



Install and cable the MetroCluster components in a configuration with array LUNs

ONTAP MetroCluster

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Install and cable the MetroCluster components in a configuration with array LUNs

Racking the hardware components in a MetroCluster configuration with array LUNs

You must ensure that the hardware components required to set up a MetroCluster configuration with array LUNs are properly racked.

About this task

You must perform this task at both the MetroCluster sites.

Steps

1. Plan the positioning of the MetroCluster components.

The rack space depends on the platform model of the storage controllers, the switch types, and the number of disk shelf stacks in your configuration.

2. Properly ground yourself.
3. Install the storage controllers in the rack or cabinet.



AFF systems are not supported with array LUNs.

[Installation procedures for your AFF or FAS system](#)

4. Install the FC switches in the rack or cabinet.

Preparing a storage array for use with ONTAP systems

Before you can begin setting up ONTAP systems in a MetroCluster configuration with array LUNs, the storage array administrator must prepare the storage for use with ONTAP.

Before you begin

The storage arrays, firmware, and switches that you plan to use in the configuration must be supported by the specific ONTAP version.

- [NetApp Interoperability \(IMT\)](#)

In the IMT, you can use the Storage Solution field to select your MetroCluster solution. You use the **Component Explorer** to select the components and ONTAP version to refine your search. You can click **Show Results** to display the list of supported configurations that match the criteria.

- [NetApp Hardware Universe](#)

About this task

You must coordinate with the storage array administrator to perform this task on the storage array.

Steps

1. Create LUNs on the storage array depending on the number of nodes in the MetroCluster configuration.

Each node in the MetroCluster configuration requires array LUNs for the root aggregate, data aggregate, and spares.

2. Configure parameters on the storage array that are required to work with ONTAP.
 - [FlexArray virtualization implementation for third-party storage](#)
 - [FlexArray virtualization implementation for NetApp E-Series storage](#)

Switch ports required for a MetroCluster configuration with array LUNs

When you are connecting ONTAP systems to FC switches for setting up a MetroCluster configuration with array LUNs, you must connect FC-VI and HBA ports from each controller to specific switch ports.

If you are using both array LUNs and disks in the MetroCluster configuration, you must ensure that the controller ports are connected to the switch ports recommended for configuration with disks, and then use the remaining ports for configuration with array LUNs.

The following table lists the specific FC switch ports to which you must connect the different controller ports in an eight-node MetroCluster configuration with array LUNs.

Overall cabling guidelines with array LUNs

You should be aware of the following guidelines when using the cabling tables:

- The Brocade and Cisco switches use different port numbering:
 - On Brocade switches, the first port is numbered 0.
 - On Cisco switches, the first port is numbered 1.
- The cabling is the same for each FC switch in the switch fabric.
- FAS8200 storage systems can be ordered with one of two options for FC-VI connectivity:
 - Onboard ports 0e and 0f configured in FC-VI mode.
 - Ports 1a and 1b on an FC-VI card in slot 1.
- FAS9000 storage systems require four FC-VI ports. The following tables show cabling for the FC switches with four FC-VI ports on each controller.

For other storage systems, use the cabling shown in the tables but ignore the cabling for FC-VI ports c and d.

You can leave those ports empty.

Brocade port usage for controllers in a MetroCluster configuration

The following tables show port usage on Brocade switches. The tables show the maximum supported configuration, with eight controller modules in two DR groups. For smaller configurations, ignore the rows for the additional controller modules. Note that eight ISLs are supported on the Brocade 6510 and G620 switches.



Port usage for the Brocade 6505 switch in an eight-node MetroCluster configuration is not shown. Due to the limited number of ports, port assignments must be made on a site-by-site basis depending on the controller module model and the number of ISLs and bridge pairs in use.

The following table shows the cabling for the first DR group:

| | | Brocade 6520, 6510, 6505, G620, G610, or 7840 switch | |
|------------------|--------------|---|-----------------|
| Component | Port | Switch 1 | Switch 2 |
| controller_x_1 | FC-VI port a | 0 | |
| | FC-VI port b | - | 0 |
| | FC-VI port c | 1 | - |
| | FC-VI port d | - | 1 |
| | HBA port a | 2 | - |
| | HBA port b | - | 2 |
| | HBA port c | 3 | - |
| | HBA port d | - | 3 |
| controller_x_2 | FC-VI port a | 4 | - |
| | FC-VI port b | - | 4 |
| | FC-VI port c | 5 | - |
| | FC-VI port d | - | 5 |
| | HBA port a | 6 | - |
| | HBA port b | - | 6 |
| | HBA port c | 7 | - |
| | HBA port d | - | 7 |

The following table shows the cabling for the second DR group:

| | Brocade 6510 | Brocade 6520 | Brocade G620 |
|--|---------------------|---------------------|---------------------|
|--|---------------------|---------------------|---------------------|

| Component | Port | Switch 1 | Switch 2 | Switch 1 | Switch 2 | Switch 1 | Switch 2 |
|----------------|--------------|----------|----------|----------|----------|----------|----------|
| controller_x_3 | FC-VI port a | 24 | - | 48 | - | 18 | - |
| | FC-VI port b | - | 24 | - | 48 | - | 18 |
| | FC-VI port c | 25 | - | 49 | - | 19 | - |
| | FC-VI port d | - | 25 | - | 49 | - | 19 |
| | HBA port a | 26 | - | 50 | - | 24 | - |
| | HBA port b | - | 26 | - | 50 | - | 24 |
| | HBA port c | 27 | - | 51 | - | 25 | - |
| | HBA port d | - | 27 | - | 51 | - | 25 |
| controller_x_4 | FC-VI port a | 28 | - | 52 | - | 22 | - |
| | FC-VI port b | - | 28 | - | 52 | - | 22 |
| | FC-VI port c | 29 | - | 53 | - | 23 | - |
| | FC-VI port d | - | 29 | - | 53 | - | 23 |
| | HBA port a | 30 | - | 54 | - | 28 | - |
| | HBA port b | - | 30 | - | 54 | - | 28 |
| | HBA port c | 31 | - | 55 | - | 29 | - |
| | HBA port d | - | 31 | - | 55 | - | 29 |
| ISLs | | | | | | | |
| ISL 1 | | 40 | 40 | 23 | 23 | 40 | 40 |
| ISL 2 | | 41 | 41 | 47 | 47 | 41 | 41 |
| ISL 3 | | 42 | 42 | 71 | 71 | 42 | 42 |
| ISL 4 | | 43 | 43 | 95 | 95 | 43 | 43 |

| | | | | | |
|-------|----|----|---------------|----|----|
| ISL 5 | 44 | 44 | Not supported | 44 | 44 |
| ISL 6 | 45 | 45 | | 45 | 45 |
| ISL 7 | 46 | 46 | | 46 | 46 |
| ISL 8 | 47 | 47 | | 47 | 47 |

Cisco port usage for controllers in a MetroCluster configuration running ONTAP 9.4 or later

The tables show the maximum supported configuration, with eight controller modules in two DR groups. For smaller configurations, ignore the rows for the additional controller modules.

Cisco 9396S port usage

| Cisco 9396S | | | |
|----------------|--------------|----------|----------|
| Component | Port | Switch 1 | Switch 2 |
| controller_x_1 | FC-VI port a | 1 | - |
| | FC-VI port b | - | 1 |
| | FC-VI port c | 2 | - |
| | FC-VI port d | - | 2 |
| | HBA port a | 3 | - |
| | HBA port b | - | 3 |
| | HBA port c | 4 | - |
| | HBA port d | - | 4 |

| | | | |
|----------------|--------------|----|----|
| controller_x_2 | FC-VI port a | 5 | - |
| | FC-VI port b | - | 5 |
| | FC-VI port c | 6 | - |
| | FC-VI port d | - | 6 |
| | HBA port a | 7 | - |
| | HBA port b | - | 7 |
| | HBA port c | 8 | - |
| | HBA port d | - | 8 |
| controller_x_3 | FC-VI port a | 49 | |
| | FC-VI port b | - | 49 |
| | FC-VI port c | 50 | |
| | FC-VI port d | - | 50 |
| | HBA port a | 51 | |
| | HBA port b | - | 51 |
| | HBA port c | 52 | |
| | HBA port d | - | 52 |

| | | | |
|----------------|--------------|----|----|
| controller_x_4 | FC-VI port a | 53 | - |
| | FC-VI port b | - | 53 |
| | FC-VI port c | 54 | - |
| | FC-VI port d | - | 54 |
| | HBA port a | 55 | - |
| | HBA port b | - | 55 |
| | HBA port c | 56 | - |
| | HBA port d | - | 56 |

Cisco 9148S port usage

| Cisco 9148S | | | |
|----------------|--------------|----------|----------|
| Component | Port | Switch 1 | Switch 2 |
| controller_x_1 | FC-VI port a | 1 | - |
| | FC-VI port b | - | 1 |
| | FC-VI port c | 2 | - |
| | FC-VI port d | - | 2 |
| | HBA port a | 3 | - |
| | HBA port b | - | 3 |
| | HBA port c | 4 | - |
| | HBA port d | - | 4 |

| | | | |
|----------------|--------------|----|----|
| controller_x_2 | FC-VI port a | 5 | - |
| | FC-VI port b | - | 5 |
| | FC-VI port c | 6 | - |
| | FC-VI port d | - | 6 |
| | HBA port a | 7 | - |
| | HBA port b | - | 7 |
| | HBA port c | 8 | - |
| | HBA port d | - | 8 |
| controller_x_3 | FC-VI port a | 25 | |
| | FC-VI port b | - | 25 |
| | FC-VI port c | 26 | - |
| | FC-VI port d | - | 26 |
| | HBA port a | 27 | - |
| | HBA port b | - | 27 |
| | HBA port c | 28 | - |
| | HBA port d | - | 28 |

| | | | |
|----------------|--------------|----|----|
| controller_x_4 | FC-VI port a | 29 | - |
| | FC-VI port b | - | 29 |
| | FC-VI port c | 30 | - |
| | FC-VI port d | - | 30 |
| | HBA port a | 31 | - |
| | HBA port b | - | 31 |
| | HBA port c | 32 | - |
| | HBA port d | - | 32 |

Cisco 9132T port usage

| Cisco 9132T | | | |
|----------------|--------------|----------|----------|
| MDS module 1 | | | |
| Component | Port | Switch 1 | Switch 2 |
| controller_x_1 | FC-VI port a | 1 | - |
| | FC-VI port b | - | 1 |
| | FC-VI port c | 2 | - |
| | FC-VI port d | - | 2 |
| | HBA port a | 3 | - |
| | HBA port b | - | 3 |
| | HBA port c | 4 | - |
| | HBA port d | - | 4 |

| | | | |
|---------------------|--------------|-----------------|-----------------|
| controller_x_2 | FC-VI port a | 5 | - |
| | FC-VI port b | - | 5 |
| | FC-VI port c | 6 | - |
| | FC-VI port d | - | 6 |
| | HBA port a | 7 | - |
| | HBA port b | - | 7 |
| | HBA port c | 8 | - |
| | HBA port d | - | 8 |
| MDS module 2 | | | |
| Component | Port | Switch 1 | Switch 2 |
| controller_x_3 | FC-VI port a | 1 | - |
| | FC-VI port b | - | 1 |
| | FC-VI port c | 2 | - |
| | FC-VI port d | - | 2 |
| | HBA port a | 3 | - |
| | HBA port b | - | 3 |
| | HBA port c | 4 | - |
| | HBA port d | - | 4 |

| | | | |
|----------------|--------------|---|---|
| controller_x_4 | FC-VI port a | 5 | - |
| | FC-VI port b | - | 5 |
| | FC-VI port c | 6 | - |
| | FC-VI port d | - | 6 |
| | HBA port a | 7 | - |
| | HBA port b | - | 7 |
| | HBA port c | 8 | - |
| | HBA port d | - | 8 |

Cisco 9250 port usage



The following table shows systems with two FC-VI ports. AFF A700 and FAS9000 systems have four FC-VI ports (a, b, c, and d). If using an AFF A700 or FAS9000 system, the port assignments move along by one position. For example, FC-VI ports c and d go to switch port 2 and HBA ports a and b go to switch port 3.

| Cisco 9250i | | | |
|---|--------------|----------|----------|
| The Cisco 9250i switch is not supported for eight-node MetroCluster configurations. | | | |
| Component | Port | Switch 1 | Switch 2 |
| controller_x_1 | FC-VI port a | 1 | - |
| | FC-VI port b | - | 1 |
| | HBA port a | 2 | - |
| | HBA port b | - | 2 |
| | HBA port c | 3 | - |
| | HBA port d | - | 3 |

| | | | |
|----------------|--------------|----|----|
| controller_x_2 | FC-VI port a | 4 | - |
| | FC-VI port b | - | 4 |
| | HBA port a | 5 | - |
| | HBA port b | - | 5 |
| | HBA port c | 6 | - |
| | HBA port d | - | 6 |
| controller_x_3 | FC-VI port a | 7 | - |
| | FC-VI port b | - | 7 |
| | HBA port a | 8 | - |
| | HBA port b | - | 8 |
| | HBA port c | 9 | - |
| | HBA port d | - | 9 |
| controller_x_4 | FC-VI port a | 10 | - |
| | FC-VI port b | - | 10 |
| | HBA port a | 11 | - |
| | HBA port b | - | 11 |
| | HBA port c | 13 | - |
| | HBA port d | - | 13 |

Shared initiator and shared target support for MetroCluster configuration with array LUNs

Being able to share a given FC initiator port or target ports is useful for organizations that want to minimize the number of initiator or target ports used. For example, an organization that expects low I/O usage over an FC initiator port or target ports might prefer to share FC initiator port or target ports instead of dedicating each FC initiator port to a single target port.

However sharing of initiator or target ports can adversely affect performance.

Cable the FC-VI and HBA ports in a MetroCluster configuration with array LUNs

Cabling the FC-VI and HBA ports in a two-node fabric-attached MetroCluster configuration with array LUNs

If you are setting up a two-node fabric-attached MetroCluster configuration with array LUNs, you must cable the FC-VI ports and the HBA ports to the switch ports.

About this task

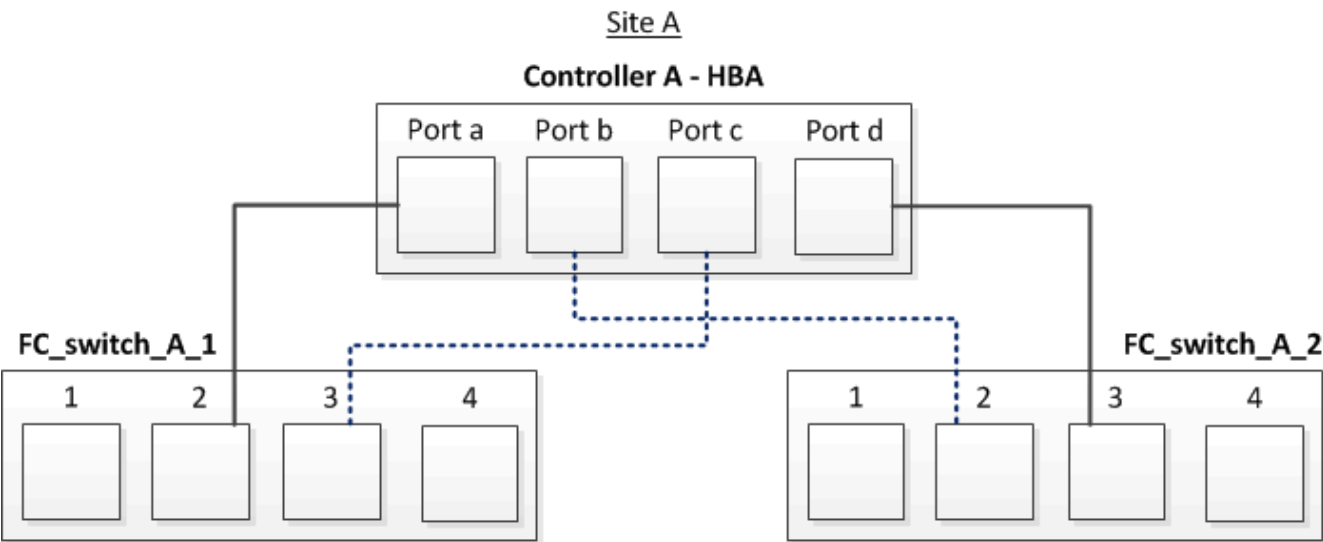
- You must repeat this task for each controller at both of the MetroCluster sites.
- If you plan to use disks in addition to array LUNs in your MetroCluster configuration, you must use the HBA ports and switch ports specified for configuration with disks.
 - [Port assignments for FC switches when using ONTAP 9.1 and later](#)
 - [Port assignments for FC switches when using ONTAP 9.0](#)

Steps

1. Cable the FC-VI ports from the controller to alternate switch ports.
2. Perform the controller-to-switch cabling at both of the MetroCluster sites.

You must ensure redundancy in connections from the controller to the switches. Therefore, for each controller at a site, you must ensure that both of the HBA ports in the same port pair are connected to alternate FC switches.

The following example shows the connections between the HBA ports on Controller A and ports on FC_switch_A_1 and FC_switch_A_2:



The following table lists the connections between the HBA ports and the FC switch ports in the illustration:

| HBA ports | Switch ports |
|-----------|--------------|
|-----------|--------------|

| | |
|------------------|-----------------------|
| Port pair | |
| Port a | FC_switch_A_1, Port 2 |
| Port d | FC_switch_A_2, Port 3 |
| Port pair | |
| Port b | FC_switch_A_2, Port 2 |
| Port c | FC_switch_A_1, Port 3 |

After you finish

You should cable the ISLs between the FC switches across the MetroCluster sites.

Cabling the FC-VI and HBA ports in a four-node fabric-attached MetroCluster configuration with array LUNs

If you are setting up a four-node fabric-attached MetroCluster configuration with array LUNs, you must cable the FC-VI ports and the HBA ports to the switch ports.

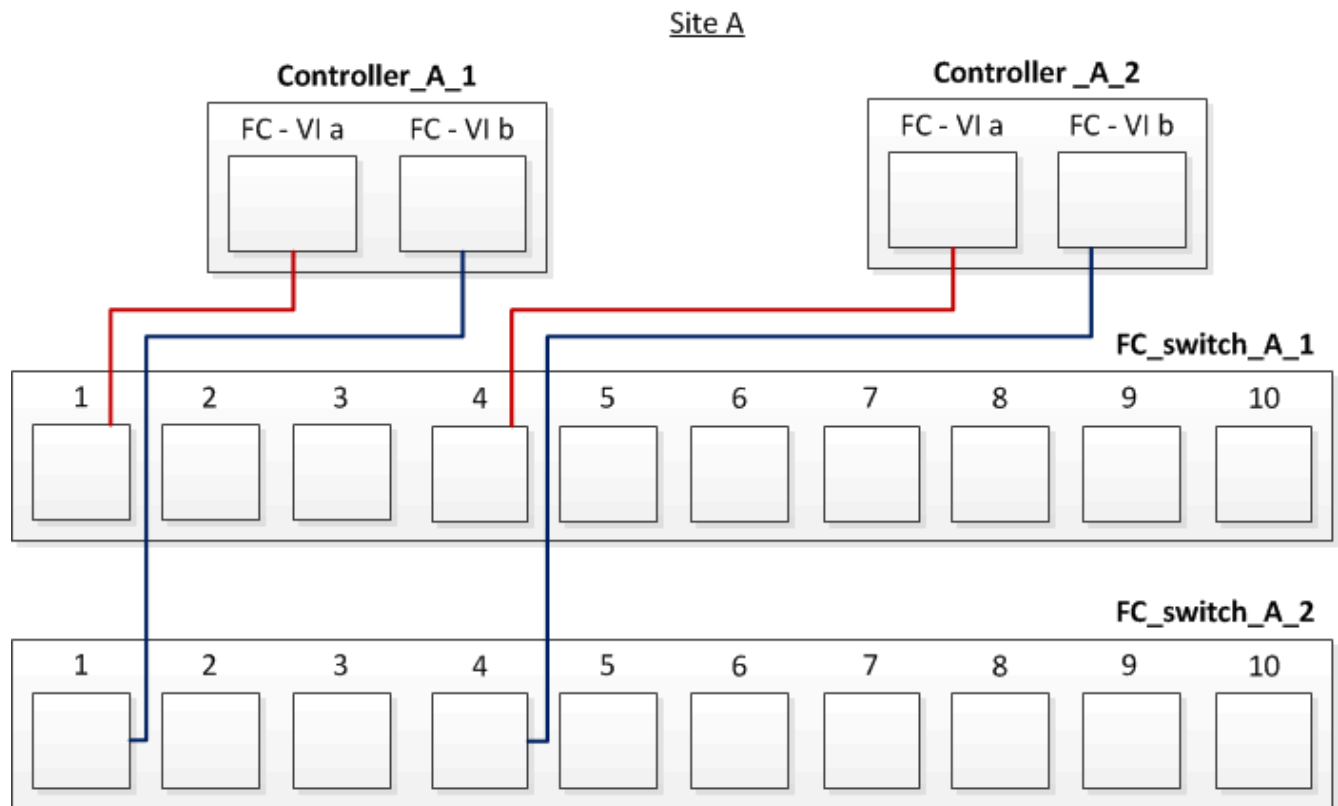
About this task

- You must repeat this task for each controller at both of the MetroCluster sites.
- If you plan to use disks in addition to array LUNs in your MetroCluster configuration, you must use the HBA ports and switch ports specified for configuration with disks.
 - [Port assignments for FC switches when using ONTAP 9.1 and later](#)
 - [Port assignments for FC switches when using ONTAP 9.0](#)

Steps

1. Cable the FC-VI ports from each controller to the ports on alternate FC switches.

The following example shows the connections between the FC-VI ports and switch ports at Site A:



2. Perform the controller-to-switch cabling at both of the MetroCluster sites.

You must ensure redundancy in connections from the controller to the switches. Therefore, for each controller at a site, you must ensure that both of the HBA ports in the same port pair are connected to alternate FC switches.

The following example shows the connections between the HBA ports and switch ports at Site A:

Site A



The following table lists the connections between the HBA ports on controller_A_1 and the FC switch ports in the illustration:

| HBA ports | Switch ports |
|------------------|-----------------------|
| Port pair | |
| Port a | FC_switch_A_1, Port 2 |
| Port d | FC_switch_A_2, Port 3 |
| Port pair | |
| Port b | FC_switch_A_2, Port 2 |
| Port c | FC_switch_A_1, Port 3 |

The following table lists the connections between the HBA ports on controller_A_2 and the FC switch ports in the illustration:

| HBA ports | Switch ports |
|------------------|-----------------------|
| Port pair | |
| Port a | FC_switch_A_1, Port 5 |
| Port d | FC_switch_A_2, Port 6 |

| Port pair | |
|-----------|-----------------------|
| Port b | FC_switch_A_2, Port 5 |
| Port c | FC_switch_A_1, Port 6 |

After you finish

You should cable the ISLs between the FC switches across the MetroCluster sites.

Related information

When you are connecting ONTAP systems to FC switches for setting up a MetroCluster configuration with array LUNs, you must connect FC-VI and HBA ports from each controller to specific switch ports.

[Switch ports required for a MetroCluster configuration with array LUNs](#)

Cabling the FC-VI and HBA ports in an eight-node fabric-attached MetroCluster configuration with array LUNs

If you are setting up an eight-node fabric-attached MetroCluster configuration with array LUNs, you must cable the FC-VI ports and the HBA ports to the switch ports.

About this task

- You must repeat this task for each controller at both of the MetroCluster sites.
- If you plan to use disks in addition to array LUNs in your MetroCluster configuration, you must use the HBA ports and switch ports specified for configuration with disks.
 - [Port assignments for FC switches when using ONTAP 9.1 and later](#)
 - [Port assignments for FC switches when using ONTAP 9.0](#)

Step

1. Cable the FC-VI ports and HBA ports from each controller to the ports on alternate FC switches. Refer to the following tables:

Cabling configurations for FibreBridge 7500N or 7600N using both FC ports

| Configurations using FibreBridge 7500N or 7600N using both FC ports (FC1 and FC2) | | | | |
|---|------|--|----------------------------|----------------------------|
| MetroCluster 1 or DR Group 1 | | | | |
| Component | Port | Brocade switch models 6505, 6510, 6520, 7810, 7840, G610, G620, G620-1, G630, G630-1, and DCX 8510-8 | | Brocade switch G720 |
| | | Connects to FC_switch... | Connects to switch port... | Connects to switch port... |

| | | | | | |
|----------------|-------------|--------------|---|---|----|
| controller_x_1 | | FC-VI port a | 1 | 0 | 0 |
| | | FC-VI port b | 2 | 0 | 0 |
| | | FC-VI port c | 1 | 1 | 1 |
| | | FC-VI port d | 2 | 1 | 1 |
| | | HBA port a | 1 | 2 | 8 |
| | | HBA port b | 2 | 2 | 8 |
| | | HBA port c | 1 | 3 | 9 |
| | | HBA port d | 2 | 3 | 9 |
| controller_x_2 | | FC-VI port a | 1 | 4 | 4 |
| | | FC-VI port b | 2 | 4 | 4 |
| | | FC-VI port c | 1 | 5 | 5 |
| | | FC-VI port d | 2 | 5 | 5 |
| | | HBA port a | 1 | 6 | 12 |
| | | HBA port b | 2 | 6 | 12 |
| | | HBA port c | 1 | 7 | 13 |
| | | HBA port d | 2 | 7 | 13 |
| Stack 1 | bridge_x_1a | FC1 | 1 | 8 | 10 |
| | | FC2 | 2 | 8 | 10 |
| | bridge_x_1B | FC1 | 1 | 9 | 11 |
| | | FC2 | 2 | 9 | 11 |

| | | | | | |
|--|-------------|-----|---|-----|----|
| Stack 2 | bridge_x_2a | FC1 | 1 | 10 | 14 |
| | | FC2 | 2 | 10 | 14 |
| | bridge_x_2B | FC1 | 1 | 11 | 15 |
| | | FC2 | 2 | 11 | 15 |
| Stack 3 | bridge_x_3a | FC1 | 1 | 12* | 16 |
| | | FC2 | 2 | 12* | 16 |
| | bridge_x_3B | FC1 | 1 | 13* | 17 |
| | | FC2 | 2 | 13* | 17 |
| Stack y | bridge_x_ya | FC1 | 1 | 14* | 20 |
| | | FC2 | 2 | 14* | 20 |
| | bridge_x_yb | FC1 | 1 | 15* | 21 |
| | | FC2 | 2 | 15* | 21 |
| * Ports 12 through 15 are reserved for the second MetroCluster or DR group on the Brocade 7840 switch. | | | | | |
| Note: Additional bridges can be cabled to ports 16, 17, 20 and 21 in G620, G630, G620-1 and G630-1 switches. | | | | | |

After you finish

You should cable the ISLs between the FC switches across the MetroCluster sites.

Cabling configurations for Cisco 9250i

| Cisco 9250i* | | | |
|--------------|------|----------|----------|
| Component | Port | Switch 1 | Switch 2 |

| | | | |
|----------------|--------------|---|---|
| controller_x_1 | FC-VI port a | 1 | - |
| | FC-VI port b | - | 1 |
| | HBA port a | 2 | - |
| | HBA port b | - | 2 |
| | HBA port c | 3 | - |
| | HBA port d | - | 3 |
| controller_x_2 | FC-VI port a | 4 | - |
| | FC-VI port b | - | 4 |
| | HBA port a | 5 | - |
| | HBA port b | - | 5 |
| | HBA port c | 6 | - |
| | HBA port d | - | 6 |
| controller_x_3 | FC-VI port a | 7 | - |
| | FC-VI port b | - | 7 |
| | HBA port a | 8 | - |
| | HBA port b | - | 8 |
| | HBA port c | 9 | - |
| | HBA port d | - | 9 |

| | | | |
|----------------|--------------|----|----|
| controller_x_4 | FC-VI port a | 10 | - |
| | FC-VI port b | - | 10 |
| | HBA port a | 11 | - |
| | HBA port b | - | 11 |
| | HBA port c | 13 | - |
| | HBA port d | - | 13 |

After you finish

You should cable the ISLs between the FC switches across the MetroCluster sites.

Cabling the ISLs in a MetroCluster configuration with array LUNs

You must connect the FC switches across the sites through Inter-Switch Links (ISLs) to form switch fabrics in your MetroCluster configuration with array LUNs.

Steps

1. Connect the switches at each site to the ISL or ISLs, using the cabling in the table that corresponds to your configuration and switch model.

The switch port numbers that you can use for the FC ISLs are as follows:

| Switch model | ISL port | Switch port |
|--------------|------------|-------------|
| Brocade 6520 | ISL port 1 | 23 |
| | ISL port 2 | 47 |
| | ISL port 3 | 71 |
| | ISL port 4 | 95 |
| Brocade 6505 | ISL port 1 | 20 |
| | ISL port 2 | 21 |
| | ISL port 3 | 22 |
| | ISL port 4 | 23 |

| | | |
|--|------------|--------------------------------|
| Brocade 6510 and Brocade DCX 8510-8 | ISL port 1 | 40 |
| | ISL port 2 | 41 |
| | ISL port 3 | 42 |
| | ISL port 4 | 43 |
| | ISL port 5 | 44 |
| | ISL port 6 | 45 |
| | ISL port 7 | 46 |
| | ISL port 8 | 47 |
| Brocade 7810 | ISL port 1 | ge2 (10-Gbps) |
| | ISL port 2 | ge3(10-Gbps) |
| | ISL port 3 | ge4 (10-Gbps) |
| | ISL port 4 | ge5 (10-Gbps) |
| | ISL port 5 | ge6 (10-Gbps) |
| | ISL port 6 | ge7 (10-Gbps) |
| Brocade 7840 Note: The Brocade 7840 switch supports either two 40 Gbps VE-ports or up to four 10 Gbps VE-ports per switch for the creation of FCIP ISLs. | ISL port 1 | ge0 (40-Gbps) or ge2 (10-Gbps) |
| | ISL port 2 | ge1 (40-Gbps) or ge3 (10-Gbps) |
| | ISL port 3 | ge10 (10-Gbps) |
| | ISL port 4 | ge11 (10-Gbps) |
| Brocade G610 | ISL port 1 | 20 |
| | ISL port 2 | 21 |
| | ISL port 3 | 22 |
| | ISL port 4 | 23 |

| | | |
|--|-----------------|--------------------|
| Brocade G620, G620-1, G630, G630-1, G720 | ISL port 1 | 40 |
| | ISL port 2 | 41 |
| | ISL port 3 | 42 |
| | ISL port 4 | 43 |
| | ISL port 5 | 44 |
| | ISL port 6 | 45 |
| | ISL port 7 | 46 |
| | ISL port 8 | 47 |
| Switch mode I | ISL port | Switch port |
| Cisco 9396S | ISL 1 | 44 |
| | ISL 2 | 48 |
| | ISL 3 | 92 |
| | ISL 4 | 96 |
| Cisco 9250i with 24 port license | ISL 1 | 12 |
| | ISL 2 | 16 |
| | ISL 3 | 20 |
| | ISL 4 | 24 |
| Cisco 9148S | ISL 1 | 20 |
| | ISL 2 | 24 |
| | ISL 3 | 44 |
| | ISL 4 | 48 |

| | | |
|--|-------|----------------------|
| Cisco 9132T | ISL 1 | MDS module 1 port 13 |
| | ISL 2 | MDS module 1 port 14 |
| | ISL 3 | MDS module 1 port 15 |
| | ISL 4 | MDS module 1 port 16 |
| * The Cisco 9250i switch uses the FCIP ports for the ISL. There are certain limitations and procedures for using the FCIP ports. | | |
| Ports 40 through 48 are 10 GbE ports and are not used in the MetroCluster configuration. | | |

Cabling the cluster interconnect in eight- or four-node configurations

In eight- or four-node MetroCluster configurations, you must cable the cluster interconnect between the local controller modules at each site.

About this task

This task is not required on two-node MetroCluster configurations.

This task must be performed at both MetroCluster sites.

Step

1. Cable the cluster interconnect from one controller module to the other, or if cluster interconnect switches are used, from each controller module to the switches.

Related information

[AFF and FAS Documentation Center](#)

[Network and LIF management](#)

Cabling the cluster peering connections

You must cable the controller module ports used for cluster peering so that they have connectivity with the cluster on the partner site.

About this task

This task must be performed on each controller module in the MetroCluster configuration.

At least two ports on each controller module should be used for cluster peering.

The recommended minimum bandwidth for the ports and network connectivity is 1 GbE.

Step

1. Identify and cable at least two ports for cluster peering and verify they have network connectivity with the partner cluster.

Cluster peering can be done on dedicated ports or on data ports. Using dedicated ports provides higher throughput for the cluster peering traffic.

Related information

[Cluster and SVM peering express configuration](#)

Each MetroCluster site is configured as a peer to its partner site. You should be familiar with the prerequisites and guidelines for configuring the peering relationships and when deciding whether to use shared or dedicated ports for those relationships.

[Considerations for configuring cluster peering](#)

Cabling the HA interconnect

If you have an eight- or a four-node MetroCluster configuration and the storage controllers within the HA pairs are in separate chassis, you must cable the HA interconnect between the controllers.

About this task

- This task does not apply to two-node MetroCluster configurations.
- This task must be performed at both MetroCluster sites.
- The HA interconnect must be cabled only if the storage controllers within the HA pair are in separate chassis.

Some storage controller models support two controllers in a single chassis, in which case they use an internal HA interconnect.

Steps

1. Cable the HA interconnect if the storage controller's HA partner is in a separate chassis.

[AFF and FAS Documentation Center](#)

2. If the MetroCluster site includes two HA pairs, repeat the previous steps on the second HA pair.
3. Repeat this task at the MetroCluster partner site.

Cabling the management and data connections

You must cable the management and data ports on each storage controller to the site networks.

About this task

This task must be repeated for each new controller at both MetroCluster sites.

You can connect the controller and cluster switch management ports to existing switches in your network or to new dedicated network switches such as NetApp CN1601 cluster management switches.

Step

1. Cable the controller's management and data ports to the management and data networks at the local site.

Cable storage arrays to FC switches in a MetroCluster configuration

Cabling storage arrays to FC switches in a MetroCluster configuration

You must connect storage arrays to FC switches so that the ONTAP systems in the MetroCluster configuration can access a specific array LUN through at least two paths.

Before you begin

- The storage arrays must be set up to present array LUNs to ONTAP.
- The ONTAP controllers must be connected to the FC switches.
- The ISLs must be cabled between the FC switches across the MetroCluster sites.
- You must repeat this task for each storage array at both of the MetroCluster sites.
- You must connect the controllers in a MetroCluster configuration to the storage arrays through FC switches.

Steps

1. Connect the storage array ports to FC switch ports.

At each site, connect the redundant port pairs in the storage array to FC switches on alternate fabrics. This provides redundancy in the paths for accessing the array LUNs.

Related information

- [Configuring switch zoning enables you to define which array LUNs can be viewed by a specific ONTAP system in the MetroCluster configuration.](#)

[Switch zoning in a MetroCluster configuration with array LUNs](#)

- In a MetroCluster configuration with array LUNs, you must connect the storage array ports that form a redundant port pair to alternate FC switches.

[Example of cabling storage array ports to FC switches in a two-node MetroCluster configuration](#)

[Example of cabling storage array ports to FC switches in a four-node MetroCluster configuration](#)

[Example of cabling storage array ports to FC switches in an eight-node MetroCluster configuration](#)

Example of cabling storage array ports to FC switches in a two-node MetroCluster configuration

In a MetroCluster configuration with array LUNs, you must connect the storage array ports that form a redundant port pair to alternate FC switches.

The following illustration shows the connections between storage arrays and FC switches in a two-node fabric-attached MetroCluster configuration with array LUNs:



The connections between storage array ports and FC switch ports are similar for both stretch and fabric-attached variants of two-node MetroCluster configurations with array LUNs.



If you plan to use disks in addition to array LUNs in your MetroCluster configuration, you must use the switch ports specified for the configuration with disks.

[Port assignments for FC switches when using ONTAP 9.1 and later](#)

In the illustration, the redundant array port pairs for both the sites are as follows:

- Storage array at Site A:
 - Ports 1A and 2A
 - Ports 1B and 2B
- Storage array at Site B:
 - Ports 1A' and 2A'
 - Ports 1B' and 2B'

FC_switch_A_1 at Site A and FC_switch_B_1 at Site B are connected to form fabric_1. Similarly, FC_switch_A_2 at Site A and FC_switch_B_2 are connected to form fabric_2.

The following table lists the connections between the storage array ports and the FC switches for the example MetroCluster illustration:

| Array LUN ports | FC switch ports | Switch fabrics |
|-----------------|------------------------|----------------|
| Site A | | |
| 1A | FC_switch_A_1, Port 9 | fabric_1 |
| 2A | FC_switch_A_2, Port 10 | fabric_2 |
| 1B | FC_switch_A_1, Port 10 | fabric_1 |

| | | |
|---------------|------------------------|----------|
| 2B | FC_switch_A_2, Port 9 | fabric_2 |
| Site B | | |
| 1A' | FC_switch_B_1, Port 9 | fabric_1 |
| 2A' | FC_switch_B_2, Port 10 | fabric_2 |
| 1B' | FC_switch_B_1, Port 10 | fabric_1 |
| 2B' | FC_switch_B_2, Port 9 | fabric_2 |

Example of cabling storage array ports to FC switches in a four-node MetroCluster configuration

In a MetroCluster configuration with array LUNs, you must connect the storage array ports that form a redundant port pair to alternate FC switches.

The following reference illustration shows the connections between storage arrays and FC switches in a four-node MetroCluster configuration with array LUNs:



If you plan to use disks in addition to array LUNs in your MetroCluster configuration, you must use the switch ports specified for the configuration with disks.

[Port assignments for FC switches when using ONTAP 9.1 and later](#)

In the illustration, the redundant array port pairs for both the sites are as follows:

- Storage array at Site A:

- Ports 1A and 2A
- Ports 1B and 2B
- Ports 1C and 2C
- Ports 1D and 2D
- Storage array at Site B:
 - Ports 1A' and 2A'
 - Ports 1B' and 2B'
 - Ports 1C' and 2C'
 - Ports 1D' and 2D'

FC_switch_A_1 at Site A and FC_switch_B_1 at Site B are connected to form fabric_1. Similarly, FC_switch_A_2 at Site A and FC_switch_B_2 are connected to form fabric_2.

The following table lists the connections between the storage array ports and the FC switches for the MetroCluster illustration:

| Array LUN ports | FC switch ports | Switch fabrics |
|-----------------|------------------------|----------------|
| Site A | | |
| 1A | FC_switch_A_1, Port 7 | fabric_1 |
| 2A | FC_switch_A_2, Port 11 | fabric_2 |
| 1B | FC_switch_A_1, Port 8 | fabric_1 |
| 2B | FC_switch_A_2, Port 10 | fabric_2 |
| 1C | FC_switch_A_1, Port 9 | fabric_1 |
| 2C | FC_switch_A_2, Port 9 | fabric_2 |
| 1D | FC_switch_A_1, Port 10 | fabric_1 |
| 2D | FC_switch_A_2, Port 8 | fabric_2 |
| Site B | | |
| 1A' | FC_switch_B_1, Port 7 | fabric_1 |
| 2A' | FC_switch_B_2, Port 11 | fabric_2 |
| 1B' | FC_switch_B_1, Port 8 | fabric_1 |
| 2B' | FC_switch_B_2, Port 10 | fabric_2 |

| | | |
|-----|------------------------|----------|
| 1C' | FC_switch_B_1, Port 9 | fabric_1 |
| 2C' | FC_switch_B_2, Port 9 | fabric_2 |
| 1D' | FC_switch_B_1, Port 10 | fabric_1 |
| 2D' | FC_switch_B_2, Port 8 | fabric_2 |

Example of cabling storage array ports to FC switches in an eight-node MetroCluster configuration

In a MetroCluster configuration with array LUNs, you must connect the storage array ports that form a redundant port pair to alternate FC switches.

An eight-node MetroCluster configuration consists of two four-node DR groups. The first DR group consists of the following nodes:

- controller_A_1
- controller_A_2
- controller_B_1
- controller_B_2

The second DR group consists of the following nodes:

- controller_A_3
- controller_A_4
- controller_B_3
- controller_B_4

To cable the array ports for the first DR group, you can use the cabling examples for a four-node MetroCluster configuration for the first DR group.

Example of cabling storage array ports to FC switches in a four-node MetroCluster configuration

To cable the array ports for the second DR group, follow the same examples and extrapolate for the FC-VI ports and FC initiator ports belonging to the controllers in the second DR group.

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