that each shelf has two connections to each controller in the HA pair.

About this task

Your hardware system may be compatible with both NS224 shelves with NSM100 modules and NS224 shelves with NSM100B modules. To check the compatibility and port names for your hardware and shelves, consult the [NetApp Hardware Universe](#).

Cable shelf to ASA A1K

You can hot-add up to three additional NS224 shelves (for a total of four shelves) to an ASA A1K HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has at least one existing NS224 shelf.
- This procedure addresses the following hot-add scenarios:
 - Hot-adding a second shelf to an HA pair with two RoCE-capable I/O modules in each controller. (You have installed a second I/O module and recabled the first shelf to both I/O modules or already had the first shelf cabled to two I/O modules. You will cable the second shelf to both I/O modules).
 - Hot-adding a third shelf to an HA pair with three RoCE-capable I/O modules in each controller. (You have installed a third I/O module and will cable the third shelf to only the third I/O module).
 - Hot-adding a third shelf to an HA pair with four RoCE-capable I/O modules in each controller. (You have installed a third and fourth I/O module and will cable the third shelf to the third and fourth I/O modules).
 - Hot-adding a fourth shelf to an HA pair with four RoCE-capable I/O modules in each controller. (You have installed a fourth I/O module and recabled the third shelf to the third and fourth I/O modules or already had the third shelf cabled to the third and fourth I/O modules. You will cable the fourth shelf to both the third and fourth I/O module).

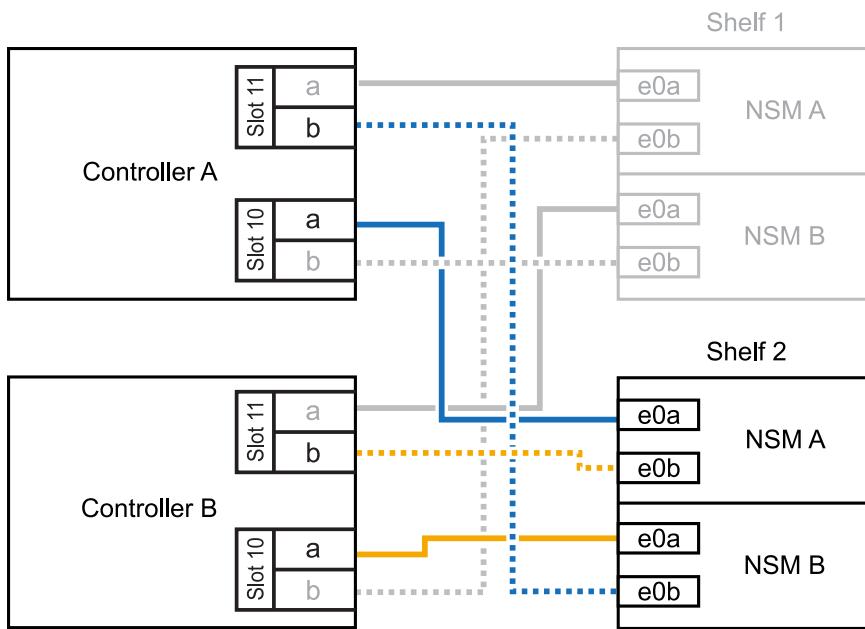
Steps

1. If the NS224 shelf you are hot-adding will be the second NS224 shelf in the HA pair, complete the following substeps.

Otherwise, go to the next step.

- a. Cable shelf NSM A port e0a to controller A slot 10 port a (e10a).
- b. Cable shelf NSM A port e0b to controller B slot 11 port b (e11b).
- c. Cable shelf NSM B port e0a to controller B slot 10 port a (e10a).
- d. Cable shelf NSM B port e0b to controller A slot 11 port b (e11b).

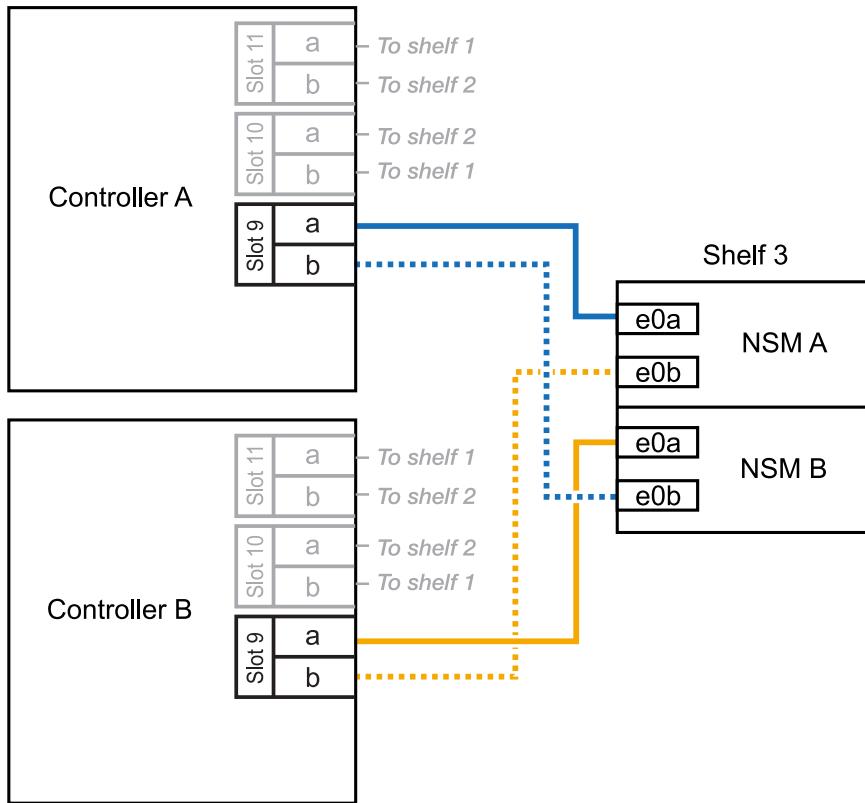
The following illustration highlights the cabling for the second shelf in the HA pair with two RoCE-capable I/O modules in each controller:



2. If the NS224 shelf you are hot-adding will be the third NS224 shelf in the HA pair with three RoCE-capable I/O modules in each controller, complete the following substeps. Otherwise, go to the next step.

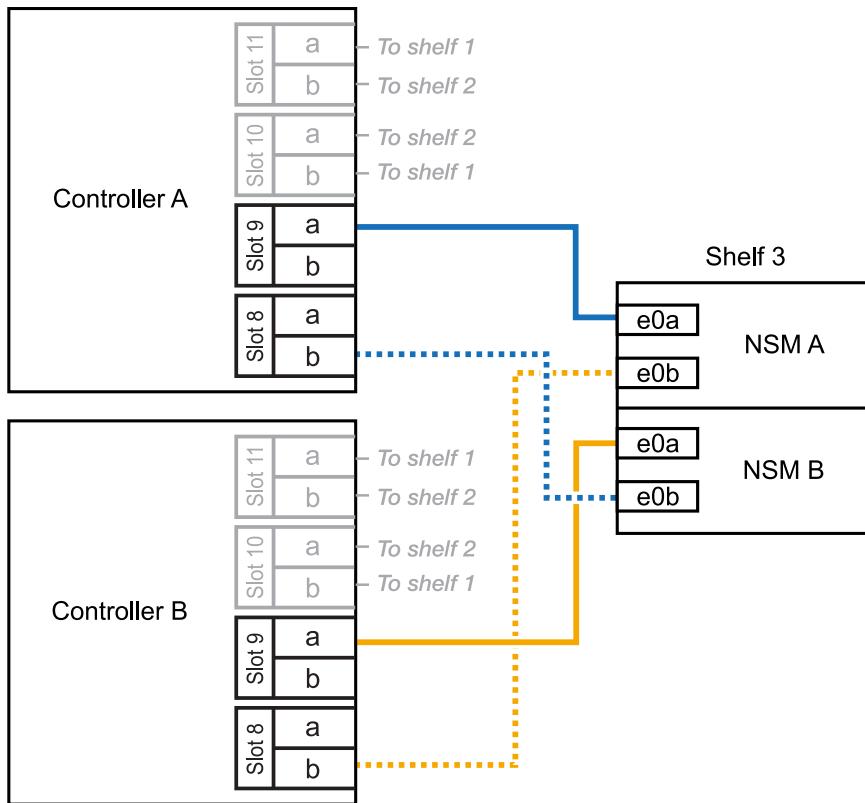
- Cable shelf NSM A port e0a to controller A slot 9 port a (e9a).
- Cable shelf NSM A port e0b to controller B slot 9 port b (e9b).
- Cable shelf NSM B port e0a to controller B slot 9 port a (e9a).
- Cable shelf NSM B port e0b to controller A slot 9 port b (e9b).

The following illustration highlights the cabling for the third shelf in the HA pair with three RoCE-capable I/O modules in each controller:



3. If the NS224 shelf you are hot-adding will be the third NS224 shelf in the HA pair with four RoCE-capable I/O modules in each controller, complete the following substeps. Otherwise, go to the next step.
 - a. Cable shelf NSM A port e0a to controller A slot 9 port a (e9a).
 - b. Cable shelf NSM A port e0b to controller B slot 8 port b (e8b).
 - c. Cable shelf NSM B port e0a to controller B slot 9 port a (e9a).
 - d. Cable shelf NSM B port e0b to controller A slot 8 port b (e8b).

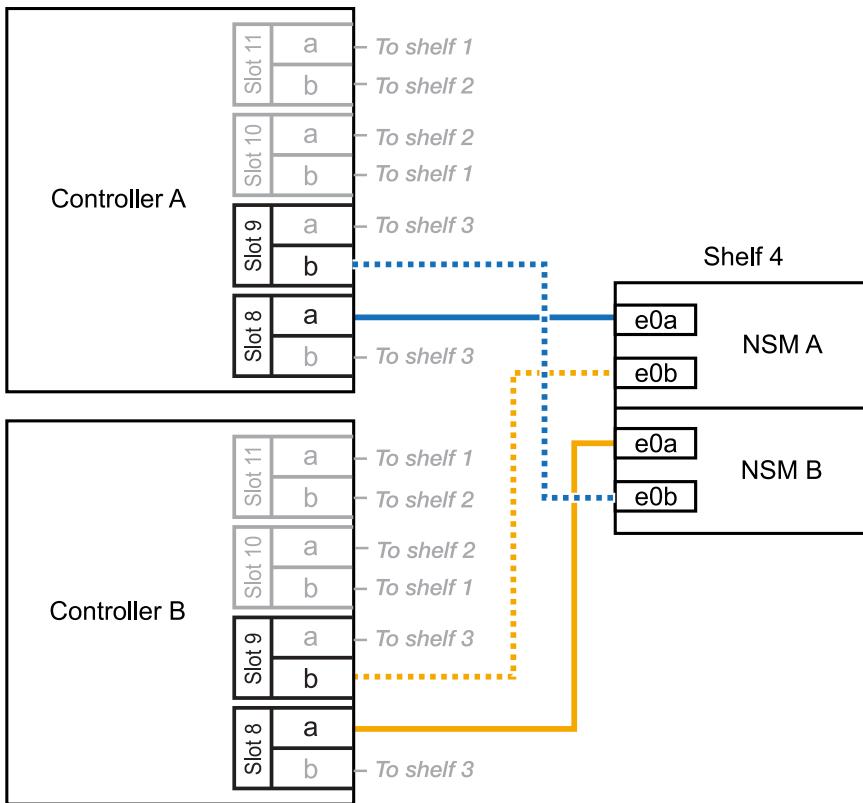
The following illustration highlights the cabling for the third shelf in the HA pair with four RoCE-capable I/O modules in each controller:



4. If the NS224 shelf you are hot-adding will be the fourth NS224 shelf in the HA pair with four RoCE-capable I/O modules in each controller, complete the following substeps.

- Cable shelf NSM A port e0a to controller A slot 8 port a (e8a).
- Cable shelf NSM A port e0b to controller B slot 9 port b (e9b).
- Cable shelf NSM B port e0a to controller B slot 8 port a (e8a).
- Cable shelf NSM B port e0b to controller A slot 9 port b (e9b).

The following illustration highlights the cabling for the fourth shelf in the HA pair with four RoCE-capable I/O modules in each controller:



5. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to ASA A20

You can hot-add a maximum of one NS224 shelf to an ASA A20 HA pair when additional storage (to the internal shelf) is needed.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has only internal storage (no external shelves) and that you are hot-adding up to one additional shelf.
- This procedure addresses the following hot-add scenarios:
 - Hot-adding the first shelf to an HA pair with one RoCE-capable I/O module in each controller.
 - Hot-adding the first shelf to an HA pair with two RoCE-capable I/O modules in each controller.
- These systems are compatible with both NS224 shelves with NSM100 modules and NS224 shelves with NSM100B modules. To ensure you cable your controllers to the correct ports, replace the "X" in each diagram with the correct port number for your module:

Module type	Port labeling
NSM100	"0" ex. e0a
NSM100B	"1" ex. e1a

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE-capable I/O module) in each controller module, and this is the only NS224 shelf in your HA pair, complete the following substeps.

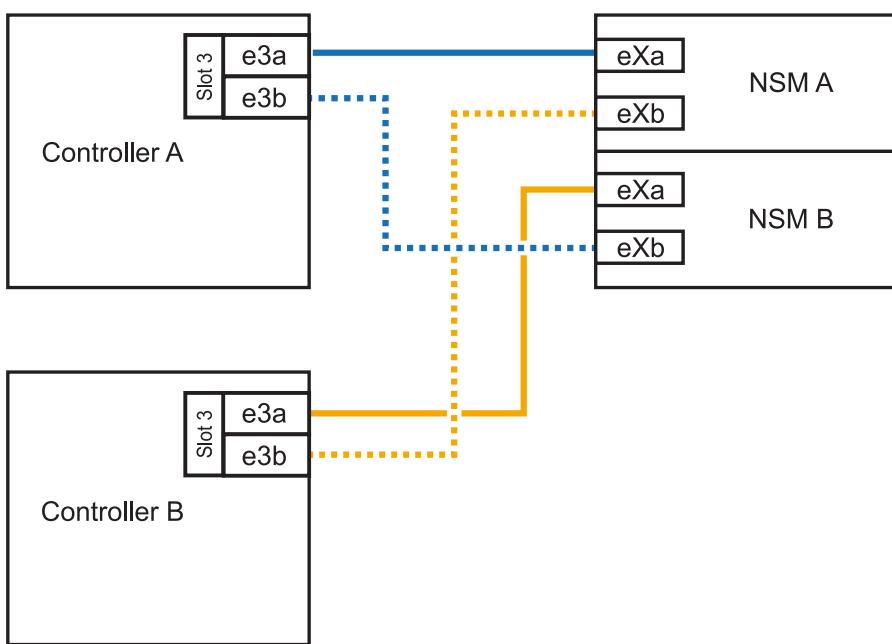
Otherwise, go to the next step.



This step assumes you installed the RoCE-capable I/O module in slot 3.

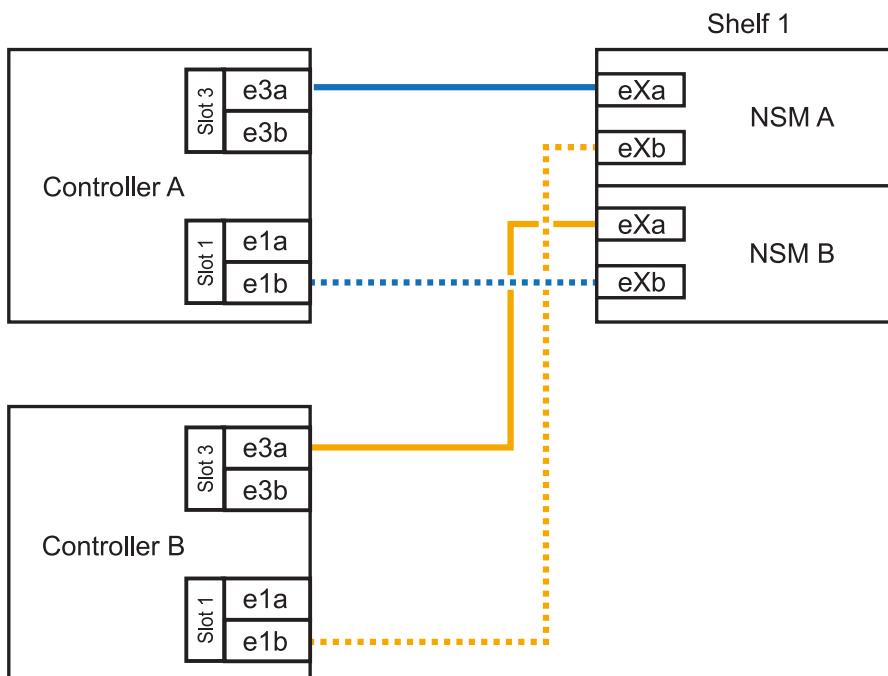
- a. Cable shelf NSM A port eXa to controller A slot 3 port a (e3a).
- b. Cable shelf NSM A port eXb to controller B slot 3 port b (e3b).
- c. Cable shelf NSM B port eXa to controller B slot 3 port a (e3a).
- d. Cable shelf NSM B port eXb to controller A slot 3 port b (e3b).

The following illustration shows cabling for one hot-added shelf using one RoCE-capable I/O module in each controller module:



2. If you are hot-adding one shelf using two sets of RoCE-capable ports (two RoCE-capable I/O modules) in each controller module, complete the following substeps.
 - a. Cable NSM A port eXa to controller A slot 3 port a (e3a).
 - b. Cable NSM A port eXb to controller B slot 1 port b (e1b).
 - c. Cable NSM B port eXa to controller B slot 3 port a (e3a).
 - d. Cable NSM B port eXb to controller A slot 1 port b (e1b).

The following illustration shows cabling for one hot-added shelf using two RoCE-capable I/O modules in each controller module:



1. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to ASA A30 or ASA A50

You can hot-add up to two NS224 shelves to an ASA A30 or A50 HA pair when additional storage (to the internal shelf) is needed.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has only internal storage (no external shelves) and that you are Hot-adding up to two additional shelves and two RoCE-capable I/O modules in each controller.
- This procedure addresses the following hot-add scenarios:
 - Hot-adding the first shelf to an HA pair with one RoCE-capable I/O module in each controller.
 - Hot-adding the first shelf to an HA pair with two RoCE-capable I/O modules in each controller.
 - Hot- adding the second shelf to an HA pair with two RoCE-capable I/O modules in each controller.
- These systems are compatible with both NS224 shelves with NSM100 modules and NS224 shelves with NSM100B modules. To ensure you cable your controllers to the correct ports, replace the "X" in each diagram with the correct port number for your module:

Module type	Port labeling
NSM100	"0" ex. e0a
NSM100B	"1" ex. e1a

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE-capable I/O module) in each controller module, and this is the only NS224 shelf in your HA pair, complete the following substeps.

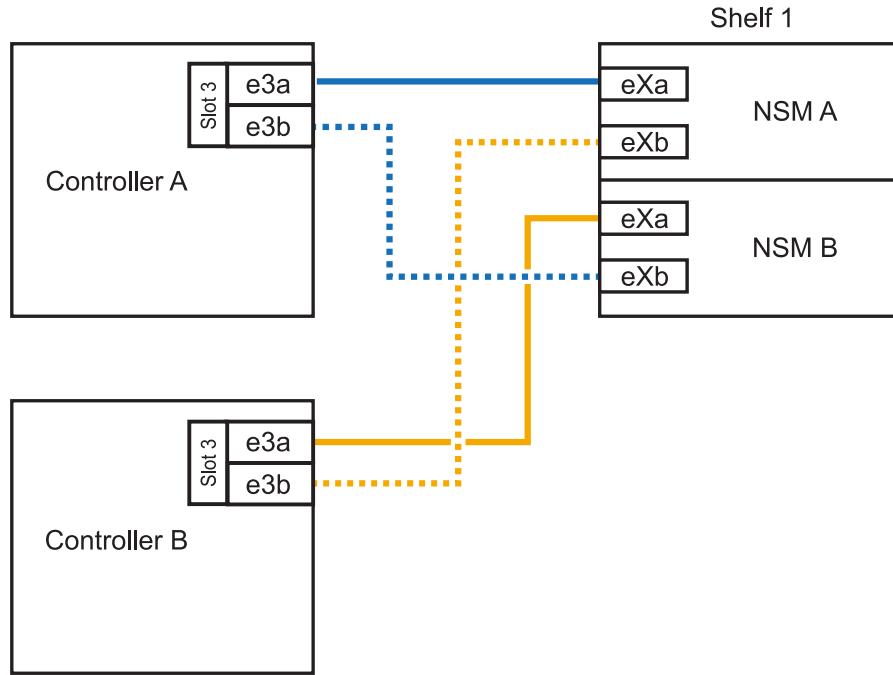
Otherwise, go to the next step.



This step assumes you installed the RoCE-capable I/O module in slot 3.

- a. Cable shelf NSM A port eXa to controller A slot 3 port a (e3a).
- b. Cable shelf NSM A port eXb to controller B slot 3 port b (e3b).
- c. Cable shelf NSM B port eXa to controller B slot 3 port a (e3a).
- d. Cable shelf NSM B port eXb to controller A slot 3 port b (e3b).

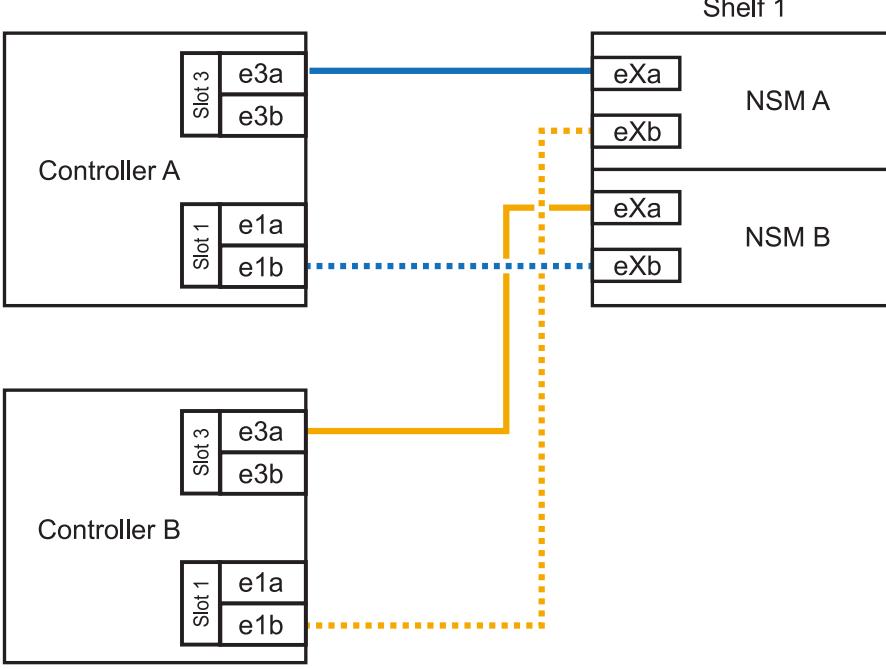
The following illustration shows cabling for one hot-added shelf using one RoCE-capable I/O module in each controller module:



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (two RoCE-capable I/O modules) in each controller module, complete the applicable substeps.



This step assumes you installed the RoCE-capable I/O modules in slots 3 and 1.

Shelves	Cabling
Shelf 1	<p>a. Cable NSM A port eXa to controller A slot 3 port a (e3a).</p> <p>b. Cable NSM A port eXb to controller B slot 1 port b (e1b).</p> <p>c. Cable NSM B port eXa to controller B slot 3 port a (e3a).</p> <p>d. Cable NSM B port eXb to controller A slot 1 port b (e1b).</p> <p>e. If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.</p> <p>The following illustration shows cabling for one hot-added shelf using two RoCE-capable I/O modules in each controller module:</p> 

Shelves	Cabling
Shelf 2	<ol style="list-style-type: none"> Cable NSM A port eXa to controller A slot 1 port a (e1a). Cable NSM A port eXb to controller B slot 3 port b (e3b). Cable NSM B port eXa to controller B slot 1 port a (e1a). Cable NSM B port eXb to controller A slot 3 port b (e3b). Go to the next step. <p>The following illustration shows cabling for two hot-added shelf using two RoCE-capable I/O modules in each controller module:</p>

3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to ASA A70 or ASA A90

You can hot-add up to two NS224 shelves to an ASA A70 or ASA A90 HA pair when additional storage (to the internal shelf) is needed.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has only internal storage (no external shelves) and that you are hot-adding up to two additional shelves and two RoCE-capable I/O modules in each controller.
- This procedure addresses the following hot-add scenarios:
 - Hot-adding the first shelf to an HA pair with one RoCE-capable I/O module in each controller.
 - Hot-adding the first shelf to an HA pair with two RoCE-capable I/O modules in each controller.
 - Hot- adding the second shelf to an HA pair with two RoCE-capable I/O modules in each controller.

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE-capable I/O module) in each controller module, and this is the only NS224 shelf in your HA pair, complete the following substeps.

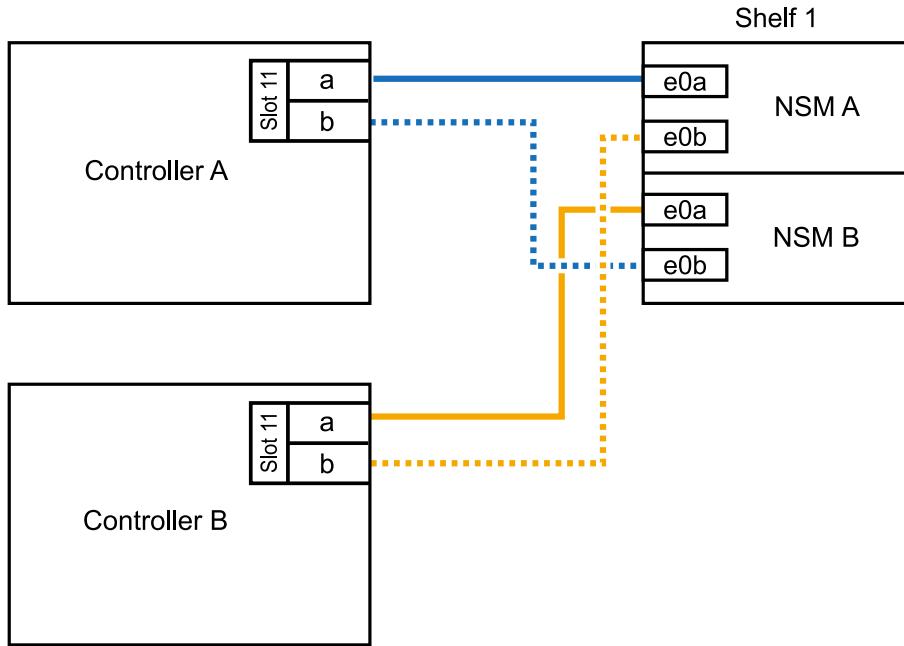
Otherwise, go to the next step.



This step assumes you installed the RoCE-capable I/O module in slot 11.

- a. Cable shelf NSM A port e0a to controller A slot 11 port a (e11a).
- b. Cable shelf NSM A port e0b to controller B slot 11 port b (e11b).
- c. Cable shelf NSM B port e0a to controller B slot 11 port a (e11a).
- d. Cable shelf NSM B port e0b to controller A slot 11 port b (e11b).

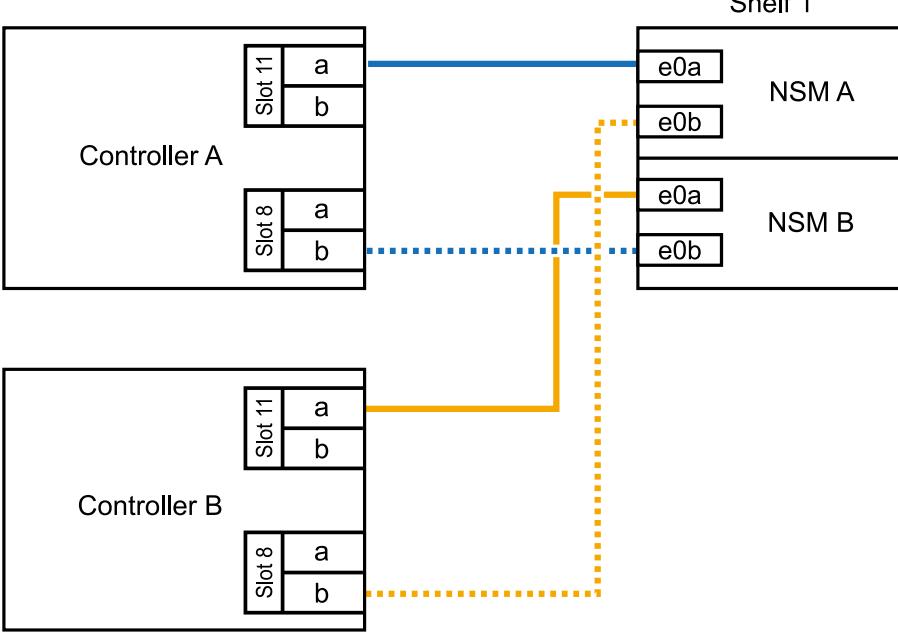
The following illustration shows cabling for one hot-added shelf using one RoCE-capable I/O module in each controller module:



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (two RoCE-capable I/O modules) in each controller module, complete the applicable substeps.



This step assumes you installed the RoCE-capable I/O modules in slots 11 and 8.

Shelves	Cabling
Shelf 1	<ol style="list-style-type: none"> a. Cable NSM A port e0a to controller A slot 11 port a (e11a). b. Cable NSM A port e0b to controller B slot 8 port b (e8b). c. Cable NSM B port e0a to controller B slot 11 port a (e11a). d. Cable NSM B port e0b to controller A slot 8 port b (e8b). e. If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step. <p>The following illustration shows cabling for one hot-added shelf using two RoCE-capable I/O modules in each controller module:</p> 

Shelves	Cabling
Shelf 2	<p>a. Cable NSM A port e0a to controller A slot 8 port a (e8a).</p> <p>b. Cable NSM A port e0b to controller B slot 11 port b (e11b).</p> <p>c. Cable NSM B port e0a to controller B slot 8 port a (e8a).</p> <p>d. Cable NSM B port e0b to controller A slot 11 port b (e11b).</p> <p>e. Go to the next step.</p> <p>The following illustration shows cabling for two hot-added shelf using two RoCE-capable I/O modules in each controller module:</p>

3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to ASA A250 or ASA C250

When additional storage is needed, you can hot-add a maximum of one NS224 shelf to an ASA A250 or ASA C250 HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

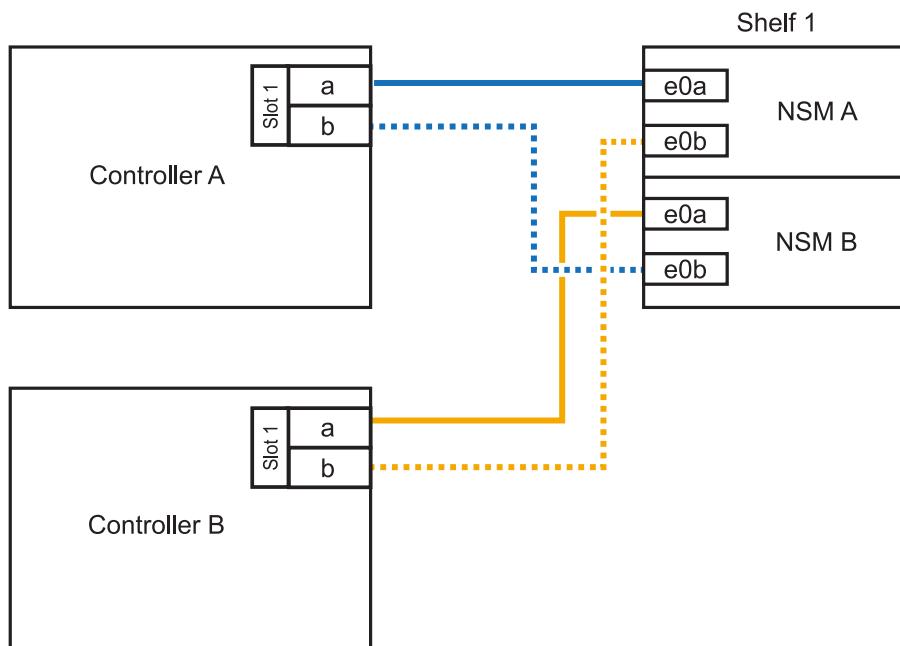
About this task

When viewed from the rear of the platform chassis, the RoCE-capable card port on the left is port "a" (e1a) and the port on the right is port "b" (e1b).

Steps

1. Cable the shelf connections:
 - a. Cable shelf NSM A port e0a to controller A slot 1 port a (e1a).
 - b. Cable shelf NSM A port e0b to controller B slot 1 port b (e1b).
 - c. Cable shelf NSM B port e0a to controller B slot 1 port a (e1a).
 - d. Cable shelf NSM B port e0b to controller A slot 1 port b (e1b).

The following illustration shows the shelf cabling when completed.



2. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to ASA A400 or ASA C400

How you cable an NS224 shelf for a hot-add depends on whether you have an ASA A400 or ASA C400 HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

Cable shelf to an AFF A400 HA pair

For an AFF A400 HA pair, you can hot-add up to two shelves and use onboard ports e0c/e0d and ports in slot 5 as needed.

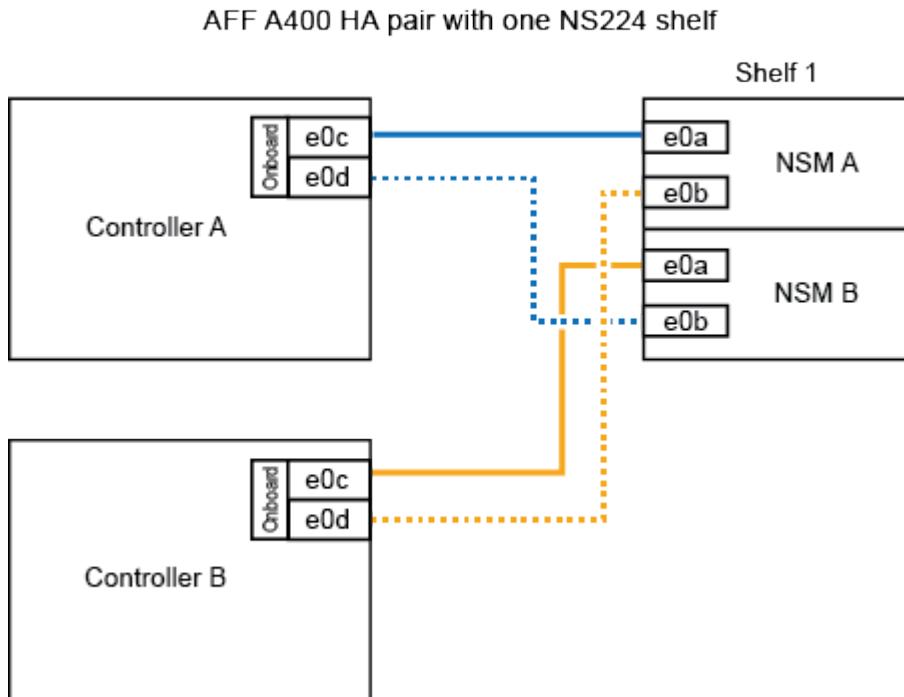
Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (onboard RoCE-capable ports) on each controller, and this is the only NS224 shelf in your HA pair, complete the following substeps.

Otherwise, go to the next step.

- a. Cable shelf NSM A port e0a to controller A port e0c.
- b. Cable shelf NSM A port e0b to controller B port e0d.
- c. Cable shelf NSM B port e0a to controller B port e0c.
- d. Cable shelf NSM B port e0b to controller A port e0d.

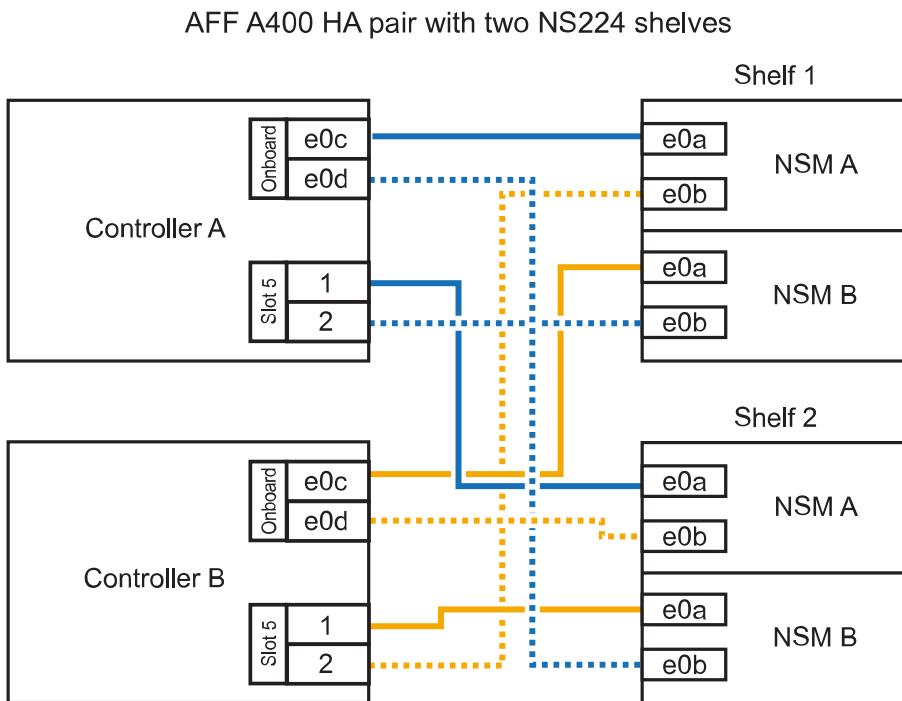
The following illustration shows cabling for one hot-added shelf using one set of RoCE-capable ports on each controller:



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (on board and PCIe card RoCE-capable ports) on each controller, complete the following substeps.

Shelves	Cabling
Shelf 1	<ol style="list-style-type: none"> Cable NSM A port e0a to controller A port e0c. Cable NSM A port e0b to controller B slot 5 port 2 (e5b). Cable NSM B port e0a to controller B port e0c. Cable NSM B port e0b to controller A slot 5 port 2 (e5b). If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.
Shelf 2	<ol style="list-style-type: none"> Cable NSM A port e0a to controller A slot 5 port 1 (e5a). Cable NSM A port e0b to controller B port e0d. Cable NSM B port e0a to controller B slot 5 port 1 (e5a). Cable NSM B port e0b to controller A port e0d. Go to the next step.

The following illustration shows cabling for two hot-added shelves:



3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

4. If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then re enable automatic drive assignment, if needed. See [Complete the hot-add](#).

Otherwise, you are done with this procedure.

Cable shelf to an AFF C400 HA pair

For an AFF C400 HA pair, you can hot-add up to two shelves and use ports in slot 4 and 5 as needed.

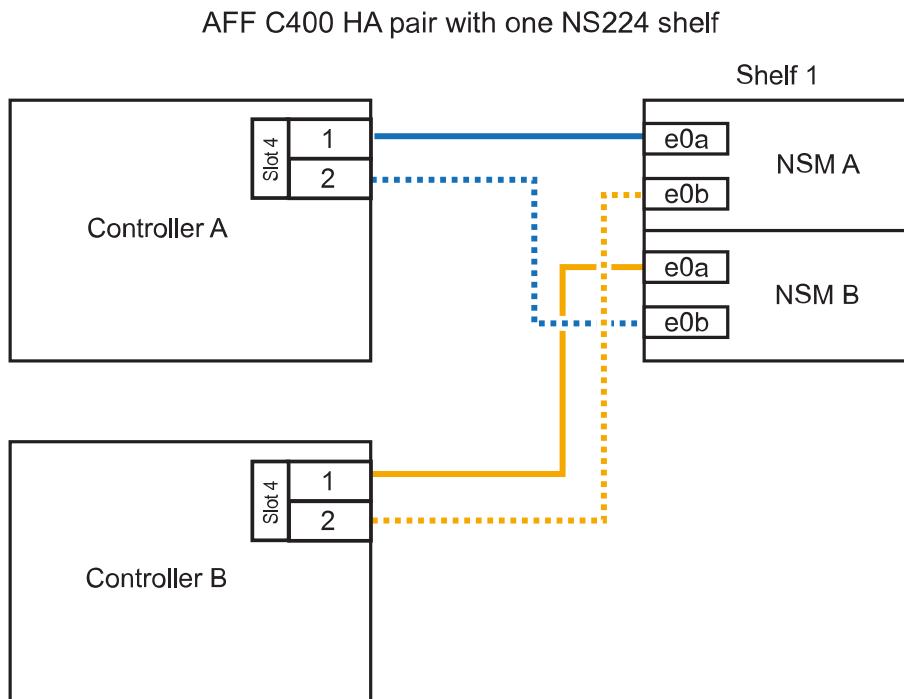
Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports on each controller, and this is the only NS224 shelf in your HA pair, complete the following substeps.

Otherwise, go to the next step.

- a. Cable shelf NSM A port e0a to controller A slot 4 port 1 (e4a).
- b. Cable shelf NSM A port e0b to controller B slot 4 port 2 (e4b).
- c. Cable shelf NSM B port e0a to controller B slot 4 port 1 (e4a).
- d. Cable shelf NSM B port e0b to controller A slot 4 port 2 (e4b).

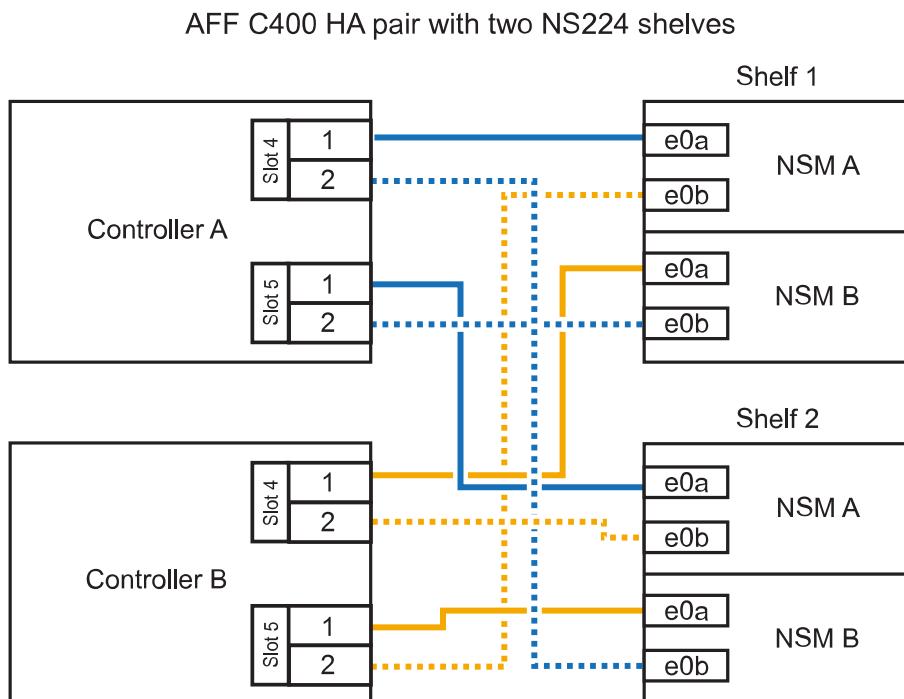
The following illustration shows cabling for one hot-added shelf using one set of RoCE-capable ports on each controller:



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports on each controller, complete the following substeps.

Shelves	Cabling
Shelf 1	<ol style="list-style-type: none"> Cable NSM A port e0a to controller A slot 4 port 1 (e4a). Cable NSM A port e0b to controller B slot 5 port 2 (e5b). Cable NSM B port e0a to controller B port slot 4 port 1 (e4a). Cable NSM B port e0b to controller A slot 5 port 2 (e5b). If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.
Shelf 2	<ol style="list-style-type: none"> Cable NSM A port e0a to controller A slot 5 port 1 (e5a). Cable NSM A port e0b to controller B slot 4 port 2 (e4b). Cable NSM B port e0a to controller B slot 5 port 1 (e5a). Cable NSM B port e0b to controller A slot 4 port 2 (e4b). Go to the next step.

The following illustration shows cabling for two hot-added shelves:



3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to ASA A800 or ASA C800

How you cable an NS224 shelf in an ASA A800 or ASA C800 HA pair depends on the number of shelves you are hot-adding and the number of RoCE-capable port sets (one or two) you are using on the controllers.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE-capable PCIe card) on each controller, and this is the only NS224 shelf in your HA pair, complete the following substeps.

Otherwise, go to the next step.

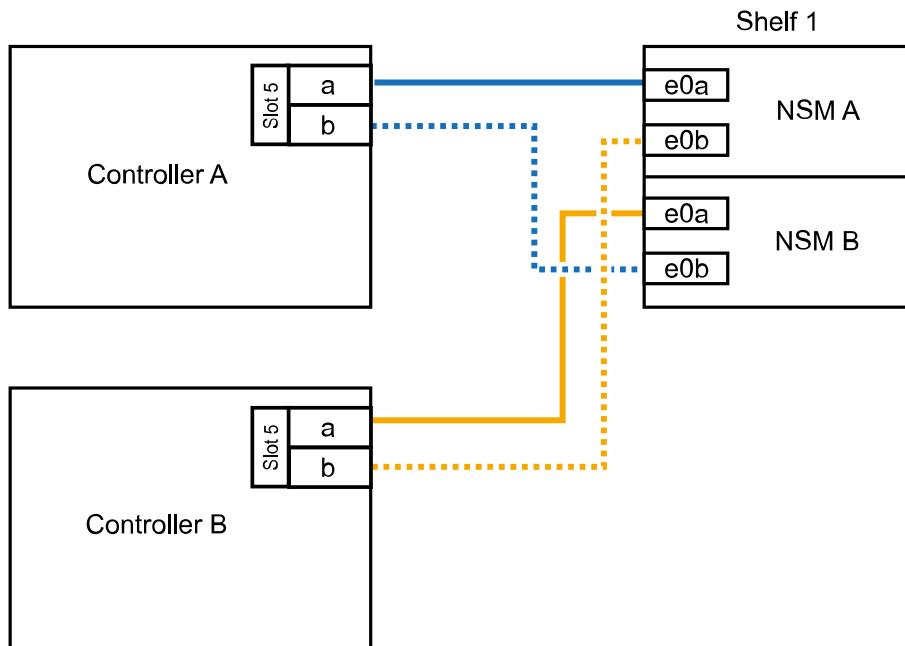


This step assumes you installed the RoCE-capable PCIe card in slot 5.

- a. Cable shelf NSM A port e0a to controller A slot 5 port a (e5a).
- b. Cable shelf NSM A port e0b to controller B slot 5 port b (e5b).
- c. Cable shelf NSM B port e0a to controller B slot 5 port a (e5a).
- d. Cable shelf NSM B port e0b to controller A slot 5 port b (e5b).

The following illustration shows cabling for one hot-added shelf using one RoCE-capable PCIe card on each controller:

AFF A800 or AFF C800 HA pair with one NS224 shelf



2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (two RoCE-capable

PCIe cards) on each controller, complete the applicable substeps.

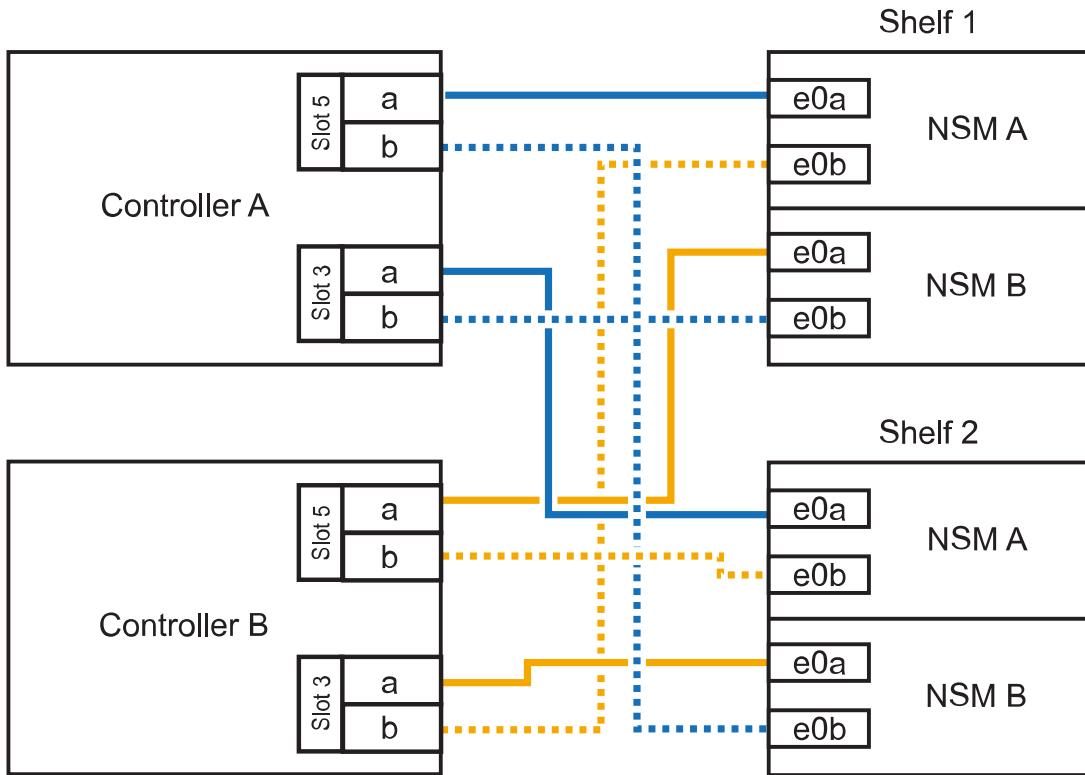


This step assumes you installed the RoCE-capable PCIe cards in slot 5 and slot 3.

Shelves	Cabling
Shelf 1	<p> These substeps assume you are beginning the cabling by cabling shelf port e0a to the RoCE-capable PCIe card in slot 5, instead of slot 3.</p> <ol style="list-style-type: none"><li data-bbox="543 466 1269 498">a. Cable NSM A port e0a to controller A slot 5 port a (e5a).<li data-bbox="543 515 1269 547">b. Cable NSM A port e0b to controller B slot 3 port b (e3b).<li data-bbox="543 563 1269 595">c. Cable NSM B port e0a to controller B slot 5 port a (e5a).<li data-bbox="543 612 1269 644">d. Cable NSM B port e0b to controller A slot 3 port b (e3b).<li data-bbox="543 661 1441 720">e. If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.
Shelf 2	<p> These substeps assume you are beginning the cabling by cabling shelf port e0a to the RoCE-capable PCIe card in slot 3, instead of slot 5 (which correlates with the cabling substeps for shelf 1).</p> <ol style="list-style-type: none"><li data-bbox="543 973 1269 1005">a. Cable NSM A port e0a to controller A slot 3 port a (e3a).<li data-bbox="543 1022 1269 1053">b. Cable NSM A port e0b to controller B slot 5 port b (e5b).<li data-bbox="543 1070 1269 1102">c. Cable NSM B port e0a to controller B slot 3 port a (e3a).<li data-bbox="543 1119 1269 1151">d. Cable NSM B port e0b to controller A slot 5 port b (e5b).<li data-bbox="543 1167 812 1199">e. Go to the next step.

The following illustration shows cabling for two hot-added shelves:

AFF A800 or AFF C800 HA pair with two NS224 shelves



3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to ASA A900

When additional storage is needed, you can hot-add up to three additional NS224 drive shelves (for a total of four shelves) to an ASA A900 HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

About this task

- This procedure assumes that your HA pair has at least one existing NS224 shelf and that you are hot-adding up to three additional shelves.
- If your HA pair has only one existing NS224 shelf, this procedure assumes that the shelf is cabled across two RoCE-capable 100GbE I/O modules on each controller.

Steps

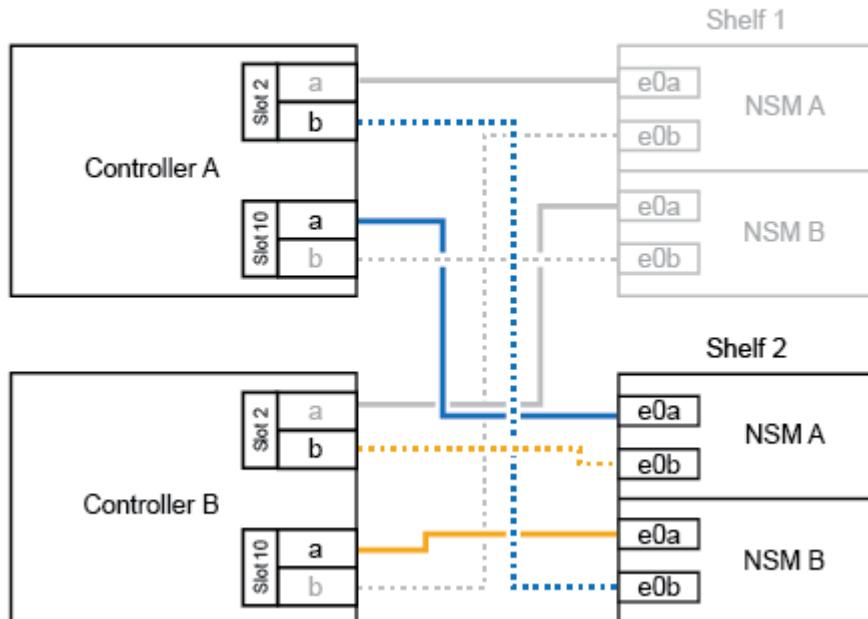
1. If the NS224 shelf you are hot-adding will be the second NS224 shelf in the HA pair, complete the following substeps.

Otherwise, go to the next step.

- a. Cable shelf NSM A port e0a to controller A slot 10 port a (e10a).
- b. Cable shelf NSM A port e0b to controller B slot 2 port b (e2b).
- c. Cable shelf NSM B port e0a to controller B slot 10 port a (e10a).
- d. Cable shelf NSM B port e0b to controller A slot 2 port b (e2b).

The following illustration shows the second shelf cabling (and the first shelf).

AFF A900 HA pair with two NS224 shelves



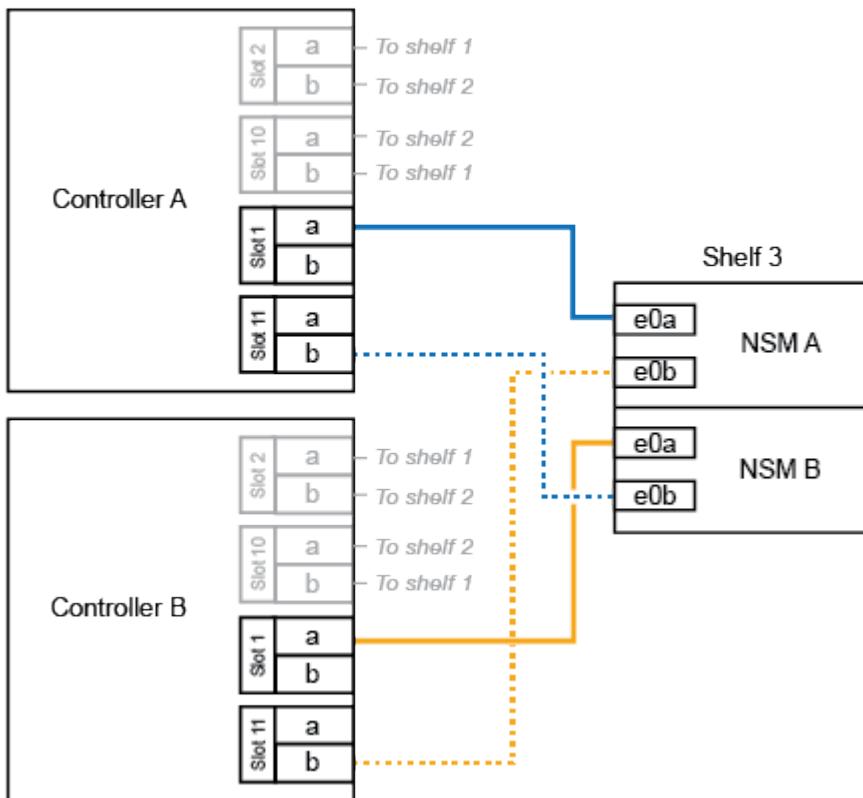
2. If the NS224 shelf you are hot-adding will be the third NS224 shelf in the HA pair, complete the following substeps.

Otherwise, go to the next step.

- Cable shelf NSM A port e0a to controller A slot 1 port a (e1a).
- Cable shelf NSM A port e0b to controller B slot 11 port b (e11b).
- Cable shelf NSM B port e0a to controller B slot 1 port a (e1a).
- Cable shelf NSM B port e0b to controller A slot 11 port b (e11b).

The following illustration shows the third shelf cabling.

AFF A900 HA pair with three NS224 shelves



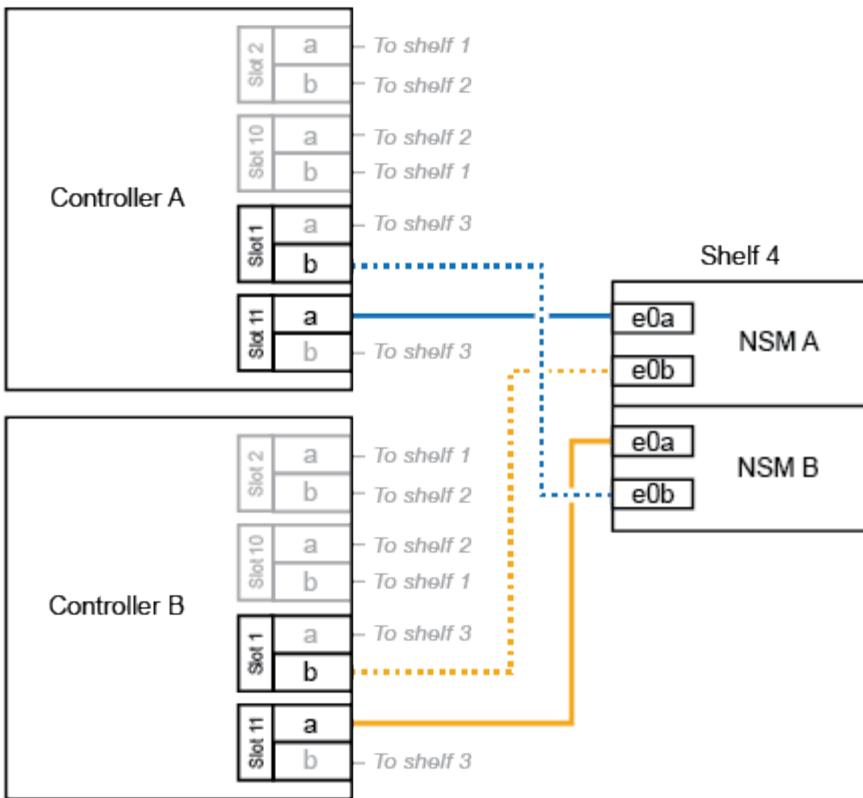
3. If the NS224 shelf you are hot-adding will be the fourth NS224 shelf in the HA pair, complete the following substeps.

Otherwise, go to the next step.

- Cable shelf NSM A port e0a to controller A slot 11 port a (e11a).
- Cable shelf NSM A port e0b to controller B slot 1 port b (e1b).
- Cable shelf NSM B port e0a to controller B slot 11 port a (e11a).
- Cable shelf NSM B port e0b to controller A slot 1 port b (e1b).

The following illustration shows the fourth shelf cabling.

AFF A900 HA pair with four NS224 shelves



4. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to end-of-availability systems - NS224 shelves

You cable each NS224 shelf you are hot-adding so that each shelf has two connections to each controller in the HA pair.

Cable shelf to AFF A320

You can hot-add a second shelf to an existing HA pair when additional storage is needed.

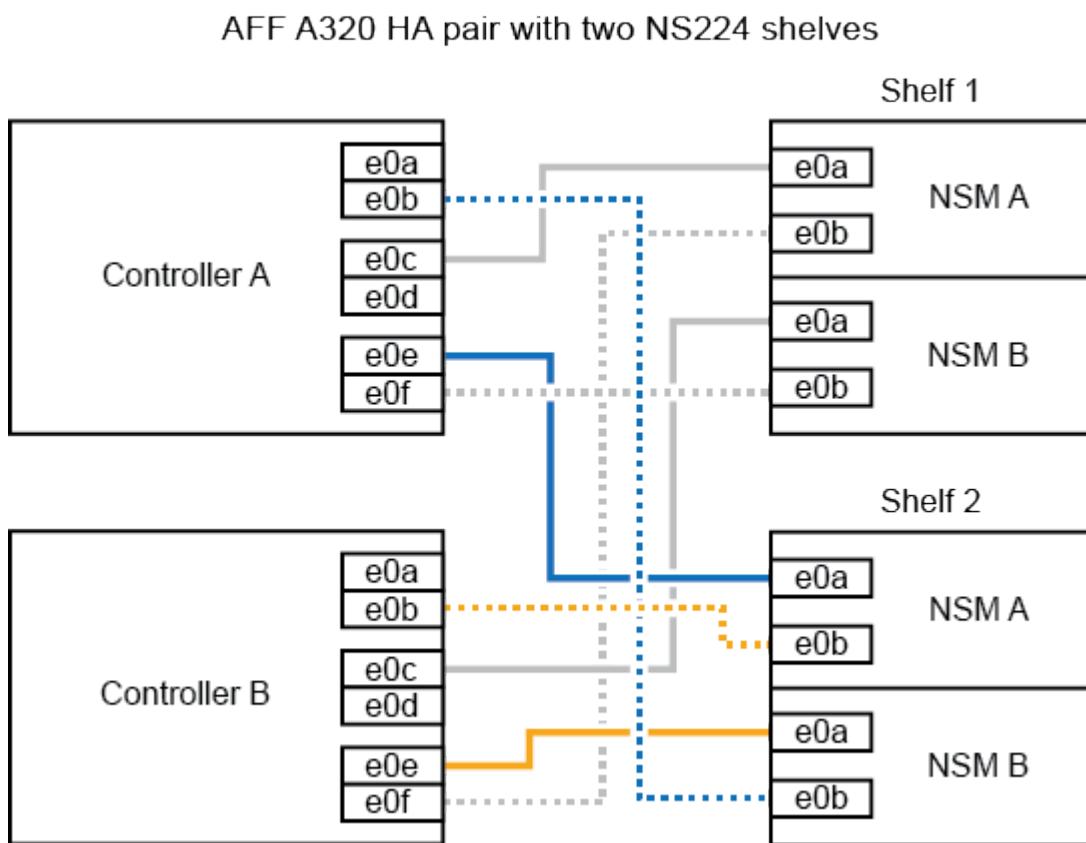
Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

Steps

1. Cable the shelf to the controllers.
 - a. Cable NSM A port e0a to controller A port e0e.
 - b. Cable NSM A port e0b to controller B port e0b.
 - c. Cable NSM B port e0a to controller B port e0e.
 - d. Cable NSM B port e0b to controller A port e0b.

The following illustration shows cabling for the hot-added shelf (shelf 2):



2. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to

manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to AFF A700

How you cable an NS224 shelf to an AFF A700 HA pair depends on the number of shelves you are hot-adding and the number of RoCE-capable port sets (one or two) you are using on the controllers.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).
- If you are hot-adding the initial NS224 shelf (no NS224 shelf exists in your HA pair), you must install a core dump module (X9170A, NVMe 1TB SSD) in each controller to support core dumps (store core files).

See [Replace the caching module or add/replace a core dump module — AFF A700 and FAS9000](#).

Steps

1. If you are hot-adding one shelf using one set of RoCE-capable ports (one RoCE capable I/O module) on each controller, and this is the only NS224 shelf in your HA pair, complete the following substeps.

Otherwise, go to the next step.

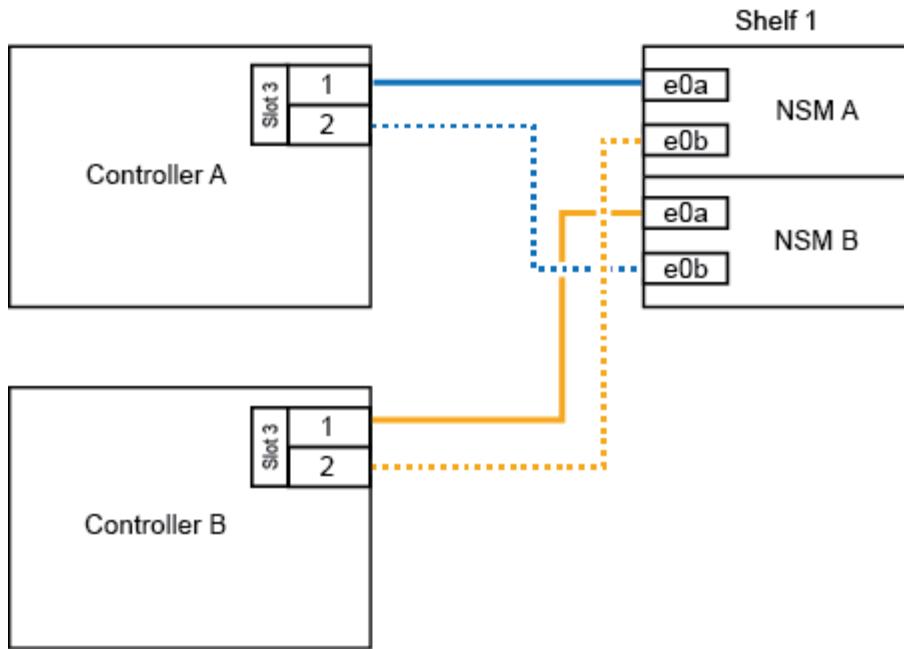


This step assumes that you installed the RoCE-capable I/O module in slot 3, instead of slot 7, on each controller.

- a. Cable shelf NSM A port e0a to controller A slot 3 port a.
- b. Cable shelf NSM A port e0b to controller B slot 3 port b.
- c. Cable shelf NSM B port e0a to controller B slot 3 port a.
- d. Cable shelf NSM B port e0b to controller A slot 3 port b.

The following illustration shows cabling for one hot-added shelf using one RoCE-capable I/O module in each controller:

AFF A700 HA pair with one NS224 shelf

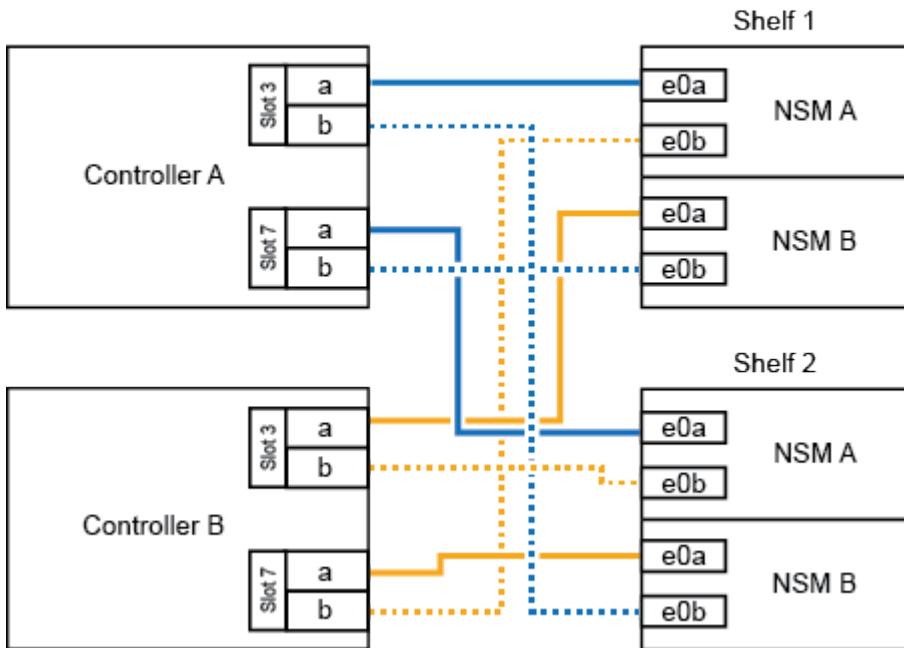


2. If you are hot-adding one or two shelves using two sets of RoCE-capable ports (two RoCE-capable I/O modules) in each controller, complete the applicable substeps.

Shelves	Cabling
Shelf 1	<p>i These substeps assume that you are beginning the cabling by cabling shelf port e0a to the RoCE-capable I/O module in slot 3, instead of slot 7.</p> <ol style="list-style-type: none"> Cable NSM A port e0a to controller A slot 3 port a. Cable NSM A port e0b to controller B slot 7 port b. Cable NSM B port e0a to controller B slot 3 port a. Cable NSM B port e0b to controller A slot 7 port b. If you are hot-adding a second shelf, complete the “Shelf 2” substeps; otherwise, go to the next step.
Shelf 2	<p>i These substeps assume that you are beginning the cabling by cabling shelf port e0a to the RoCE-capable I/O module in slot 7, instead of slot 3 (which correlates with the cabling substeps for shelf 1).</p> <ol style="list-style-type: none"> Cable NSM A port e0a to controller A slot 7 port a. Cable NSM A port e0b to controller B slot 3 port b. Cable NSM B port e0a to controller B slot 7 port a. Cable NSM B port e0b to controller A slot 3 port b. Go to the next step.

The following illustration shows cabling for the first and second hot-added shelves:

AFF A700 HA pair with two NS224 shelves



3. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

Cable shelf to FAS500f

When additional storage is needed, you can hot-add one NS224 shelf to a FAS500f HA pair.

Before you begin

- You must have reviewed the [hot-add requirements and best practices](#).
- You must have completed the applicable procedures in [Prepare-to hot-add a shelf](#).
- You must have installed the shelves, powered them on, and set the shelf IDs as described in [Install a shelf for a hot-add](#).

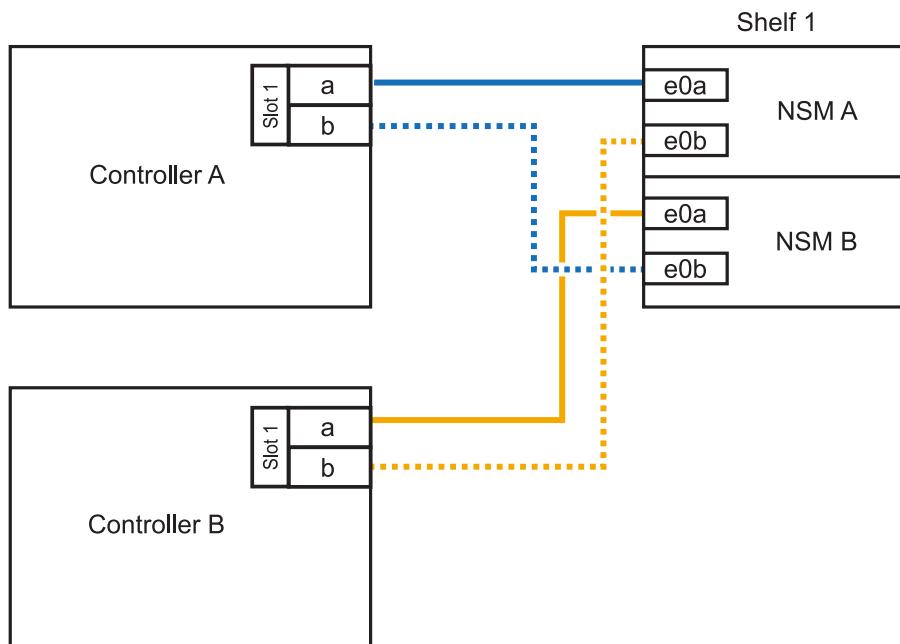
About this task

When viewed from the rear of the platform chassis, the RoCE-capable card port on the left is port "a" (e1a) and the port on the right is port "b" (e1b).

Steps

1. Cable the shelf connections:
 - a. Cable shelf NSM A port e0a to controller A slot 1 port a (e1a).
 - b. Cable shelf NSM A port e0b to controller B slot 1 port b (e1b).
 - c. Cable shelf NSM B port e0a to controller B slot 1 port a (e1a).
 - d. Cable shelf NSM B port e0b to controller A slot 1 port b (e1b).

The following illustration shows the shelf cabling when completed.



2. Verify that the hot-added shelf is cabled correctly using [Active IQ Config Advisor](#).

If any cabling errors are generated, follow the corrective actions provided.

What's next?

If you disabled automatic drive assignment as part of the preparation for this procedure, you need to manually assign drive ownership and then reenable automatic drive assignment, if needed. Go to [Complete the hot-add](#).

Otherwise, you are done with the hot-add shelf procedure.

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